Air Force Waiver Guide

"This document primarily provides guidance for waivers on trained flying class II and III personnel, and where specifically stated applies to flying class I/IA applicants and other special duty personnel. This waiver guide does not cover general military entrance, commissioning, or enlistment."

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WAIVER GUIDE
Updated: Jan 2016
Supersedes waiver guide of Jan 2013
By: LtCol Charles G. Mahakian (RAM 17) and Dr Dan Van Syoc
Reviewed by LtCol Patrick Ellison, AF/SG consultant for Dermatology

CONDITION:
Acne (Acne Vulgaris) (Jan 16)

I. Overview.

Acne is a follicular disease with the principal abnormality being impaction and distention of the pilosebaceous unit. It typically appears at puberty and lessens in severity as adolescence comes to an end; it is estimated that up to 85% of all adolescents are affected. Although acne is predominately a disease of youngsters in their teens, the mean age at presentation to a physician is 24 years with 10 percent of visits for people between the ages of 35 and 44 years. Recent estimates are that roughly 33 percent of people ages 15 to 44 years are affected by acne. Adolescent acne has a male predominance, but post-adolescent disease predominately affects women.[1, 2, 3] The social, psychological, and emotional impairment that can result from a significant case of acne has been reported to be similar to that associated with epilepsy, asthma, diabetes, and arthritis.[2]

Acne is caused by interplay of four factors: excessive sebum production secondary to sebaceous gland hyperplasia; hyperkeratinization of the hair follicle which prevents normal shedding of the follicular keratinocytes and obstructing the follicle; lipid and cellular debris accumulation which encourages colonization of *Propionibacterium acnes;* and finally, inflammation.[4] Androgens play a significant role in the pathophysiology of acne. The effect is exerted mainly on the sebaceous gland; androgens have been shown to trigger sebaceous gland growth and development and to stimulate sebum production. In contrast, estrogens (particularly estradiol) tend to decrease sebum production.[1] Other factors leading to the development of acne include cosmetics (especially the oil-based products), stress which mainly affects acne severity, and repetitive mechanical trauma leading to the development of inflammatory lesions. There has long been controversy regarding diet and acne. Some evidence exists of an association between acne and milk intake, but there is no reliable evidence to implicate chocolate ingestion with an increased prevalence or severity of acne.[3]

Acne lesions are divided into inflammatory and noninflammatory lesions: *noninflammatory*-open (blackheads) and closed (whiteheads) comedones; *inflammatory*-papules, pustules, and nodules/cysts. The primary pathologic site for acne expression is the face and less frequently the back, chest, and shoulders. At the present time there is no universal classification system for acne vulgaris. This is due to the extensive variety of clinical presentations and the varying levels of social and psychological impairment seen with the disease. A commonly used classification system divides acne into three levels: mild, moderate and severe. Mild disease is characterized by the presence of few to several papules and pustules, but no nodules. Moderate disease has several to many papules and pustules, along with a few to several nodules. Finally, in severe disease, patients have numerous or extensive papules and pustules, as well as many nodules.[3,4]

The goals in the treatment of acne are to relieve clinical symptoms and to prevent scarring. As the extent and severity of scarring are associated with the severity and longevity of acne prior to therapy, most dermatologists strongly encourage patients to obtain early treatment.[5] After

evaluation of a patient with acne, the patient needs to be given realistic expectations regarding the timeline for improvement. The time for a microcomedo to mature is approximately eight weeks; therefore therapy must be continued beyond eight weeks to assess efficacy.[6] Patients need to receive careful instructions on the proper use of all their medications as most will be on more than one agent.

With improved understanding of the pathogenesis of acne, it is now the consensus of dermatologists that topical retinoids should be the foundation of treatment for most patients with non-inflammatory and inflammatory acne as the retinoids target the microcomedo, the precursor to all acne lesions. Combining a topical retinoid with an antimicrobial agent has demonstrated significantly faster and greater clearing of inflammatory lesions as opposed to antimicrobial therapy alone. Topical antimicrobial agents include benzoyl peroxide (BPO), clindamycin, and erythromycin. BPO has both antimicrobial and comedolytic properties; unlike other topical antibiotics, it has not been shown to produce resistance in *P. acnes*. BPO should not be applied to the skin simultaneously with tretinoin due to the oxidizing effects of BPO on tretinoin. Combination therapy with BPO and an antibiotic (topical or oral) has also been shown to be more effective than monotherapy and reduces development of antibiotic resistance.[6] Oral antibiotics should have a limited treatment course, maximum of 12 to 18 weeks, with an assessment at 6 to 8 weeks with discontinuation of the antibiotic if there is no clinical improvement.[6, 7] Finally, due to the chronic nature of acne, topical retinoids are now recommended for maintenance therapy due to their strong effect on the microcomedo.[8]

The major factor in the move away from monotherapy with antibiotics for the treatment of acne is the growing resistance to *P acnes*. Office-based dermatologists prescribe 8 to 9 million oral antibiotic prescriptions annually, and the number is much higher if we include prescriptions from primary care providers. Oral antibiotics are indicated to treat moderate to severe inflammatory disease on the face or trunk. Monotherapy with these agents is to be avoided; the resistance of *P. acnes* to erythromycin approaches 50%. When the antibiotic is used concurrently with topical benzoyl peroxide resistance is significantly reduced. The most common agents used are the tetracycline family of drugs (tetracycline, doxycycline, and minocycline) and erythromycin. Any of these agents may cause gastrointestinal disturbance. The bioavailability of the tetracycline family is reduced by food, up to 50 %, and with dairy intake inhibition increasing to 65%. Minocycline is not approved for aviation usage secondary to an elevated incidence of vertigo and a myriad of central nervous system anomalies.

Isotretinoin (Accutane®), a synthetic oral retinoid prescribed for severe nodular acne, can cause a sudden onset of decreased night vision, and is associated with corneal opacities, inflammatory bowel disease, elevated lipids, hepatotoxicity, musculoskeletal symptoms, pruritus, epistaxis, and dryness of skin, nose, and mouth. It is also highly teratogenic and requires a rigorous documentation process for any child-bearing age female.[9, 10] Therefore, isotretinoin is also not approved for aviation usage.

A final note about acne in women is important in our discussion. Polycystic ovary syndrome (PCOS) is the most common hormonal disorder in young women. Its diagnosis relies upon the presence of two out of three following criteria: oligomenorrhea or amenorrhea; hyperandrogenism evidenced by hirsutism, androgenic alopecia, and acne; and polycystic ovaries demonstrated by ultrasound. Approximately 23% to 35% of women with PCOS have acne and the majority of women with severe acne have PCOS, with rates reported to be as high as 83%. Female patients

need to be carefully evaluated to rule out PCOS and may require oral contraceptive treatment.[1] Hormonal therapies are used in women only and include estrogen-containing oral contraceptives and spironolactone. Spironolactone for the treatment of hirsutism requires ACS approval, and is restricted to non-high performance aviation.[11] Oral contraceptives low in androgenic progestin (e.g. Ortho tri-cyclen®, Yasmin®) are preferred.

II. Aeromedical Concerns.

The main concerns are interference with the wear of protective aviation equipment; exacerbation of acne due to rubbing, pressure, and/or exposure to hot and humid environments; psychological factors; use of acne medications that are incompatible with flying duties; and extended grounding due to a difficult or prolonged treatment course. Lesions on the face may interfere with mask or respirator seal and helmet wear (chin straps). Lesions on the shoulder, chest, and back may cause discomfort and distraction when wearing restraint or parachute harnesses or with prolonged sitting. Repeated or prolonged rubbing or pressure against the skin can produce or exacerbate an eruption (mechanical acne) with striking inflammation.

III. Waiver Consideration.

Per the Medical Standards Directory (MSD), severe acne that is "unresponsive to treatment and interfering with the satisfactory performance of duty or wear of the uniform or use of military equipment" requires an evaluation for retention. Mild to moderate acne in flyers is covered if it is "chronic or of a nature that requires frequent specialty medical care or interferes with the satisfactory performance of military duty" including if it is "severe enough to cause recurrent grounding from flying duties." Treatment with approved topical agents does not require a waiver. The local flight surgeon must confirm, however, there are no adverse effects and the disease itself does not interfere with use of aviation equipment or safe mission completion. Systemic maintenance agents such as oral erythromycin, tetracycline, and trimethoprim-sulfamethoxazole require a waiver. If acne does not interfere with the use of life support equipment, treatment with doxycycline does not require a waiver. These oral agents are compatible with flying once it is confirmed that side effects are absent or acceptable in severity. Isotretinoin therapy is not compatible with flying duties and would require prolonged grounding (usually 20 weeks) if used when clinically indicated. In addition, waiver will not be considered for acne treated with minocycline. Therapy with oral contraceptives may be considered for women. In rare cases severe nodulocystic acne or scarring may require a categorical waiver to avoid routine use of a helmet or mask.

Table 1: Waiver potential for acne

Flying Class (FC)	Acne Treatment	Waiver Potential Waiver Authority‡
I/IA	Topical treatment – topical retinoids (tretinoin, adapalene, tazarotene), benzoyl peroxide, salicylic acid, azelaic acid, topical antibiotics (clindamycin, erythromycin, sulfacetamide-sulfur)	N/A
	Oral contraceptive (female only)	Yes AETC
	Oral antibiotics - tetracycline, erythromycin, doxycycline, and trimethoprim-sulfamethoxazole.*†	Yes AETC
II/ RPA Pilot/III#	As above	Yes MAJCOM
ATC/GBC	As above	Yes AETC** or MAJCOM***
MOD	As above	Yes AFGSC

*Minocycline is not approved for flying duties.
† No waiver (any flying class) is necessary for doxycycline if used as monotherapy for acne.
# Initial FC II (RPA Pilot or FS) and initial FC III require certification by AETC.
** Initial waiver authority is AETC/SG.
*** Continued duty waiver authority is MAJCOM.
‡ For FC other than FCI/IA, AFMSA retains waiver authority if condition warrants MEB/I-RILO evaluation, or if categorical waiver is required.

AIMWTS review in OcJan 2016resulted in a total of 819 Air Force aviators with a diagnosis of acne. There were 70 FC I/IA cases, 331 FC II cases, 330 FC III cases, 67 (ATC/GBC), and 21 MOD. There were a total of 28 disqualifications; 8 were FC I/IA, 3 were FC II, and 16 were FC III, and 1 was ATC/GBC. None of the disqualified cases resulted from the acne diagnosis.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for acne should include the following:
A. History of acne problem, age at onset of problem, extent and location(s) of lesions, and a description of current and past therapy - all medications including dosage, and frequency, and side effects. In adult women, need to address menstrual regularity and presence or absence of hirsutism.
B. Comments addressing interference with use of aviation or other military equipment.

C. Dermatology consult if individual has recalcitrant moderate to severe inflammatory or severe/nodulocystic acne.
D. Medical evaluation board (MEB) reports and narrative if required.

ICD-9 code for acne	
706.1	Other acne (acne vulgaris)

ICD-10 codes for acne	
L70.0	Acne vulgaris
L70.8	Other acne

V. References.

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WAIVER GUIDE
Updated: May 2014
Supersedes Waiver Guide of Feb 2011
By: Dr Dan Van Syoc
Reviewed by Col Kent McDonald, Chief ACS Neuropsychiatry Branch and Dr. Terry Correll, ACS staff psychiatrist

CONDITION:
Adjustment Disorders (May 14)

I. Overview.

Adjustment disorders occur following the development of clinically significant emotional or behavioral symptoms in response to identifiable psychosocial stressor(s). They are categorized by DSM-5 under Trauma- and Stressor-Related Disorders with the stressor(s) typically involving financial struggles, medical illness, and/or a relationship difficulties.[1] These symptoms are diagnostically significant (distinguishing them from ICD-9 V Codes for Occupational Problem, Partner Relational Problem, etc.) if the distress is in excess of what would normally be expected from exposure to the stressor or there is associated impairment in social or occupational functioning. Symptoms associated with bereavement following the death of a loved one are not, however, classified as an adjustment disorder unless the symptoms are very severe (socially/occupationally impairing) or last longer than expected. At that point, an adjustment disorder or a mood disorder should be considered. An adjustment disorder must begin within three months of the onset of a stressor and resolve within six months of the termination of the stressor or its consequences. Stressors may be a single event, a result of multiple stressors, recurrent or continuous. DSM-IV characterized adjustment disorders lasting longer than 6 months as chronic adjustment disorders; If the disturbance meets the criteria for another Axis I disorder or is an exacerbation of a preexisting Axis I or II disorder, the diagnosis of adjustment disorder should not be utilized.[2] Research indicates the platelet monoamine oxidase activity is lower and plasma cortisol levels higher in patients with adjustment disorder, and suicidality is higher than in gender-matched controls.[3]

<u>DSM-5 Criteria</u>[3]
1. Behavioral or emotional symptoms must develop in response to an identifiable event(s) and occur within three months of the onset of that event(s)/stressor(s).
2. These behaviors or symptoms must be clinically significant as evidenced by at least one of the following:
a. After exposure to the event(s)/stressor(s), the behavioral or emotional symptoms seem in excess of what would be normally expected.
b. Significant social, occupational, or other functional impairment.
3. The disturbance does not meet the criteria for another specific Axis I disorder or is not part of a preexisting Axis I or Axis II disorder.
4. The behavioral or emotional symptoms do not represent bereavement.
5. Once the event(s)/stressor(s) has terminated, the symptoms do not last more than additional 6 months.

Adjustment disorder is used in psychiatry, but is more typically seen in primary care settings, and has an estimated incidence of 5-21% in psychiatric consultation services for adults.[1, 4, 5] Early

interventions with psychotherapy to strengthen coping mechanisms and short-term pharmacotherapy have been shown to promote recovery.[6, 7] Delay in treatment can lead to progression of symptoms to a more severe Axis I diagnosis.[5, 8] Adjustment disorders tend to resolve and only 17-21% ever develop into a chronic course, major depression, or personality disorder.[4, 5, 9] A study in college students noted that a substantial number of students in the first year met adjustment disorder criteria.[10]

There has been little systematic study of adjustment disorder treatment. Psychotherapy is the mainstay of treatment for adjustment disorders.[11-13] Psychotherapeutic treatment of adjustment disorder enables reduction of the stressor, enhanced coping with the stressor that cannot be reduced or eliminated, and establishment of a support system to maximize adaptation.[14] Specific treatment interventions include supportive psychological approaches, cognitive-behavioral, and psychodynamic interventions. Short term treatment may be adequate for many individuals; however, more extended treatment may be appropriate in situations in which individual characteristics predispose the individual to stress intolerance.[1] There are very few systematic clinical trials assessing the efficacy of pharmacologic interventions for adjustment disorders. The judicious use of medications to treat specific symptoms associated with adjustment disorders, typically antidepressants and anxiolytics, may be helpful. Surveys of prescribing habits of office-based physicians show significant increase in prescriptions for antidepressants, particularly SSRIs.[1] Some studies have found SSRIs in the primary care setting are very effective for adjustment disorder with depressed mood.[6]

There is debate in the literature regarding assessment of adjustment disorder with depressed mood and an overlap of Major Depressive Disorder, therefore history and careful diagnosis are very important.[5]

II. Aeromedical Concerns.

Adjustment disorders are one of the most common psychiatric diagnoses among aviators. These disorders are commonly associated with functional impairment resulting from decreased concentration, depression, anxiety, inattention, decreased working/short-term memory, insomnia, fatigue, temporary changes in social relationships and problems with decision making. These impairments are all incompatible with aviation duties.

III. Waiver Consideration.

Adjustment disorders that interfere with the safety of flight are disqualifying for all flying classes I/IA, II, III, and for ATC/GBC and MOD personnel. If there are any functional limitations or the adjustment disorder lasts greater than 60 days, a waiver is required. If the DSM-5 diagnostic criteria for adjustment disorder are met, then aviators should be placed DNIF until the disturbance is resolved. If the disorder resolves within 60 days the aviator is placed back on flying status and no waiver is required. If the disorder persists beyond 60 days, or results in hospitalization, the aviator is disqualified and a waiver is required. An evaluation by a qualified mental health professional is required prior to waiver consideration. There is no mandated recovery period before waiver application, except a one-year period after resolution for FC I/IA applicants and other untrained aircrew applicants. The period of remission for trained aircrew should be of such length that the flight surgeon and mental health consultant perceive with confidence that the aviator will not suffer a clinically significant recurrence.

Finally, certain psychiatric disorders render an individual unsuited for duty, rather than unfit, and are subject to administrative separation (IAW AFI 36-3208, para 5.11). Adjustment disorders may fall under this provision if there is unsatisfactory duty performance.

Table 1: Waiver potential for adjustment disorder > 60 days

Flying Class (FC)	**Waiver Potential** **Waiver Authority****
I/IA	Yes†* AETC
II/III	Yes†* MAJCOM
ATC/GBC	Maybe*** MAJCOM
MOD	Yes*** AFGSC

† Waiver will not be considered until one-year after resolution for FC I/IA and untrained aircrew.
* Waiver is likely if the stressors are resolved, the individual has demonstrated good coping skills, is on no disqualifying medications, and the adjustment disorder has clearly resolved.
** ACS review or consultation is at the discretion of the waiver authority.
*** ATC/GBC and MOD personnel with Adjustment Disorder are evaluated based on how the condition affects their ability to continue performing their assigned duties.

AIMWITS search in Apr 2014 revealed a total of 1109 members with an AMS containing the diagnosis of adjustment disorder. There were a total of 492 cases resulting in a disqualification disposition. Breakdown of the cases was as follows: 66 FC I/IA cases (24 disqualified), 220 FC II cases (57 disqualified), 549 FC III cases (246 disqualified), 212 ATC/GBC cases (147 disqualified), and 62 MOD cases (18 disqualified).

IV. Information Required for Waiver Submission.
Submitting a Mental Health Waiver Guide:

AFI 48-123 –MSD, 13 DEC 2013, Q1 and the Aeromedical Consultation Service (ACS) Waiver Guide addresses waiver evaluations

Step 1 - Is the aviator ready for waiver submission?

A. Waiver is submitted when 1) the member is asymptomatic and 2) medications/psychotherapy treatment have been completed, as applicable to diagnostic category, for the specified time-frame below (Note: psychotherapy "booster sessions", and sometimes SSRIs, are permissible and often advisable after initial symptom resolution):

- ☐ 1 Year—Psychotic Disorders & Somatoform Disorders
- ☐ 6 Months—Mood Disorders, Anxiety Disorders & Suicidal Behavior
- ☐ Discretion of Flight Surgeon—Adjustment Disorders & V-Codes ("Other Conditions") requiring waiver
- ☐ For Traumatic Brain Injury cases, please refer to TBI Waiver Guide
- ☐ For aviators with any other psychiatric disorders, please refer to AFI 48-123 and ACS Waiver Guide

B. To be considered for an aeromedical waiver, any disqualifying condition must meet the following criteria per AFI 48-123 Section 6B, 6.2.1.1 through 6.2.1.6. (pg.31):

- ☐ Not pose a risk of sudden incapacitation
- ☐ Pose minimal potential for subtle performance decrement, particularly with regard to the higher senses
- ☐ Be resolved, or be stable, and be expected to remain so under the stresses of the aviation environment
- ☐ If the possibility of progression or recurrence exists, the first symptoms or signs must be easily detectable and not pose a risk to the individual or the safety of others
- ☐ Cannot require exotic tests, regular invasive procedures, or frequent absences to monitor for stability or progression
- ☐ Must be compatible with the performance of sustained flying operations

Step 2 - Before beginning the Aeromedical Summary (AMS), Flight Surgeon must obtain Mental Health consultation and ensure it contains items specified below:
Instructions for the Mental Health Provider
The mental health evaluation must include a **comprehensive written report** addressing:

- ☐ Consultation must address each criteria in Step 1B
- ☐ Clinical mental health history (description of symptoms, treatment modality, frequency and compliance with treatment, relevant personal and family history, and perceived impact on occupational duties)
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…) ***** for alcohol cases, please comment on carbohydrate-deficient transferrin (CDT) results*****

- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, input from line leadership, if possible, and please address current state of any triggers for the mental illness)
- ☐ Current and past aviation related duties and any history of current and past occupational performance difficulties (to include perceived impact of mental health condition on performance of duties)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Summary and interpretation of psychological/neuropsychological testing results (recommend MMPI-2, NEO PI-R, or similar personality test). For neuropsychological cases, please contact ACS neuropsychologist (Dr. Gary Ford, DSN: 798-2704) for guidance on recommended neuropsychological tests.
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly or engage in special duty operations (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)
- ☐ Copies of all records (mental health/ADAPT/inpatient) and raw testing data should be on hand for shipment to ACS Neuropsychiatry Branch

Step 3 - Items for the Flight Surgeon to include in the AMS:

- ☐ AMS must clearly address each criteria in Step 1B and the risk to the member, mission, and safety
- ☐ Summarize Mental Health history and focus on occupational impact
  ***** If 2 or more months have passed since the comprehensive evaluation/report was completed, the flight surgeon should address how the member has done since and consult with the mental health provider if the member has been seen at mental health since the evaluation*****
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…)
  ***** for alcohol cases, please comment on carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, if possible - please address current state of any triggers for the mental illness)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)

Step 4 - Items to complete the waiver package:

- ☐ Letter of support from command
- ☐ Comprehensive mental health written-report
- ☐ Confirm mental health has made copies of chart(s) and testing. When requested send to:

ACS Aerospace Medicine Branch, USAFSAM/FECA
c/o Neuropsychiatry Branch
2510 Fifth Street Bldg 840
Wright Patterson AFB, OH 45433-7913
Fax: (937) 904-6296 DSN: 674-9296

Please feel free to contact the ACS Neuropsychiatry Branch with questions:
SSgt Krista Traut 798-2653, or Mr. John Heaton: 798-2766

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for adjustment disorder should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History with special attention to symptoms, frequency, duration, treatment, precipitating factors, action taken to mitigate recurrence and any social, occupational, administrative or legal problems associated with the case.
C. Copies of psychiatric evaluation and treatment summary (within 3 months of package submission).
D. Letters from the aviator's squadron commander or operations officer and treating psychiatrist or psychologist supporting or refuting a return to flying status.

The AMS for waiver renewal for adjustment disorder should include the following:
A. Interval history and any changes in the aviator's condition with special emphasis on the mental health of the individual.
B. Copies of any applicable evaluations.

ICD-9 codes for Adjustment Disorders	
309.0	Adjustment disorder with depressed mood
309.24	Adjustment disorder with anxiety
309.28	Adjustment disorder with mixed anxiety and depressed mood
309.3	Adjustment disorder with disturbance of conduct
309.4	Adjustment disorder with mixed disturbance of emotions and conduct
309.9	Adjustment disorder – unspecified.

ICD-10 codes for Adjustment Disorders	
F43.21	Adjustment disorder with depressed mood
F43.22	Adjustment disorder with anxiety
F43.34	Adjustment disorder with mixed anxiety and depressed mood
F43.24	Adjustment disorder with disturbance of conduct
F43.25	Adjustment disorder with mixed disturbance of emotions and conduct
F43.20	Adjustment disorder – unspecified.

V. References.

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WAIVER GUIDE
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Supersedes Waiver Guide of May 2010
By: Maj Clifton M Nowell (RAM 13) and Dr Dan Van Syoc
Reviewed by Col Kent McDonald, ACS chief, Neuropsychiatry Branch

CONDITION:
Alcohol Use Disorders (Oct 13)

I. Overview.

Alcohol consumption can significantly impair social, interpersonal, and/or occupational functioning. These disorders commonly develop between the ages of 20 and 40. Alcohol use disorders (AUDs) in the U.S. military are well described public health problems. Given the accessibility of alcohol and its common use in military culture, service members may use alcohol consumption as a recreational activity or to help cope with stressful or traumatic events associated with military duties or combat. From 2001-2010, there has been a sharp increase in the use of alcohol among all U.S. military branches. More than one-fifth (21%) of all acute alcohol-related encounters were recurrent diagnoses and the proportion of recurrences was higher among those in combat occupations (26%). Along with alcohol misuse, abuse and dependence (DSM-IV-TR criteria) are among the most commonly seen psychiatric issues encountered in aerospace medicine. Recent psychiatric diagnostic changes per DSM-5 no longer differentiate between alcohol abuse and alcohol dependence. Studies showed little functional difference between the disorders so the new guide classifies AUDs along a spectrum from unaffected, mild, moderate, to severe. The new diagnostic criteria set is a combination of the old from alcohol abuse and dependence adding "craving or a strong desire or urge to drink" as a new criterion and dropping "recurrent legal problems" due to poor discrimination ability. By DSM-5 AUD criteria, those endorsing 0-1 criterion (out of a total of 11) would be classified as unaffected, those endorsing 2-3 criteria would have a diagnosis of mild AUD, 4-5 criteria would have a diagnosis of moderate AUD, while endorsement of 6+ criteria would indicate severe AUD. The new criteria are expected to result in an overall increase of 6-11% in AUD diagnoses. However, those who met criteria for alcohol abuse based solely on one criterion or "recurrent legal problems" criterion plus one other criterion, would no longer meet the new criteria for a disorder. The primary group this would affect would be those who were singularly caught drinking in college or in the military while under age. If they were caught driving while intoxicated, however, the use in hazardous situations criteria would still be met. That plus one other criterion, which includes the new criteria of "craving" alcohol, and their diagnosis would not be dropped.

Ranked the third leading cause of preventable death in the United States, alcohol use results in approximately 75,000 fatalities annually and is associated with liver disease, cardiomyopathy/arrhythmias, gastritis, mental disorders, motor-vehicle fatalities, suicide and decreased/poor job performance. Operational effectiveness of the force can be seriously impeded as a result of AUDs. Inevitably, the family life is impacted and potential career advancement issues can ensue. AUDs are also associated with social disruption (e.g., domestic strife), misconduct (e.g., fighting, drunk driving), and accidental and intentional injuries.

AUDs are difficult to detect and there is not one objective parameter that can be used to make the diagnosis. Therefore, a flight surgeon must be aware of and watchful for circumstances which can

signal their presence, e.g., presence of alcohol on the breath during duty hours, an alcohol-related incident, such as a DUI or domestic incident, an elevated blood alcohol level above 0.15mg/dl in a person not appearing drunk, unexplained insomnia or hypertension, vague GI problems, and frequent minor injuries. Laboratory abnormalities such as elevations of MCV, GGT, ALT, AST, uric acid, triglycerides, or increased carbohydrate deficient transferrin (CDT) may also be present. Chronic depression, irritability, and anxiety may indicate the presence of an AUD, especially when they represent a change from a flyer's normal personality. Screening questionnaires (CAGE, MAST, AUDIT, and McAndrew) are available for use by the flight surgeon or through the Mental Health Clinic. Recently, the National Institute of Alcohol Abuse and Alcoholism has developed a single-question test for primary care doctors to replace longer questionnaires. This question asks, "How many times in the past year have you had (for men) 5 or more drinks or (for women) 4 or more drinks in a single day?" Answering "1 or more days" in the past year should prompt further investigation. None of these screeners make or confirm the diagnosis, but they can help evaluate the presence, extent, and severity of alcohol use problems.

Per AFI 44-121, it is the responsibility of the flight surgeon to inform the commander and notify the Alcohol & Drug Abuse Prevention & Treatment (ADAPT) program manager of an individual who has been admitted for alcohol detoxification, receives treatment for an injury or illness that may be the result of substance use, or is suspicious of having an alcohol problem. Referral and enrollment in the ADAPT program is key to starting the member on the correct path. Along with the usual medical evaluation, the workup should include an assessment for other psychiatric disorders, such as major depression, anxiety disorders, and personality disorders, for which alcoholics are at increased risk. Another substance use disorder and antisocial personality disorder [associated in young men with alcohol dependence (DSM IV-TR)] are the most common co-morbid diagnoses.

A recent study showed that relapse rates among Air Force personnel are as high as 35%. Abstinence from alcohol is the preferred modality for preventing relapse in aviators. Abstinence has been associated with a lower risk for relapse when compared to low risk drinking. Some studies have shown that limited drinkers were four times more likely to relapse to unacceptable drinking levels than were those who reported total abstinence.

II. Aeromedical Concerns.

A continuum exists ranging from normal social use of alcohol, through non-diagnosable alcohol misuse of aeromedical concern, to severe alcohol use disorders. As an alcohol problem progresses, it often causes problems at home first, then in the social environment. Performance in the cockpit may be the last area to be affected. One of the more vital roles of the flight surgeon is involvement with the squadron aircrew in their off-duty time and, in particular, participation in social and recreational activities where the use of alcohol often occurs.

Alcohol misuse presents hazards to aviation because of both acute and chronic effects on cognitive and physical performance. Acute alcohol intoxication and hangover, which can cause obviously incompatible with flying. Similarly, alcohol withdrawal is a threat to flight safety due to anxiety, tremor, and the possibility of arrhythmia or seizure. Further, subtle cognitive impairment, manifesting as slowed reaction time, inattentiveness, difficulty in monitoring multiple sensory inputs, and difficulty making rapid shifts of attention from one stimulus to another, can occur after low doses of alcohol which would not cause intoxication. After moderate alcohol consumption, impairments can persist for many hours after the blood alcohol level has returned to zero and well

beyond the 12-hour “bottle-to-throttle” guidelines. Positional alcohol nystagmus, indicating impairment in vestibular function, can occur under G-load up to 48 hours after alcohol consumption. Heavy drinkers are at risk for arrhythmias ("holiday heart") for several days after drinking.

III. Waiver Consideration.

AUDs are disqualifying for all classes of aviation and MOD in the US Air Force. ATC/GBC personnel are covered under retention standards for substance abuse disorders. For FC II/III trained assets, these conditions may be waived by MAJCOM/SGPA for a period of no greater than three years. The majority of aviator waiver recommendations for alcohol related diagnoses are managed through base and command level interaction; Aeromedical Consultation Service (ACS) in-person evaluation is seldom required.

Table 1: Waiver potential for alcohol use disorders.

Flying Class (FC)	**Waiver Potential† Waiver Authority**	**ACS Review/Evaluation**
I/IA	Maybe** AETC	Maybe*
II and III, Untrained Assets	Maybe** AETC	Maybe*
II and III, Trained Assets	Yes MAJCOM	Maybe*
ATC/GBC	Yes MAJCOM	Maybe*
MOD	Yes AFGSC/SG	Maybe*

† All aviators with a history of alcohol use disorders must remain abstinent, provide documentation of successful treatment and after-care follow-up, and must not take any psychiatric medications.
*ACS evaluation or review is at the discretion of the waiver authority.
**There is no formal waiver provision for FC I/IA and initial FC II or FC IIU. If the waiver authority deems it appropriate, a waiver may be considered on a case by case basis only.

AIMWITS search in Sep 2013 revealed 955 individuals seeking waiver for alcohol related disqualification. There were 23 FCI/IA cases (12 were disqualified), 201 FCII cases (43 were disqualified), 519 FCIII cases (193 were disqualified), 63 MOD cases (20 were disqualified), and 149 cases for GBC/ATC (57 were disqualified). Many of the aviators in the pool of 955 had multiple aeromedical summaries for alcohol-related diagnoses. There were some who were disqualified and later waived, some waived and later disqualified, and a few who were disqualified, waived and then disqualified again.

IV. Information Required for Waiver Submission.

Submitting a Mental Health Waiver Guide:

AFI 48-123 –Chapter 6 (pg. 55) and the Aeromedical Consultation Service (ACS) Waiver Guide addresses waiver evaluations

Step 1 - Is the aviator ready for waiver submission?

A. Waiver is submitted when 1) the member is asymptomatic and 2) medications/psychotherapy treatment have been completed, as applicable to diagnostic category, for the specified time-frame below (Note: psychotherapy "booster sessions", and some antidepressants, are permissible and often advisable after initial symptom resolution):

- ☐ 1 Year—Psychotic Disorders & Somatoform Disorders
- ☐ 6 Months—Mood Disorders, Anxiety Disorders & Suicidal Behavior
- ☐ Discretion of Flight Surgeon—Adjustment Disorders & V-Codes requiring waiver
- ☐ For Traumatic Brain Injury cases, please refer to TBI Waiver Guide
- ☐ For aviators with any other psychiatric disorders, please refer to AFI 48-123 and ACS Waiver Guide

B. To be considered for an aeromedical waiver, any disqualifying condition must meet the following criteria per AFI 48-123 Section 6B, 6.2.1.1 through 6.2.1.6. (pg. 57-58):

- ☐ Not pose a risk of sudden incapacitation
- ☐ Pose minimal potential for subtle performance decrement, particularly with regard to the higher senses
- ☐ Be resolved, or be stable, and be expected to remain so under the stresses of the aviation environment
- ☐ If the possibility of progression or recurrence exists, the first symptoms or signs must be easily detectable and not pose a risk to the individual or the safety of others
- ☐ Cannot require exotic tests, regular invasive procedures, or frequent absences to monitor for stability or progression
- ☐ Must be compatible with the performance of sustained flying operations

Step 2 - Before beginning the Aeromedical Summary (AMS), Flight Surgeon must obtain Mental Health consultation and ensure it contains items specified below:

Instructions for the Mental Health Provider

The mental health evaluation must include a **comprehensive written report** addressing:

- ☐ Consultation must address each criteria in Step 1B
- ☐ Clinical mental health history (description of symptoms, treatment modality, frequency and compliance with treatment, relevant personal and family history, and perceived impact on occupational duties)
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…) ***** for alcohol cases, please comment on carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, input from line leadership, if possible, and please address current state of any triggers for the mental illness)
- ☐ Current and past aviation related duties and any history of current and past occupational performance difficulties (to include perceived impact of mental health condition on performance of duties)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Summary and interpretation of psychological/neuropsychological testing results (recommend MMPI-2, NEO PI-R, or similar personality test). For neuropsychological cases, please contact ACS neuropsychologist (Dr. Gary Ford, DSN: 798-2704) for guidance on recommended neuropsychological tests.

- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly or engage in special duty operations (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)
- ☐ Copies of all records (mental health/ADAPT/inpatient) and raw testing data should be on hand for shipment to ACS Neuropsychiatry Branch

Step 3 - Items for the Flight Surgeon to include in the AMS:

- ☐ AMS must clearly address each criteria in Step 1B and the risk to the member, mission, and safety
- ☐ Summarize Mental Health history and focus on occupational impact
  ***** If 2 or more months have passed since the comprehensive evaluation/report was completed, the flight surgeon should address how the member has done since and consult with the mental health provider if the member has been seen at mental health since the evaluation*****
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…)
  ***** for alcohol cases, please comment on carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, if possible - please address current state of any triggers for the mental illness)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)

Step 4 - Items to complete the waiver package:

- ☐ Letter of support from command
- ☐ Comprehensive mental health written-report
- ☐ Confirm mental health has made copies of chart(s) and testing. When requested send to:

ACS Aerospace Medicine Branch, USAFSAM/FECA
c/o Neuropsychiatry Branch
2510 Fifth Street Bldg 840
Wright Patterson AFB, OH 45433-7913
Fax: (937) 904-6296 DSN: 674-9296

Please feel free to contact the ACS Neuropsychiatry Branch with questions:
TSgt Tonya Merriweather: DSN 798-2703 or Mr. John Heaton: 798-2766

These conditions may be waived by MAJCOM/SGPA for a period no greater than three years. In order to be considered for waiver, three conditions must be met: 1) the individual must have successfully completed treatment (defined below) as determined and documented by the MTF

Alcohol & Drug Abuse Prevention & Treatment (ADAPT) program treatment team; 2) the individual must be compliant with post-treatment aftercare program requirements (also defined below) and 3) the individual must have a positive attitude and unqualified acknowledgement of his/her alcohol disorder. Flight surgeon participation in both the ADAPT treatment team meetings and aftercare follow up is required;

Treatment Program Requirements: Individuals will have successfully completed treatment when the following conditions are met: 1) they meet the Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria for early full remission of substance use disorder; 2) the treatment team determines, based on DSM criteria, the individual shows progress towards agreed-upon goals and/or issues as stated in the treatment plan; and 3) they remain abstinent without the need for medication.

Post-treatment Aftercare Program Requirements: The individual must 1) remain abstinent without the need for medication, 2) document participation in an organized substance use aftercare program [e.g., Alcoholics Anonymous (AA), or other program approved by the MTF ADAPT Program Manager], and 3) meet with the designated professionals for the following specific timeframes:

Table 2: Post-treatment Aftercare Requirements

Professional/Meetings	**First Year**	**Second/Third Year**	**Fourth Year**
Flight Surgeon	Monthly	Quarterly	Annually
ADAPT	Monthly	Monthly	N/A
Psychiatrist, Psychologist, or Social Worker	Annually	Annually	N/A
Organized Alcohol Aftercare Program	3x weekly	1x weekly	Recommended (not required)

Notes:

1. The flight surgeon has primary responsibility for collecting and submitting the required documentation for waiver submission. The ADAPT representative documents substance use aftercare program attendance. Temporary modification of aftercare program requirements because of operational demands must be documented by the flight surgeon.

2. Initial waiver may be requested after ―treatment program completion and successful completion of 90 days in the post-treatment aftercare program.

3. Unsatisfactory Progress in Aftercare Program: Failure of a member to acknowledge his/her alcohol problem, to abstain from alcohol during aftercare, or to comply with all aftercare requirements is medically disqualifying. The following pertain to any individual who fails to remain abstinent or otherwise not comply with all aftercare program requirements: If a replapse occurs during aftercare pending a first waiver, there must be 12 months sobriety / success in aftercare before waiver submission. If the member's condition has been waived previously, ground the member and arrange for re-evaluation by flight surgeon and ADAPT provider to determine potential for re-treatment. If the member is determined to have potential for re-treatment, follow the initial waiver and aftercare program processes. If the member is determined not to have potential for re-treatment, an AMS must be submitted for permanent disqualification. A second waiver

request for substance use disorder may be considered in accordance with initial waiver requirements, but requested no sooner than 12 months from the last date that non-compliance with the post-treatment aftercare program was documented. Second waiver requests are considered on a case-by-case basis only, and waiver authority for these individuals is AFMSA/SG3P.

4. As part of the waiver package, the individual states in writing that they understand the waiver is valid, only if total abstinence from substance is maintained, and that a verifiable break in abstinence, once the waiver period has begun, is considered medically disqualifying. This written statement, kept in the medical records, must be accomplished at the initial waiver request, and re-accomplished each time a waiver renewal is requested.

5. ACS evaluation is not routinely requested in cases of alcohol use disorders, but such an evaluation may be requested through the MAJCOM if an aviator's flight surgeon and/or commander desire it, particularly for a second opinion. In such cases, a summary of all evaluations (ADAPT Program, medical, and Mental Health) done during the initial workup, a report from a mental health evaluation done within three months of waiver package submission documenting the absence of co-morbid psychiatric pathology and cognitive impairment (e.g. WAIS-R), an aeromedical summary containing salient laboratory values, and required aftercare documentation should be submitted. See mental health waiver submission requirements above.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for alcohol use disorders should include the following:
A. Aeromedical summary containing a physical exam and 2 sets of laboratory values (blood alcohol test, CBC with MCV, GGT, SGOT, SGPT, triglycerides, and CDT). Labs should be collected at treatment initiation and just before waiver submission. The summary should also address work performance, peer relationships, family and marital relationships, psychosocial stressors, attitude toward recovery, abstinence, AA or other approved alcohol recovery program attendance, and mental status examination.
B. Copy of alcoholism treatment program summary (first time only).
C. ADAPT statements documenting aftercare and AA or other approved alcohol recovery program attendance.
D. Copy of annual psychiatrist/psychologist examination while in aftercare.
E. Letter of recommendation from individual's commanding officer.
F. Copy of signed abstinence letter (initial and renewal waiver requests must have a signed abstinence statement included as an AIMWTS attachment). In the abstinence letter, the individual states in writing that he or she understands that, if granted, the waiver is valid only if total abstinence from alcohol is maintained. A verifiable break in abstinence once the waiver period has begun is medically disqualifying. The abstinence letter should be signed and dated immediately upon the individual expressing intent to return to flying status.

The AMS for waiver renewal for alcohol abuse or alcohol dependence should include the following:
A. Interval history – aeromedical summary since the last waiver.
B. Flight surgeon summary of any interim alcohol-related therapy to include ADAPT and laboratory results as above drawn at time of AMS.

C. Consultation from any providers evaluating member for alcohol problems or assessing them for history of same.
D. Copy of signed abstinence letter (initial and renewal waiver requests must have a signed abstinence statement included as an AIMWTS attachment). In the abstinence letter, the individual states in writing that he or she understands that, if granted, the waiver is valid only if total abstinence from alcohol is maintained. A verifiable break in abstinence once the waiver period has begun is medically disqualifying. The abstinence letter should be signed and dated immediately upon the individual expressing intent to return to flying status.

ICD-9 codes for alcohol abuse and dependence (no current ICD-9 code for alcohol use disorder)	
305	Alcohol Abuse
303.9	Alcohol Dependence

ICD-10 codes for alcohol abuse and dependence	
F10.10	Alcohol Abuse
F10.20	Alcohol Dependence

V. References.

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WAIVER GUIDE
Updated: Jul 2013
Supersedes Waiver Guide of Feb 2010
By: Maj Calen Wherry (RAM 13) and Dr Dan Van Syoc
Reviewed by LtCol Stephen Scranton, AF/SG Consultant for Allergy/Immunology

CONDITION:
Allergic Rhinoconjunctivitis (Jul 13)

I. Overview.

Allergic rhinoconjunctivitis (AR) is usually considered a relatively minor health condition. However, it can result in major adverse effects in aviators in light of the unique environmental and physical stresses of flight. It is the most common of allergic disorders, affecting an estimated 20 to 40 million people in the United States and up to 30% of adults worldwide.[1, 2] For the average person, AR is a nuisance; for aircrew it can be a serious and potentially fatal condition. Aircrew can be adversely affected by AR because the condition can diminish active flying operations and readiness through temporary flying duty restrictions.[3-5] One study at a US Coast Guard air station found 5.7% of total days restricted attributed to allergic causes (allergic rhinitis and asthma).[6] Currently, the modes of therapy acceptable for flying duty (intranasal steroids and mast-cell stabilizers, some second-generation antihistamines, leukotriene modifier [montelukast] and immunotherapy) are generally effective. However, the actual impact of AR on mission effectiveness in terms of temporary flying duty restriction is unknown. AR has been shown to increase health care utilization and health care expenditures in relation to patients who do not have AR.[7]

AR often occurs seasonally in direct response to elevated airborne pollens but can also exist perennially (such as house dust mites, pet dander, cockroaches and some molds). A family history of allergies is often present. The symptoms of common "hay fever" include nasal pruritus, congestion, rhinorrhea, sneezing, eye irritation and pruritus. Clinical findings include edematous or inflamed nasal mucosa, increased nasal secretion (which is typically clear), and conjunctival edema and erythema. Difficult cases may require skin or serologic tests to allergens. However, in most cases the appropriate diagnosis can be made on the basis of a careful medical history, thorough clinical exam, and a documented response to appropriate therapeutic intervention. The differential diagnosis includes viral upper respiratory infection (URI), non-allergic rhinitis, sinusitis and side effects of medications. Abuse of decongestant nasal sprays (rhinitis medicamentosa) and anatomic deformity should also be excluded as a cause of chronic congestion and obstruction. cases of prolonged or moderate to severe symptoms a formal allergy consultation may be appropriate.[1, 2, 8] Anatomic causes for chronic rhinitis can most easily be ruled out via sinus CT and/or rhinoscopy.

Topical drug therapy for mild to moderate symptoms of AR consists of intranasal delivery of topical steroids or nasal antihistamine sprays such as azelastine (Astepro® or Astelin®) and olopatadine (Patanase®); only olopatadine is currently approved for use by aircrew. The steroids act as local anti-inflammatory agents and the antihistamines as work locally. These agents are very effective but may take several days to reach the desired effect. Intranasal steroids are widely accepted as the most effective and preferred first-line treatment for AR. Oral antihistamines are another choice for acute and chronic control of allergic rhinitis. Antihistamines competitively inhibit binding of histamine to H_1 receptors. Fexofenadine (Allegra®), or loratadine (Claritin®) (10mg dose only) are

the only aeromedically approved second-generation antihistamines. Because these medications are larger molecules they do not cross the blood-brain barrier and are considered non-sedating antihistamines. Loratadine at doses higher then 10mg per day can cross the blood-brain barrier and is therefore not approved at these doses for use in USAF aviators. Montelukast (Singulair®) has shown modest control of allergic rhinitis and is an overall safe drug (do beware of the black box warning for Singulair regarding neuropsychiatric effects such as agitation, aggression, anxiousness, dream abnormalities and hallucinations, depression, insomnia, irritability, restlessness, suicidal thinking and behavior, and tremor) and oral decongestants such as Sudafed can be utilized as well. If a patient responds poorly to nasal spray, antihistamines or montelukast, immunotherapy may then be considered. Immunotherapy carries a higher risk of serious adverse reaction and the initiation and maintenance of treatment are more complicated than with nasal spray or antihistamine.[9, 10, 11] A treatment course in immunotherapy typically lasts 3-5 years.

II. Aeromedical Concerns.

Potential hazards include: ear and sinus barotrauma with potential in-flight incapacitation; airway compromise; discomfort and distraction; reduced sense of smell; and possible use of easily accessible, unauthorized over the counter medication. Symptomatic allergies with sneezing could be a particular hazard in high speed, low level flight. Barotrauma as well as infectious complications can lead to prolonged periods of flying restriction, reducing operational effectiveness and mission effectiveness.

Antihistamines may adversely influence cognition and performance; hence, ground testing prior to acceptance for operational use is required.[12] Idiosyncratic reactions need to be excluded for any selected mode of therapy. Additionally, symptomatic control should be achieved. Because of the risk of an allergic reaction to an immunotherapy injection, the flyer should remain in the physician's office for approximately 30 minutes post-injection. Though sublingual immunotherapy is an option in some settings (is investigational only at this time), subcutaneous is still statistically more effective.[13] DNIF is required until potential idiosyncratic reaction is ruled out and adequate control is maintained before submission for a waiver. Once a waiver has been granted (when maintenance dosage reached or symptoms under control) a 4-hour verbal DNIF is required for aircrew after each injection. DNIF is not required for ground operations. Aircrew will not deploy on immunotherapy.

	DNIF Duration
	Rule out idiosyncratic reaction and ensure all symptoms are resolved
Claritin	Minimum 72 hours
Allegra	Minimum 72 hours
Nasal Steroids	Time required for symptom control
Nasal Antihistamines	Time required for symptom control
Oral Decongestants	Time required for symptom control
Cromolyn Sodium	Time required for symptom control
Montelukast	Time required for symptom control
Immunotherapy	Symptom control and 4hr verbal DNIF after each injection

III. Waiver Consideration.

Historically, the waiver approval rate for allergic rhinitis has exceeded 99%. The AFMOA Policy Letter, "Nasal Steroids and Nasal Cromolyn Sodium Use in Aviators", dated May 2001, approved the use of topical nasal steroids or cromolyn for the treatment of mild allergic, non-allergic or vasomotor rhinitis without a waiver.[14] The length of DNIF is dictated by the time required for control of underlying symptoms. In July 2004, the HQ USAF/SGOP Policy Letter, "Medication Changes for Aviators and Special Duty Personnel", approved the use of loratadine (Claritin®) or fexofenadine (Allegra®) for the treatment of mild allergic rhinitis without a waiver.[15] A minimum of 72 hours as a ground trial at initiation of therapy to ensure adequate symptom control and to exclude idiosyncratic reactions is required. Loratadine is limited to a maximum dosage of 10 mg per day. As an aside, the combination therapy of azelastine with fluticasone has proven more beneficial than fluticasone alone in moderate to severe cases.[16] Refer to the Official Air Force Aerospace Medicine Approved Medications list for any specific medication questions.

IAW AFI 48-123, a waiver is required for FC II and III duties for AR unless it is mild in degree. For seasonal cases only requiring approved antihistamines, montelukast, or nasal steroids, a waiver is not required. A waiver for medical therapy is necessary only for the use of immunotherapy (desensitization) and these will not be indefinite. For ATC/GBC duties, symptomatic AR not controlled by use of a single approved medication is disqualifying. It is not listed as disqualifying for MOD duties or for retention purposes.

A verified history of allergic, non-allergic and vasomotor rhinitis after age 12, unless symptoms are mild and controlled by a single approved medication, is disqualifying for FC I/IA. Therefore, a waiver is required for FC I and IA duties for AR successfully treated with <u>one</u> of the following: an approved second-generation antihistamines, topical medications, montelukast or immunotherapy.

The use of Claritin-D® or Allegra-D® is not approved for flying duties.

Table 1: Waiver potential for allergic rhinoconjunctivitis

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation or Review
I/IA*#	AR	Yes α AETC	At the request of AETC
II*# III*#	AR	Yes MAJCOM	At the request of MAJCOM
ATC/GBC	Symptomatic AR	Yes MAJCOM	No
MOD	AR	N/A	N/A

α No requirement for FCI/IA waiver for AR or history of same after age 12, if symptoms are mild and controlled on a single approved medication.
*All medication usage must be in accordance with the most recent Air Force Approved Aircrew Medications list.
Indefinite waiver appropriate for all cases except those requiring immunotherapy or montelukast.

A review of AIMWTS in April 2013 revealed 4527 submitted cases with a history of AR. There were 690 IFC I/IA cases, 2100 FC II cases, 1435 FC III cases, 254 GBC cases, and 48 MOD cases. There were a total of 275 disqualifications. A 10% review of these DQ's showed only three DQs were due to allergic rhinitis, the rest were due to other medical or administrative conditions. Of the three, two were due to inadequate time following immunotherapy (12 month symptom free requirement at that time).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

AMS for <u>initial waiver</u> for AR should include the following:
A. History of symptoms: dates, treatments (to include any possible skin testing and allergy shots) and effect of symptoms on everyday life and job.
B. Physical examination with emphasis on ears, nose, eyes, pharynx and lungs.
C. Use of an approved treatment.
- montelukast (waiver required for FC I, IA, II, and III**)**
- immunotherapy (waiver required for FC I, IA, II, and III)

D. Consultation report from allergy provider. If the history is remote (no symptoms for at least one year), it is reasonable to only require a good synopsis of the problem.
E. Documentation that symptoms greatly improved or resolved on therapy and that there are no side effects from therapy.

AMS for <u>waiver renewal</u> for allergic rhinitis should include the following:
A. Interval history since last waiver submittal; document impact of AR on everyday life and job.
B. Physical examination as above

C. Consultation report from allergy provider.

ICD 9 code for Allergic Rhinoconjunctivitis	
477	Allergic Rhinitis

ICD 10 code for Allergic Rhinoconjunctivitis	
J30.9	Allergic Rhinitis, unspecified

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WAIVER GUIDE
Updated: Mar 2016
Supersedes Waiver Guide of Jun 2012
By: Lt Col Stefanie M. Watkins-Nance (RAM 2017) and Dr. Dan Van Syoc
Reviewed by LtCol Roger Wood, AF/SG consultant for Hematology/Oncology

CONDITION:
Anemia/Blood Loss/Bone Marrow Donation (Mar 16)

I. Overview.

Anemia is a common problem with an estimated prevalence of 32.9% globally in 2010, notably higher in developing countries.[1] During 2010, there were 392,000 hospital discharges with anemia listed first as a diagnosis, with an average length of stay of 4.1 days.[2] In addition, the 237,000 visits to emergency departments with anemia as the primary hospital discharge diagnosis in 2011 is reflective of its commonality in the outpatient population as well.[3]

Simply described, anemia is a decrease in the individual's hemoglobin from their baseline.[4] Anemia is more specifically defined as a value more than 2 standard deviations below the mean. This equates to hemoglobin < 13.5 g/dL or a hematocrit < 41.0% in men, and <12.0 g/dL or < 36.0% for women.[5] The USAF Medical Standards Directory defines anemia as hematocrit values less than 40% for men and 35% for women.

Iron deficiency anemia is the most prevalent type of anemia. In fact, half of all cases worldwide are due to iron deficiency, particularly in the very young, those with poor nutrition, and women of childbearing age.[6] For American women ages 20-49, the prevalence is estimated to be as high as 11%.[7] Other less common etiologies for anemia include hemoglobinopathies, abnormal red cell membranes, and disturbed B_{12} or folate absorption.[8]

Iron deficiency anemia can be caused by blood loss secondary to internal or external hemorrhage as well as blood donation. Occult bleeding can be difficult to evaluate in many people. Other causes of iron deficiency include decreased iron absorption, certain foods and medications, celiac disease, and other more uncommon causes such as intravascular hemolysis and pulmonary hemosiderosis.[9] Aside from hemorrhage, causes of anemia can be categorized as either hypoproliferative (impaired blood cell production) or hyperproliferative (hemolytic).[10]

Blood donation is a common practice and is, in fact, promoted to the general and military populations through programs sponsored by the American Red Cross and Armed Services Blood Program. If an aircrew member is interested in platelet or plasma donation, it needs to be noted that this procedure (apheresis) can involve up to 800 mL in volume loss. As there is also some risk of hypocalcemia with this procedure, the member needs to be in a DNIF status for 72 hours after completion of the apheresis.

Iron deficiency anemia is theoretically simple to treat with medicinal iron supplementation. There are three available iron salts and these can be administered orally via tablet or elixir. Absorption of iron can be inhibited or enhanced by patient variables to include gastric acidity and use of other medications such as antacids. More recent studies on iron supplementation are stressing the

importance of patient participation in their own care by helping their provider to identify a tolerable dose and dosing schedule.[11]

Bone marrow donation is also known as Stem Cell Harvest or Peripheral Blood Stem Cell Harvest. Civilians and military members may volunteer to donate bone marrow for either matched relatives or donor matches through the National Marrow Donor Program or C.W. Bill Young Department of Defense Marrow Donor Program (for more information, go to www.dodmarrow.org/ or www.dodmarrow.org/Pages/about/about_program.htm).

II. Aeromedical Concerns.

Irrespective of the cause, anemia or blood volume loss can reduce tissue oxygenation and compromise organ function manifesting as fatigue, generalized weakness, decreased stamina, lightheadedness, chest pain, and decreased Gz tolerance. Physical exertion and hypoxia can further compromise function and overwhelm the body's capacity to compensate for the anemia. In younger patients, these symptoms may not be recognized until the hemoglobin is less than 7 or 8 g/dL.[4] More elderly patients may recognize these symptoms at hemoglobin levels of 9 to 11 g/dL while patients with chronic disease or gradual loss of red cell mass may report being asymptomatic at levels down to 5 to 6 g/dL. These clinical observations are based on patient data usually at low altitudes without extreme occupational exposures or duties.

For a patient with any baseline hemoglobin level, the above-noted symptoms will be more pronounced in the setting of acute blood loss, particularly if it is accompanied by loss of intravascular blood volume. A patient may tolerate up to 20% of acute blood volume loss with no cardiovascular compromise. In a recent study, it was found that the body replaces blood volume at an average of 36 days following a 550 cc whole blood donation.[7] One study compared the changes in cardiovascular parameters and symptoms between donors who underwent sham, 1-unit, and 2-unit blood donations.[12] There were no statistically significant differences between the groups. Nonetheless, it is still important to ensure that aviators do not exhibit any signs or symptoms of anemia. As a result, acute blood loss between 200-400 mL (including blood donation) requires grounding for at least 72 hours. When the flyer is clinically stable and otherwise fit for returning to flying duties, there is no reason to get labs following blood loss less than 400 mL or blood donation. As long as the flyer is feeling well, there is almost never a need to visit the FSO before resuming aviation duties.

Bone marrow (Stem Cell) donation is a more involved process than blood donation. Marrow may be donated via two methods. The first method involves actual harvest of stem cells from the donor bone marrow. In this method, patients are admitted to the hospital and may stay anywhere from 8 to 36 hours.[13] Marrow is collected from the posterior-superior iliac spines or the sternum. The most common post-procedure symptoms include pain at the donor site (77%), fatigue (38%), nausea (25%), vomiting requiring intravenous medications (8%), and fever (5%). In order to accelerate recovery, some patients will choose to have autologous blood transfusions, but the overwhelming majority of patients never need a transfusion of any kind after donating bone marrow. Most women and some men also take oral iron replacement upon discharge. Pain resolves, on average, in 5.5 days with a range of 1 to 25 days. Full recovery of pre-procedure hemoglobin levels was observed at 3 months for males and 1 month for females. The authors noted that more females took iron supplementation than males in that study.

A second technique of bone marrow stem cell collection is peripheral blood stem cell (PBSC) apheresis.[6] PBSC apheresis is accomplished in an outpatient setting. With this collection method, the donor is given granulocyte colony-stimulating factors (GCSF) approximately one week before the collection. Once the donor's WBC count is sufficiently raised, stem cells are harvested from either an IV placed in the donor's arms or through a central catheter placed in the chest wall. The collection, similar in nature to a platelet donation, can usually be completed in 1-2 apheresis settings. The donor has minimal discomfort with this procedure and the side effects are limited to those of the GCSF administration. There is no prolonged anemia or recovery. The donor may have an elevated WBC for a few weeks following the donation.

Fliers who donate bone marrow should be DNIF until the following parameters have been met:

- surgical site has healed, and
- they deny any distracting pain, and
- stable follow-up hematocrit is above 32.

Oral iron supplements are compatible with flying status after successful ground testing. Iron injections may be administered to flying personnel while they are DNIF. No waiver is required following bone marrow donation.

III. Waiver Consideration.

Anemia (hereditary, acquired, aplastic, or unspecified) is does not meet retention standards and is disqualifying when symptomatic or when response to therapy is unsatisfactory, or when therapy requires more than annual hematologist follow-up for all FC I/IA, FC II, RPA pilots, FC III individuals, as well as all MOD and operational support personnel. For certification of Ground Based Controller (GBC), any anemia must be evaluated. Anemia refers to all hereditary, acquired, aplastic or unspecified forms. Anemia, defined as hematocrit values less than 40% for men or 35% for women, is disqualifying for FC I/IA, FC II and FC III individuals. Minor, asymptomatic nutrition-related anemia that fully responds to vitamin supplementation does not require a waiver. Evaluations are recommended for hematocrit values below 40% in men and 35% in women. The exact nature of the work-up should be guided by a thorough history and physical, but typically should include a complete blood cell count with red blood cell indices, peripheral smear, and reticulocyte count. Results from these may indicate the need for evaluation of iron or B_{12} stores, hemoglobin electrophoresis, or possibly bone marrow biopsy. Donation of blood products is disqualifying for 72 hours for aviators and 8 hours for GBC and RPA pilots.

Table 1: Waiver potential for anemia*

Flying Class (FC)	Waiver Potential Waiver Authority†	ACS review/evaluation
I/IA Untrained II/III/ATC	Yes AETC	Maybe+
II/III	Yes MAJCOM	Maybe+
ATC/GBC	Yes MAJCOM	No
MOD	Yes AFGSC	No

*Anemia excluding thalassemia and sickle cell.
†Symptomatic anemia, or anemia that has not been satisfactorily treated or requires continuing hematology follow-up requires an AFMSA waiver and MEB review for all.
+ACS review appropriate for any situation that needs further explanation or that the waiver authority wishes to have reviewed.

AIMWTS search in Jan 2016 revealed a total of 1309 cases of anemia with an aeromedical disposition; there were a total of 109 disqualifications in this group. Breakdown of the cases was as follows: 89 FC I/IA cases (13 disqualifications), 177 FC II cases (19 disqualifications), 700 FC III cases (58 disqualifications), 335 ATC/GBC cases (18 disqualifications) and 8 MOD cases (1 disqualification). Most of the FC III and ATC/GBC disqualifications were initial exams and the majority of the rest of the cases were disqualified for a diagnosis other than anemia.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. If an MEB is required due to continued symptomatic anemia, or anemia that has not been satisfactorily treated or requires continuing hematology follow-up, ensure the MEB result is included in the AMS.

Unless the waiver is for a chronic condition, most of these waivers would be expected to be indefinite.

The AMS for an anemia waiver (initial or renewal) should include the following:
A. Complete history of the anemia event to include all treatments.
B. Current labs to include complete blood cell count with red blood cell indices, peripheral smear, and reticulocyte count.
C. Any consultation reports and special studies as applicable.

ICD-9 Codes for Anemia, Blood Loss, and Marrow Donations	
280	Iron Deficiency Anemia
281	Other deficiency anemias
282	Hereditary hemolytic anemias
283	Acquired hemolytic anemias
284	Aplastic anemia & other bone marrow failure syndromes
285	Other and unspecified anemias
ICD-10 Codes for Anemia, Blood Loss, and Marrow Donations	
D50.9	Iron Deficiency Anemia, unspecified
D50.8	Other deficiency anemias
D58.9	Hereditary hemolytic anemia, unspecified
D59.9	Acquired hemolytic anemia, unspecified
D61.89	Other specified aplastic anemias & other bone marrow failure syndromes
D64.9	Anemia, unspecified

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WAIVER GUIDE
Updated: Mar 2016
Supersedes Waiver Guide of Feb 2013
By: Dr Dan Van Syoc
Reviewed by Col Matthew Carroll, AF/SG consultant for Rheumatology

CONDITION:
Ankylosing Spondylitis (Mar 16)

I. Overview.

Ankylosing spondylitis (AS), the most common of the spondyloarthritides, is a chronic inflammatory disease principally involving the hips and axial skeleton. The name for the disorder is derived from the Greek root "ankylos", which means bent or crooked and "spondylos", which refers to a vertebra. The term "ankylosis" therefore refers to a fibrous or bony bridging of joints. In the spine this includes bridging of one or more intervertebral discs.[1] AS typically has an insidious onset, can have extra-articular manifestations, and is diagnosed based on clinical suspicion supported by imaging techniques and associated human leukocyte antigen HLA-B27.[2] It also must be differentiated from other types of seronegative spondyloarthropathies, systemic inflammatory arthritis, as well as mechanical and degenerative causes of back pain.

The key pathological lesion in AS is enthesitis, though the main diagnostic feature is sacroiliitis. Entheses are complex and variable structures at the junction between ligament, joint capsule or tendon and bone. The recognition that there is continuity between the enthesis and both underlying bone and overlying synovium has led to the concept of the enthesitis organ. In the spine, entheses are affected at the attachment of joint capsules around facet joints and sacroiliac joints, at the disco-vertebral junctions and at the attachments of the interspinous ligaments.[3]

The prevalence of AS in Caucasian populations vary from <0.1 and 1.4%.[4] In general, an individual's risk of developing AS is increased 5.6- to 16-fold if there is a first degree relative with AS. This risk depends partly upon the presence of HLA-B27; in US populations AS occurs in 1% to 3% of HLA-B-27-positive individuals, but 10% to 20% of HLA-B27-positive individuals with affected first degree relatives develop AS.[5]

AS commonly affects young adults as evidenced by the peak age of onset being 20 to 30 years. The male to female ratio is approximately 2 to 3:1. Among Caucasians, the estimated prevalence rate of AS, as defined by the modified New York criteria, ranges from 68 per 100,000 population older than 20 years in the Netherlands, to 197 per 100,000 in the United States.[6] In the general population, AS is likely to develop in about 1% to 2% of HLA-B27–positive adults who have a disease-associated B27 subtype, although there may be regional or geographic differences. For example, in northern Norway, AS may develop in 6.7% of HLA-B27–positive people.[7] The disease is much more common among HLA-B27–positive, first-degree relatives. Of HLA-B27–positive AS patients, roughly 10% to 30% of them have signs or symptoms of AS.[6] The prevalence of AS in working adults with back pain of greater than three weeks duration was 4.6% in one study.[7] Thus, if a patient has at least one first degree relative with AS and the patient is HLA-B27 positive, additional clinical screening for Ankylosing Spondylitis would be reasonable.[8]

AS can also present with nonspecific symptoms such as low-grade fever, fatigue and weight loss. Non-skeletal involvement frequently occurs, including acute anterior uveitis; neurologic symptoms resulting from fractured spine, atlantoaxial subluxation, cauda equina syndrome and costovertebral rigidity; aortic regurgitation; IgA nephropathy and secondary amyloidosis; ileal and colonic mucosal ulcerations; and osteopenia.[9] Recent studies have demonstrated an increased risk of vertebral and nonvertebral fractures that were independent of other risk factors.[10]

Diagnosis and Treatment:

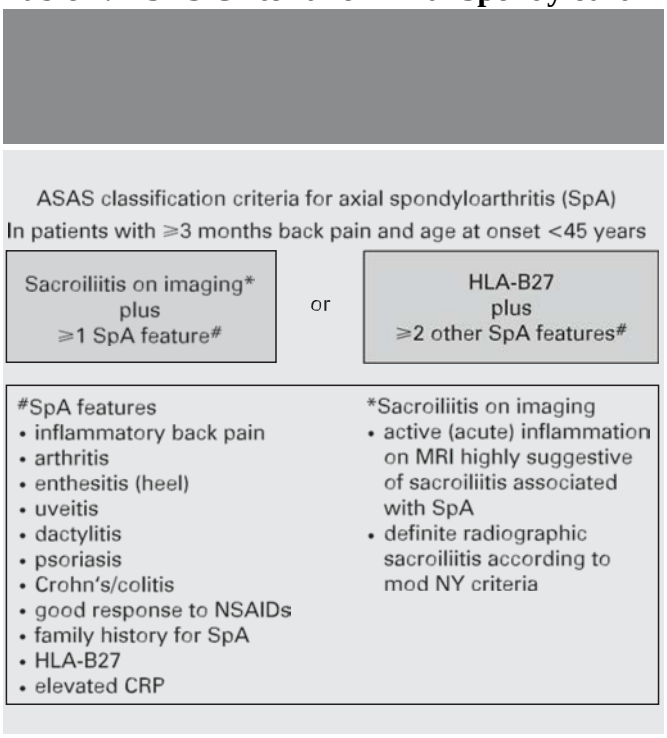
The diagnosis of AS is a clinical diagnosis with physical findings and radiographic evidence of disease. The modified New York diagnostic criteria are in almost universal use.

The modified New York classification criteria for AS include requirements for both clinical and radiographic findings:
Clinical parameters

- Low back pain and stiffness for more than three months that improves with exercise but is not relieved by rest
    - Limitation of motion of the lumbar spine in both the sagittal and frontal planes
    - Limitation of chest expansion relative to normal values correlated for age and sex
- Radiological parameters
    - Sacroiliitis grade $\geq$2 bilaterally
    - Sacroiliitis grade 3 to 4 unilaterally
- A patient is regarded as having definite AS if he or she fulfills at least one radiological parameter plus at least one clinical parameter.

In clinical practice, this set of criteria is moderately specific for ankylosing spondylitis but has a low degree of sensitivity. Because of the delay in appearance of characteristic radiographic findings, many patients who eventually fulfill the 1984 Modified New York Criteria for ankylosing spondylitis will not do so when they first come to medical attention. For patients early in the course, the ASAS (Assessment of SpondyloArthritis international Society) classification criteria for axial spondyloarthritis are more useful.

Table 1: ASAS Criteria for Axial Spondyloarthritis[3]



Because AS has an insidious onset, the diagnosis is based on a high index of clinical suspicion and supported with a judicious use of imaging, laboratory testing along with a therapeutic trial of nonsteroidal anti-inflammatory drugs (NSAIDs). Signs and symptoms suggestive of inflammatory back pain include: onset prior to age 40, insidious onset, symptoms persisting longer than three months, morning stiffness, and improvement with exercise. The presence of four of the five above has a sensitivity and specificity of up to 75 percent.[7]

Nonetheless, conventional radiography remains the method of choice for making the diagnosis of AS since the high cost and limited availability of MRI and CT restrict their use in the routine evaluation of the sacroiliac joints. These tests should be reserved for patients with normal or equivocal radiographs for whom clinical suspicion of AS is high.[4]

Range of Motion (ROM) Measurement:

Assessment of ROM of the lumbar spine is a key clinical finding. The modified Schober test is one accepted method to assess lumbar spine ROM by measuring the forward flexion of the spine in a patient with suspected AS. The test is performed with the patient standing erect; a mark is made over the spinous process of the 5th lumbar vertebra or the imaginary line joining the posterior superior iliac spine and another mark is made 10 centimeters above this mark in the midline. In a patient with no lumbar spine motility abnormalities, the measured distance between the two points should increase by 5 cm when the patient bends forward to touch his toes while keeping the knees locked. The severity of cervical flexion deformity can be assessed using the Tragus to wall test. With the patient's heels and back against the wall and their chin in the usual carrying position, have the patient exert maximum effort to touch their head against the wall. Measure the distance from the wall to the tragus. Report the better of two tries in centimeters. In addition, assessment of chest

wall expansion, lateral flexion, and cervical rotation are important indicators of range of motion abnormalities.[11]

Serological Testing:

The cause(s) of AS remain unknown. Genetic factors, including HLA-B27 and the IL-23 receptor, confer susceptibility to AS but environmental precipitating factors have not been identified.

Testing for C-reactive protein and HLA-B27 can help to support the clinical picture, but caution is advised as these tests should not be used as screening tests, that is, the value of either positive or negative results is only realized when the test is applied in the appropriate clinical setting. A history of chronic, inflammatory low back stiffness, elevated ESR, positive C-reactive protein with a positive HLA-B27 in an otherwise healthy young male with a familial history of inflammatory back stiffness supports a diagnosis of AS.[8] The finding of a negative HLA-B27 in the same clinical setting reduces the likelihood of AS to 1 in 20 (5%). Likewise, the indiscriminate use of additional serologic assays (i.e. "the rheumatology lab panel"), in search of alternative diagnoses, is further discouraged. Serologic studies must be carefully chosen based on the constellation of the presenting history and physical exam features.

Imaging Studies:

The Modified New York Criteria for the diagnosis of AS still utilizes standard radiography as the method of choice. A CT of the sacroiliac (SI) joints will visualize bony changes better than plain radiographs; it will not detect early acute inflammatory changes in the bone marrow and it exposes the patient to a relatively high dose of gonadal radiation. Plain films can be used to follow clinical progression.[11] Though AS usually manifests as a spinal disease, chronic changes in peripheral joints can occur in about 25 percent of patients. In the presence of chronic, inflammatory back symptoms and a physical exam consistent with the same, screening plain radiographs of the SI joints and lumbosacral spine are recommended. Many experts recommend plain X-rays to include lateral views of the lumbar spine, lateral views of the cervical spine, and a pelvic X-ray that includes sacroiliac joints and both hips.[12] Recent classification criteria and recommendations issued by the ASAS-OMERACT (Outcome Measures in Rheumatology) working group give considerable weight to magnetic resonance imaging and ultrasonography. These imaging methods can ensure the early diagnosis of AS in the absence of radiographic sacroiliitis. These methods also provide therapeutic guidance at any time during the course of the disease and supplies objective information on the degree of inflammation and response to treatment. Studies are under way to determine the role of MRI and ultrasonography in the diagnosis and monitoring of AS.[13]

Treatment:

First-line therapy to control pain and inflammation in AS consists of NSAIDs. In patients with increased risk of gastrointestinal problems, selective cyclooxygenase-2 inhibitors (coxibs) should be considered. Intra- or peri-articular corticosteroid injections are indicated for relieving the pain of sacroiliitis. There is no evidence supporting the use of systemic corticosteroids.[4] Despite their success in treating other inflammatory diseases such as RA, disease-modifying anti-rheumatic drugs (DMARDs), including methotrexate and sulfasalazine, have not shown efficacy in treating the axial manifestations of AS. However, sulfasalazine may be beneficial in treating peripheral joint disease in reducing ESR and easing morning stiffness. Both etanercept and infliximab caused regression of

spinal inflammation, and this effect was not lost after up to 2 years of treatment. Progression of structural damage was not prevented by treatment with anti-TNF agents, but appeared to have been slowed, in patients with definite radiographic changes at baseline. Furthermore, treatment of AS patients with TNF-inhibitors is associated with a significant decrease in the number of anterior uveitis flares.[4]

The use of NSAIDs and physical therapy are the mainstays of treatment in AS. This approach is both therapeutic and diagnostic. The goal of treatment is to provide symptomatic relief, restore function, prevent joint damage and spinal fusion, minimize extra-spinal and extra-articular disease, and prevent complications of spinal disease. The majority of AS patients using NSAIDs experience relief of symptoms. Regardless of the NSAID used, the maximum dose is usually required, taken daily for at least two weeks, and the NSAID must be on the list of approved medications for aviators.[4] A 2015 Cochrane study demonstrated strong evidence to support the use of traditional and COX-2 NSAIDs for pain and possibly for reduction in radiographic spinal progression.[14] Anti-TNF-alpha agents can also be used in patients with a firm clinical diagnosis of AS with moderate to severe spinal disease who have not responded to NSAIDs.[4, 15] Recent analysis has demonstrated that the anti-TNF inhibitors do improve symptoms in patients with AS.[16] In advanced cases surgery may be required such as total hip replacement and/or spinal or cervical fusion.[4]

II. Aeromedical Concerns.

In aviators with AS, cramped cockpit conditions for prolonged periods may be poorly tolerated. There may be functional limitations in all aircraft, especially in high performance aircraft and flying in typical cockpits may exacerbate eventual disability. Affected aviators may be hampered if quick visual scanning in all directions is necessary. Typical AS symptoms are incompatible with ejection and special duty that would require parachute qualification or other skill sets that may subject the service member to impact forces. The cervical and lumbosacral limitations of AS may also interfere with emergency ground egress and can limit vision due to restricted neck motion. Concomitant uveitis/iritis occurs in up to 25% of cases. The development of most of the extra-articular manifestations in AS are disqualifying, and chronic treatment with NSAIDs and tumor necrosis factor alpha antagonists is disqualifying, but can be considered for a waiver on a case-by-case basis.

III. Waiver Consideration.

AS is disqualifying for all classes of flying and for retention if requiring duty restrictions, frequent absences from duty, ongoing specialty follow-up greater than once a year, or use of immunomodulators or DMARDs.

Table 2: Waiver Potential for Ankylosing Spondylitis

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	AS, with or without extra articular disease	No AETC	No
II/III	AS, without extra articular involvement AS with extra articular involvement	Maybe*$# MAJCOM Maybe*$# MAJCOM	Yes Yes
RPA Pilot	AS, with or without extra articular involvement	Maybe*$# MAJCOM	Yes
ATC/GBC	AS, with or without extra articular involvement	Maybe*$# MAJCOM	Yes
MOD	AS, with or without extra articular involvement	Maybe*+# AFGSC	No

* Waiver possible with documentation of treatment and resolution of symptoms. MEB required first if individual experiences occupational limitations or absences from duty because of recurrence of symptoms.
$ Waiver restricted for individuals treated with etanercept, adalimumab or infliximab (non-ejection seat, no worldwide qualified, TDY requires access to transport and refrigeration of etanercept/adalimumab). Observe for 3 to 6 months on therapy before consideration of waiver to allow for assessment of response and possible adverse effects. MEB is required. Initial waiver may be granted for one year, thereafter usually three years. Forward to ACS for review. AFMSA is the waiver authority for aviators and GBC personnel on a TNF-alpha inhibitor.
+ If on etanercept, adalimumab or infliximab, should be restricted from some deployments; TDY requires access to transport and refrigeration of adalimumab/etanercept, and MEB required.
# If condition does not meet retention standards, waiver authority is then AFMSA.

Review of AIMWTS through Feb 2016 revealed a total 44 cases of AS submitted for consideration of a waiver. There were no 0 FC I/IA cases, 24 FC II cases (4 disqualified), 15 FC III cases (5 disqualified), 4 ATC cases (2 disqualified), and 1 MOD case. Four FC II waiver requests, 4 FC III, and 2 ATC were disqualified. Several cases were waived with identified anti-TNF-alpha agents. All of the disqualified cases were due to the disease process.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver should include:
A. Detailed history: onset, time course, joints and/or extra-articular involvement, extra-articular manifestations, medication and side effects and activity level. Also discuss fully any other diagnoses requiring a waiver.

B. Physical exam: joints; extra-articular tissues involved, eyes, kidneys, and heart, tragus to wall measurements, modified Schober test, lateral flexion, and cervical rotation measurements
C. Rheumatology or internal medicine consultation report.
D. Ophthalmology/optometry consultation; to document eye involvement.
E. Laboratory: comprehensive metabolic panel (because of NSAID use), HLA B-27 serology, erythrocyte sedimentation rate (ESR)/C-reactive protein (CRP), urinalysis.
F. Radiographs: baseline of involved levels of spine to include SI joints (Ferguson views).
G. Current echocardiogram and cardiology consult if cardiac valves involved.
H. If on etanercept, adalimumab or infliximab, results of chest x-ray and TB testing.
I. Medical evaluation board results, if required.

The AMS for waiver renewal should include:
A. Interim history.
B. Physical exam: thorough exam to include any extra-articular involved sites.
C. Rheumatology or internal medicine consultation report.
D. Echocardiogram if indicated.
E. Any MEB or IRILO updates if required.

ICD-9 Code for Ankylosing Spondylitis	
720.0	Ankylosing Spondylitis

ICD-10 Code for Ankylosing Spondylitis	
M45.0	Ankylosing Spondylitis

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WAIVER GUIDE
Updated: Jun 2016
Supersedes Waiver Guide of Apr 2013
By: Maj Jaime Rojas (RAM 17) and Dr Dan Van Syoc
Reviewed by Lt Col Dan LaMothe, Chief of ACS Ophthalmology branch

CONDITION:
Anterior Ischemic Optic Neuropathy (Jun 16)

I. Overview

Anterior ischemic optic neuropathy (AION) results from ischemic damage to the anterior portion of the optic nerve, a region primarily supplied by the posterior ciliary artery circulation.[1] AION presents with acute, painless visual loss and is the most common acute optic nerve event after age 45 and can result in degradation of visual acuity, visual field, stereopsis, and color vision.[2] AION is divided into arteritic (A-AION) and non-arteritic (NA-AION) anterior ischemic optic neuropathy, depending on the pathogenesis. A-AION is caused by temporal arteritis (giant-cell arteritis) and is characterized by inflammation of medium to large arteries. NA-AION is characterized by optic disc ischemia (hypoxia), associated with small vessel disease, and can be exacerbated by elevated intraocular pressure (IOP) and/or decreased perfusion pressure.[1]

The distinction between A-AION and NA-AION is important, because A-AION is an ocular emergency, requiring emergent intravenous corticosteroid administration and referral to an ophthalmologist to prevent permanent sequelae and contralateral vision loss. NA-AION constitutes 95% of all AION cases, affecting between two to ten individuals per 100,000.[1] As A-AION is a disease primarily in individuals over the age of 50 and is significantly less common, this waiver guide will restrict discussion of AION to NA-AION.

Table 1: Arteritic vs. Non-arteritic Ischemic Optic Neuropathy

	A-AION	**NA-AION**
Age	Mean, 70 years	Mean, 60 years
Sex	Female > Male	Female = Male
Other Symptoms	Jaw claudication, scalp tenderness, headache	None
Visual acuity	<20/200 in >60% of cases	>20/200 in >60% of cases
Disc findings	Pale, edematous; normal cup	Pale or initially hyperemic and edematous; small cup
Erythrocyte Sedimentation Rate (ESR)	Often elevated (Mean, 70 mm/hr)	Usually normal (Mean, 20-40 mm/hr)
C-reactive protein	Elevated	Normal
Fluorescein Angiography	Disc and choroid delay	Disc delay only
Natural history	Rarely improve; fellow eye 54-95%	16%-42.7% improve; fellow eye 12%-19%
Treatment	Systemic steroids	None proven.

Adapted from American Academy of Ophthalmology, Basic and Clinical Science Course. Neuro-Ophthalmology. 2011-2012, page 126.

Hayreh (2009) defined ocular blood flow as the perfusion pressure divided by the resistance to flow, where the perfusion pressure is calculated by subtracting the intraocular pressure from the mean blood pressure. Ocular nerve head blood flow is intrinsically dependent on three factors: blood pressure, IOP, and the resistance to blood flow. Any change in one of these factors can lead to hypoperfusion of the disc and NA-AION. Small vessel circulatory insufficiency of the optic nerve head is the most widely accepted pathophysiology of NA-AION.[1] Nocturnal hypotension is thought to be a significant contributing factor, as 73% of patients report noticing the visual loss upon awakening in the morning.[3] However, any condition that decreases ocular blood flow, including a sharp rise in IOP or transient drop in perfusion pressure, can precipitate NA-AION. Phosphodiesterase inhibitors have been implicated in some cases of NA-AION, probably due to their systemic hypotensive effects, but a definitive causal link has yet to be made.[4, 5] Non-arteritic anterior and posterior ischemic optic neuropathies have been described following surgical cases in which the systolic blood pressure was deliberately maintained between 85 and 100 mm Hg for prolonged periods to reduce blood loss, such as during spinal surgeries.[6]

A significant risk factor for NA-AION is a small, crowded optic disc, the so-called "disc-at-risk."[3, 7] Approximately 97% of people who develop NA-AION have a small optic disc (less than 1.2 mm) with a small or absent physiological cup (C/D $\leq$0.2).[8] Hyperopia has also been mentioned as a possible risk factor for the development of NA-AION. This is presumably due to a smaller scleral canal associated with optic nerve head crowding in the hyperopic eye.[9] It is believed that a congenitally small disc may predispose individuals to NA-AION by crowding all the nerve axons into a smaller space, which results in less of an ability to compensate for decreased perfusion pressure, axonal swelling, and interruption of axoplasmic flow.[3, 10] Whereas a normal sized disc and cup might be more capable of accommodating swollen axons without causing secondary compression of adjacent axons and capillaries, swollen axons in a congenitally small disc, with little or no cupping, is believed to secondarily compress intervening capillaries supplying the nerve head and adjacent axons leading to a vicious cycle of ischemia and disruption of axoplasmic flow.[3] Other risk factors for NA-AION include arterial hypertension, nocturnal arterial hypotension, sleep apnea, diabetes mellitus, ischemic heart disease, hyperlipidemia, smoking, atherosclerosis and arteriosclerosis.[11, 12] In addition to the conditions associated with small vessel arteriosclerosis, small vessel vasculitis and hyperviscosity syndromes, such as systemic lupus erythematosis or antiphospholipid syndromes, can be a risk factor. The reason that NA-AION does not typically occur earlier in life, despite the presence of a "disc-at-risk," is that small vessel disease generally does not significantly develop until after middle age.

Although AION is typically a disease of slightly older individuals, this is not always the case. Preechawat, et al., demonstrated a significant number of cases diagnosed with AION seen at Emory University between 1989 and 2006 were individuals under the age of 50. Their study reported 29% were younger than 50 with the youngest included being thirteen years of age.[13] According to this study, approximately 31% of those presenting with unilateral disease, went on to have contralateral involvement. In addition, six percent of patients experienced a recurrence in the presenting eye. Though several risk factors were associated with disease to include hypertension, diabetes, and hyperlipidemia, 82% of individuals demonstrated a "disc-at-risk" with cup-to-disc ratios <0.2.

Fellow eye involvement occurs in 14.7% of patients after being diagnosed with unilateral NA-AION with a median follow-up of 5.1 years.[14] Other studies have quoted roughly a 15-24% risk of involvement of the contralateral eye over five years, with a 3-8% risk of recurrence in the previously impacted eye.[2] This is in contrast to 54%-95% of fellow eye involvement in A-AION.[7]

Prognosis for visual recovery depends on several factors. Vision tends to progressively worsen up to two weeks following the event. Several studies have shown a possible correlation between visual outcomes and age. One study demonstrated visual acuity of 20/200 or worse in 31-42% of patients.[1]

Acute elevations in intraocular pressure can initiate the cycle of ischemia in NA-AION. This elevation can be due to angle-closure glaucoma, sleep apnea, or as a side effect from ocular medications, notably topical steroids. Complications from ocular steroid use have been clearly outlined. Review of the literature reveals that 18-40% of individuals in the general population are "steroid-responders" (as defined by a rise of 5 mmHg or more IOP) and experience acute elevation of IOP's after several weeks of topical ocular steroid use.[15, 16] This percentage increases to 46-92% in patients previously diagnosed with primary open-angle glaucoma.[16] Overall, 12-25% of refractive surgery patients have increased IOP measurements of 24 mm Hg or greater if topical steroids are used post-operatively.[17] It is believed that IOP increases because of steroid induced morphologic and functional changes in the trabecular meshwork.[15] Any visual changes in patients on topical ocular steroids should be thoroughly evaluated by an ophthalmologist emergently, with pressure reduction medications initiated if so indicated.

Currently there are limited therapeutic options for NA-AION. Several approaches have been or are currently being studied in the treatment/prevention of AION. Some of these include modalities to treat thrombosis, increase ocular perfusion pressure, decrease vascular resistance, and reduce optic nerve swelling. IOP reduction can prevent further damage to the optic nerve, especially if the NA-AION is due to acutely elevated pressures. Systemic corticosteroid therapy has recently been shown to increase the probability of visual acuity and visual field recovery in NA-AION affected eyes (well-controlled prospective data on oral versus IV corticosteroids are lacking at this time).[18] However, past treatment recommendations, based on initially promising studies, have often been shown to be controversial. For example, surgical decompression was shown to not be effective and may in fact have detrimental effects on patients.[19] Levo-dopa was also suggested to improve visual recovery, but follow-up studies have not uniformly found treatment benefit. Although aspirin is commonly given to reduce the risk of fellow eye involvement, risk reduction remains controversial.[12, 20] Hyperbaric oxygen has been proposed as a potential treatment, but one study found no improvement in those treated for acute NA-AION.[21] There has been suggestion that neuro-protective agents theoretically may help. However, all these proposed treatments have never been uniformly proven, and in fact, may have deleterious side effects.

II. Aeromedical Concerns

The primary aeromedical concerns with anterior ischemic optic neuropathy are final visual acuity, permanent visual field deficits, loss of stereopsis, and other permanent visual sequelae. The etiology of NA-ION makes it susceptible to risks associated with the aviation environment. Currently, there are no known studies documenting an increased risk in aircrew with a "disc-at-risk," but there have been cases seen at the ACS of "discs-at-risk" becoming ischemic from relative hypoxia at altitude, suspected DCS, and with high gravitational forces.[22, 23] These ischemic events led to detriments of one or more visual component measurements (i.e. stereopsis, color vision, visual fields or acuity). Also of concern is the rate of fellow eye involvement and the risk of recurrence for these cases as mentioned above. Though these events are usually not incapacitating from a medical perspective, the rapidity of the onset of symptoms and the crucial impact on visual abilities makes future events concerning in the aerospace environment. Due to the theoretical risk

associated with repeated exposure to high gravitational forces and depressurized cabin environments on NA-AION susceptible nerves, restriction to flying non-high performance, multi-piloted aircraft is recommended along with restrictions to cabin altitudes of less than 8,000-10,000. Even if vision is adequately restored, the underlying systemic conditions may pose potential serious risks to safe flight. Therefore, investigation of any underlying causes or risk factors is critical to both management and aeromedical disposition.

III. Waiver Considerations

Air Force policy states that optic neuropathies are disqualifying for FC I, IA, II, III, and RPA Pilot duties. The diagnoses are not disqualifying for GBC, MOD, or Operational Support Flying duties. An ACS evaluation is required for all initial waivers for anterior ischemic optic neuropathy. The probability of waiver approval is dependent on the final visual acuity, visual field and absence of other significant pathology or complications. Any underlying contributing pathology must also be waiverable for the individual to be returned to flight status. An ACS review or evaluation is required for all waiver renewals.

Table 2: Anterior Ischemic Optic Neuropathy

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority**	**ACS Evaluation/Review**
I/IA	AION resolved without residua	No AETC	No
	AION with residual visual defects	No AETC	No
II/RPA/III	AION resolved without residua	Yes# MAJCOM**	Yes
	AION with residual visual defects	Maybe*# MAJCOM**	Yes

*Waivers may be considered in aviators with residual visual defects after complete evaluation at the ACS.
** Categorical waiver requests go to AFMSA.
# No indefinite waivers.

AIMWTS review in Jun 2016 revealed a total of 16 cases. Breakdown of the cases was as follows: 0 FC I/IA cases, 11 FC II cases (1 disqualified), and 5 FC III cases (2 disqualified). The 3 disqualified cases were due to progressive or recurrent disease.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for an initial waiver for AION should include:

A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History of disease, including treatment modalities attempted.
C. Full ophthalmology exam to include best corrected visual acuities at distance and near, Humphrey visual field 30-2 testing for each eye, stereopsis testing using the OVT (if substandard stereopsis is present, include all tests found in Defective Depth Perception Waiver Guide), and examination of fellow eye with pertinent findings.
D. Current color vision testing results by CCT.
E. Any relevant laboratory work-up performed.
F. Diagnostic imaging of the nerve head and peripapillary region; e.g. optic disc photos, optical coherence tomography (OCT) with retinal nerve fiber layer (RNFL) analysis, etc.
G. Consultation report(s) from all treating eye care specialists.

The AMS for a waiver renewal for AION should include:

A. Interim history since last waiver and ACS visit.
B. Ongoing treatment modalities.
C. Full ophthalmology exam to include items as noted above.

ICD 9 code for AION	
377.41	Ischemic Optic Neuropathy

ICD-10 code for AION	
H47.01	Ischemic Optic Neuropathy

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WAIVER GUIDE
Updated: May 2014
Supersedes Waiver Guide of Mar 2011
By: Col Bill Mueller, 711HPW/HP Pilot-Physician and Dr. Dan Van Syoc

CONDITION:
Anthropometrics (Short Stature, Excessive Height, Weight, and Other Body Measurements) (May 14)

I. Overview.

In March 2003, the Chief of Staff of the Air Force (CSAF) announced a new process to manage CSAF Exception to Policy (ETP) requests for anthropometric waivers. As a result, individuals who do not meet AFI 48-123 Medical Standards Directory anthropometric standards can apply for a categorical waiver to enter flight training. Such categorical waivers would be limited to those aircraft in which the candidate meets 'functional fit' and 'safe-escape' standards. The criteria for 'functional fit' would be based on Air Force Research Lab (AFRL) cockpit anthropometric surveys of USAF aircraft. The criteria for 'safe-escape' would be based on ejection-seat design criteria. In his letter, CSAF designated AETC/CC, in coordination with AETC/SG, as the waiver authority for all anthropometric waivers. AETC/CC has delegated this waiver authority to the AETC/A2/3/10 (Director of Intelligence, Operations, and Nuclear Integration). Standing height, sitting height, buttock-to-knee length, and nude body weight are the screening measurements required for all initial Flying Class (FC) I, IA, II and III physicals to determine the need for further anthropometric clearance.

<u>STANDING HEIGHT and SITTING HEIGHT</u>:

For initial FC I/IA, II and III, the standing-height limits are 64-77 inches. FC I applicants have a sitting height requirement of 34-40 inches and cannot exceed a buttock-to-knee of over 27.9 inches, while initial FC IA and II applicants have a sitting height requirement of 33-40 inches If outside this range, the applicant does not meet anthropometric standards and may be considered for an anthropometric waiver.

For FC I applicants seeking an anthropometric waiver, eight cardinal measurements must be performed at either the USAFA (for USAFA cadets) or the Medical Flight Screening (MFS) clinic at USAFSAM (for ROTC, OTS, and AD UFT Board Selectees). These measurements include: standing height, sitting height, buttock-knee-length, sitting knee height, arm span, sitting eye height, acromial height, and functional reach. These measurements are forwarded to AETC/SGPA for consideration of waiver potential. AETC/SGPA enters the cardinal measurements into a web-based Pilot Accommodation Study (PASS) computer program, which derives its data from the above mentioned AFRL study. The PASS program determines "functional fit" for all USAF aircraft as either "safe", "marginal", or "unsafe". Candidates with "safe" and "marginal" fits are able to adequately reach and manipulate the aircraft controls for that particular airplane.

After using the PASS program to assess functional fit, AETC/SGPA will make one of three possible waiver recommendations: unconditionally qualified, conditionally qualified for certain aircraft, or disqualified. This waiver recommendation is coordinated through AETC/A3F before final approval from AETC/A2/3/10.

The T-38 has the most restrictive anthropometric fit in the AF inventory. Since the T-38 is the pipeline aircraft to all fighters and bombers, conditional FC-I anthropometric waivers that exclude the T-38 also exclude fighters and bombers.

For non-pilot aircrew whose duties could be in an ejection seat aircraft (e.g. F-15E weapons system navigator, flight surgeon, aerial photographer, test-flight engineer), sitting height, butt-knee length and weight (discussed in WEIGHT section) must meet the minimum safe ejection seat requirements listed in Table 1. If outside these standards, then a conditional waiver will not include ejection-seat aircraft.

Table 1 – Ejection Seat Safe Escape Standards

MAXIMUM VALUES (inches) *(Minimum sitting height for all ejection seat aircraft is 33")*			
Aircraft	**Butt-Knee Length**	**Sitting Height**	**Weight Limits**
T-6	27.9	41.5	103-245
T-38	30.8	40	103-240
A-10	26.7*	43.6	103-245
F-15	27.2	44.1	103-245
F-16	27.1	39.7	103-245
F-22	27.9	43.4	103-245
B-1	28	44.4	103-245
B-2	30.6	55.3	103-245
B-52	28.4	53	103-245

*Based on data obtained after an A-1- mishap.

WEIGHT:

DODI 1308.3 (DoD Physical Fitness and Body Fat Programs Procedures) specifies weight standards which apply to all military members (may soon not apply to Air Force members). More restrictive weight criteria exist for safe-escape standards from ejection-seat aircraft. Specifically, nude body weight must be between 103 and 245 lbs (240 lbs for the T-38). Trained aircrew in ejection seat aircraft that fall outside these limits are placed on DNIF status until they meet standards. Trained aircrew flying ejection seat aircraft aircrew and not meeting weight standards may be considered for reassignment to a non-ejection seat aircraft. This process is managed by the operational chain of command and does not include a medical waiver for weight.

An individual who does not meet weight standards should be evaluated for primary medical causes of the weight gain/loss. If the evaluation rules out a pathologic cause, effective weight control may be obtained by an adequate dietary and physical exercise programs.

II. Aeromedical Concerns.

Height and weight extremes are concerns for functional fit and ejection. Functional fit takes into account the aircrew's angle of view over the nose of the aircraft and the ability to reach and actuate all controls. Improper functional fit due to anthropometric limitations can result in the inability to control the aircraft during certain phases of flight. During ejection, excessive height may be associated with increased neck and flail injuries because of positioning to accommodate the individual in the cockpit. Weight and stature also affects the center-of-gravity (CG) specifications of the ejection seat. The thrust mechanisms for ejection act behind the CG of the manned ejection seat. Therefore, low-weight can result in abnormal forward-pitch and interfere with man-seat separation and the parachute-opening sequence. Excessive weight alters the seat-aircraft separation sequence and the CG-parameters designed for the seat.

III. Waiver Considerations.

A waiver is required if the following values are exceeded on the initial flying class physical. There are no anthropometric standards for ATC/GBC and SMOD personnel. FC IIU personnel are required to meet FC II standards. In addition, there is a minimum functional reach of 76 inches for aeromedical evacuation crewmembers, regardless of their height. See Section T of the MSD for more detail.

Table 2: Waiver potential for anthropometric issues

Condition	**FC I**	**FC IA, initial II, and initial III**	**Waiver Potential Waiver Authority**
Height	<64 inches or >77 inches	<64 inches or >77 inches*	Possible‡ AETC/A2/3/10
Sitting height	<34 inches or >40 inches	<33 inches or >40 inches (for initial FC IA and II)	Possible‡ AETC/A2/3/10
Weight and buttock-knee	If outside values of Table 1.	If outside values of Table 1.†	No waiver potential for FC-I/IA because T-6 has ejection seat. Waiver for non-ejection seat a/c for all others. AETC/A2/3/10

* Weapons controllers/directors, combat control, pararescue and air battle managers do not require anthropometric waivers).
† Required for fighter track UNT, flight surgeons and any aircrew whose primary duties are in ejection seat aircraft.
‡ FC I waiver eligibility depends on functional fit and safe-escape criteria. FC IA, II, and III waiver eligibility depends on safe-escape criteria only.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

An AMS for anthropometric waivers should include the following:

- Required anthropometric measurements for the applicable flying class physical.
- If weight less than minimum standard, AMS should include weight history, review of systems, physical exam, and appropriate laboratory work up to rule out secondary causes.

V. References.

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WAIVER GUIDE
Updated: Jan 2016
Supersedes Waiver Guide of Jul 2011
By: Maj Jeffrey Woolford (RAM 16) and Dr Dan Van Syoc
Reviewed by Aeromedical Consultation Service/Neuropsychiatry Branch

CONDITION:
Anxiety Disorders (Jan 16)

I. Overview.

ANXIETY DISORDERS

Basic Features
Anxiety disorders are characterized by feelings of anxiety and fear, where anxiety is defined as a worry about future events and fear is defined as a reaction to current events. These feelings may cause physical symptoms, such as a racing heart and shakiness, and are associated with marked distress and functional impairments in multiple domains.[1] Anxiety disorders represent the second most prevalent psychiatric condition in the United States after substance use disorders.[2] They are also the most common cause of disability in the workplace in the United States.[3]

Anxiety disorders are partly genetic, but may also be a result of drug use/withdrawal, including alcohol and caffeine. They often occur with other mental disorders, particularly mood disorders and certain personality disorders. The emotions present in anxiety disorders range from simple nervousness to bouts of terror. Other medical problems that may mimic the symptoms of an anxiety disorder, such as hyperthyroidism, must be considered when diagnosing.

Diagnostic Considerations
DSM-5 is the mental health diagnostic standard. Typical symptoms of anxiety include persistent and excessive worry, restlessness, difficulty concentrating, irritability, muscle tension, and sleep disturbance. Panic attacks, a particular concern in aviation mental health due to the risk of acute incapacitation, often include an intense, abrupt surge of fear with accompanying accelerated heart rate, sweating, trembling, chest pain, nausea, dizziness, and other related physiologic symptoms.[1]

Prevalence
The lifetime prevalence rate for anxiety disorders as a group is 24.9%.[4] Generalized anxiety disorder (GAD) is the most common anxiety disorder seen in primary care.[5] The onset of GAD usually occurs before age 25 and the lifetime prevalence is 5% with a female to male ratio of 2:1.[2] The annual prevalence of panic disorder in the US is approximately 2.7% with a female to male ratio of 2:1. In contrast, a study of USAF pilots and navigators found an annual prevalence of .002%.[6] Social anxiety disorder, also known as social phobia, has a lifetime prevalence rate of 5% to 12%. It is more common in women, but an approximately equal number of men and women seek treatment for the condition.[7] Specific phobia (fearful/anxious about or avoidant of circumscribed objects/situations) has a 12-month prevalence rate between 7-9%.[1]

Recurrence
Anxiety disorders tend to have a chronic clinical course with low rates of recovery and high likelihood of recurrence.[8] One notable exception is for patients with specific phobia, who when

treated early for a clearly defined fear have shown clinically significant improvement in 70-85% of cases treated with exposure therapy.[9]

Treatment Options

Common treatment options include education on anxiety disorders and how they may manifest in a particular person's life, lifestyle changes, psychotherapy, and medications. Medications are typically recommended only if other measures are not effective.

Behavioral psychotherapy is standard treatment for anxiety disorders. In particular, exposure-based and cognitive-behavioral therapies have shown to be effective for treatment of specific phobia, social phobia, GAD, and panic disorder, and there is evidence that gains from behavioral psychotherapies are more durable than those achieved by pharmacotherapy.[9]

Healthy lifestyle interventions (exercise, relaxation, deep breathing, meditation, bibliotherapy, healthy eating, meaningful social connections, etc.) should always be considered in treatment planning. Regular exercise and reducing caffeine (from all sources) are often useful in treating anxiety. There is evidence that yoga may be effective. Quitting smoking has also had a beneficial effect, at least as significant as medication.[10]

Antidepressants are often utilized as first line psychotropic therapy if necessary to augment the effectiveness of psychotherapy and/or healthy lifestyle interventions. Select FC II/III, RPA, MOD and GBC personnel may be considered for waivers on the following monotherapies:

1. Zoloft up to 200 mg/day
2. Celexa up to 40 mg/day
3. Lexapro up to 20 mg/day
4. Wellbutrin SR or XL up to 450 mg/day

Of these approved medications, Wellbutrin is known to be less effective in treating anxiety disorders. Also, the dosage of the antidepressant tends to require "higher than usual" amounts when treating anxiety as compared to treatment for depression. This often makes Zoloft an attractive choice in treating anxiety among these approved antidepressants.

Special Considerations

Three terms that relate specifically to anxiety and flying are often used in aerospace medicine. These are: manifestations of apprehension (MOA), fear of flying (FOF), and phobic fear of flying (specific phobia in DSM-5). MOA and FOF are used to denote a non-phobic fear based on uneasiness, lack of motivation, feelings of inadequacy, rational decision, life circumstance, etc.; MOA is used with student aviators and FOF for rated/trained aviators. Both MOA and FOF are handled administratively by the commander (often in the context of a flying evaluation board or the SUPT/UNT equivalent). A mental health consultation is helpful to clarify the issues in MOA and FOF, and to help rule out a true anxiety disorder. An increasingly recognized problem in the ATC/GBC community is fear of controlling. Similar to fear of flying, these cases are almost always handled administratively.

Phobic fear of flying is a true phobia, often involving only flying, though the symptoms can broaden to other areas of life if not treated. Phobic fear of flying is handled like the other anxiety disorders: by medical disqualification, referral to mental health for evaluation and treatment, and then a return to flying when the disorder is resolved. Persistence of anxiety symptoms, despite adequate treatment or a reluctance to enter treatment, should raise questions about the aviator's motivation to fly.

II. Aeromedical Concerns.

Many of the emotional and behavioral manifestations of anxiety disorders can interfere with flying safety and mission completion. Severe anxiety can markedly impair the ability to focus and concentrate on the task at hand. Trembling may diminish the ability to manipulate controls. Palpitations, shortness of breath, chest pain, nausea, and dizziness may be significantly distracting. Some of the more severe symptoms of anxiety, such as those seen in panic disorder (overwhelming anxiety, derealization, and fear of losing control) may be acutely incapacitating. Anxiety is often a factor in depression and psychosomatic complaints as well as being associated with substance misuse, particularly alcohol. Clinical levels of situational or chronic anxiety raise concerns regarding an aviator's emotional stamina and resilience needed to manage the inherent dangers and rigors associated with flying, especially during austere and deployed conditions. It should also be noted that anxiety stemming from a chronically high operational tempo, large workload, and accumulating life stressors may manifest itself as low motivation to fly. The aeromedical disposition of flight personnel diagnosed with an anxiety disorder depends on the specific category of the disorder and phase of the illness.[11]

Anxiety disorders are generally characterized by fear/apprehension, obsessions, fear of loss of control, and physiological symptoms severe enough to interfere with social or occupational functioning.[1] Anxiety is seen in many other psychiatric disorders, but in its benign form, is part of normal emotional experience. Symptomatic anxiety can be constant or nearly so, as in generalized anxiety disorder, or episodic. Episodic spells of anxiety can begin without warning or provocation, as in panic disorder, or predictably in certain situations, as in simple or social phobia. In the latter case, efforts to avoid the anxiety-provoking stimulus can drastically impact the aviator's lifestyle.

III. Waiver Considerations.

Anxiety disorders are disqualifying for all flying classes to include ATC/GBC and MOD duties, and may be disqualifying for continued service. Untreated or undertreated anxiety disorders may have potentially disastrous consequences. If the diagnostic criteria are met for specific phobia, social anxiety disorder, panic disorder, agoraphobia, generalized anxiety disorder, substance/medication-induced anxiety disorder, anxiety disorder due to another medical condition, other specified anxiety disorder, or unspecified anxiety disorder, the aviator is disqualified.

To be considered for waiver, a mental health evaluation, with accurate diagnosis per the current Diagnostic and Statistical Manual (DSM), is the vital first step. USAF psychologists/psychiatrists familiar with aeromedical standards are the preferred choice for evaluation and potential development of the treatment plan.

If the diagnosis of an anxiety disorder is established, then grounding the aviator is necessary to allow optimal treatment to be initiated. Psychotherapy, healthy lifestyle interventions, and/or psychotropic medications may be utilized as treatment options until anxiety symptoms are fully resolved (an important goal because partial resolution of symptoms may lead to long-term psychiatric morbidity). Antidepressants are usually the psychotropic agent of choice if healthy lifestyle interventions/psychotherapy have not achieved full resolution of symptoms. Clinical judgment is required for the duration of the antidepressant treatment (maintenance treatment phase), often dictated by the duration of anxious symptoms which prompted the treatment. In treating a

first episode of major depressive disorder, antidepressants are typically continued for 6-12 months after full resolution of depressive symptoms in order to prevent abrupt relapse after medication cessation. Since there are no comparable guidelines for length of recommended maintenance treatment of anxiety, clinical judgment is necessary. Psychotherapy may be continued after symptom resolution to bolster resiliency and coping mechanisms. A waiver may be considered after six months of demonstrated stability (i.e., aviator is back to best baseline functioning). Therefore, it is important for the mental health professional to designate the date of full resolution of symptoms. It is from that date of full resolution of symptoms that six months of stability should be measured from for potential waiver, regardless of ongoing psychotropic medication and/or psychotherapy in pursuit of optimal therapeutic benefit.

If anxiety symptoms return after discontinuing treatment, a return to (or enhancement of) psychotherapy, healthy lifestyle interventions, and/or antidepressant medication for maintenance treatment should be considered. The aviator on a maintenance antidepressant (only one aeromedically approved medication allowed) needs to be on the medication with a stable dose and remain clinically asymptomatic for at least six months before waiver consideration. If a psychotropic medication is ever discontinued in an aviator, a few weeks of observation should occur before considering resuming full flight duties to ensure no adverse/unexpected side effects occur.

Table 1: Waiver potential for anxiety disorders

Flying Class (FC)	**Waiver Potential** **Waiver Authority**
I/IA	Maybe† AETC
II/III ATC/GBC	Yes* MAJCOM
MOD	Yes* AFGSC

† Waiver only likely in well-defined identifiable precipitating factors which are unlikely to reoccur.
* Waivers for untrained individuals with history of anxiety disorders are unlikely, unless demonstrated remission for several years or in well-defined identifiable precipitating factors which are unlikely to reoccur.

AIMWTS review in Jan 2016revealed a total of 10467 cases with a diagnosis of an anxiety-related disorder. Of these, 280 (26.2%) received waivers and 787 (73.8%) were disqualified. Breakdown of the cases revealed: 40 FC I/IA cases (26 disqualified), 159 FC II cases (90 disqualified), 449 FC III cases (327 disqualified), 358 ATC/GBC cases (310 disqualified), and 61 MOD cases (36 disqualified). Of interest, the large number of GBC cases resulted from numerous early disqualifications due to fear of controlling (as noted above, these cases need to be handled administratively).

IV. Information Required for Waiver Submission.

Submitting a Mental Health Waiver Guide:
AFI 48-123 –Chapter 6, USAF Medical Standards Directory, Section Q, and the Aeromedical Consultation Service (ACS) Waiver Guide addresses waiver evaluations
Step 1 - Is the aviator ready for waiver submission?

A. A waiver is submitted when the member is asymptomatic (back to best baseline functioning), as applicable to diagnostic category, for the specified time-frame below (Note: medications/psychotherapy/healthy lifestyle interventions for optimal therapeutic benefit are permissible and often advisable after initial symptom resolution):

- ☐ 6 Months—Mood Disorders, Anxiety Disorders, PTSD, & Suicidal Behavior

B. To be considered for an aeromedical waiver, any disqualifying condition must meet the following criteria per AFI 48-123 Section 6B, 6.2.1.1 through 6.2.1.6. (pg. 31):

- ☐ Not pose a risk of sudden incapacitation
- ☐ Pose minimal potential for subtle performance decrement, particularly with regard to the higher senses
- ☐ Be resolved, or be stable, and be expected to remain so under the stresses of the aviation environment
- ☐ If the possibility of progression or recurrence exists, the first symptoms or signs must be easily detectable and not pose a risk to the individual or the safety of others
- ☐ Cannot require exotic tests, regular invasive procedures, or frequent absences to monitor for stability or progression
- ☐ Must be compatible with the performance of sustained flying operations

Step 2 - Before beginning the Aeromedical Summary (AMS), Flight Surgeon must obtain Mental Health consultation and ensure it contains items specified below:
Instructions for the Mental Health Provider
The mental health evaluation must include a **comprehensive written report** addressing:

- ☐ Consultation must address each criteria in Step 1B
- ☐ Clinical mental health history (description of symptoms, treatment modality, frequency and compliance with treatment, relevant personal and family history, and perceived impact on occupational duties)
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Appropriate laboratory results (i.e., thyroid, liver function tests, drug screen, CDT**, chemical profile…)
  ***** for alcohol cases, please comment on Carbohydrate-Deficient Transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, input from line leadership, if possible, and please address current state of any triggers for the mental illness)
- ☐ Current and past aviation related duties and any history of current and past occupational performance difficulties (to include perceived impact of mental health condition on performance of duties)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Summary and interpretation of psychological/neuropsychological testing results (recommend MMPI-2, NEO PI-III, PAI, or similar personality test, as well as cognitive testing/screening).
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly or engage in special duty operations (past and current)
- ☐ Recommendation for future psychological and medical treatment

- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)
- ☐ Please forward copies of all mental health or behavioral health records (Mental health, Behavioral Health, civilian provider, ADAPT, FAP, and/or inpatient treatment records) including the raw scores, standard scores, and in some cases T-scores from completed psychological or neuropsychological testing, in addition to the written report to ACS Neuropsychiatry Branch (address is below) when member completes the attached Release of Information form **(information will be reviewed by ACS Clinical Psychologist)**

Step 3 - Items for the Flight Surgeon to include in the AMS:

- ☐ AMS must clearly address each criteria in Step 1B and the risk to the member, mission, and safety
- ☐ Summarize Mental Health history and focus on occupational impact
  ***** If 2 or more months have passed since the comprehensive evaluation/report was completed, the flight surgeon should address how the member has done since and consult with the mental health provider if the member has been seen at mental health since the evaluation*****
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Appropriate laboratory results (i.e., thyroid, liver function tests, drug screen, CDT**, chemical profile…)
  ***** for alcohol cases, please comment on Carbohydrate-Deficient Transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, if possible - please address current state of any triggers for the mental illness)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)

Step 4 - Additional items to complete the waiver package:

- ☐ Letter of support from command
- ☐ Have member complete/sign a **Release of Information** f… Clinic (where treatment was provided) for processing. Instruct the MHC to release copies of MH record (provide MHC with ACS Neuropsychiatry Branch contact information, if necessary) and send to:

NOTE:
DO NOT SEND AHLTA NOTES AS A SUBSTITUTE FOR MENTAL HEALTH

ACS Aerospace Medicine Branch, USAFSAM/FECA
c/o Neuropsychiatry Branch
2510 Fifth Street Bldg 840
Wright Patterson AFB, OH 45433-7913
Fax: (937) 904-8753 DSN: 674-8753

Please feel free to contact the ACS Neuropsychiatry Branch with questions:

MSgt Walter Croft: DSN 798-2778
walter.croft@us.af.mil

Mr. John Heaton: DSN 798-2766
john.heaton.7@us.af.mil

AUTHORIZATION FOR DISCLOSURE OF MEDICAL OR DENTAL INFORMATION

PRIVACY ACT STATEMENT

In accordance with the Privacy Act of 1974 (Public Law 93-579), the notice informs you of the purpose of the form and how it will be used. Please read it carefully.
AUTHORITY: Public Law 104-191; E.O. 9397 (SSAN); DoD 6025.18-R.
PRINCIPAL PURPOSE(S): This form is to provide the Military Treatment Facility/Dental Treatment Facility/TRICARE Health Plan with a means to request the use and/or disclosure of an individual's protected health information.
ROUTINE USE(S): To any third party or the individual upon authorization for the disclosure from the individual for: personal use; insurance; continued medical care; school; legal; retirement/separation; or other reasons.
DISCLOSURE: Voluntary. Failure to sign the authorization form will result in the non-release of the protected health information.
This form will not be used for the authorization to disclose alcohol or drug abuse patient information from medical records or for authorization to disclose information from records of an alcohol or drug abuse treatment program. In addition, any use as an authorization to use or disclose psychotherapy notes may not be combined with another authorization except one to use or disclose psychotherapy notes.

SECTION I - PATIENT DATA

1. NAME *(Last, First, Middle Initial)*	2. DATE OF BIRTH *(YYYYMMDD)*	3. SOCIAL SECURITY NUMBER

4. PERIOD OF TREATMENT: FROM - TO *(YYYYMMDD)*	5. TYPE OF TREATMENT *(X one)*
ALL	☐ OUTPATIENT ☐ INPATIENT ☐ BOTH

SECTION II - DISCLOSURE

6. I AUTHORIZE *(Name of Facility/TRICARE Health Plan)* **TO RELEASE MY PATIENT INFORMATION TO:**

a. NAME OF PHYSICIAN, FACILITY, OR TRICARE HEALTH PLAN	b. ADDRESS *(Street, City, State and ZIP Code)*
Neuropsychiatry Branch - Aeromedical Consultation Service USAF School of Aerospace Medicine	2510 5th Street, Bldg 840, Area B Wright-Patterson AFB, OH 45433-7913
c. TELEPHONE *(Include Area Code)* (937) 938-2766	d. FAX *(Include Area Code)* (937) 904-8753

7. REASON FOR REQUEST/USE OF MEDICAL INFORMATION *(X as applicable)*

☐ PERSONAL USE ☐ INSURANCE ☐ CONTINUED MEDICAL CARE ☐ RETIREMENT/SEPARATION ☒ OTHER *(Specify)* **AEROMEDICAL CONSULTATION SERVICE WAIVER PACKAGE** ☐ SCHOOL

8. INFORMATION TO BE RELEASED

All Mental/Behavioral Health (Sections A-F), ADAPT, FAP, and/or civilian records (when applicable). Please include any and all of the records to include, but not limited to: background questionnaires, intake forms, psychological/personality testing (standard, raw, T scores/reports), OQ-45 questionnaires, PCL-M, inpatient records, treatment notes (not AHLTA copies), etc.

9. AUTHORIZATION START DATE *(YYYYMMDD)*	10. AUTHORIZATION EXPIRATION DATE *(YYYYMMDD)*	☐ ACTION COMPLETED
	☐	☐

SECTION III - RELEASE AUTHORIZATION

I understand that:
a. I have the right to revoke this authorization at any time. My revocation must be in writing and provided to the facility where my medical records are kept or to the TMA Privacy Officer if this is an authorization for information possessed by the TRICARE Health Plan rather than an MTF or DTF. I am aware that if I later revoke this authorization, the person(s) I herein name will have used and/or disclosed my protected information on the basis of this authorization.
b. If I authorize my protected health information to be disclosed to someone who is not required to comply with federal privacy protection regulations, then such information may be re-disclosed and would no longer be protected.
c. I have a right to inspect and receive a copy of my own protected health information to be used or disclosed, in accordance with the requirements of the federal privacy protection regulations found in the Privacy Act and 45 CFR § 164.524.
d. The Military Health System (which includes the TRICARE Health Plan) may not condition treatment in MTFs/DTFs, payment by the TRICARE Health Plan, enrollment in the TRICARE Health Plan or eligibility for TRICARE Health Plan benefits on failure to obtain this authorization.
I request and authorize the named provider/treatment facility/TRICARE Health Plan to release the information described above to the named individual/organization indicated.

11. SIGNATURE OF PATIENT/PARENT/LEGAL REPRESENTATIVE	12. RELATIONSHIP TO PATIENT *(If applicable)*	13. DATE *(YYYYMMDD)*
	self	

SECTION IV - FOR STAFF USE ONLY *(To be completed only upon receipt of written revocation)*

14. X IF APPLICABLE:	15. REVOCATION COMPLETED BY	16. DATE *(YYYYMMDD)*
☐ AUTHORIZATION REVOKED		

17. IMPRINT OF PATIENT IDENTIFICATION PLATE WHEN AVAILABLE	SPONSOR NAME: SPONSOR RANK: FMP/SPONSOR SSN: BRANCH OF SERVICE: PHONE NUMBER:

Revised: Sep-14

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for anxiety disorders should include:
A. History with special attention to symptoms, frequency, duration, treatment, precipitating factors, action taken to mitigate recurrence and any social, occupational, administrative or legal problems associated with the case.
B. Psychiatric/psychology evaluation and treatment summary (within 2 months of package submission).
C. List any medication usage, past or current, for the anxiety disorder.
D. Letters from aviator's squadron commander or operations officer supporting or refuting a return to flying status.
E. A copy of the MEB narrative if applicable.

The AMS for waiver renewal for anxiety disorders should include:
A. Intervening history with special attention to status of previously precipitating factors, any new stresses, coping skills and work performance should be addressed.
B. Psychiatric/psychology evaluation (within 2 months of package submission).

ICD 9 codes for anxiety disorders	
291.89	Alcohol-Induced Anxiety Disorder
292.89	Substance/Medication-Induced Anxiety Disorder (name specific substance)
293.84	Anxiety Disorder Due to Another General Medical Condition
300.00	Unspecified Anxiety Disorder
300.01	Panic Disorder
300.02	Generalized Anxiety Disorder
300.09	Other specified Anxiety Disorder
300.22	Agoraphobia
300.23	Social Anxiety Disorder (Social Phobia)
300.29	Specific Phobia (*formerly* Simple Phobia)
300.3	Obsessive-Compulsive Disorder

ICD-10 codes for anxiety disorders	
F41.9	Anxiety Disorder, Unspecified
F41.0	Panic Disorder (episodic paroxysmal anxiety) without Agoraphobia
F41.1	Generalized Anxiety Disorder
F40.01	Agoraphobia with Panic Disorder
F40.02	Agoraphobia without Panic Disorder
F40.10 F40.11	Social Phobia, Generalized
F42	Obsessive-compulsive disorder
F06.4	Anxiety Disorder Due to Known Psychological Condition
F19.980	Other Psychoactive Substance Use, Unspecified with Psychoactive Substance-Induced Anxiety Disorder

V. References.

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2. Fricchione G. Generalized anxiety disorder. N Engl J Med, 2004; 351(7): 675-82.

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5. Kavan MG, Elsasser GN, and Barone EJ. Generalized Anxiety Disorder: Practical Assessment and Management. Am Fam Physician, 2009; 79: 785-91.

6. Marsh RQ, Sowin TW, Thompson WT. Panic Disorder in Military Aviators: A Retrospective Study of Prevalence. Aviat. Space Environ Med, 2010; 81:589-92.

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WAIVER GUIDE
Initial Version: Dec 2015
Supersedes Waiver Guides of Aug 2014 (Bicuspid Aortic Valve), Oct 2010 (Aortic Insufficiency), and Oct 2010 (Aortic Stenosis)
By: Dr Dan Van Syoc, Dr. Eddie Davenport (ACS Chief Cardiologist)

CONDITION:
Aortic Valve Disease (Dec 15)

I. Overview.

Aortic valvular disease is relatively common in our aviation population. Previous waiver guides have separately addressed bicuspid aortic valve, aortic insufficiency, and aortic stenosis. As there is significant overlap of these conditions, this new waiver guide will discuss all three together.

Bicuspid Aortic Valve (BAV)
BAV occurs in 1-2% of the general U.S. population and is the most common congenital cardiac malformation, excluding mitral valve prolapse.[1] BAV and calcified aortic valve are the most common causes of chronic aortic regurgitation in the US and developed countries.[2] The prevalence of BAV is 0.6% in the United States Air Force (USAF) based on a database of over 20,000 Medical Flight Screening echocardiograms (echo) performed on pilot training candidates.[3, 4] Based on current ACS database review 84% of BAV subjects will develop some degree of aortic stenosis (AS) and/or aortic insufficiency (AI) during their lifetime. Additionally, 30-40% will require aortic valve replacement during their lifetime, predominantly after age 45.[3, 4] There is an association of BAV with aortopathy and thus CT angiography of the aorta is recommended if the morphology of aortic sinuses, sinotubular junction, or ascending portion cannot be assessed accurately or fully by echocardiography or when the aortic diameter appears greater than 4.0 cm on echocardiography.[2] There is some more recent published data that may support one evaluation of the ascending aorta via CT Aorta with contrast even without any signs or symptoms or aortopathy. Waiver criteria is largely based on degree of AI or AS as below, however even in the absence of AS or AI, waiver is still required given the high progression rates of BAV. Waiver for BAV with no or trace AI will typically be followed every three years with echocardiography

Aortic Insufficiency/Regurgitation
Aortic Insufficiency (AI), particularly in its milder forms, is usually asymptomatic for decades due to the compensation of the left ventricle to the volume overload produced by this condition. Symptoms generally do not become clinically apparent until some degree of left ventricular (LV) failure has occurred, usually after the fourth decade of life. AI is therefore most commonly associated with symptoms related to left ventricular failure, (e.g., exertional dyspnea, orthopnea, fatigue, and paroxysmal nocturnal dyspnea). Symptoms of angina are rare in the absence of coronary artery disease. The severity of AI is graded as trace, mild, moderate or severe. Trace AI is considered to be a physiologically normal variant in the absence of an accompanying AI murmur and with a structurally normal three-leaflet valve. The natural progression of AI varies based on symptoms and LV dysfunction as listed below. There is very little published data on the natural history of the progression of AI, particularly the mild to moderate types in a structurally normal valve. However, in an ACS review of 877 cases of Aortic Valve insufficiency followed over 10 years, progression rates from mild insufficiency to moderate was 8%, and progression rates from moderate to severe insufficiency was 23%. In a review of all cases of any valvular regurgitation,

the aortic valve was most likely to have moderate or greater insufficiency on screening echocardiography, and the only valve in which mild insufficiency progression rates were >2%. Severe AI has a worse prognosis as seen below.

Table 1: Natural History of Severe Aortic Insufficiency[5]

Asymptomatic patients with normal LV systolic function	
• Progression to symptoms and /or LV dysfunction	<6%/year
• Progression to asymptomatic LV dysfunction	<3.5%/year
• Sudden death	<0.2%/year
Asymptomatic patients with LV systolic dysfunction	
• Progression to cardiac symptoms	>25%/year
Symptomatic patients	
• Mortality rate	>10%/year

Although there is a low likelihood of patients developing asymptomatic LV dysfunction, more than one fourth of the patients who die or develop systolic dysfunction will do so prior to the onset of any warning symptoms.

In a clinical population, AI is caused by aortic root or leaflet pathology. Root pathology is most commonly caused by dilatation associated with hypertension and aging. Other root pathologies include Marfan's syndrome, aortic dissection, ankylosing spondylitis and syphilis. Leaflet pathologies include infective endocarditis, bicuspid aortic valve and rheumatic heart disease. In the aviator population, the most common etiologies will be idiopathic AI with normal aortic valve and root and bicuspid aortic valve.

Theoretical concerns exist that extreme athletic activity or isometric exercise, or activities which include a significant component of such exercise, may promote progression of this condition and should therefore be discouraged. Examples of such activities would include the anti-G straining maneuver, weight lifting, and sprint running. Published guidelines for athletes with AI restrict activities for those with the moderate and severe types. Therefore, moderate AI and asymptomatic severe AI that does not meet guidelines criteria for surgery are restricted to non-high performance aircraft. Symptomatic severe AI and severe AI meeting guidelines criteria for surgery are disqualifying and waiver is not recommended. Moderate to severe AI should be followed closely, preferably by a cardiologist, for development of criteria for surgical intervention and to address the need for vasodilator therapy. Medications to reduce afterload, such as ACE inhibitors and nifedipine, have documented clinical benefit in chronic AI of moderate or greater severity especially if blood pressure is elevated. These medications can delay the need for surgery and improvement of surgical outcome. The use of approved ACE inhibitors and nifedipine is therefore acceptable in aviators with asymptomatic moderate and severe AI (although waiver still required).[3] An echocardiogram with Doppler flow study easily diagnoses AI and is the mainstay of severity assessment. In addition, left ventricular function and chamber size impact the assessment of the severity of disease.

<u>Aortic Stenosis</u>

Aortic stenosis (AS) usually occurs at the level of the aortic valve. Supravalvular and subvalvular forms of AS exist but are unusual congenital defects less likely to present as a new diagnosis in adult military aviator/aircrew. These would be addressed aeromedically on a case-by-case basis.

Valvular AS has several causes. In older adults the most common is senile AS, an aging-related calcifying, degenerative process. In the military aviator/aircrew population the most common cause will be associated bicuspid aortic valve. AS is still unusual in military aviator/aircrew with bicuspid aortic valve because this complication usually occurs in middle-aged or older patients.[3, 4]

While the diagnosis may be suspected by careful auscultation, AS is primarily an echocardiographic (echo) diagnosis. On echo AS is graded by a combination of mean pressure gradient across the stenotic valve and calculated valve area. Grading categories are mild, moderate and severe.[1, 3, 4, 5] The prognosis of mild AS is good and essentially normal for at least five years after diagnosis however progression is common and thus disqualifying for all pilot candidates (FCI/IA). Once AS has progressed to moderate or severe, aeromedical and clinical concerns also include sudden cardiac death, syncope, angina and dyspnea. Angina may occur in the absence of significant coronary atherosclerosis while dyspnea may appear as a result of left ventricular dysfunction. Event rates are 5% and 10% per year for asymptomatic and symptomatic moderate AS, respectively. Event rates are considerably higher for severe AS. Mild-to-moderate AS has normal expected event rates for 1-3 years, but represents AS that is likely progressing toward moderate and later severe AS. At this level of stenosis, maintenance of normal cardiac output under +Gz load is a potential aeromedical concern, prompting restriction from high performance flying duties.

Antibiotic Endocarditis Prophylaxis for Aortic Valve disease

In early 2007, the American Heart Association published new infective endocarditis guidelines that are dramatically different from past recommendations.[6] Subsequently endocarditis prophylaxis was recommended only for specified high risk groups, and only for dental procedures, respiratory tract procedures, and procedures on infected skin, skin structures or musculoskeletal tissue. The high risk group was limited to prosthetic cardiac valves, previous endocarditis, select congenital heart conditions and cardiac transplant patients with valvulopathy. Prophylaxis was no longer recommended for gastrointestinal or genitourinary procedures. Conditions commonly seen by most aerospace medicine practitioners were not included in the list of high risk conditions. Such common conditions no longer recommended for endocarditis prophylaxis include bicuspid aortic valve and aortic regurgitation with normal valve morphology.

II. Aeromedical Concerns.

Aeromedical concerns include the development and progression of AS and/or AI. Risk of a sudden incapacitating event is very low and aeromedically acceptable in the absence of significant AS or AI. Aeromedical concerns include: related symptoms such as exertional dyspnea, orthopnea and paroxysmal nocturnal dyspnea. Also the progression of AI or AS to greater than mild and the impact of the anti-G straining maneuver or isometric/dynamic exercise on the degree of AI/AS which could result in reduced cardiac output and hypoperfusion of the brain are additional concerns. Any requirement for medical therapy, such as vasodilators are important concerns for aircrew with AI/AS. Waiver policies are thus primarily dependent on the presence and severity of associated AS and AI. AI and AS severity is graded by echo as: mild, moderate and severe (AI can also be trace).[3] Asymptomatic BAV in USAF aviators was recently reviewed with 10 year progression rates of 10% for AS, 84% for AI, and 0.8% for endocarditis.[7] Progression to severe AI or AS or symptoms requiring valvular replacement was 2%. Progression rates of moderate valvular regurgitation to severe is greater than 20% over 10 years.[8] Aeromedical risks of aortopathy which can be associated with BAV include dissection and rupture and thus a one-time CT angiography of the aorta is recommended for aviators with BAV if not well visualized or dilated on echocardiography.

Aeromedical concerns for AS include progression to significant stenosis and requirement for aortic valve replacement or repair. The prognosis of mild AS is good and essentially normal for at least five years after diagnosis. Once AS has progressed to moderate or severe, aeromedical and clinical concerns also include sudden cardiac death, syncope, angina and dyspnea. Angina may occur in the absence of significant coronary atherosclerosis while dyspnea may appear as a result of left ventricular dysfunction. Event rates are 5% and 10% per year for asymptomatic and symptomatic moderate AS, respectively. Event rates are considerably higher for severe AS. Mild-to-moderate AS has normal expected event rates for 1-3 years but represents AS that is likely progressing toward moderate and later severe AS. At this level of stenosis, maintenance of normal cardiac output under +Gz load is a potential aeromedical concern, prompting restriction from high performance flying duties.[3]

III. Waiver Consideration.

All flying classes except MOD are disqualified for AI greater than trace, any degree of AS, and BAV (regardless of degree of AI & AS). Moderate to severe AS, even if asymptomatic, is also disqualifying for all classes and for retention. Finally, severe AI if symptomatic and associated with left ventricular dilation or dysfunction is disqualifying for all classes and for retention.

ACS review is required for waiver consideration. ACS evaluation may be required, depending on the flying class or for specific concerns in an individual case. Waiver recommendations are primarily dependent on the presence and severity of associated AS and AI. FC I and IA will only be waiver eligible for BAV with ≤ mild AI and no AS; any greater AI or any AS is not waiver eligible. FC II/III requires ACS evaluation for waiver consideration. ACS re-evaluations will be performed at 1-3 year intervals, depending on the degree of AI and/or AS and other related conditions such as chamber dilation, left ventricular function and left ventricular hypertrophy. As discussed above, the use of approved ACE inhibitors and nifedipine for afterload reduction is acceptable in aviators with BAV and asymptomatic moderate or severe AI.[3] Waiver may be considered after surgery; please refer to the "Valve Surgery – Replacement or Repair" waiver guide. Table 2 is a summary of the clinical manifestations and most common requirements for the separate flying class (FC) duties for BAV, table 3 summarizes recommendations for AI in a structurally normal valve, and table 4 summarizes recommendations for AS in a structurally normal valve.

Table 2. Summary of BAV and Associated Clinical Conditions and ACS Requirements.

BAV and Associated Levels of Aortic Stenosis (AS) and/or Aortic Insufficiency (AI)	Flying Class	Waiver Potential Waiver Authority	Required ACS Review and/or ACS Evaluation
BAV with no, trace or mild AI (≤mild) and no AS	FC I/IA	Yes AETC	ACS review
BAV with >mild AI or any AS	FC I/IA	No AETC	ACS review
	FC II, RPA Pilot**	Yes MAJCOM	ACS review
	ATC/GBC	Yes MAJCOM	ACS review
BAV with ≤ mild AI and/or ≤ mild AS	FC II/III, RPA Pilot**	Yes MAJCOM	ACS evaluation
	ATC/GBC	Yes MAJCOM	ACS review
BAV with moderate AI and/or greater than mild AS†	FC IIA (non-SHGA only)	Yes AFMSA	ACS evaluation
	RPA Pilot**, FC III (low performance only)	Yes AFMSA	ACS evaluation
BAV with severe AI only – asymptomatic and nonsurgical AI per guidelines	FC IIA only	Maybe* AFMSA	ACS evaluation
	RPA Pilot**, FC III (low performance only)	Maybe* MAJCOM	ACS evaluation
	ATC/GBC	Maybe MAJCOM	ACS Review
BAV with ≥ moderate AS† or with severe AI‡ surgical by guidelines	FC II/III, RPA Pilot**	No AFMSA	ACS review
	ATC/GBC	Maybe AFMSA	ACS review to confirm

* Waiver in untrained FC II and III individuals unlikely.
† Moderate to severe AS requires medical evaluation board (IRILO/MEB).
‡ Severe AI if symptomatic and associated with left ventricular dilation or dysfunction requires IRILO/MEB.
**AETC is the certification authority for initial URT

Table 3: Summary of waiver potential and required ACS evaluation for degrees of AI in aircrew.

Degree of Aortic Insufficiency (AI)	Condition	Flying Class	Waiver Potential/ Waiver Authority	Required ACS Review and/or ACS Evaluation
Trace	Trileaflet aortic valve	Qualifying for all classes	Not required (Normal variant)	ACS review to confirm
	Bicuspid aortic valve (BAV)	FC I/IA	Yes AETC	ACS evaluation
		FC II, RPA Pilot	Yes MAJCOM	ACS evaluation
Mild	Trileaflet or BAV***	FC I/IA	Yes AETC	ACS evaluation.
		FC II/III, RPA Pilot	Yes MAJCOM	ACS evaluation
Moderate	Trileaflet or BAV	FC I/IA	No AETC	ACS review to confirm
		FC IIA	Yes* AFMSA	ACS evaluation
		RPA Pilot, FC III (low performance only)	Yes* MAJCOM	ACS evaluation
		ATC/GBC	Yes MAJCOM	ACS review
		MOD	N/A	
Severe – asymptomatic and nonsurgical per guidelines	Trileaflet or BAV	FC IIA only	Maybe* AFMSA	ACS evaluation
		RPA Pilot, FC III (low performance only)	Maybe* MAJCOM	ACS evaluation
		ATC/GBC	Yes MAJCOM	ACS review
		MOD	N/A	
Severe – symptomatic or surgical per guidelines†	Trileaflet or BAV	FC II/III, RPA Pilot	No MAJCOM	ACS review
		ATC/GBC	Maybe MAJCOM	ACS review
		MOD	Maybe AFGSC	ACS review

* Waiver in untrained FC II and III unlikely. **AETC is the certification authority for initial URT
† Medical evaluation board (MEB) required. *** RPA Pilot and ATC/GBC waivers for mild disease are very likely to be approved.

Table 4: Summary of Degree of Aortic Stenosis and ACS Requirements.

Associated Levels of Aortic Stenosis (AS)	**Flying Class**	**Waiver Potential** **Waiver Authority**	**Required ACS Review and/or ACS Evaluation**
Mild AS	FC I/IA	No AETC	ACS review to confirm
	FC II/III, RPA Pilot	Yes MAJCOM**	ACS evaluation
	ATC/GBC	Yes MAJCOM	ACS review to confirm
Mild-to-moderate AS (greater than mild not meeting all criteria for moderate based on ACS review)	FC IIA (low G- aircraft)	Yes AFMSA	ACS evaluation
	RPA Pilot, FC III (low G- aircraft)	Yes MAJCOM	ACS evaluation
	IFC II (For URT)**	Yes AETC	ACS review to confirm
	ATC/GBC	Yes MAJCOM	ACS review to confirm
$\geq$ Moderate AS*	FCI/IA, II, III	No	ACS review to confirm
	RPA Pilot**	Maybe AFMSA	ACS review to confirm
	ATC/GBC	Maybe AFMSA	ACS review to confirm

* Medical evaluation board (MEB) required.
**AETC is the certification authority for initial FC II for URT.

AIMWTS search in Dec 2015 for aortic valve disease revealed a total of 372 cases. Breakdown of the cases revealed: 41 FC I/IA cases (8 disqualified), 227 FC II cases (23 disqualified), 89 FC III cases (20 disqualified), 6 ATC/GBC cases (1 disqualified), and 9 MOD cases (1 disqualified). There was significant overlap in these cases and the vast majority were mild and well controlled.

IV. Information Required for Waiver Submission.

Aeromedical Consultation Service (ACS) review/evaluation is required for all classes of flying duties for BAV with or without AI/AS, as well as for AI or AS without BAV. No additional studies are routinely required prior to ACS evaluation. If however, the treating physician deems it clinically necessary to perform additional studies, it is required that all studies be forwarded to the ACS for review. There is no minimum required non-flying observation period for waiver consideration for BAV, regardless of the presence or severity of AI or AS.

The aeromedical summary for initial waiver for aortic valve disease (initial ACS evaluation) should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history and physical examination – to include detailed description of symptoms, medications, activity level, family history, and CAD risk factors (positive and negative).
C. Copy of the local echo report and videotape or CD copy of the echo documenting BAV. (Notes 1 and 2)
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)
E. Additional local cardiac testing is not routinely required but may be requested in individual cases.
F. Results of IRILO/MEB, if required.

The aeromedical summary of waiver renewal for aortic valve disease (ACS follow-up evaluations) should include the following:
A. Complete history and physical examination – to include detailed description of symptoms, medications and activity level.
B. Local follow-up cardiac testing is not routinely required prior to ACS re-evaluation. However, in asymptomatic individuals with mild or less AS/AI, it is common for the ACS to make a recommendation based on local AMS, ECG, and echocardiogram. This often will be specified in the report of the previous ACS evaluation.
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manager for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

To expedite the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

ICD-9 codes for Aortic Valve Disease	
395.0	Rheumatic aortic stenosis
395.1	Rheumatic aortic regurgitation
395.2	Rheumatic aortic stenosis with aortic regurgitation
395.9	Other and unspecified rheumatic aortic disease
396.0	Mitral valve stenosis and aortic valve stenosis
424.1	Aortic valve disorders
746.4	Congenital insufficiency of aortic valve

ICD-10 codes for Aortic Valve Disease	
I06.0	Rheumatic aortic stenosis
I06.1	Rheumatic aortic regurgitation
I06.2	Rheumatic aortic stenosis with aortic regurgitation
I06.8	Other rheumatic aortic diseases
Q23.1	Congenital insufficiency of aortic valve
I35.8	Other nonrheumatic aortic valve disorders

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WAIVER GUIDE
Updated: Sep 2015
Supersedes Waiver Guide of May 2012
By: Lt Col An Duong (RAM 16) and Dr Dan Van Syoc
Reviewed by Dr Joshua Sill, ACS pulmonologist

CONDITION:
Asthma (Sep 15)

I. Overview.

Although it is unlikely that asthma has ever been a rare disorder, over the past twenty years the prevalence has increased by roughly 40%. Numerous hypotheses have been advanced to explain the rise in prevalence, such as decreased air exchange in energy-efficient buildings, or decreased childhood infections resulting in an upregulation of IgE-mediated immunity, but no consensus exists. Given the fact that asthma as a cause of death is rarely confused with any other etiology, and the fact that the increase in prevalence has been documented in numerous countries, the increase in prevalence is unlikely to be an artifact of inconsistent diagnostic criteria.[1-4]

That being said, variations in diagnostic criteria do affect epidemiologic studies of asthma. For such a common disease, it has been surprisingly difficult to agree on a definition. In clinical practice, inconsistent criteria have resulted in a great deal of variability in applying the diagnosis. Asthma has also had more than its share of euphemistic alternative names, including reactive airways disease, reactive bronchitis, and others. Asthma is a chronic disorder of the airways that is complex and characterized by variable and recurring airflow obstruction, bronchial hyperresponsiveness, and underlying inflammation. The interaction of these features of asthma determines the clinical manifestations, the severity of asthma and the response to treatment.[5] Excluded from this definition would be airway inflammation that complicates other structural lung diseases, or that results from serious insults, such as toxins or significant infections (e.g., smoke inhalation, industrial accidents, influenza). The qualification that the infection should be significant is important, albeit difficult to delimit. To give an example, six weeks of persistent cough following a common rhinovirus infection should raise a suspicion for asthma, and if this is a recurring pattern, the diagnosis is probable. Prolonged symptoms after viral infection are considerably more common in children, as discussed below.

With the understanding that diagnostic criteria vary, current asthma prevalence is estimated to be 8.2% of the U.S. population (24.6 million people); within population subgroups it tends to be higher among females, children, persons of non-Hispanic black and Puerto Rican ethnicity, persons with family income below the poverty level, and those residing in the Northeast and Midwest regions of the U.S.[6] Consideration of secondary etiologic factors is important, since mitigation of those factors may allow better or (rarely) complete control. Asthma often shows an atopic association, particularly with allergic rhinitis, and treatment of allergic rhinitis with immunotherapy may lead to marked improvement in asthmatic symptoms. In the absence of allergic rhinitis, immunotherapy in an attempt to directly control asthma is rarely of value. Avoidance of allergens would seem to be an obvious recommendation in atopic cases, but this is rarely practical, particularly in military environments. On occasion, a specific avoidable precipitating factor is identified by history or skin testing, and can be successfully avoided. Animal, particularly cat, allergy is the most common example whereby avoidance may succeed in controlling asthma. Chronic rhinitis may be

accompanied by sinusitis and, anecdotally, treatment of chronic sinusitis has occasionally resulted in better control of asthma. There is also an association of asthma with gastroesophageal reflux, but it is unclear which is cause and which is effect, since pressure excursions within the thorax and abdomen may predispose to reflux. Acid suppression with proton pump inhibitors rarely leads to clinical improvement, and most reviews have failed to support a role for reflux in asthma pathogenesis. However, in rare instances, reflux with nocturnal aspiration of gastric secretions may mimic asthma. As opposed to etiologic factors, exacerbating factors are often easy to identify; while these may be idiosyncratic to the individual, attacks are commonly precipitated by exercise in cold, dry air, by exposure to pollutants (e.g., exhaust fumes), or by viral respiratory infections.

Exacerbation of chronic or intermittent asthma by exercise is an extremely common symptom, reported by 70-90% of asthmatics; since it is well documented that many individuals fail to symptomatically differentiate asthma from normal exertional breathlessness, even this percentage may be an underestimate.[7, 8] In addition to exercise exacerbating bronchospasm in established asthma, there is a separate phenomenon of solitary exercise-induced bronchospasm (EIB). Unfortunately, published reports of EIB often fail to separate the two conditions, making interpretation of results difficult in those studies. Solitary EIB appears to be due to airway hyperosmolarity induced by hyperpnea and free water loss, and/or cooling and subsequent rewarming of the airways. There are no published reports of death from solitary EIB. In contrast, asthmatic deaths as a result of exercise in those with established asthma are well documented.[9] Solitary EIB occurs in recreational as well as high school and collegiate athletes; the prevalence is significant, typically affecting about 9-12% of children in athletic programs.[10] This percentage is based on results of post-exercise spirometry; many did not have significant symptoms. The phenomenon has been best studied in professional athletes. Endurance sports have a higher risk than intermittent activities. Among cross-country runners in one study, 14% of those without a history of asthma showed objective evidence of EIB.[8] The greatest risk involves winter sports, which is consistent with the likely mechanism of EIB. Screening of the 1998 Winter Olympic Team using sport-specific challenge showed an overall rate of EIB of 23%, with cross-country skiing showing a prevalence of 50%. Another study found a 35% prevalence of solitary EIB in figure skaters.[11] Unlike the case in established asthma, inflammation is generally not believed to play a role in solitary EIB, though endurance athletes in winter sports may actually show inflammatory changes on histopathology.[12]

The major symptoms of asthma include wheezing, shortness of breath, chest tightness, and cough. Both clinical experience and studies have shown that subjective reporting of symptoms does not correlate well with severity of obstruction. Patients tend to adapt to chronic airflow obstruction, so that symptoms correlate better with the rate of fall of FEV1 during an attack, rather than with the absolute degree of obstruction. Spirometry utilizing the forced vital capacity maneuver is the standard method for measuring obstruction. Proper technique and adequate effort by the individual are crucial. In the past, a ratio of FEV1/FVC less than 0.75 was used to define the presence of airflow obstruction. However, the normal range of FEV1 can vary significantly, depending on race, age, gender, and anthropomorphic measurements. Population based studies of normal individuals have been used to create algorithms that take these factors into account. By convention, we consider values above the 95th or below the 5th percentile for a given population to be abnormal. Modern pulmonary function testing equipment utilizes these algorithms to predict a normal range for spirometric testing. Airway obstruction is defined as a FEV1/FVC ratio lower than the predicted range for the individual patient. The FEV1 is used to gauge the severity of the obstruction. Reversible airway obstruction is defined as an increase of at least 12% and 200 mL in

FEV1 and/or FVC, after administration of an inhaled bronchodilator. A 12% relative and 200 mL absolute change in FEV1 over time (an interval that may be anywhere from minutes to months) should also raise suspicion that a reversible obstruction may be present. A post-bronchodilator study may also be useful in those with low-normal airflows who have a suspicious history; even if the FEV1/FVC falls within the normal range, a 12% and 200 mL improvement in FEV1 indicates reversible obstruction. Whether the finding of reversible obstruction signifies asthma, depends on the clinical setting. Bronchospasm may complicate airway inflammation from any of a number of etiologies. Serious respiratory infections such as influenza are often accompanied by airway inflammation that may persist for weeks, and the presence of reversible airflow obstruction during this period would not equate to asthma. Airflow obstruction is often a feature of other chronic diseases involving the airways (e.g., chronic obstructive pulmonary disease [COPD], bronchiectasis), and when the obstructive pathophysiology involves inflammation, the airflow obstruction may be at least partially reversible.

Children are prone to asthma. As many as a third will have symptoms compatible with asthma at some point, most often in the early pre-school years. Some of these cases represent a prolonged response to viral bronchiolitis, in particular from respiratory syncytial virus. This is especially true in infancy. The longer that symptoms persist, the more likely that the problem truly represents asthma. For childhood asthma, age shows a clear association with asthma prevalence. In the British 1958 cohort, of 880 subjects with asthma during preschool years, 50% still wheezed at age 7, 18% at age 11, 10% at ages 16 and 23.[13]

Selection of aircrew for military aviation is complicated by the fact that many asthmatics who become free of symptoms in early adolescence will suffer relapse in their twenties or early thirties. In the British 1958 study noted earlier, after reaching a nadir in late adolescence and the early twenties, the percentage of those with active wheezing rose to 27% by age 33. In general, about 30-35% of remitted childhood asthmatics will relapse. Numerous natural history studies have attempted to correlate a variety of factors (e.g., childhood pet exposure) to the risk of persistence or relapse of asthma, but results have been contradictory. Cofactors that have correlated in reasonably consistent fashion to the risk of relapse have included a history of atopy and the frequency and severity of attacks in childhood, but since the risk of relapse is only about one and a half times the background risk, neither factor is a particularly useful predictor. Furthermore, even when pediatric medical records are reasonably complete, it is surprisingly difficult except in the most severe cases to quantify frequency or severity of childhood asthma. Remission at a very early age is associated with less risk of subsequent asthma, in that those with wheezing confined to infancy, i.e., less than two years old, have been shown to be at no greater risk of adult relapse than those who never wheezed.[14]

A number of studies have shown that airway inflammation and/or hyperreactivity frequently persist in adolescents who have clinically remitted.[15-17] Regardless of whether disease activity has been measured by elevated eosinophils in bronchoalveolar lavage, abnormal endobronchial histopathology, or positive methacholine challenge testing, anywhere from a quarter to two-thirds of those in apparent remission have evidence of continued subclinical activity. Not unreasonably, this has led to a perception that bronchoprovocation testing of individuals in remission could identify those at greater risk of later relapse. Reasonable or not, the perception has proven to be incorrect. The prevalence of methacholine reactivity from childhood to adulthood has been shown to simply mirror the prevalence of asthma; many of those who show normal reactivity in their early twenties show a recurrence of reactivity at a later age.[18] A study of allergic rhinitis patients showed no

difference in the risk of developing asthma between those with positive and negative bronchoprovocation tests.[19] Most convincingly, in a publication from the data in the Dunedin (New Zealand) cohort, of 58 subjects in their mid-teens with remission of childhood asthma and negative methacholine challenge testing, 33% subsequently relapsed by age 26, consistent with historical rates of relapse.[20] Those with positive bronchoprovocation testing showed a slightly greater risk of relapse, but that group numbered only six individuals, of whom three relapsed. Broncho-provocation testing appears to be of no value in predicting relapse in remitted childhood asthmatics.

Medications employed to treat asthma are generally classified as controller, rescue, or, in the case of EIB, prophylactic therapy.[21] Rescue therapy primarily consists of a variety of short-acting beta-agonists (SABA) delivered via inhalation. In addition to the fact that these agents have a number of cardiac and neurologic adverse effects, the need for a SABA generally signifies asthma that is not under control. However, prophylactic use prior to exercising in those with solitary EIB does not indicate a similar lack of control, and within certain limits outlined below, such use is waiverable. Use of albuterol fifteen minutes before exertion generally confers protection for about four hours. Among controller medications, inhaled corticosteroids (ICS) are the mainstay of asthma therapy. They have been shown to control disease and reduce the number of exacerbations. It is very important that patients understand that these are slow-acting medications; while some benefit is apparent as early as a week or two, continued improvement may be seen for up to twelve months. Adverse effects are usually local, consisting of pharyngeal candidiasis (thrush), which is generally avoidable by rinsing and gargling after inhalation, and a smaller risk of dysphonia. At high doses, some suppression of the hypothalamic-pituitary-adrenal (HPA) axis may occur, though this is rare. Leukotriene modifiers (leukotriene receptor antagonist), including montelukast (Singulair® and Montelo-10®), zafirlukast (Accolate®) and zileutin (Zyflo®) have very few adverse effects, though they are generally less effective than inhaled steroids. Nonetheless, some patients respond well, and it can be useful as add-on therapy, or to allow reduction of the inhaled steroid. It reaches maximal effect within about a day of therapy, and doses higher than 10 mg are of no additional value. Cromolyn sodium is nearly devoid of adverse effects, but is rarely efficacious in adults.[22]

Other medications are not compatible with USAF aviation. Long-acting beta-agonists (LABA) such as salmeterol (Serevent®, contained in Advair®), formoterol (Foradil®, contained in Symbicort® and Dulera®), vilanterol (contained in Breo® Ellipta and Anoro®), olodaterol (Striverdi®), and indacaterol (Arcepta®) have been in vogue in recent years. They are generally classified as controllers, though suppressor is a better term, since they fail to address the underlying inflammatory process. Administering a LABA twice a day differs little, if at all, from plying a patient every four hours with a SABA and are not to be used as monotherapy for long-term asthma control. As with SABAs, tolerance with LABAs is a real problem, and concerns about cardiac and neurologic adverse effects are similar. The tolerance problem is best illustrated with EIB; not only does regular use of a SABA or LABA result in less prophylactic efficacy prior to exercise, and a sluggish response to rescue bronchodilation, but such use also typically results in the occurrence of more severe EIB. Furthermore, prospective data have shown use of salmeterol is associated with increased mortality, echoing the experience with isoproterenol and fenoterol in previous decades. For this reason, the U.S. Food and Drug Administration (FDA) has published an advisory, and salmeterol is not recommended as first-line therapy.[22] The possible mechanisms behind the increase in asthma mortality with salmeterol are direct toxicity, tolerance, delay in seeking help, and decreased use of inhaled corticosteroids.[23] While the study cited was performed using salmeterol, there is little reason to assume other LABAs would be any different. In fact, FDA now requires a black box warning for all drugs in this class, warning against the risks of asthma-related death.

A second class of long acting bronchodilators, known as long acting muscarinic antagonists (LAMAs), has traditionally been used to treat COPD. Drugs in this class include tiotropium (Spiriva®), aclidinium bromide (Tudorza Pressair®), and umeclidinium (contained in Anoro®). In 2010, a study published in the New England Journal of Medicine suggested that tiotropium could be useful for the treatment of asthma that was incompletely controlled with inhaled corticosteroids.[24] Since then, numerous studies have been published, confirming the efficacy of tiotropium as step-up therapy for poorly controlled asthma.[25-27] Based on this, tiotropium now has an indication for the treatment of asthma in Europe. While the manufacturer has applied to the FDA for an indication in the treatment of asthma, its utilization in this capacity currently constitutes off-label use. Furthermore, most of the aeromedical concerns regarding LABAs also apply to the use of LAMAs. For these reasons, the use of LAMAs is not waiverable.

Theophylline has a very narrow therapeutic window, and is associated with highly significant adverse effects, such as cardiac arrhythmias and seizures. Systemic steroid therapy is complicated by serious adverse effects with either acute or chronic use, and within a few weeks of therapy the HPA axis is effectively suppressed. Furthermore, the fact that the individual needs systemic steroid therapy denotes a severe degree of asthma.

II. Aeromedical Concerns.

Severity of obstruction and presence/absence of symptoms are clearly important, but the principal aeromedical concern is the risk of serious bronchospasm in response to minor insults. Since breathing cold, dry air, or exposure to smoke, fumes or pressure breathing can provoke asthma attacks; the danger of incapacitating bronchospasm is real. In particular, exercise in cold, dry air is one of the most consistent provocative stimuli, whether for established asthma or for solitary EIB. Thus, high-performance aviation is not recommended for either condition. Additionally, military aviation concerns include lack of available care in austere locations. This typically results in deployability restrictions.

III. Waiver Consideration.

Any type of asthma or history of asthma is disqualifying for all flying duties as well as for ATC/GBC and MOD personnel, as well as retention. Although some data suggests that the age of waiverable childhood asthma could potentially be lowered, current policy makers have left the regulation as it has been for the past several years.[15] A history of childhood asthma prior to the 13th birthday is waiverable; after age 12 (after the 13th birthday) waiver is not generally granted on initial flying physicals.

For trained aircrew, asthma and solitary EIB may be waivered for FC IIC (no high performance and no routine use of aviator mask) and FC III, after ACS review. The diagnosis of solitary EIB will only be entertained if no evidence of established asthma is present, and SABA should only have been used for prophylaxis. Use of more than three metered-dose inhalers per year is suspicious for utilization as rescue treatment. If evidence of established asthma is present, waiver is still possible, but the patient should be well treated, usually with an aircrew-approved controller medication.

Since ICS and montelukast both show efficacy for exercise-induced symptoms in established asthma, use of SABA should not be necessary. The sole exception would be a flare associated with

a respiratory infection, during which the aviator should be DNIF. If such a flare occurs, the individual should remain DNIF for one week after stopping use of SABA, to allow the inflammatory process to resolve. The ACS typically performs a methacholine challenge test (MCT) on all members requesting a waiver for asthma. This test is done on patients, while they are taking their controller medications to measure their level of residual bronchial hyper-reactivity. In the ACS's experience, asthmatics who require rescue inhaler use, even rarely, typically fail their methacholine challenge tests and are not granted waivers. For this reason, it is of paramount importance for the local flight surgeon to make sure the patient's asthma is under excellent control, prior to submitting a waiver application.

Table 1: Waiver potential for asthma and EIB.

Flying Class	Condition/Treatment	Waiver Potential Waiver Authority	ACS evaluation required
I/IA	History of childhood asthma ≤12 (before 13th birthday)	Yes AETC	No
	History of asthma after age 12 (≥13) and/or asthma/exercise-induced bronchospasm controlled on any medication	No AETC	No
II/III	Initial FC II/IIU, history of childhood asthma ≤12-years-old	Yes AETC	No
	Initial FC II/IIU, history of childhood asthma ≥13-years-old	No AETC	No
	Any active asthma history*	Yes **# AFMSA	Yes†&
	Asthma treated with beta-agonists‡, theophylline, systemic corticosteroids	No AFMSA	No
ATC/GBC MOD	Initial, history of childhood asthma ≤12-years-old	Yes AFMSA	No
	Initial, history of childhood asthma ≥13-years-old	No AFMSA	No
	Solitary exercise-induced bronchospasm (prophylaxed with albuterol*)	Yes AFMSA	No
	Any active asthma history*	Yes AFMSA	No
	Asthma treated with beta-agonists‡, theophylline, systemic corticosteroids	No AFMSA	No

* Use of more than three metered-dose inhalers per year is suspicious for utilization as rescue treatment.

† ACS evaluation will normally include methacholine challenge testing to assess sufficiency of therapy.

‡ Combination agents containing LABA and inhaled corticosteroid (Advair®, Combivent®) are not waiverable.

** No high-performance aircraft; no routine use of aviator mask

For FC II, a FC IIC waiver may be considered with AFMSA being the waiver authority.

& ACS evaluations for FC II personnel only.

A review of AIMWTS in Jul 2015 revealed 1416 cases of asthma or a history of asthma. There were 356 cases resulting in a disqualified disposition. Breakdown of the cases revealed 428 FC I/IA cases, 249 FC II cases, 500 FC III cases, 143 ATC/GBC cases, and 96 MOD cases. Of the 356 asthma cases disqualified, 100 were FCI/IA, 48 were FC II, 158 were FC III, 29 were ATC/GBC and 19 were MOD. In the disqualified category, about 80% were disqualified for the asthma [e.g. controlled on non-waiverable medications (Advair®, albuterol), not well controlled, childhood asthma after age 12] and the others were disqualified for other medical conditions.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for solitary exercised induced bronchospasm (EIB) should include:
A. Detailed chronology of asthmatic episodes, provocative factors, emergency room visits and treatment.
B. Rate of utilization of metered-dose inhalers.
C. Results of all (minimum of three) spirometry studies (FEV1, FVC, and FEV/FEC) (Note 1).
D. Internal medicine or pulmonary consult.
E. Medical evaluation board (MEB) results.

Note 1: At a minimum, three separate studies should be submitted, with at least a week interval between the studies. At least one study should include post-bronchodilator spirometry, regardless of whether baseline spirometry is "within normal limits." In individuals with suspected EIB, exercise challenge testing should be performed to establish the diagnosis.

The aeromedical summary for asthma should include:
A. Detailed chronology of asthmatic episodes, provocative factors, current Asthma Control Test score (Note 4), emergency room visits and treatment.
B. Results of all spirometry. Should also include results of spirometry with pre and post bronchodilator after three months on current therapy [ICS (Note 2) +/- montelukast (possibly cromolyn)].
C. Internal medicine or pulmonary consult.
D. Allergy consult if individual also has allergic rhinitis.
E. MEB results, if complete.

Note 2: The choice of ICS is probably irrelevant, though some research suggests fluticasone may cause more HPA axis suppression on an equipotent dose compared with budesonide and others. Regardless of the ICS used, it is important to use the lowest dose necessary to achieve control.

Note 3: Bronchoprovocation is not recommended as part of the waiver submission process, ACS may accomplish testing during ACS evaluation.

Note 4: The Asthma Control Test (ACT) is a quick, 5 question assessment tool that is meant to quantify the level of the patient's asthma control. It is scored on a scale of 5-25. The American

Thoracic Society considers a score of > 19 to be indicative of well-controlled asthma. The questionnaire can be found at www.asthmacontroltest.com.

ICD-9 Codes for Asthma	
493.0	Extrinsic asthma
493.1	Intrinsic asthma
493.2	Chronic obstructive asthma
493.3	Other forms of asthma (exercised induced, cough variant)
493.9	Asthma, unspecified

ICD-10 Codes for Asthma	
J45.20	Mild intermittent asthma, uncomplicated
J45.998	Other astham
493.9	Unspecified asthma, uncomplicated

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WAIVER GUIDE
Updated: Feb 2015
Supersedes waiver guide of Aug 2011
By: LtCol Tory Woodard (RAM 16), Dr. Dan Van Syoc, Lt Col Steven Gore, and Maj Eddie Davenport (ACS Chief Cardiologist)

CONDITION:
Atrial Fibrillation And Atrial Flutter (Feb 15)

I. Overview.

Atrial fibrillation (AF) is the most common type of cardiac arrhythmia. Its prevalence is 0.4-1% in the general U.S. population, although values of 1.5-2.9% have been reported in European studies. A 2012 study of United Kingdom aircrew found asymptomatic atrial fibrillation in 0.3% of patients screened during routine ECG screening. Risk factors for AF include alcohol abuse, stress, smoking, excessive caffeine intake, drugs, hyperthyroidism, acute diarrhea, respiratory disease, excessive physical activity and fatigue or exhaustion. The frequency of AF increases with age, and can be complicated by thromboembolic events, palpitations, heart failure and syncope. These complications may expose aircrew to risks which could be detrimental to flight safety. The aeromedical disposition of atrial fibrillation with other associated comorbidities should be guided by policies for the underlying comorbid conditions (e.g., hypertension, hyperthyroidism, congestive heart failure, valvular heart disease, and cardiomyopathy) and the AF considered a complication or endpoint. This waiver guide addresses lone AF, a misleading term in the cardiac literature which would be better termed idiopathic AF. Lone (or idiopathic) AF is defined as AF without structural heart disease, hyperthyroidism or hypertension in patients under age 60 at presentation. Lone AF may occur as a single isolated episode, recurrent paroxysmal events or chronically persistent AF. AF encountered in the military aircrew population will usually be lone AF that is converted spontaneously or by medical intervention within 24 hours. A single idiopathic episode often has an identifiable precipitating cause, such as acute abuse of alcohol (holiday heart syndrome) and/or other stimulant use (heavy caffeine and decongestant use, weight lifting supplements, illicit drug use, etc.) By definition Lone AF (even if persistent or permanent) is at low risk for thromboembolism, thus any risk score used to determine thromboembolic / CVA risk such as the $CHADS_2$ or a CHA_2DS_2-VASc score should be "0" and thus anticoagulation not recommended. If an aviator meets anticoagulation criteria then stroke risk is over 1% and thus permanent disqualification is recommended.

Atrial flutter is often associated with atrial fibrillation and has similar risks of tachycardia and thromboembolism. While atrial flutter may be a complication of underlying cardiac disease (36%-76% in reviewed studies), this waiver guide addresses idiopathic atrial flutter not associated with an underlying disease. The atrial rate of atrial flutter is commonly around 300 beats per minute. Typically there is physiologic AV block of 4:1, 3:1 or 2:1, yielding a ventricular rate of about 75, 100 or 150 beats per minute, respectively. However, 1:1 conduction with a ventricular rate of about 300 beats per minute is possible, especially in young and healthy subjects. Given expected resting ventricular rates up to 150 beats per minute, persistent or frequent atrial flutter thus may require AV node blocking medication for ventricular rate control.

Initial treatment of AF or atrial flutter depends on the individual's clinical status, but the major objective is to slow the ventricular rate and/or restore sinus rhythm. Medications and/or

cardioversion may be used. In cases of lone AF, one month of prophylactic therapy with beta blocker, calcium channel blocker or digitalis preparation may be used after sinus rhythm is restored to suppress short-term recurrence of AF. A history of cardioversion or short-term use of antiarrhythmic medications or anticoagulation does not preclude waiver and should not delay waiver processing.

Medications and/or radiofrequency ablation are used for long term management of paroxysmal and chronic AF and atrial flutter. Paroxysmal and chronic AF often require chronic treatment with an atrioventricular (AV) node blocking medication, such as a beta blocker, non-dihydropyridine calcium channel blocker or digitalis for ventricular rate control. The beta-blockers atenolol and metoprolol are the only AV node blocking agents currently approved for aircrew. Dihydropyridine calcium channel blockers currently approved to treat hypertension in aircrew (such as Procardia XL® and Adalat CC®) are not effective for AV node blockade. Atrial flutter can also be treated with AV node blocking medication, but control is often difficult to achieve. Both AF and atrial flutter may also be treated by radiofrequency ablation. Ablation of atrial flutter is very low risk, technically simple, and has a greater than 90% success rate. Radiofrequency ablation for AF is 70 to 85% effective in individuals with paroxysmal AF and 50 to 70% in individuals with chronic AF. Repeat ablations do carry higher success rates. Only 1.2% of those treated for paroxysmal AF have been shown to progress to persistent AF in short-term follow-up studies, with a progression rate of only 0.3% per year. Aeromedical guidelines for ablation of AF and atrial flutter are discussed in a separate waiver guide, Radiofrequency Ablation (RFA) of Tachyarrhythmias.

II. Aeromedical Concerns.

Clinical and aeromedical concerns for lone AF and atrial flutter include hemodynamic instability and exercise intolerance, thromboembolic risk and a requirement for chronic medication use to maintain sinus rhythm or to control ventricular rate. The loss of atrial contribution to cardiac output, loss of atrioventricular synchrony, and a rapid ventricular rate response during an afib/flutter episode may impair cardiac performance, especially during exertion, resulting in hemodynamic symptoms or reduced exercise capacity. This reduced exercise capacity has operational implications, especially for pilots in high performance aircraft. AV node blocking medication may be required – and without such use, the ventricular rate response of AF during exertion may quickly increase to the range of 220-250 beats per minute. Published guidelines regarding the management of AF recommend that beta blockers are safe and effective for long-term control of ventricular rate response at rest and during exercise. However, AV node blockade with beta blocker use suppresses heart rate and blood pressure response, creating an aeromedical concern regarding +Gz tolerance.

Clinical literature typically reports cardiac event rates less than 1% per year for lone AF, whether a single event, paroxysmal or chronic in mechanism. Previously, waivers for AF were limited to an isolated episode without hemodynamic symptoms. In an attempt to better define the natural history of lone AF in this young and otherwise healthy population and to refine waiver policy, the Aeromedical Consultation Service (ACS) reviewed its experience with AF in aircrew. From 1957 to 1993, 300 male aircrew were evaluated for AF approximately 6 months after the initial AF episode. Two hundred thirty-four of the 300 (78%) were found to have lone AF. The events considered were hemodynamic symptoms, cerebral ischemic events, and sudden cardiac death. The arrhythmic event rate prior to age 60 was low (0.4% per year) and the likelihood of a cerebral ischemic event before age 60 without chronic AF was minimal (none in this review). In those initially presenting with an isolated episode of AF, 63% had no recurrence, 36% developed

paroxysmal AF and 1% developed chronic AF. In those presenting initially with paroxysmal AF, 15% subsequently developed chronic AF.

III. Waiver Considerations.

History of AF and/or atrial flutter is disqualifying for flying classes I/IA, II and III. For retention purposes, any type of atrial fibrillation or atrial flutter is disqualifying. The one exception is a single episode of atrial fibrillation clearly associated with a reversible cause. Additionally, the use of maintenance medications for the treatment or prevention of major rhythm disturbances including atrial flutter or atrial fibrillation requires a waiver for retention and all flying classes. A history of catheter ablation is also disqualifying for all flying classes and is addressed in a separate waiver guide; Radiofrequency Ablation (RFA) of Tachyarrhythmias. If hyperthyroidism is determined to be the cause of the AF, a waiver may be considered per policy after correction of the hyperthyroidism (the hyperthyroidism waiver guide needs to be considered in those cases).

Table 1: Atrial fibrillation (lone), atrial flutter and waiver potential.@

Flying Class	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Atrial fibrillation, single episode, without hemodynamic symptoms, no medications, and including "holiday heart" scenario.	Maybe† AETC	Yes
	All other atrial fibrillation episodes, with or without hemodynamic symptoms.	No AETC	No
	Atrial flutter, with or without hemodynamic symptoms.	No AETC	No
II/III*** RPA	Atrial fibrillation, single episode, without hemodynamic symptoms, no medications.	Yes†$* MAJCOM&	Yes
	Atrial flutter with successful radiofrequency ablation and/or atrial fibrillation, paroxysmal or chronic, without hemodynamic symptoms, with or without beta-blocker, with or without radiofrequency ablation.	Maybe#+$ AFMSA	Yes
	Atrial flutter, without successful radiofrequency ablation and/or atrial fibrillation with hemodynamic symptoms.	No MAJCOM	No
ATC/GBC MOD**	Atrial fibrillation (unless single episode with identified reversible cause, without hemodynamic symptoms, no maintenance medications OR unless successfully ablated). ‡	Maybe† AFMSA	No
	Atrial flutter, (unless successful radiofrequency ablation).***	Maybe AFMSA	No

† Waiver for single episode AF should not be submitted until at least 3 months after conversion to sinus rhythm, including a minimum of two months off antiarrhythmic medications. There is a minimum 3 months observation before submitting waiver for paroxysmal and chronic atrial fibrillation.

$ For untrained FC II individuals waiver is unlikely and for untrained FC III individuals waiver will be considered on a case by case basis.

In cases of paroxysmal and chronic atrial fibrillation treated with or without beta-blocker, waiver will be restricted to low performance aircraft (IIA) and in case of pilots, with another qualified pilot at redundant controls (IIC).

+ If treated with radiofrequency ablation, see *Radiofrequency Ablation (RFA) of Tachyarrhythmias* waiver guide for further guidance.

* In cases of paroxysmal and chronic atrial fibrillation treated with or without beta-blocker, FC III individuals are restricted to low performance aircraft.

** Waiver authority for MOD is AFGSC.

& Atrial flutter, single occurrence, without structural cardiac abnormality and/or related to acute alcohol and/or stimulant intake, may be waiverable WITH ACS evaluation
*** Initial FC II/III waiver authority is AETC.
@ Per AFI 48-123 6.4.1.3, AFMSA remains waiver authority for all initial waivers for conditions that do not meet retention standards, unless 6.4.1.4.1 applies.
‡If individual meets all "unless" criteria for their diagnosis, then they meet the standard for GBC/MOD. If they do not meet the "unless" criteria, an MEB is required and AFMSA retains waiver authority.

Review of AIMWTS through Feb 2015 revealed 200 cases of atrial fibrillation/flutter; there were 28 disqualified cases. Breakdown of the cases revealed: 3 FC I/A cases (1 disqualified), 121 FC II cases (17 disqualified), 63 FC III cases (9 disqualified), and 5 ATC/GBC cases (0 disqualified), and 8 MOD cases (1 disqualified).

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after administrative and clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver for single episode of atrial fibrillation converted to sinus rhythm should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, blood pressure, medications, and activity level.
B. Cardiology consult.
C. Electrocardiogram (ECG) during atrial fibrillation and after conversion to sinus rhythm.
D. Report and videotape/CD copy of echocardiogram to the ACS, study performed after conversion to sinus rhythm. (Notes 1 and 2)
E. Lab testing to include Complete Blood Count (CBC), Complete Metabolic Panel (CMP) and Thyroid function test (TSH).
F. Report and representative tracings of Holter monitor performed in the final month of DNIF observation.
G. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (See notes 1 and 2)
H. Results of medical evaluation board MEB (worldwide duty evaluation for ARC members), if required.

The aeromedical summary for initial waiver for paroxysmal or chronic atrial fibrillation or atrial flutter should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, blood pressure, medications, and activity level.
B. Cardiology consult.
C. Electrocardiogram (ECG).
D. Report and videotape/CD copy of echocardiogram to the ACS. (Notes 1 and 2)
E. Lab testing to include Complete Blood Count (CBC), Complete Metabolic Panel (CMP) and Thyroid function test (TSH).

F. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (See notes 1 and 2)
G. Results of medical evaluation board MEB (worldwide duty evaluation for ARC members), if required.

The aeromedical summary for waiver renewal should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, medications, and activity level.
B. Electrocardiogram (ECG).
C. Additional local cardiac testing is not routinely required for re-evaluation cases followed at the ACS but may be requested in individual cases. If so, the previous ACS evaluation/review will specify details regarding any requested local testing.
D. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (See notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manager for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD-9 Codes for atrial fibrillation and flutter	
427.31	Atrial fibrillation
427.32	Atrial flutter

ICD-10 Codes for atrial fibrillation and flutter	
I48.91	Unspecified Atrial fibrillation
I48.82	Unspecified Atrial flutter

V. References.

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WAIVER GUIDE
Updated: Sep 2015
Supersedes waiver guide of Sep 2011
By: Dr. Kevin Van Valkenburg (RAM 16) and Dr. Dan Van Syoc
Reviewed by LtCol Eddie Davenport, Chief ACS Cardiologist

CONDITION:
Atrioventricular Conduction Disturbances (Sep 15)

I. Overview.

Atrioventricular (AV) conduction disturbances include first degree AV block, Mobitz I second degree AV block (Wenckebach), Mobitz II second degree AV block and third degree AV block (complete heart block).

First degree AV block, defined as PR interval >0.20 seconds, is common in athletes and other fit people such as aircrew. If the airman is asymptomatic without evidence of structural heart disease, there should be no limitations for flying or flying training.[1] Second degree AV block is separated into Mobitz types I and II. In type I block (Wenckebach) there is progressive delay between atrial and ventricular contraction (PR interval) with an eventual dropped beat. In most cases, Mobitz type I block does not produce any symptoms and further evaluation is normally not indicated.[2] Like first degree AV block, second degree Mobitz type I AV block is at or above the AV node and thus likely secondary to increased Vagal tone which is common in healthy airmen. Mobitz I second degree AV block is thus considered a normal variant and requires no further evaluation. Both first degree AV block and second degree Mobitz type I AV block can be intermittent and occur more often during sleep so are commonly found on Holter monitoring during sleep rather than on a 12-lead ECG performed while awake. In Second degree Mobitz type II block, as with type I block, there is a dropped beat; however, in type II block the PR interval is unchanged prior to and after the dropped beat. The site of involvement for type II block is often below the AV node which puts the patient at a considerable risk for progression to complete heart block (third degree heart block).[3] In third degree AV block (complete heart block), there is complete AV dissociation and the atrial and ventricular rates are independent of each other.

First degree AV block and Mobitz I AV block have been reported on ECG in 0.6% and 0.004% of aviators, respectively.[4] In this population these two findings are usually normal variants related to increased baseline vagal tone, especially in physically active individuals. Presentations due to underlying heart disease would be very unusual in our population, but should be considered in appropriate clinical scenarios. The site of the conduction delay is most commonly in the AV node. Exercise reduces vagal tone and typically reverses these two blocks. First degree AV block previously required a "hopogram" (exercise in place to increase heart rate) for evaluation. In 1999, the USAF Central ECG Library reviewed its database of 72 hopograms done for first degree AV block. No cases of AV conduction system disease were found. Consequently, hopogram is no longer routinely required and first degree AV block is considered to be a normal variant.

Mobitz II second degree AV block and third degree AV block have been reported on ECG in 0.003% and 0.004% of aviators, respectively. They generally are recommended for permanent pacemaker placement due to their **potentially sudden** bradycardia-related **hemodynamic**

impairment with syncope/presyncope.[4] They are not compatible with continued flying status and are also disqualifying for retention in the military.

II. Aeromedical Concerns.

Aeromedical evaluation is usually not indicated for first degree AV block and Mobitz I AV block, but the USAF Central ECG Library/ACS may request further local evaluation for unusual individual cases, such as first degree AV block with marked PR prolongation (usually >0.30 seconds), first appearance of either of these two blocks at an older age (usually >40 years), or frequent Mobitz I on an ECG or other tracing, especially while awake. Both Mobitz II second degree AV block and third degree AV block are at risk for sudden death, syncope, bradycardia-related hemodynamic symptoms and heart failure.

III. Waiver Considerations.

As noted above, first degree AV block and Mobitz I second degree AV block are generally considered normal variants and as such do not require a waiver. Mobitz II second degree block and third degree block are disqualifying for all classes. If further testing is requested by the ACS ECG Library for unusual individual cases, aeromedical disposition will be guided by the findings. Since these are normally incidental findings on routine ECGs, DNIF of the aircrew member is not required for further work-up unless specifically recommended by the ACS. Few aviators with Mobitz II second degree AV block or third degree AV block are seen at the ACS because the recommendation for permanent cardiac pacing and the risk of hemodynamic symptoms is not compatible with flying status. Waiver for these two diagnoses is unlikely. For ATC/GBC and MOD personnel, retention standards state that symptomatic or asymptomatic second degree Type II or third degree atrioventricular block, or symptomatic second degree Type I atrioventricular block are disqualifying. The exception is atrioventricular blocks which are clearly associated with a reversible cause.

Table 1: Waiver potential for AV conduction disturbances.

Flying Class	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	First degree AV block and Mobitz I second degree AV block (Wenckebach)	Not required - qualified	Yes#
	Mobitz II second degree AV block and third degree (complete) block	No AETC	Yes#
II, including untrained	First degree AV block and Mobitz I second degree AV block (Wenckebach)	Not required - qualified	Yes*
	Mobitz II second degree AV block and third degree (complete) block	No AFMSA	Yes*
III, including untrained	First degree AV block and Mobitz I second degree AV block (Wenckebach)	Not required - qualified	No (certifying authority for initial physicals may send to ECG Library)
	Mobitz II second degree AV block and third degree (complete) block	No AFMSA	Yes
ATC/GBC MOD	First degree AV block and Mobitz I second degree AV block (Wenckebach)	Not required - qualified	No
	Mobitz II second degree AV block and third degree (complete) block	No AFMSA	No

ECG Library is reviewing all FC I/IA ECGs (USAFA, USAFSAM and AD sent by HQ AETC).
* ECG Library would review; all cardiac studies on FC II individuals are required to be sent to ECG library for review.

A review of AIMWTS in Jun 2015 revealed 35 cases of AV conduction disturbances: 4 FC I/IA, 13 FC II (2 disqualifications), 16 FC III (2 disqualifications), and 2 ATC/GBC. Two of the disqualified cases were for Mobitz type II, one for multiple medical problems and one for vision-related issues. Many of the cases granted waiver were for first degree AV block or Mobitz I second degree AV block, which is no longer required.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary should contain the following information for waiver for Mobitz II second degree block, third degree (complete) block or if ECG library identifies abnormal first degree block or Mobitz I second degree block requiring waiver:
A. Complete history and physical exam – to include description of symptoms (negative included), medications/treatment, and activity level.
B. Cardiology consult. (Not required in abnormal first degree block or Mobitz I second degree block, if ECG library does not request.)
C. Electrocardiogram (ECG).
D. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)
E. MEB results.

Note 1: The address to send tracings, CDs, and reports if not uploaded electronically:
Attn: Case Manager for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD-9 Codes for AV conduction disturbances	
426.0	Atrioventricular block, complete
426.11	First degree atrioventricular block
426.12	Mobitz (type) II atrioventricular block
426.13	Mobitz (type) I [Wenckebach] atrioventricular block

ICD-10 Codes for AV conduction disturbances	
I44.2	Atrioventricular block, complete
I44.0	First degree atrioventricular block
I44.1	Mobitz (type) II atrioventricular block
I44.39	Other atrioventricular block vs. I44.1

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WAIVER GUIDE
Updated: Nov 2013
Supersedes Waiver Guide of Feb 2009
By: LtCol Robert Sarlay (RAM 13) and Dr Dan Van Syoc
Reviewed by Col Kent McDonald, chief ACS Neuropsychiatry branch

CONDITION:
Attenion-Deficit Hyperactivity Disorder (ADHD) (Nov 13)

I. Overview.

Attention deficit-hyperactivity disorder (ADHD) is characterized by disturbance of attention relative to the inability to marshal and sustain attention, modulate activity level, and moderate impulsive actions. Three types of ADHD can be diagnosed: combined inattentive, hyperactive, and impulsive (about 80% of all patients); predominately inattentive (about 10-15%); and predominately hyperactive and impulsive (about 5%). Treating providers need to be aware that behaviors of ADHD may overlap or coexist with other mental health conditions.[1] The classic triad of ADHD symptoms includes inattention and distractibility, impulsivity, and hyperactivity. While these symptoms are typical in childhood, many adults do not exhibit the full triad. Other symptom clusters typically affect adults with ADHD. Common complaints include: confusion or trouble thinking; depression or low self-esteem; difficulty maintaining a job; excessive moodiness or irritability; forgetfulness or memory difficulties; lack of organization; marital or relationship discord; poor discipline or procrastination; and underachievement, as manifested by performing below intellectual competency at work or school. The diagnosis of adult ADHD should not be made without a history that began in childhood, usually before the age of seven.[2, 3]

Until the past couple of decades, little thought was given to adult manifestations of ADHD. Clinicians now realize this disorder, once believed to "burn out" in adolescence, can persist into adulthood. Both genetic and environmental factors are undoubtedly important in the etiology of this disorder.[4] ADHD is thought to affect an estimated 3% to 11% of children in North America. The prevalence of ADHD is increasing over time. Montejano et al. showed a threefold increase from 2002 to 2007 in the prevalence of ADHD in the American adult population with the largest increase in the age group of 18-24 year-olds.[5] ADHD may continue to manifest during adulthood in 30% to 70% of cases.[6] In childhood, boys outnumber girls by as much as 10 to 1, but the disorder seems to persist in a higher proportion of girls, and by adulthood the ratio of men to women approximates 1 to 1. It is also probable that many young females manifest this disorder in ways that do not create the level of concern to parents and teachers as do boys. Most current estimates put the prevalence of ADHD in adults at 1% to 3%, with persistence of childhood disease into adult years at 30 to 70%.[7] Typical childhood symptoms are likely to present in adult years as poor time management, trouble initiating and completing tasks, trouble with multitasking, procrastination, and avoiding activities that demand adult attention.[2] Many of these symptoms are common to normals, but the diagnosis is made when the symptoms interfere with school/work/relationships and activities of daily living.

Longitudinal studies have shown that ADHD symptoms persist into adult life. Biederman et al showed in a cohort of youths aged 15 to 19 at 16 year follow-up that the ADHD subjects as compared to controls had significant impairment in psychosocial, educational, and neuropsychological functioning which could not be accounted for by other pathology.[8] Brook et al

likewise showed a strong correlation of adolescent ADHD predicting adult work performance impairment; in fact they showed an adjusted odds ratio of 2.46 with a $p < 0.01$ for their cohort of patients followed to a mean age of 37 that adolescent ADHD would have impaired work performance.[9] Additional research has shown that adults with diagnosis of ADHD have a threefold increase risk of motor vehicle collisions, and an increase of industrial accidents are seen whether treated with medication or not.

Treatment of ADHD in adults is similar to that of children, although the results in adults are much less predictable than in children. The mainstay of treatment in both groups is pharmacologic treatment with stimulants, which have demonstrated a clinically and statistically significant effect on reducing ADHD symptoms, although some trials have shown that 30% to 50% of adult subjects either do not respond or have adverse effects. There has been some recent success with non-stimulant medication, particularly atomoxetine.[3] Others believe that the issue with many "non-responding" adults is that they are probably underdosed.[10] Non-pharmacologic treatment of ADHD in adults has not been studied. However, it is accepted that psychological treatment (often in a group setting) can improve patients' lives by teaching them how to structure their environment and improve their organizational skills, how to improve social skills and relationships, and how to manage mood liability.

II. Aeromedical Concerns.

Symptoms of ADHD are incompatible with flying duty however, psychiatric diagnoses made during childhood or as adults are occasionally found to be unsubstantiated in light of a careful, accurate history. This is particularly true in adults if the service member has had no symptoms since early childhood. The more subtle learning and cognitive inefficiencies that can degrade performance under the demands of military flying may not be detected or recognized in prior non-flying pursuits. As it is unlikely that an initial flight applicant or rated aviator would self-identify as suffering from attention deficit disorder, the clinician must have a high index of suspicion for this disorder. Complaints may come to the attention of the flight surgeon through the reports of spouses, supervisors, colleagues or other aircrew. In such cases, it needs to be stressed that the aviator's behavior must be sufficiently inappropriate for their age, as well as be excessive, long-term, and pervasive.[7] The flight surgeon or clinician who suspects ADHD must attempt to establish a retrospective childhood diagnosis. Diagnostic skepticism is warranted in the context of a referral for poor performance when there is no prior history of cognitive or behavioral problems. Since the diagnosis of ADHD is a clinical one, a comprehensive interview plus careful neuropsychological testing are important diagnostic procedures.

A confirmed diagnosis of ADHD was disqualifying for all classes of flying until 2009. Since then ADHD is no longer considered disqualifying if the individual can demonstrate passing academic performance and there has been no medication use in the past 12 months. With the policy change and the increased incidence of diagnosis in the community, aviators with a diagnosis of ADHD or a history of such are more common.

Use of medication to control ADHD particularly a stimulant medication(s), remains incompatible with flying. Further, ADHD can put military retention at risk if treatment with medication is required for adequate duty performance.[11] If unable to perform without medication or if unable to meet AFSC qualifications due to the need for medication, referral to the unit commander for

determination of administrative disposition is appropriate. If treatment with medication is not required for adequate duty performance, the member remains suited for continued military service.

III. Waiver Consideration.

ADHD is only disqualifying for flying duties in the US Air Force if the applicant requires the use of medication or if there is demonstrated academic performance failure. Current US Air Force policy allows the high achieving interpersonally skilled applicant with ADHD or a history of ADHD who is not on medication entry into training despite literature which shows adults with ADHD can still have significant neurocognitive dysfunction whether on medication or not. The change in policy means that a waiver is no longer needed for aircrew with a history of ADHD controlled with medication if they can function without the 'need' for medication in the last 12 months and have not manifested a degradation of their performance of duties or academics.

Table 1: Waiver potential for ADHD

Flying Class (FC)	**Waiver Potential Waiver Authority**	**ACS review/evaluation**
I/IA	Maybe** AETC	Maybe*
II/III	Maybe** MAJCOM+	Yes*
ATC/GBC MOD$	Maybe # MAJCOM+	Maybe

+ For untrained FC II and III personnel as well as ATC/GBC, waiver authority is AETC; otherwise it is the MAJCOM of assignment.
* ACS review/evaluation if requested by AETC for initial FC I/IA, FC II and FCIII applicants.
** Untrained individuals with passing grades in high school or college and who have not used any medications for at least twelve months do NOT require a waiver for ADHD. No waiver has been granted to date for ADHD controlled on medication for flying class II or III.
# Individuals with passing grades and academic performance who have not used any medications for at least twelve months do NOT require a waiver. Commander determines suitability for continued service. Treatment with medications would be disqualifying and no waiver has been granted to date for ADHD controlled with medication for these duties.
$ Waiver authority for MOD personnel is AFGSC.

AIMWITS search in Nov 2013 revealed a total of 234 cases with 128 of them resulting in a disqualification disposition. There were a total of 34 FC I/IA cases of which 9 were disqualified; 28 FC II cases with 11 disqualifications, 104 FC III cases with 70 disqualifications, 43 ATC/GBC cases with 27 disqualifications, and 25 MOD cases 11 disqualifications.

IV. Information Required for Waiver Submission.

Submitting a Mental Health Waiver Guide:

AFI 48-123 –Chapter 6 (pg. 55) and the Aeromedical Consultation Service (ACS) Waiver Guide addresses waiver evaluations

Step 1 - Is the aviator ready for waiver submission?

A. Waiver is submitted when 1) the member is asymptomatic and 2) medications/psychotherapy treatment have been completed, as applicable to diagnostic category, for the specified time-frame below (Note: psychotherapy "booster sessions", and sometimes SSRIs, are permissible and often advisable after initial symptom resolution):

- ☐ 1 Year—Psychotic Disorders & Somatoform Disorders
- ☐ 6 Months—Mood Disorders, Anxiety Disorders & Suicidal Behavior
- ☐ Discretion of Flight Surgeon—Adjustment Disorders & V-Codes requiring waiver
- ☐ For Traumatic Brain Injury cases, please refer to TBI Waiver Guide
- ☐ For aviators with any other psychiatric disorders, please refer to AFI 48-123 and ACS Waiver Guide

B. To be considered for an aeromedical waiver, any disqualifying condition must meet the following criteria per AFI 48-123 Section 6B, 6.2.1.1 through 6.2.1.6. (pg. 57-58):

- ☐ Not pose a risk of sudden incapacitation
- ☐ Pose minimal potential for subtle performance decrement, particularly with regard to the higher senses
- ☐ Be resolved, or be stable, and be expected to remain so under the stresses of the aviation environment
- ☐ If the possibility of progression or recurrence exists, the first symptoms or signs must be easily detectable and not pose a risk to the individual or the safety of others
- ☐ Cannot require exotic tests, regular invasive procedures, or frequent absences to monitor for stability or progression
- ☐ Must be compatible with the performance of sustained flying operations

Step 2 - Before beginning the Aeromedical Summary (AMS), Flight Surgeon must obtain Mental Health consultation and ensure it contains items specified below:

Instructions for the Mental Health Provider

The mental health evaluation must include a **comprehensive written report** addressing:

- ☐ Consultation must address each criteria in Step 1B
- ☐ Clinical mental health history (description of symptoms, treatment modality, frequency and compliance with treatment, relevant personal and family history, and perceived impact on occupational duties)
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…)
  ***** for alcohol cases, please comment on Carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, input from line leadership, if possible, and please address current state of any triggers for the mental illness)
- ☐ Current and past aviation related duties and any history of current and past occupational performance difficulties (to include perceived impact of mental health condition on performance of duties)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)

- ☐ Summary and interpretation of psychological/neuropsychological testing results (recommend MMPI-2, NEO PI-R, or similar personality test). For neuropsychological cases, please contact ACS neuropsychologist (Dr. Gary Ford, DSN: 798-2704) for guidance on recommended neuropsychological tests.
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly or engage in special duty operations (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)
- ☐ Copies of all records (mental health/ADAPT/inpatient) and raw testing data should be on hand for shipment to ACS Neuropsychiatry Branch

Step 3 - Items for the Flight Surgeon to include in the AMS:

- ☐ AMS must clearly address each criteria in Step 1B and the risk to the member, mission, and safety
- ☐ Summarize Mental Health history and focus on occupational impact
  ***** If 2 or more months have passed since the comprehensive evaluation/report was completed, the flight surgeon should address how the member has done since and consult with the mental health provider if the member has been seen at mental health since the evaluation*****
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…)
  ***** for alcohol cases, please comment on Carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, if possible - please address current state of any triggers for the mental illness)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)

Step 4 - Items to complete the waiver package:

- ☐ Letter of support from command
- ☐ Comprehensive mental health written-report
- ☐ Confirm mental health has made copies of chart(s) and testing. When requested send to:

ACS Aerospace Medicine Branch, USAFSAM/FECA
c/o Neuropsychiatry Branch
2510 Fifth Street Bldg 840
Wright Patterson AFB, OH 45433-7913
Fax: (937) 904-6296 DSN: 674-9296

Please feel free to contact the ACS Neuropsychiatry Branch with questions:
TSgt Tonya Merriweather: DSN 798-2703 or Mr. John Heaton: 798-2766

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for ADHD should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of ADHD specifically including psychological and neuropsychological evaluation reports (with their raw data) and any pertinent past medical or mental health records. Aeromedical summary should include details of social, occupational, administrative, or legal problems, including analysis of the aeromedical implications of this particular case history. Also include a detailed history of academic achievement and use of any educational accommodations. For FCII and FCIII a letter from the flier's aviation supervisor or commander supporting a return to flying status.
C. Consultation from a mental health professional preferably with expertise in ADHD.

The AMS for waiver renewal for ADHD should include the following:
A. Interval history.
B. All applicable labs testing results.
C. Consultation from mental health professional.

ICD-9 codes for ADHD	
314.00	ADHD, primarily inattentive type
314.0	ADHD, child or adult
314.01	ADHD with hyperactivity

ICD-10 codes for ADHD	
F90.0	ADHD, primarily inattentive type
F90.0	ADHD, unspecified type
F90.1	ADHD with hyperactivity

V. References.

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11. Fitzgerald D, Navathe P, and Drane A. Aeromedical Decision Making in Attention-Deficit/Hyperactivity Disorder. Aviat Space Environ Med, 2011; 82: 550-4.

WAIVER GUIDE
Updated: Sep 2015
Supersedes Waiver Guide of Mar 2011
By: Col. Tim Duffy (RAM 16) and Dr. Dan Van Syoc
Reviewed by LtCol Joseph Gower, AF/SG Consultant for Orthopedic Surgery

CONDITION:
Back Pain (Chronic Low) (Sep 15)

I. Overview.

Virtually everyone experiences low back pain (LBP) at some time in their lives. Chronic LBP refers to spinal and paraspinal symptoms in the lumbosacral region for >12 weeks. Subacute LBP lasts from 4-12 weeks and acute LBP resolves within 4 weeks.[1] LBP is second only to upper respiratory problems as a reason to visit primary care providers.[2] LBP affects men and women equally and is most prevalent in the age range of 30 - 50 years. Occupationally, it is the most common cause of work related disability in people under 45 years of age.[3] Aeromedically, a Royal Air Force study found a 13% incidence of backache directly related to flying in their pilots.[4] The total costs of LBP in the US exceeds $100 billion annually and 75% of the total cost is attributable to fewer than 5% of all patients.[2, 5] Back pain is the most common and most expensive cause of work-related disability in the population younger than 45 years.[6] For work-related cases, risk factors for the development of disabling chronic or persistent back pain include preexisting psychological distress, disputed compensation issues, others types of chronic pain, and job dissatisfaction.[7]

It is estimated that up to 85% of patients with isolated LBP cannot be given a precise diagnosis based on symptoms and anatomy.[5, 8] Commonly accepted risk factors include increasing age, heavy physical work, bending, twisting, vibration, obesity, poor conditioning, static work postures, sustained or repeated applications of force, sustained awkward postures, rapid repeated motions, cold environment, fatigue, smoking, severe scoliosis, and psychological/psychosocial factors.[9] Vibration is rarely thought of, but it was the most commonly reported cause of back pain in occupations that had prolonged whole body vibration exposures.[10] Vibration exposure in the 4 to 6 Hz range, as seen in motor vehicle operation (truck drivers), has been shown to be a risk factor for LBP. In the aeromedical environment, rotary wing aviators are at the highest risk for vibration associated injury. Repeated exposures to vibration can fatigue the paraspinal musculature which can lead to injury.[4, 10] Some feel that the increased incidence of back pain in helicopter pilots is due to vibration, while others feel it is also attributable to their bent-over posture while flying.[4, 11]

Randomized Controlled Trials (RCTs) show that 90% of patients with acute LBP recover within 2 weeks, 75% within 4 weeks and 95% within 12 weeks with or without treatment.[12, 13] Mechanical LBP accounts for 97% of the diagnosis; etiologies include 70% lumbar strain/sprain, 10% degenerative processes, 4% herniated disc, 4% osteoporotic compression fracture, 3% spinal stenosis, 2% spondylolisthesis, 1% traumatic fracture, and less than 1% congenital disease. Referred pain from visceral disease accounts for 2% including disease of the pelvic organs, renal disease, aortic aneurysm, and gastrointestinal disease. Non-mechanical spinal conditions account for approximately 1% which includes neoplasia (0.7%), inflammatory arthritis (0.3%), and infection (0.01%).[8] This waiver guide primarily deals with mechanical LBP due to lumbar strain/sprain and degenerative processes. For other causes of low back pain, see the Herniated Nucleus Pulposus

(HNP) and Spinal Fusion, Spinal Fracture, and Spondylolysis Spondylolisthesis waiver guides for help with those topics.

Initial evaluation of LBP should include a history and physical to help place the individual into one of three broad categories: nonspecific LBP, back pain with radiculopathy, or back pain with another specific spinal cause (i.e. spinal stenosis). The "red flags" of back pain include; history of trauma, age greater than 50 years or less than 20 years, history of malignancy or immune compromised, pain which worsens when supine, recent onset of bowel or bladder dysfunction, saddle anesthesia, and severe or progressive neurologic deficit of the lower extremities.[5] Other significant history includes chronic corticosteroid use, unexplained weight loss, IV drug use, recent urinary tract infection, pain over one month duration, or failure to improve with conservative therapy. Psychosocial factors and emotional distress should be assessed because they are stronger predictors of adverse LBP outcomes than either physical examination findings or severity and duration of pain. Routine imaging and other diagnostic tests in individuals with nonspecific LBP is not recommended; whereas in individuals with LBP and severe or progressive neurologic deficits or when serious underlying conditions are suspected then imaging is appropriate.[5] Individuals with persistent (> 4 weeks) LBP and signs or symptoms of radiculopathy or spinal stenosis should be evaluated with MRI and plain radiographs. Of note, anatomic evidence of a herniated disc may be found in 22 - 40% of asymptomatic persons. Bulging discs may be seen in up to 81% of asymptomatic persons.[8]

Evaluation of nonspecific LBP rarely necessitates use of imaging modalities. As the vast majority resolve with conservative therapy, imaging adds little to the care and evaluation of the patient.[5] Initial advice for most patient is to maintain activity as tolerated. Bedrest does not improve function or decrease pain levels.[1, 12] Multiple therapeutic modalities are available for LBP, particularly lumbar strain/sprain and degenerative processes. For most patients with LBP, recommendations are to resume walking and normal daily activities as quickly as possible. Nonsteroidal anti-inflammatory drugs (NSAIDs) are first-line medications for acute LBP based on 37 high or moderate quality RCTs. Muscle relaxants are second-line treatment after NSAIDs for acute LBP based upon 32 RCTs. However, for chronic LBP, muscle relaxants are not recommended. Tricyclic antidepressants (TCA) have been shown to effectively treat pain in about one-third of those with chronic LBP. Treating chronic LBP with narcotics is strongly not recommended. Narcotics should only be used with acute LBP refractory to NSAIDs, muscle relaxants and TCAs.[12, 14] Other recommended treatment modalities for chronic LPB include aquatic therapy, yoga, tai chi, and massage. TENS is not recommended for acute LBP based on 32 RCTs but is reserved for chronic LBP. A review of 36 RCTs on spinal manipulation yielded mixed results. Current guidelines are unable to validate any recommendation; however, consideration is warranted. Based on 20 RCTs, there is no quality evidence for traditional Chinese acupuncture with acute LBP, yet with chronic LBP it may be effectively used as an adjunct to other treatments. Epidural glucocorticosteroid injections are not recommended for acute, subacute, or chronic LBP in the absence of significant radicular symptoms based on a review of 24 RCTs. Oral steroids are also not recommended unless there are radicular symptoms.[14] Traction, corsets and braces have not been shown to be of much benefit for acute or chronic back pain or prevention of recurrence of back injury. With chronic LBP, an early multidisciplinary approach to combine cognitive-behavioral therapy, patient education, supervised exercise, selective nerve blocks, or other strategies to restore functioning is recommended.[8]

For additional information and Evidenced Based Clinical Practice Guidelines:

An Evidence-Based Clinical Practice Guideline from the American Pain Society[15] and DOD/VA Clinical Practice Guidelines "Assessment and Management of Low Back Pain" – http://www.healthquality.va.gov/low_back_pain_lbp_clinical_practice_guideline.asp

II. Aeromedical Concerns.

The final aeromedical disposition for mechanical LBP due to lumbar strain/sprain and degenerative processes is dependent on the degree of functional residual impairment that remains once treatment and rehabilitation are completed. The flight surgeon must ascertain that the airman can safely perform all flight duties. There should be no significant limitation of motion, loss of strength, or functional impairment that may compromise safe operation of the aircraft, and/or safe egress. If the patient responds well to therapy and there are few or no recurrences, the airman may be eligible for continuation of flight duties. If the LBP is recurrent and disabling it is disqualifying for all flight classes regardless of the cause. LBP due to other causes such as herniated disc, spondylolisthesis, and spinal fractures has unique aeromedical concerns and is discussed in their respective waiver guides.

Aircrew members who wear chest, back or seat style parachutes may use a lumbar pad to provide comfort to the lumbar region of the individual's back and keep the spine in the best position to withstand shock. Air Force Instruction 11-301, volume 2, permits a flight surgeon to authorize use of the inflatable lumbar support pad MXU-22/P.[16] This pad, if correctly fitted, may help to preserve the lordotic curve, reducing lower back muscle strain. Technical order 14P3-12-1 provides further guidance for the lumbar pads. Aircrew Flight Equipment Specialists can obtain, fit and provide specific guidance on the use of lumbar pad.

III. Waiver Consideration.

Back pain is specifically disqualifying for Flying Classes I/IA, II, and III. FC IIU personnel are disqualified based on the following terminology: "History of disease or injury of the spine or sacroiliac joints, either with or without objective signs, which has prevented the examinee from successfully following a physically active lifestyle or associated with local or referred pain to the extremities, muscular spasms, postural deformities, requires external support, requires frequent treatment, or prevents satisfactory performance of duties.." ATC/GBC and MOD personnel are disqualified based on this definition: "Chronic back or neck pain, regardless of cause, which requires ongoing duty or deployment restrictions for over a year, or ongoing specialist follow-up more than annually, or frequent duty absences, or chronic/recurrent use of narcotics."

Table 1: Waiver potential for chronic low back pain

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	Chronic Pain#	No AETC
II/III	Chronic Pain#	Yes* MAJCOM
ATC/GBC MOD	Chronic Pain#	Yes* MAJCOM**

* Waiver is unlikely for untrained personnel.
** Waiver authority for MOD personnel is AFGSC
# If member does not meet retention standards (Chronic back or neck pain, regardless of cause, which requires ongoing duty or deployment restrictions for over a year, or ongoing specialist follow-up more than annually, or frequent duty absences, or chronic/recurrent use of narcotics), the waiver authority is AFMSA

AIMWTS search in Jul 2015 revealed a total of 399 individuals with waiver dispositions containing the diagnosis of LBP. Of the total, there were 6 FC I/IA cases (4 disqualifications), 125 FC II cases (24 disqualifications), 213 FC III cases (133 disqualifications), 38 ATC/GBC cases (26 disqualifications), and 17 MOD cases (11 disqualifications). The cause for the disqualification in the vast majority of the 198 disqualified cases was strongly related to the issue of LBP.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for <u>initial waiver</u> for chronic LBP should include the following:
A. History - Must define the back pain symptomatology; location, radiation, duration, conditions that improve or aggravate the pain, limitations of activities, treatment, and medications. Discuss any "Red Flags" such as bowel and bladder dysfunction and address pertinent negatives.
B. Physical exam – range of motion, muscle strength, gait, sensation, reflexes, etc.
C. Reports of any radiological or neurological studies and lab work to exclude specific causes of back pain.
D. All specialty consults/opinions obtained.
E. MEB results if appropriate.

The aeromedical summary for <u>waiver renewal</u> for chronic LBP should include the following:
A. Brief history of back pain symptomatology; location, radiation, duration, conditions that improve or aggravate the pain, work-up and treatment. Include the interval history since last waiver with special attention to changes in symptoms, exasperation and work impact.
B. All specialty consults/opinions obtained.

ICD-9 code for low back pain	
742.2	Lumbago
742.5	Backache, unspecified

ICD-10 code for low back pain	
M54.40	Lumbago with sciatica, unspecified side; M54.41 right side, M54.42 left side
M54.89	Other dorsalgia

V. References.

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WAIVER GUIDE
Updated: Mar 2015
Supersedes Waiver Guide of Mar 2012
By: Dr. Vanessa Pearson (RAM 16), Col Roger Hesselbrock (ACS Neurologist), and Dr. Dan Van Syoc

CONDITION:
Bell's Palsy (Mar 15)

I. Overview.

Bell's palsy, or idiopathic facial paralysis, is an acute, unilateral, peripheral, lower-motor-neuron nerve palsy involving the facial nerve (CN VII); the cranial nerve that supplies all the muscles of facial expression. Bell's palsy is named after Sir Charles Bell (1774-1842), the first to describe the syndrome along with the anatomy and function of the facial nerve.[1] It is the most common disorder affecting the facial nerve and is responsible for approximately 80% of all facial mononeuropathies. Epidemiologic studies show that Bell's palsy affects 11-40 people per 100,000 annually with a peak incidence between the ages of 15 and 50. More than 60,000 cases are diagnosed in the U.S. each year, and there are similar incidence rates reported for males and females.[2] Bell's palsy is more common in those with diabetes, upper respiratory ailments, or compromised immune systems.[3] In addition, pregnancy is an independent risk factor for developing Bell's palsy.[3, 4]

Bell's palsy is considered a diagnosis of exclusion. Idiopathic nerve edema most likely causes rapidly progressive facial paralysis over 24 to 48 hours. The nerve edema is thought to be caused by a viral insult from either activation of a latent herpetic infection or an upper respiratory tract viral infection.[5] However, there is currently no known concrete cause of Bell's palsy. The following should be considered when evaluating for Bell's palsy: (1) it is rapid in onset (<72 hours), (2) it is diagnosed when no other medical etiology is identified, (3) bilateral Bell's palsy is rare, (4) other conditions may cause facial paralysis (e.g. stroke, brain tumors, tumors of the parotid gland or infratemporal fossa, cancer involving the facial nerve, and systemic and infectious diseases such as zoster, sarcoidosis, and Lyme disease), and (5) it is typically self-limited.[3] Determining whether the facial nerve paralysis is peripheral or central is vital when making the diagnosis. A lesion involving the central motor neurons above the level of the facial nucleus in the pons causes weakness of the lower face alone, whereas Bell's palsy will manifest as weakness/paralysis of the upper (above the eyebrows) and lower face.[4] Patients with Bell's palsy will typically present with unilateral facial weakness of sudden onset with maximum weakness often seen within two days. Patients may think they have had a stroke or serious brain lesion. Up to 60% will report a preceding viral illness.[3] Common findings include eyebrow sagging, inability to close the eye, disappearance of nasolabial fold, and the mouth being drawn to the non-affected side. The clinician can assess facial movement by observing the response to a command to close the eyes, elevate the brow and frowning, showing the teeth, and puckering the lips.[6] Other presenting symptoms may include ipsilateral earache and/or numbness of the face, tongue, and ear. Cases of hyperacusis (from stapedial muscle dysfunction), tinnitus, taste disturbances (from injury to nervus intermedius proximal to the geniculate ganglion), and decreased lacrimation have been reported as well.[2, 3] Grading systems (e.g. House-Brackmann and Sunnybrook facial grading systems) have been developed to serve as clinical indicators of severity and objective records of progress.[3, 6] (Table 1)

Table 1: House-Brackmann Classification of Facial Nerve Dysfunction[6]

Grade	Characteristics
I. Normal	Normal function in all areas
II. Mild Dysfunction	Gross Slight weakness noticeable on close inspection May have slight synkinesis Normal symmetry and tone at rest Motion Forehead: Moderate to good function Eye: Complete closure with minimal effort Mouth: Slight asymmetry
III. Moderate Dysfunction	Gross Obvious but not disfiguring difference between the two sides Noticeable but not severe synkinesis, contracture, or hemifacial spasm Normal symmetry and tone at rest Motion Forehead: Slight to moderate movement Eye: Complete closure with effort Mouth: Slightly weak with maximum effort
IV. Moderately Severe Dysfunction	Gross Obvious weakness and/or disfiguring asymmetry Normal symmetry and tone at rest Motion Forehead: None Eye: Incomplete closure Mouth: Asymmetric with maximum effort
V. Severe Dysfunction	Gross Only barely perceptible motion Asymmetry at rest Motion Forehead: None Eye: Incomplete closure Mouth: Slight movement
VI. Total Paralysis	No movement

The natural history of Bell's palsy is favorable. Left untreated, 85% of patients will show at least partial recovery within two to three weeks of onset and completely recover within three to four months.[1, 3, 6] Without treatment, about 70% with complete paralysis and as many as 94% with incomplete paralysis will experience complete restoration of facial function within six months.[3] At least 70% of treated patients with Bell's palsy have full recovery within days, but it can take up to several months in rare cases. Those with observable facial movement with an incomplete paralysis experience an almost universal good recovery.[5] Prognosis of Bell's palsy is related to the severity of the lesion. In general, clinically incomplete lesions tend to recover. The prognosis is favorable if some recovery is seen within the first 21 days of onset.[6] Risk factors thought to be associated with poor outcomes include: 1) age >60 years, 2) complete paralysis, and 3) decreased taste or salivary flow on the side of paralysis (i.e. 10-25% compared to the patient's normal side). Other factors that

may be associated with poor outcome include pain in the posterior auricular area and decreased lacrimation.[4] If the ipsilateral forehead muscles are spared, this would indicate a central lesion rather than peripheral.[6]

While the majority of Bell's palsy patients will recover spontaneously even if left untreated, it is very difficult to determine which patients will spontaneously improve and which will not. Electrodiagnostic studies can be helpful to determine the prognosis; however, these tests are not necessary in a majority of patients. However, electrodiagnostic studies may be warranted for prognostic purposes with atypical, clinically complete lesions that do not fully recover. Electrodiagnostic testing to stimulate the facial nerve can assess the level of insult. Additional testing may be useful in atypical patients as well. Serologic studies can be used to test for infectious causes. Screening blood studies for underlying systemic disease or infection should be strongly considered in cases without spontaneous and rapid improvement and should include screening for Lyme disease, syphilis and herpes zoster. Hearing and vestibular testing may be needed to determine if the cochlear nerve, inner ear or vestibular nerve are involved. Finally, a Schirmer tear test can measure the eye's ability to produce tears.[3]

Imaging is warranted if physical signs are atypical, there is slow progression beyond three weeks, or if there is no improvement at six months.[7] High resolution computed tomography (CT) is excellent for bony detail, and CT and/or magnetic resonance imaging (MRI) can identify infection, inflammation, tumors, fractures, or other potential causes for facial nerve involvement that may define potential surgical causes.[3, 7] MRI with and without gadolinium enhancement may demonstrate pathological enhancement in Bell's palsy, and is reported in a majority of patients. The absence of enhancement may be a good prognostic sign. In the rare cases requiring surgical decompression, surgeons have noted the presence of facial nerve swelling.[7]

Treatment is usually non-surgical and most clinicians feel it is important to begin treatment quickly. As noted above, as many as 30% of patients with complete paralysis will not recover complete facial function. Given the dramatic effect of facial paralysis on patient appearance, quality of life, and psychological well-being, treatment is often initiated in an attempt to decrease the likelihood of incomplete recovery.[3] Therapy has historically involved aggressive treatment with corticosteroids. Grade A evidence based on high-quality randomized controlled trials shows overwhelming benefit over harm for the use of oral steroids as early therapy in Bell's palsy.[3 ,8, 9] Treatment should begin within three days of symptom onset. Some sources suggest a regimen of high-dose prednisone (60 to 80 mg/day) for one week.[6] The Guidance Development Group for the American Academy of Otolaryngology – Head and Neck Surgery published new Clinical Practice Guidelines for Bell's palsy in 2013. According to these guidelines, the recommend steroid regimen is a 10-day course of oral steroids with at least 5 days at a high dose (either prednisolone 50 mg for 10 days or prednisone 60 mg for 5 days with a 5-day taper).

Some studies have focused on the possibility of herpes simplex virus (HSV-1) as the etiology of Bell's palsy due to the discovery of elevated HSV-1 titers in affected patients. However, other studies have failed to isolate viral DNA in biopsy specimens, leaving the causative role of HSV-1 in question.[1] There have been large studies designed to assess the benefit of antiviral drugs in the treatment of Bell's palsy. The first was in Scotland involving over 500 patients, with all treatment begun within 72 hours of onset. This study used prednisolone as the steroid and acyclovir as the antiviral agent. They concluded the early use of prednisolone was effective, but treatment with acyclovir alone or with the steroid had no effect on the outcome.[10] Another study in Japan treating

221 patients either with prednisolone and valacyclovir or prednisolone and placebo, all begun with seven days of symptom onset, showed no significantly higher rate of complete recovery in the valacyclovir/prednisolone group than in the placebo/prednisolone group.[11, 12] More recently, a prospective, randomized, double-blind, placebo-controlled, multicenter trial was conducted in Scandinavia with 829 patients aged 18 to 75 years. Patients were randomized to one of three groups: (1) prednisolone plus placebo, (2) valacyclovir plus placebo, or (3) prednisolone plus valacyclovir. The investigators found prednisolone to be beneficial at reducing mild and moderate sequelae in Bell's palsy, but there was no significant difference between the valacyclovir and the non-valacyclovir groups.[8] A systematic review was performed in 2012 to update the evidence-based guideline from the American Academy of Neurology for the use of steroids and antivirals in Bell's palsy patients. The investigators of this study found that steroids are highly likely to be effective and should be offered to increase the probability of recovery of facial nerve function, but antiviral agents in combination with steroids do not increase the probability of facial function recovery.[9] In summary, these high quality studies demonstrate that steroid treatment alone is effective for Bell's palsy, while antiviral treatment has no benefit either when given alone or when combined with steroids.

Supportive care to prevent corneal damage is indicated if the patient has incomplete or poor eye closure. These measures can include lubricating tears or ointments and eye patching. Patients at risk for corneal damage should be counseled on signs of injury or infection and advised to seek immediate medical attention should these occur.

Recurrence of idiopathic facial palsy on either the ipsilateral or contralateral side is observed in 7-15% of patients. Mean time to recurrence is about 10 years. Third and fourth attacks are unusual occurring in only 1.5-3% of cases. Recurrence has not been shown to indicate a worse prognosis for recovery. Pregnancy may be a risk factor for recurrence, and there are cases reported of patients with recurrent attacks having a family history of multiple attacks. This may suggest a genetic predisposition to Bell's palsy. In patients that suffer recurrent facial nerve palsy, Melkersson-Rosenthal syndrome should be considered in the differential diagnosis. This disorder is characterized by facial paralysis, episodic facial swelling, and a fissured tongue.[6]

II. Aeromedical Concerns.

Aviators with Bell's palsy may have eye irritation due to the inability to close the lid, and food and saliva can pool on the affected side of the mouth potentially spilling out from the corner. Vision can be adversely affected due to the dry eyes, speech may be difficult due to facial weakness, and the wear of life support gear, particularly a tight-fitting aviator mask, can be compromised due to facial weakness. These symptoms, along with normal anxiety accompanying this disorder, make flying inadvisable until resolution of the condition. As most patients will be treated with steroids and possibly antiviral agents, the aviator should be grounded during treatment as these medications, particularly the steroids, are not waiverable.

III. Waiver Consideration.

An isolated episode of Bell's palsy with full recovery and no clinical or functional residua is not aeromedically disqualifying and does not require waiver. An isolated episode of Bell's palsy with incomplete clinical recovery or recurrent episodes of Bell's palsy is disqualifying for all flying classes, and the flyer will be considered for a waiver based on the outcome of treatment and level of

post-treatment residual defects. A history of remote Bell's palsy will not necessarily be disqualifying as there is often complete resolution and affected individuals are not at an increased risk of recurrence.

Table 2: Waiver potential for flyers with Bell's Palsy

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority**	**ACS Review**
I/IA	History of recurrent Bell's palsy, completely resolved	Yes+ AETC	Maybe
	History of Bell's palsy with residual	Maybe*+ AETC	If being considered for waiver
II/III/GBC/MOD/RPA Pilot	History of recurrent Bell's palsy, completely resolved	Yes+ MAJCOM	Maybe**
	History of Bell's palsy with residual	Maybe*+ MAJCOM	If being considered for waiver

*Level of residual will be critical for consideration of waiver.
+Waivers can be granted on an indefinite basis.
** Only cases from FCII/III will be reviewed at the ACS.

AIMWTS review in Nov 2014 revealed a total of 36 cases; 3 were FCI, 13 were FCII, and 20 were FC III; there were a total of 4 disqualifications – all FC III. Two of the DQ cases were for a significant nerve deficit and the other 2 for other diagnoses. Two pilots demonstrated very mild facial weakness, one FC I applicant showed a mild hemifacial spasm, a flight surgeon had residual lagophthalmos, and one pilot showed mild facial asymmetry.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for Bell's palsy should include the following:

A. Complete history of event detailing all symptoms, treatment (all medications, dosages, and number of days treated) and level of symptom resolution.
B. Report from all treating physicians, including the results of any diagnostic testing.
C. Surgical report if applicable.

The AMS for waiver renewal for Bell's palsy should include the following:
A. Interval history and level of symptom resolution.
B. Report from all treating physicians, including the results of any interval diagnostic testing.

ICD-9 codes for Bell's palsy	
351	Facial nerve disorders
351.0	Bell's palsy
351.9	Facial nerve disorder, unspecified

ICD-10 codes for Bell's palsy	
G51.8	Facial nerve disorders
G51.0	Bell's palsy
G51.9	Facial nerve disorder, unspecified

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WAIVER GUIDE
Updated: May 2014
Supersedes Waiver Guide of Nov 2010
By: CDR Michael Acromite (ACS RAM and OB/GYN), and Dr Dan Van Syoc

CONDITION:
Birth Control (May 14)

I. Overview.

Air Force aviators' lives are fully occupied with training, qualifications, deployments, and sorties. As such, family planning can create some challenges. Aviators desiring to conceive generally attempt to plan for this event around mission, career, and family. This may involve deferring conception until the time, location, and circumstances provide a safe opportunity. Pregnancy, especially when unplanned, can create a variety of considerations for the operational and aviation environments. An unplanned pregnancy prior to or during a deployment can create unexpected risks to an individual and mission, while appropriate knowledge, prevention, and planning can significantly reduce the associated operational risks. Estimates for the general population show that half of all pregnancies are unplanned and in approximately half of these unintended pregnancies, contraception of some type was being used.[1, 2] Safe and effective contraception that has been appropriately selected and used can play an important preventive role, and flight surgeons can assist in this regard. A variety of effective contraceptive options are currently available to men and women. Factors to consider when a couple is choosing a contraceptive method include its safety, efficacy, convenience, duration of action, reversibility (once the decision to conceive has been made), effect on uterine bleeding, frequency of adverse side effects, affordability, protection against sexually transmitted diseases, and a wish for a more permanent solution.[1] Underlying conditions or risk factors must be considered in women using or planning to use a birth control method.

BENEFITS: While the currently available methods provide short-term or long-term, and reversible or permanent contraception, many gynecological or other medical conditions can be treated with the hormonal contraceptives. Hormonal contraception can provide operational benefit. Physical or emotional stress can produce physiological responses which have reactionary effects on the pituitary-ovarian hormonal axis. This can result in irregular menstrual cycles, irregular bleeding, menorrhagia, or amenorrhea during the periods of stress. Hormonal contraceptives can sustain hormonal levels that maintain regular menstrual cycles or amenorrhea in the face of these stress effects. In addition, hormonal contraception can be used to treat gynecological conditions such as abnormal uterine bleeding, endometriosis, dysmenorrhea, polycystic ovaries, uterine fibroids, and endometrial hyperplasia.[3] OC are commonly used as the first-line treatment for endometriosis.[4] They also can be used to treat non-gynecological conditions such as acne, hirsutism, menorrhagia-related anemia, premenstrual disorders, and some headaches (not migraine with aura).[3] Oral contraceptives (OC), particularly those containing desogestrel may provide a benefit for menstrual migraine headaches (without aura). OC containing desogestrel, norgestimate, or drospirinone can benefit acne. Drospirinone containing OC are FDA approved for treatment of acne and premenstrual dysphoric disorder. Oral formulations are preferred for treating acne, hirsutism, or androgenic effects due to their first-pass effect which increases hepatic sex-hormone binding globulin, which preferentially binds free androgens. OC may have effects on lipids and should be considered in those with hyperlipidemia. OC containing first generation progestins have a more beneficial effect than second or third generation progestins.

CANCER RISK-BENEFITS: Hormonal contraceptives can reduce risk of some cancers. Up to a 50% reduction in endometrial cancer has been associated with hormonal contraceptive use, particularly with higher potency progestins.[5] The progesterone secreting IUD has also been used to suppress the endometrium and treat endometrial hyperplasia. A reduction in ovarian cancer risk has been associated with hormonal contraceptive use for as little as six months. A 27% reduction in ovarian cancer has been associated with hormonal contraceptive use with benefits of up to 20% in five years of use.[6] An 18% drop in colorectal cancer has been associated with their recent use, while this effect with longer use is uncertain.[7]

ADVERSE EFFECTS: Some contraceptive choices may be associated with increased risks when used in the presence of certain underlying conditions. Estrogen containing hormonal contraceptive can increase the risk of thrombosis in any woman, especially those who are over age 35 and smoke, those with thrombophilia, or those with migraine with aura. A headache history of *migraine with aura is a contraindication* for estrogen containing oral contraceptives due to a significant increase risk of stroke. Some hormonal contraceptives such as DMPA may exacerbate depression in some cases. Progesterone-only methods may decrease bone mineral density in some women with long-term use and should be considered.[8, 9] Other potential adverse effects observed include weight gain, nausea, or vomiting. Alternative formulations with a different progestin may address these potential effects. In general, the benefit of each contraceptive method must be weighed against potential or observed adverse effects.

OPTIONS FOR WOMEN: Contraceptive options for women include abstinence, natural methods, barrier methods, oral contraceptive pills, hormonal injections, transdermal patches, vaginal rings, intrauterine devices, sub-cutaneous devices, and permanent sterilization. Natural methods refer to the timing of intercourse that does not involve the days surrounding an expected ovulation. To be successful, natural methods require predictable cycles, assessment of basal body temperature and cervical mucus, knowledge of effective application, and a highly motivated and disciplined couple. Barrier methods for women include the diaphragm and female condom. The barrier methods also require diligence and are most effective when used in conjunction with a spermicidal lubricant. If used properly, the failure rate can be as low as 2.4 per 100 woman-years.[10]

ORAL CONTRACEPTIVES: In the US, the combined estrogen-progestin oral contraceptive (OC) preparations are the most commonly used effective and reversible method of contraception, with pregnancy rates reported as less than 0.5 per 100 woman-years. While OC use is common and effective, it has a higher discontinue rate within the first year than long-acting reversible devices.[11] Most OC compounds include 35 μg or less of estrogen along with varying types and amounts of progestins. The various progestins include first, second, or third generation forms, with differing profiles relating to their estrogenic effects, progesterone effect, and androgenic effect. Progesterone activity is highest, and estrogenic activity is lowest in the second and third generation progestins. Androgenic activity is highest in the second generation and lowest in the third generation progestins. The progestin, drospirenone has spironolactone-like activity and may help with bloating, but may cause increased potassium levels. The progestins vary in their beneficial and adverse side effects regarding breakthrough bleeding, acne, bloating, headaches, lipid profiles, and premenstrual mood symptoms. Modifying OC use with these in mind may improve benefits, reduce adverse effect, and improve compliance.

STARTING, CHANGING, USING, AND STOPPING: OCs can be started anytime during the menstrual cycle. Traditionally, OC usage has begun on the first Sunday after menses begins, but may be started on the day the prescription is given provided that pregnancy has been excluded. It is important that the woman take the pill every day, because missed pills are the most common cause of contraceptive failure.[1, 10] Progesterone-only oral contraceptives must be taken every day, but also need to be taken at the same time each day to be most effective. The progesterone dominant effect of combination OC generally results in endometrial suppression with shorter and lighter menstrual flow. These combination OC may be taken with or without a placebo (withdrawal) week. Cyclic dosing includes a placebo (withdrawal) week, which usually produces a small menses. Continuous dosing avoids a placebo (withdrawal) week for three or more cycle months. This continuous method generally results in consistent amenorrhea until subsequent withdrawal. Continuous dosing can be used for specific conditions requiring menstrual suppression or used for user preference. When first starting an OC or starting a new formulation OC, it is not uncommon to have irregular spotting for the first few cycles and up to five months for some women. As the woman's body adjusts to the new OC, the menses become lighter and predictable in the monthly cycle, and some experience amenorrhea. Because of this adjustment period, it is generally recommended to continue a new OC trial for five months before considering stopping or changing for minor adverse tolerance effects. More severe adverse effects may require an earlier OC stop or change, but the adjustment period must still be considered subsequently. Resumption of ovulation may occur as soon as a single missed day of an OC, so caution must be advised. After stopping, there may be a variable delay in the return of normal menstrual flow, ovulation, and fertility, which may be up to six months for OC and up to one year for depot medroxyprogesterone acetate (DMPA).

PROGESTERONE-ONLY: Progesterone-only hormonal birth control is an option for women who desire to use hormonal birth control, but have conditions for which they must avoid estrogen. Progesterone-only methods include the norethindrone pill (Micronor®, Nor-QD®), the etonogestrel single-rod implant (Implanon®), and injectable depot medroxyprogesterone acetate (Depo-Provera®). The progesterone-only pills must be taken at the same time every day, are associated with more unscheduled (breakthrough) bleeding and slightly higher failure rates than traditional OCs. The etonogestrel sub-cutaneous implants must be placed by a provider trained in the technique according to the manufacturer. DMPA is the only injectable contraceptive option in the US. In most cases, it is given by deep intramuscular injection (150 mg) and is effective for three months. A lower-dose (104 mg) DPMA formulation (Depo-subQ Provera®), is administered subcutaneously every three months. Etonogestrel sub-cutaneous implants and DMPA have been proven effective for control of endometriosis and menstrual conditions, but have been associated with decreased bone mineral density (BMD) with prolonged use.[8, 9] While BMD may be decreased in some women, these methods are still considered for their effective contraceptive, symptomatic, and medical benefits with appropriate monitoring and supplementation. The progesterone-only methods typically result in amenorrhea following initial cycles of irregular menstrual bleeding, but some women discontinue their use for persistent irregular spotting.

LARC: Another category of contraception includes the long acting reversible contraceptive (LARC) methods. The LARC methods continue to increase in use with reportedly lower pregnancy rates and higher continuation rates than OC.[11] The three currently available LARC methods include one contraceptive implant and two intrauterine device (IUD) types. The FDA approved contraceptive implant is the etonogestrel single rod contraceptive implant (Implanon®). This single rod implant secretes the progestin, etonogestrel systemically to suppress ovulation and the endometrium for contraception. This implant may remain in place for three years. It requires provider to complete

manufacturer training before beginning to insert them in patients. The two FDA approved IUDs include the copper T380A IUD ("Copper T") and the levonorgestrel intrauterine system (Mirena®). The Copper T is a non-hormonal, T-shaped device that is immediately effective on insertion, and may remain inserted for 10 years. The levonorgestrel intrauterine system is a T-shaped device that secretes a small daily dose of the progestin, levonorgestrel that provides a hormonal suppressive effect on the endometrium with little systemic absorption. This IUD can remain in place up to five years. These IUDs are approved for use in nulliparous patients, and are not associated with an increased risk of pelvic inflammatory disease, ectopic pregnancy, or post-use infertility.[11, 12] IUDs are often associated with an increased menstrual discomfort during the first menses following insertion, but typically resolves spontaneously by subsequent months. Non-steroidal anti-inflammatory medications provide sufficient relief if this is encountered in the first menses. All the LARC methods are effective contraception, require little ongoing effort to retain contraception, and allow a prompt return of fertility upon removal.

PATCH AND RING: Additional options available to women are the transdermal patch (Ortho Evra®) and vaginal ring (NuvaRing®). They act similarly to OC, but are not taken orally and as such require a lower dose by avoiding a "first pass" hepatic effect. The patch is applied once weekly for three weeks followed by one week without application. The efficacy of the patch has been found to be similar to OC with a high user satisfaction. The contraceptive vaginal ring is a flexible ring inserted into the vagina that releases estrogen and progestin at a constant rate for the three-week period of use. The ring has been found to have an effectiveness rate similar to OC, a low incidence of adverse events, and a high satisfaction rate among users. Both of these methods have the additional benefit of easy reversibility after cessation of use.[2]

PERMANENT METHODS: Some women desire permanent sterilization. These surgical procedures include tubal ligation, or tubal obstruction. Some of these methods are potentially reversible, but the patient needs to be counseled that these procedures are intended to be permanent. Surgical procedures in the operating room include laparotomy, mini-laparotomy, or laparoscopy to excise or cauterize portions of each tube, or place sutures, bands, or clips to obstruct tubes. A convenient time to perform at tubal ligation/obstruction procedure is in the postpartum period. Women under age 26 and those having the procedure in the postpartum period, are most likely to regret sterilization. A more recent method is the "no-incision tubal ligation" (Essure ®) in which obstructing metal coils are placed into the proximal tube from inside the uterine cavity during hysteroscopy. Close follow up with the obstetrician is necessary following the insertion and requires a radiological dye confirmation after three months. This method is permanent and provides no possibility of reversal. Pregnancy after tubal sterilization is uncommon, but has an increased risk of ectopic pregnancy when pregnancy does occur.[1]

OPTIONS FOR MEN: For men, two effective methods include condoms and vasectomy. Condoms are convenient in that they are readily available and do not require a prescription. Correct condom use requires use with each intercourse event, not removed until after intercourse is completed, and used with a spermicidal agent. When used correctly, their effectiveness can approach that of hormonal contraceptives with an additional benefit of protection against most sexually transmitted diseases.[1] A permanent method for men is vasectomy, which is a permanent sterilization technique. Vasectomy is the most commonly performed urologic surgical procedure performed in the US, with an estimated 500,000 each year. Vasectomy is less expensive and associated with less morbidity and mortality than female tubal procedures. It is employed by nearly 11% of all married couples, but is less prevalent than is tubal procedures in women. As with tubal surgical procedures for

women, adequate counseling is necessary to discuss that the procedure is designed to be permanent and failures can rarely occur. With an experienced surgeon and a post vasectomy semen analysis performed to confirm effectiveness, it is unusual to have a pregnancy result months to years after the procedure.[13, 14]

II. Aeromedical Concerns.

The contraceptive and medical benefits of hormonal and non-hormonal contraceptives are well established. Certain risks should be considered related to aviation. Distracting symptoms are most common when starting an OC, other hormonal contraception, or LARC. This should be considered after their initiation and monitored for significant symptoms or adverse effects during this time. Users should be encouraged to report adverse effects. IUD may be associated with increased menstrual pain, especially during the first cycle. Irregular spotting or other transient symptoms are more common in the first 1-5 months of a hormonal contraceptive use. Estrogen containing OC may be associated with hypertension, headache, nausea, or vomiting. Persistent hypertension is a reason to discontinue a hormonal contraceptive method to consider an alternative. Underlying conditions must be considered in women using or planning to use hormonal contraceptive methods. Estrogen containing OC are not recommended for women with uncontrolled hypertension, or diabetes with end-organ damage. Estrogen containing OC are associated with an increased risk of venous thromboembolism (VTE), especially in some women. Women who are over age 35 and smoke are at increased risk of VTE which can be exacerbated with the use of estrogen containing OC. For this reason, estrogen containing OC are not recommended in these women. OC may be beneficial for women with some types of headache, including menstrual migraine, but these *estrogen containing OC are contraindicated in women with a history of migraine with aura due to a significant increased risk of stroke*. OC with the progestin, drospirinone (Yaz®, Yasmin®) can induce hyperkalemia, in some women through this progestin's spironolactone-like activity, which can also induce diuretic and anti-androgenic effects. If the woman is well screened and has no adverse effects, there is no aeromedical contraindication for the use of oral contraceptives.[15] Female or male surgical procedures for permanent sterilization have uncommon complications or adverse effects. When a sterilization procedure is uncomplicated and results in a full recovery, then there is no restriction to returning to flight status. If a pregnancy is detected in a woman with an IUD in place or a history of a permanent surgical sterilization procedure, an investigation for ectopic pregnancy must be promptly accomplished.

III. Waiver Consideration.

A waiver is not required for hormonal contraception using approved medications that are well tolerated without significant adverse effects. A waiver is not required for LARC methods appropriately placed and well tolerated. A waiver is not required for a history of successful sterilization surgery after a full recovery with appropriate follow-up, and without chronic adverse effects.

IV. Information Required for Waiver Submission.

N/A

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WAIVER GUIDE
Updated: May 2013
Supersedes Waiver Guide of Jun 2009
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Reviewed by Lt Col Edith Canby-Hagino, AF/SG Consultant for Urology

CONDITION:
Bladder Cancer (May 13)

I. Overview.

Bladder cancer is the fourth most common cause of cancer in males and affects men three times more frequently than women. Its incidence also increases with age, with 90% of cases occurring in individuals over age 55.[1] The American Cancer Society estimates that over 73,000 new cases of bladder cancer will be diagnosed in 2012 in the US and there will be over 14,000 deaths. In addition, there are an estimated 500,000 individuals in the US with a history of bladder cancer making its prevalence greater than that of lung cancer.[2] Cigarette smoking is a well known risk factor, increasing the risk 2-4 fold, and is associated with 50-66% of all bladder cancers in men.[1, 3] Unlike lung cancer, the risk for bladder cancer remains elevated for a many years after the smoking cessation, probably accounting for the rising incidence of disease noted in the past few decades.[1] Bladder cancer is much less common in African Americans than in Caucasians, who have the highest rate in the US population.[4]

It has been estimated that occupational exposures may account for up to 20% of all bladder cancer cases. Exposures to toxins in the textile dye and rubber tire industries are risk factors. Historically, these industries used β-naphthylamine, 4-aminobiphenyl and benzidine, all of which were highly associated with bladder cancer. These chemicals have been banned, but the long latency between exposure and disease development makes it difficult to ascertain a definitive relationship for a whole host of other compounds which are still used in these industries.[5] Chronic infection can also be a risk factor for bladder cancer. This is seen more commonly in under-developed countries and thought to be largely related to infection with schistosomiasis.[6]

As with most cancers, prognosis is largely determined by stage and grade; other factors include location of the lesion, number of lesions, and maximum diameter of the largest tumor.[7] The American Joint Committee on Cancer staging system (also known as TNM) is the most widely used system for staging[8] (see Table 2), while the World Health Organization and International Society of Urologic Pathologists published a recommended revised consensus classification system in 2004 (see Table 3).[9] The upper urinary tract should be imaged during initial work up as 5% of bladder cancers can have an associated upper tract lesion.[10]

Urothelial carcinoma, also known as transitional cell carcinoma, is the most common pathologic subtype of bladder cancer and is seen in over 90% of all tumors. Squamous cell tumors account for about 5% of all cases and adenocarcinomas are about 1% of the total. The presenting symptom in the majority of cases is hematuria, which can be either continuous or intermittent. Therefore, the American Urologic Association (AUA) recommended in 2001 that all patients with hematuria, particularly those without evidence of infections, stones or other common causes, undergo cystoscopy and upper tract imaging. The physical exam is unremarkable in most bladder cancer patients, particularly those with nonmuscle invasive disease, (which accounts for 70% to 75% of

patients).[1] As our aviation population is relatively young, most of the cases will be early in the lifecycle and more likely to be non-muscle-invasive in nature.

Table 1: American Joint Committee on Cancer Bladder Staging System[8]

Stage	Clinical Tumor Stage
TX	Tumor cannot be assessed
T0	No evidence of primary tumor
Ta	Non-invasive papillary carcinoma
Tis	Carcinoma in situ: “flat tumor”
T1	Tumor invades subepithelial connective tissue
T2	Tumor invades muscularis propria
pT2a	Tumor invades superficial muscularis propria (inner half)
pT2b	Invades deep muscularis propria (outer half)
T3	Tumor invades perivesical tissue/fat
pT3a	Invades perivesical tissue/fat microscopically
pT3b	Invades perivesical tissue/fat macroscopically (extravesical mass)
T4	Tumor invades any of the following: prostatic stroma, seminal vesicles, uterus, vagina, pelvic wall, abdominal wall
T4a	Tumor invades prostatic stroma, uterus, vagina
T4b	Tumor invades pelvic wall, abdominal wall
	Regional Lymph Nodes (N)
NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Single regional lymph node metastasis in the true pelvis (hypogastric, obturator, external iliac, or presacral lymph node)
N2	Multiple regional lymph node metastasis in the true pelvis (hypogastric, obturator, external iliac, or presacral lymph node metastasis)
N3	Lymph node metastasis to the common iliac lymph nodes
	Distant Metastasis (M)
M0	No distant metastasis
M1	Distant metastasis

Table 2 – AJCC Stage Grouping for Bladder Cancer[8]

Stage	Primary Tumor (pT)	Regional Lymph Nodes (N)	Distant Metastasis (M)
0a	Ta	N0	M0
0is	Tis	N0	M0
I	T1	N0	M0
II	T2a	N0	M0
	T2b	N0	M0
III	T3a	N0	M0
	T3b	N0	M0
	T4a	N0	M0
IV	4b	N0	M0
	Any T	N1-3	M0
	Any T	Any N	M1

Table 3: WHO Grading Classification of Non-muscle Invasive Urothelial Neoplasia[9]

Hyperplasia (flat and papillary)
Reactive atypia
Atypia of unknown significance
Urothelial dysplasia
Urothelial carcinoma in situ
Urothelial papilloma
Papillary urothelial neoplasm of low malignant potential
Nonmuscle invasive low-grade papillary urothelial carcinoma
Nonmuscle invasive high-grade papillary urothelial carcinoma

Treatment is largely dependent upon the grade and stage. Therapy can range from transurethral resection of a bladder tumor (TURBT) to radical cystectomy and resection of affected structures. Often, intravesical therapy is used as an adjunct to tumor resection and/or as a prophylactic measure to prevent recurrence.

For non-muscle invasive tumors (defined as stages Ta, Tis, and T1), the initial treatment is a complete TURBT and an examination under anesthesia (EUA) to rule out a palpable mass which would suggest muscle invasive disease. For T1 tumors, up to 30% of cases will be understaged by TURBT, so repeat TURBT is recommended to decrease likelihood of actual understaging. The majority of these non-muscle invasive tumor cases will recur and up to 25% will progress, so rigorous surveillance and follow-up is mandatory. Fluorescence endoscopy after intravesicular instillation of a porphyrin such as hexaminolevulinate may be more effective than white light endoscopic resection for the detection of multifocal tumors, improving the outcomes of TURBT.[11] Intravesical therapy is generally used in the adjuvant setting to prevent further recurrence. Bacillus Calmette-Guérin (BCG) and mitomycin C are widely used as intravesical immunotherapy agents but others can be used as well. A key point with these agents is that patients often have no side effects for several cycles, and then up to 90% may develop cystitis and up to than 25% will develop fever, malaise, and hematuria.[1, 3] These symptoms generally resolve quickly after completion of therapy, which is usually administered once/week for 6 weeks.

For invasive tumors (T2 and above) and for some high grade T1 tumors, radical cystectomy is the recommended therapy, with consideration of neoadjuvant chemotherapy and radiotherapy, depending on stage of disease at presentation and the patient's overall health status. Bladder preservation or sparing treatment using primary chemotherapy and external beam radiotherapy is an option in selected patients with T2 and T3a urothelial carcinomas, but is associated with higher rates of recurrence and disease specific mortality. Often this approach is reserved for patients who are medically unfit for major surgery or for those seeking an alternative treatment course.[4]

Because of a fairly high risk of recurrence for all grades and stages, there will be a lifetime need disease surveillance. The National Comprehensive Cancer Network provides guidance for surveillance stratified by surgical approach to the primary tumor. Patients treated with cystectomy get laboratory evaluations every three to six months for the first two years. These tests include urine cytology, liver and renal function tests, and serum electrolytes. Patients treated with cystectomy get a chest x-ray and abdominal and pelvic CT exams every six to twelve months for the first two years and then as clinically indicated.[4] Patients treated with bladder preservation (TURBT or partial cystectomy) get the same evaluations as patients treated with cystectomy as well as serial cystoscopies with cytological evaluation every three to six months for the first two years, with intervals based on physician discretion.[12] In general, all patients with non-invasive disease can expect a recurrence rate of 50%, but this rate is higher in those with high-grade disease.[2] After two years without recurrence, the recommendation is for indefinite annual exams.[4] Several urothelial malignancy markers have recently been approved by the FDA, but there is currently insufficient evidence for their routine use in detection of new disease or surveillance.[10, 13] However, studies are ongoing.

II. Aeromedical Concerns.

The aeromedical concerns are based more on the treatment and possible therapy complications than on the disease itself. If the aviator is off all treatment medications and is disease-free (considered to be in remission) and asymptomatic, he or she can be considered for a waiver. Due to a relatively high risk for recurrence, the flyer needs frequent follow up with their urologist. There is low likelihood that recurrence of non-invasive disease would cause sudden incapacitation.

III. Waiver Considerations.

History of bladder cancer is disqualifying for all flying classes.

Table 4: Waiver potential of bladder cancer in FC I/IA, II and III.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Stages 0 and I	Yes#† AETC	Yes%
II/III	Stages 0, I, II and possibly early III	Yes+*† AFMSA	Yes%
ATC/GBC	Stages 0, I, II and possibly early III	Yes+*† AFMSA	

For FC I/IA candidates, waiver may be considered after 5 years of remission, asymptomatic.
+ For trained FC II and III individuals waiver may be considered six months after treatment completed, in remission and asymptomatic.
* For untrained FC II and III, waiver may be considered after 5 years of remission.
† No indefinite waivers.
% ACS review needed only if waiver authority considering a waiver

Review of AIMWTS database in Mar 2013 revealed 24 waiver submissions for the diagnosis of bladder cancer. There were two disqualifications, one FC II case was disqualified for continued symptoms associated with bladder cancer, one FC III case was disqualified for another unrelated diagnosis. There were 15 FC II cases, six FC III cases, all granted a waiver, and one MOD case. One of the FC III cases was for a young man who had a bladder rhabdomyosarcoma at age 2 and recovered well.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. Waiver can be considered once the aviator is asymptomatic from both the disease and therapy.

The AMS for initial waiver for bladder cancer should include:
A. History – symptoms, pathology, stage, treatment, including date of last treatment, surveillance plan and activity level.
B. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
C. Reports from all imaging studies.
D. All cystoscopy/surgical reports along with pathology-confirmed histological diagnosis.
E. Current urinalysis.
F. Urology/oncology consults to include the quarterly tumor surveillance follow-up in accordance with National Comprehensive Cancer Network (NCCN) guidelines.
G. Tumor board report, military or civilian, if applicable.
H. Medical evaluation board results.
I. Confirmation the aviator does not require continued therapy (other than routine follow-up) and that he or she is free of physical limitations.

The AMS for waiver renewal for bladder cancer should include the following:

A. History – brief summary of stage, treatment, frequency of surveillance and results, any symptoms, activity level; all must be consistent with NCCN guidelines.
B. Physical – pertinent to present case.
C. Urology/oncology consult.
D. Labs – all urinalysis and cystoscopy results since last waiver.

ICD-9 codes for Bladder Cancer	
188	Malignant neoplasm of bladder
233.7	Carcinoma in situ of bladder

ICD-10 codes for Bladder Cancer	
C67.9	Malignant neoplasm of bladder, unspecified, C67.x (.0-.8 specific site of bladder)
D09.0	Carcinoma in situ of bladder

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WAIVER GUIDE
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CONDITION:
Breast Cancer (Jun 13)

I. Overview.

Breast cancer is a malignant proliferation of lobular or ductal epithelium of the breast. The proliferation may be hyperplastic, atypically hyperplastic, in situ carcinoma or invasive carcinoma.[1] Excluding skin cancers, breast cancer is the single most common form of cancer diagnosed in women of all races in the United States. Breast cancer is the number one cause of cancer death in Hispanic women and is the second most common cause of cancer death in Caucasian, African-American, Asian/Pacific Islander, and American Indian/Alaska Native women. In 2008 (the most recent year numbers are available), 210, 203 women were diagnosed with breast cancer and 40,589 died from the disease.[2] In 2011(most recent year numbers available) 2,190 men were diagnosed with breast cancer and 410 died from the disease.[2, 3] The chance of a woman having invasive breast cancer some time during her life is about 1 in 8 and the chance of a woman dying from breast cancer is about 1 in 35. Breast cancer is about 100 times less common among men than among women. Men and women with similar stages of breast cancer have a similar outlook for survival, although men are often diagnosed at a later stage. A person with breast cancer in early stages often has no symptoms (breast pain is usually indicative of benign conditions); and even large tumors may be noted as painless masses. Some signs which may (or may not) occur include: persistent breast thickening, swelling, distortion skin irritation, nipple discharge or abnormalities such as ulceration or retraction (peau d' orange appearance).[2]

Immutable Risk Factors[1-9]

Gender is the main risk factor for breast cancer; it is 100 times more common in women than in men.

Age: Increasing age is the second most common risk factor. About 2 out of 3 women with invasive breast cancer are age 55 or older when the cancer is discovered.

Genetic risk factors: About 5% to 10% of breast cancers are thought to be inherited. The most common mutations involve the BRCA1 and BRCA2 genes, which normally are tumor suppressor genes. Women with these mutations have a 40-85% lifetime chance of breast cancer. The BRCA1 and 2 mutations are more common in Ashkenazi Jewish ancestry. Other more rare genetic mutations associated with an increased breast cancer risk involve the following genes: ATM, TP53, CHEK2, PTEN, CDH1 and STK11.[9]

Family history: Breast cancer risk is higher among women with first degree relatives who have had the disease. The relatives can be maternal or paternal. Having a mother, sister, or daughter with breast cancer almost doubles a woman's risk.[4]

Personal history of breast cancer: A woman with a history of cancer in one breast has a greater chance of getting a new primary cancer in the other breast (1% per year) or in another part of the same breast. Bilateral disease is more common with infiltrating lobular cancer.

Race: White women are slightly more at risk than are African-American women. Asian, Hispanic, and American Indian women have a lower risk of breast cancer.

Dense breast tissue: Radiographic appearance of the breast on mammogram varies due to differences in breast tissue composition and differences in the radiographic attenuation properties of fat, stroma, and epithelium. Women with denser breast tissue are at higher risk for breast cancer; the reason is uncertain. Women with dense tissue in 75% or more of the breast have a risk of breast cancer 4-6 times as great as the risk among women with little or no dense tissue. Dense tissue also makes it more difficult to diagnose cancer.[6]

Menstrual cycle: Menarche before age 12 or menopause after age 55 increases the risk of breast cancer.

Radiation: Women who have had radiation treatment to the chest area have a greatly increased risk of breast cancer.

Treatment with DES: Women (and their daughters who were exposed to DES, *in utero),* have a slightly increased risk of breast cancer.[8]

Modifiable Risk Factors[1,5,7,10]

Parity: Women who are nulliparous or who had their first child after age 30, have slightly higher risk of breast cancer as do women who have fewer live births.

Breast-feeding: Some studies have shown that breast-feeding slightly lowers breast cancer risk, especially if the breast-feeding lasts 1½ to 2 years.

Recent use of birth control pills: Women using birth control pills have a slightly greater risk of breast cancer than women who have never used them.

Menopausal hormone therapy (MHT): Previously known as hormone replacement therapy (HRT), long-term use of combined estrogen and progesterone MHT increases the risk of breast cancer. Estrogen by itself increases breast cancer cell growth in the lab but not in vivo.

Alcohol: Use of alcohol is linked to an increased risk of breast cancer (estrogen).

Weight: Weight gain after the age of 18 and being overweight or obese, especially for women after menopause, is linked to a higher risk of breast cancer. The mechanisms may be related to the following: excess weight and physical activity affect the synthesis and metabolism of sex hormones, insulin, and related growth factors, immune response, and oxidative stress.[10] Postmenopausal obesity is related to higher tissue exposures to free estrogens and androgens, and such steroid hormones have been implicated in the etiology of breast, ovarian, and endometrial cancers. Excess weight and physical inactivity also raise levels of circulating insulin; and chronic hyperinsulinemia is associated with the pathogenesis of colorectal, breast, pancreatic, and endometrial cancers.

Excess weight also may influence the risk of cancer through effects on tumor growth regulators, including mammalian target of rapamycin (mTOR) and 50 adenosine monophosphate (AMP)-kinase, and adipokines, including adiponectin and leptin.[10]

Exercise: Studies show that regular exercise reduces breast cancer risk and inactivity increases the risk.

There are also *risk assessment tools* based on different data sets of risk factors, which can help calculate who is at high-risk and therefore who would benefit from screening modalities beyond mammograms alone. The Gail model is the only one validated for African-American women (and is used by the American Cancer Society). It takes into account race, age at menarche, age at first live birth, number of previous breast biopsies, and number of first degree relatives with breast cancer. Other models are the Claus model, the BRCAPRO, BODAICEA and Tyrer-Cuzic models.[11]

Detection

Mammogram: Mammogram screening has been shown to decrease mortality for breast cancer (by 30% since 1990) and it is the mainstay method.[11] But recently there have been conflicting recommendations on mammogram screening. The US Preventive Services Task Force (USPSTF) in 2009 revised its previous recommendations on screening mammography: it no longer recommends screening for women age 40-49 every 1-2 years, nor does it recommend teaching monthly breast self-examinations. The 16 person panel routine recommended screening mammograms every two years for women 50-74. The American College of Obstetricians and Gynecologists (ACOG) disagreed as they believe the greatest benefit is seen when cancer is detected early, and this is most likely to happen in the 40-49 age group. ACOG advised that women age 40-49 be screened every 1-2 years and women over 50 be screened annually with mammograms.[13] The American Medical Association recommended women beginning at age 40, should have access to mammogram screening and the decision as to frequency should be made by the physician and the patient.[14] The American Cancer Society agrees with ACOG.[9,14] The Society of Breast Imaging (SBI) and the American College of Radiology (ACR) recommends, like ACOG, that women at average risk for breast cancer have annual screening starting at age 40; if women are at increased risk, they recommend annual mammograms by age 30 (but not before age 25); and they recommend annual screening should stop if life expectancy is less than 5- 7 yrs or if abnormal results would not be acted upon.[11] Women who have had mantle radiation (i.e., for Hodgkin's lymphoma) between the ages of 10 and 30 should have mammograms yearly beginning 8 years after the last radiation therapy (but not before age 25). The relative risk for developing breast cancer if >4Gy is delivered to the mantle (between the ages of 10 and 30) is 4-75 times greater than the general population. The SBI highlights the fact that the cutoff of age 50 as an acceptable surrogate standard for menopause is not supported by data. The SBI and ACR also very clearly make recommendations for when to use MRI and ultrasound based on risk-stratification of individuals as low or high-risk.[l1]

Regarding the above screening discussion, AFI 44-102 (Medical Care Management), published in January 2012, notes that, "nationally recognized guidelines, such as those published by the ACOG or USPSTF or other similar authority, shall govern the frequency of periodic screening examinations (4.1.3). Beginning at age 40, MTFs must offer screening mammograms for all active duty women and other eligible beneficiaries (4.2.1). The frequency of performing mammography shall be guided by discussion with the primary care provider, taking into account the patient's risk

factors and current guidelines. MTFs must make diagnostic breast imaging available to women at any age who have been identified by their healthcare providers as requiring additional evaluation as indicated by individual risk factors (4.2.2)."

Clinical breast exam: Although the USPSTF could not definitively support clinicians performing annual exams on women, ACOG defends its utility of detecting cancers early, particularly when used in concert with mammograms and recommend women 40 and older receive annual CBE and age 20-39 have a CBE every 1-3 years. ACOG, also contrary to the USPSTF, supports educating women on self breast exams, not necessarily monthly, but as a means of being aware of changes from normal.[12,13]

Types of Breast Cancers: Breast cancer can be classified in many different ways. Describing breast cancer by the TNM (Tumor/Node/Metastasis) method is commonly done.

Table 1. American Joint Committee on Cancer (AJCC) Breast Cancer TNM Staging System[15]

Stage (T)	Primary Tumor (T)
TX	Primary Tumor cannot be assessed
T0	No evidence of primary tumor
Tis	Carcinoma in situ (DCIS, LCIS, or Paget disease of the nipple with no associated tumor mass)
T1	Tumor is 2 cm (3/4 of an inch) or less across.
T2	Tumor is more than 2 cm but not more than 5 cm (2 inches) across
T3	Tumor is more than 5 cm across
T4	Tumor of any size growing into the chest wall or skin. This includes inflammatory breast cancer
	Regional Lymph Nodes
NX	Regional lymph nodes not assessed
N0	Cancer has not spread to nearby lymph nodes
N1	Cancer has spread to 1 to 3 axillary (underarm) lymph node(s), and/or tiny amounts of cancer are found in internal mammary lymph nodes (those near the breast bone) on sentinel lymph node biopsy
N2	Cancer has spread to 4 to 9 axillary lymph nodes under the arm, or cancer has enlarged the internal mammary lymph nodes
N3	One of the following applies:
	Cancer has spread to 10 or more axillary lymph nodes
	Cancer has spread to the lymph nodes under the clavicle (collar bone)
	Cancer has spread to the lymph nodes above the clavicle
	Cancer involves axillary lymph nodes and has enlarged the internal mammary lymph nodes
	Cancer involves 4 or more axillary lymph nodes, and tiny amounts of cancer are found in internal mammary lymph nodes on sentinel lymph node biopsy
	Distant Metastasis
MX	Distant metastasis cannot be assessed
M0	No distant metastasis
M1	Spread to distant organs is present

Stage 0: In DCIS, cancer cells are still within a duct and have not invaded deeper into the surrounding fatty breast tissue. Lobular carcinoma in situ (LCIS) is sometimes classified as stage 0 breast cancer. In LCIS, abnormal cells grow within the lobules but they do not penetrate through the wall of these lobules. Paget disease of the nipple (without an underlying tumor mass) is also stage 0.
Inflammatory breast cancer (a form of ductal carcinoma)is classified as stage IIIB unless it has spread to distant lymph nodes or organs, in which case it would be stage IV.

Breast cancer can also be classified as non-invasive (Stage 0 by definition) or invasive (Stages I-IV). Non-invasive breast cancer involves Stage 0, ductal carcinoma *in situ* (DCIS).[16] Lobular carcinoma *in situ* (LCIS) falls under this category; but it is actually a risk factor for breast cancer and not breast cancer, per se. Invasive breast cancer is mostly ductal in origin (85-90% of the time).

Breast cancer can be described in terms of being epidermoid, adenocarcinoma, or undifferentiated carcinoma. It can also be described based on anatomy (involving duct, lobules or the nipple). Ductal carcinomas may be: intraductal (*in situ*), invasive with predominant intraductal component, invasive, (unspecified), comedo, inflammatory, medullary with lymphocytic infiltrate, mucinous (colloid), papillary, scirrhous, or tubular. Lobular carcinomas can be: *in situ*, invasive with predominant *in situ* component or invasive. And disease of the nipple is Paget disease. Paget disease can occur with intraductal carcinoma or with invasive ductal carcinoma. Breast tumor subtypes, not considered to be typical breast cancers are: phyllodes tumor, angiosarcoma, and primary lymphoma.[16]

Diagnosis: The diagnosis of breast cancer is a tissue diagnosis.

There are three types of biopsy that may be employed: fine needle aspiration biopsy (may be performed by a radiologist), stereotactic core needle biopsy (radiology-guided), and open surgical biopsy performed by a surgeon. A lumpectomy may be all that is required, but other options include sentinel lymph node biopsy and axillary lymph node dissection.[17]

If the biopsy indicates cancer, the biopsy sample is also given a grade from 1 to 3. Cancers resembling normal breast tissue tend to grow and spread more slowly. In general, a lower grade number means a slower-growing cancer, while a higher number means a faster-growing cancer.

Regarding hormone receptor status, the biopsy sample can and should be tested for receptors for estrogen (ER) and/or progesterone (PR). ER and PR positive cancers tend to have a better outlook than cancers without these receptors because they are much more likely to respond to targeted hormone treatment.[7, 9]

About 20% of breast cancers have human epidermal growth factor receptor 2 (HER2). Tumors with increased levels of HER2/neu are referred to as "HER2-positive." HER2 status assessment based upon core needle biopsy is inadequate for making treatment decisions. Immunohistochemical testing for HER2/neu status should only be performed upon a surgical specimen.[18] These cancers tend to grow and spread faster than other breast cancers; but they can be targeted with new monoclonal antibody treatment (trastuzumab) and adjuvant regimens.[1]

<u>Treatment:</u>
In order to make the best treatment choice for people with breast cancer, the extent of disease locally and systemically, the disease stage, features of hormone receptor status and evidence of metastases to lymph nodes and beyond, must be defined. Treatment then becomes a combination of local and systemic therapy (because the permutations are vast, we will not address them here; refer to the NCCN, National Comprehensive Cancer Network Clinical Practice Guidelines).

Neoadjuvant therapy, as systemic treatment before surgery to shrink a tumor, may be needed before primary chemotherapy. The goal of adjuvant therapy is to eliminate micrometastases after primary treatment.

There are multiple chemotherapeutic regimens for primary treatment of advanced or metastatic disease available to the oncologist. These choices include anthracyclines, taxanes, anti-metabolites, and other agents such as cyclophosphamide and fluorouracils. There are also multiple chemotherapy combinations used, however, there is no compelling evidence that the combination

regimens are superior to sequential single agents.[1] Surgical interventions may precede, be concurrent with, or follow chemotherapy and radiation therapy. Surgical options include: partial (segmental) mastectomy or quadrantectomy, simple or total mastectomy (lymph nodes are not removed), modified radical mastectomy and radical mastectomy (surgeon removes the entire breast, axillary lymph nodes, and the pectoralis/chest wall muscles).[17] Reconstructive or breast implant surgery may be beneficial from an aesthetic and psychological standpoint, as well, and particularly in the interest of supporting and maintaining our flying assets. It is believed, regardless, a multi-pronged approach is essential.

Staging for prognosis and treatment

Table 2: Anatomic Stage/Prognostic Groups[19]

Stage[0]	**T[0]**	**N[0]**	**M[0]**
0	Tis	N0	M0
IA	T1[a]	N0	M0
IB	T0	N1mi	M0
	T1[a]	N1mi	M0
IIA	T0	N1	M0
	T1[a]	N1	M0
	T2	N0	M0
IIB	T2	N1	M0
	T3	N0	M0
IIIA	T0	N2	M0
	T1	N2	M0
	T2	N2	M0
	T3	N1	M0
	T3	N2	M0
IIIB	T4	N0	M0
	T4	N1	M0
	T4	N2	M0
IIIC	Any T	N3	M0
IV	Any T	Any N	M1

[a] T1 includes T1mi

-T0 and Tq tumors with nodal micrometastases only are excluded from Stage IIA and are classified Stage IB.

-M0 includes M0(i+)

-The designation pM0 is not valid; M0 should be clinical

-If a patient presents with M1 prior to neoadjuvant systematic therapy, the stage is considered Stage IV and remains Stage IV regardless of response to neoadjuvant therapy.

-Stage designation may be changed if postsurgical imaging studies reveal the presence of distant metastasis, provide that the studies are carried out with 4 months of diagnosis in the absence of disease progression and provided that the patient has not received neoadjuvant therapy.

-Postneoadjuvant therapy is designated with"yc" or "yp" prefic. Of note, no stage group is assigned if there is a complete pathologic response (CR) to neoadjuvant therapy, for example, ypT0ypN0cM0.

Staging, as a means of defining how widespread the cancer is, also involves the classic TNM paradigm. The stage of a cancer is almost always the most important factor in choosing among treatment options. The following tests may be needed for staging (and follow-up): chest X-Ray, mammogram, ultrasound, CT scan, MRI (for those who are high-risk or whose breasts cannot be adequately imaged with mammography and ultrasound i.e., due to very dense tissue, positive axillary nodes or possible occult primary tumor originating in the breast or to evaluate the chest wall itself), and PET scan (limited use: not recommended for Stage I, IIA, IIB or T3N1M0 due to high false-negative).[1] These radiographic methods may need to be used in concert.

Prognostic and Predictive risk factors: [4] In order to delineate personal prognosis, age and menopause (often standardized as age over 50), comorbidities, stage of the disease, histologic and nuclear grade of the primary tumor, ER and PR status of the tumor, HER2 overexpression, and proliferative capacity of the tumor (i.e., Ki67 tumor marker antigen) are used. In the future, microarray assays or reverse transcriptase polymerase chain reaction methods may be used for gene expression subtype analysis, molecular profiling and risk stratification.[1] 3D mammography as well as technetium sestamibi scintimammography may improve diagnosis, prognosis and predict relapse free survival.[1 ,9, 11]

Breast cancer survival rates by stage

The numbers below come from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) database, and are based on women who were diagnosed with breast cancer between 1975 and 2008.[19] There are some important points to note about these numbers:

The SEER database does not divide survival rates by substages, such as IIA and IIB but rather it stratifies by local, regional (nodes) and distant (metastases) tumor growth. Changing definitions over the year, of what defines specific Stages, can confound rates, as well. The *5-year survival rate* refers to the percentage of patients who live at *least 5 years* after being diagnosed with cancer. Many of these patients live much longer than 5 years after diagnosis. Five-year *relative* survival rates (such as the numbers below) take into account the fact that some patients with cancer will die from other causes. Finally, while survival statistics can sometimes be useful as a general guide, they may not accurately represent any one person's prognosis. A number of other factors, including other tumor characteristics and a person's age and general health, must be assessed.[20]

Breast Cancer Survival Rates

5-Year Relative Survival (Percent) All Races, Female by Year of Diagnosis, Stage and Age

Table 3: Stage Distribution (%) 2001 - 2007

All Stages	All	Age < 50	Age > 50
Number of Cases	292,714	73,750	218,964
Percent	100	100	100
Localized	60	53	63
Regional	33	41	30
Distant	5	4	5
Unstaged	2	1	2

Table 4: Five-Year Relative Survival (%) 2001 - 2007

Age at diagnosis	
< 45	86.9
45 - 54	89.8
55 - 64	90.1
65 - 74	90.5
75+	87.2
< 65	89.2
65+	88.9

Table 5: Stage Distribution (%) 2001 - 2007

Stage	All	Age < 50	Age > 50
All Stages	89.1	88.4	89.3
Localized	98.6	96.2	99.3
Regional	83.8	84.6	83.4
Distant	23.3	30.6	21.3
Unstaged	52.4	71.9	47.5
In situ	100.0	100.0	100.0

Algorithms have been published which estimate risk for recurrence. One such model is Adjuvant! which is found at: www.adjuvantonline.com. It uses all of the strongest prognostic factors for recurrence except for HER2 status (patient age, comorbidity, tumor size and grade, number of involved axillary nodes), in order to help clinicians estimate relapse risk.

II. Aeromedical Concerns

Breast cancer, in the early stages, has almost no risk of sudden incapacitation; and it is only in the later stages, with involvement of distant organ metastases, where such risk occurs. However, the treatment of breast cancer can have local and systemic effects which can result in significant adverse impact in the aerospace environment. For instance, mastectomy can be associated with significant muscle and tissue loss, loss of self esteem, depression, as well as with lymphedema from axillary node dissection. There can also be loss of upper limb mobility from nerve damage during the surgery, particularly if there is damage to the long thoracic and thoracodorsal nerve distributions. Scar tissue and chronic pain can be the result of surgery and/or radiation therapy. All of these situations can adversely affect strength, endurance, comfort, and mobility in the cockpit environment, and may preclude safe wear of equipment and safe operation of an aerospace vehicle. In addition, the systemic effects of chemotherapy (such as nausea, vomiting, blood clots, hot flashes, arthralgias and myalgias) can also adversely affect strength, endurance, and stamina in the cockpit and the aviation environment; and this is not withstanding the very real risks of neutropenia, as well as anemia, which even in its mildest forms can decrease performance at altitude.

III. Waiver Considerations

Breast cancer or a history of breast cancer is disqualifying for all classes of flying in the United States Air Force. It is not listed specifically as disqualifying for ATC/GBC and MOD personnel, but for retention, the following verbiage applies: "Malignant neoplasms (including carcinomas in-situ). Malignancies that respond to treatment may require follow-up care that impacts deployability. Malignant neoplasms that are unresponsive to therapy, or have residuals of treatment, are in themselves unfitting under other provisions of this chapter."

Table 6: Waiver potential of breast cancer

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Stages 0 or I	Yes#† AETC	Yes
	Stage IIA, or IIB	No AETC	No
	Stage III or IV	No AETC	No
II/III	Stages 0, I, IIA or IIB	Yes+*† MAJCOM%	Yes
	Stage III or IV	No MAJCOM%	No
ATC/GBC MOD**	Stages 0, I, IIA, or IIB	Yes† MAJCOM%	At discretion of waiver authority
	Stage III or IV	No MAJCOM%	No

For Flying Class I/IA candidates, waiver may be considered after five years cancer free.
† No indefinite waivers.
* For untrained FC II and III, waiver may be considered after 5 years of remission.
+ For trained FC II and III individuals waiver may be considered as early as six months after treatment completed, in remission, surveillance is ongoing, and asymptomatic.
% All waivers need to go to MAJCOM who will then route them to AFMSA after appropriate review at their level. Per AF policy, those medical conditions requiring an MEB need to be waived initially by AFMSA.
** Waiver authority for MOD is AFSPC or GSC.

AIMWTS review in Jun 2013 revealed a total of 32 individuals with a waiver submission with the diagnosis of breast cancer. Breakdown of the cases revealed: no FC I/IA cases 9 FC II cases (1 disqualified), 18 FC III cases (2 disqualified), 2 ATC/GBC cases (0 disqualified), and 3 MOD cases (1 disqualified). Of the 32 cases, two were male and both received a waiver. The highest stage of

breast cancer that was successfully waived on several occasions was stage IIb. At least two individuals have been waived for Flying Class III duties while taking Arimidex® (anastrozole).

IV. Information Required for Waiver Submission

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for breast cancer should include the following:
A. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
B. History- initial symptom or screening used to detect the malignancy. Also include overall health, fitness, family history, prior surgery, and prior illnesses.
C. Laboratory results: CBC with differential and platelet count, complete metabolic panel including liver function tests, alkaline phosphatase
D. Current Physical- especially describing any deformity, lymphedema, or restricted range of motion for the upper extremities and chest wall, as well as mental state.
E. Imaging studies: For stage II or greater, include mammogram, ultrasound, chest X-ray, CT scan of brain and liver, bone scan and or MRI if applicable; PET if applicable.
F. Pathology findings to include tumor, tumor markers, ER and PR determination, HER2 status, tumor size, location, margins, node status, and means used to obtain lymph nodes.
G. Surgical operative reports to include placement of any prosthesis, vascular access port, or implant/muscular flap.
H. Oncology report to include treatment plan and protocol, prognosis, and stage of cancer.
I. Documentation that the level of follow-up care is consistent with current NCCN standards[1.]
J. Tumor Board report as applicable.
K. Medical Evaluation Board report.

The AMS for waiver renewal for breast cancer should include the following:
A. Interim history.
B. Physical exam of chest wall and axillae regions.
C. Oncology and Surgery consultation reports.
D. Laboratory results since last waiver.
E. Radiological results since last waiver.
F. Evidence of follow-up care consistent with NCCN standards.[1]

ICD-9 codes for breast cancer	
174.0-174.9	Malignant neoplasm of the female breast
175.0-175.9	Malignant neoplasm of the male breast
217	Benign neoplasm of breast (nonmetastasizing tumor arising from breast parenchyma)

ICD-10 codes for breast cancer	
C50.111	Malignant neoplasm of the central portion of right female breast, .112 left, .119 unspecified, *quadrant defined 0.2, 0.3, 0.4, 0.5, 0.6, 0.8, 0.9
C50.121	Malignant neoplasm of the central portion of right male breast, .122 left, .129 unspecified, *quadrant defined 0.2, 0.3, 0.4, 0.5, 0.6, 0.8, 0.9
D24.1	Benign neoplasm of right breast, .2 left, .9 unspecified

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WAIVER GUIDE
Updated: Jan 2016
Supersedes Waiver Guide of Apr 2012
By: Dr. Dan Van Syoc

CONDITION:
Cancers, Miscellaneous (Jan 16)

I. Overview.

Previously, there were several cancer diagnoses in the waiver guide which have since been removed. The reason for so doing is the paucity of AIMWTS submissions in these categories. Causes for this would include: rarity of the tumor in our aviation population, poor prognosis of the tumor once diagnosed, long duration of chemotherapy and hazards associated with a particular drug regimen, and treatment side effects that are not compatible with aviation duties.

Having said this, there are those folks with many types of cancer who defy the odds and do well after an aggressive approach to their disease. After a thorough evaluation it may be determined that they are fit for waiver consideration.

The following malignancies have a current posted waiver guide:

- Bladder
- Breast
- Cervical
- Colorectal
- Hodgkin Lymphoma
- Leukemia
- Malignant Melanoma
- Non-Hodgkin Lymphoma
- Pituitary Tumors
- Prostate
- Salivary Gland
- Testicular
- Thyroid

The following malignancies have been removed from the waiver guide:

- Carcinoid
- Kidney
- Laryngeal
- Lung
- Neurological Tumors
- Oral cancers
- Other GI tumors
- Ovarian

Plasma cell dyscrasias

- Uterine

II. Aeromedical Concerns.

As with all malignancies, there is concern with recurrence and sudden incapacitation. There is also concern with side effects of treatment such as surgery, radiation, and chemotherapy. An aviator returned to flying duties after treatment for a malignancy must be able to endure all the rigors of his or her aviation environment as well as to safely egress the aircraft in case of an emergency. Depending on the tumor and stage, as well as flyer's aircraft, it may be prudent to have the aviator spin in a centrifuge and/or go through altitude chamber training prior to waiver consideration.

III. Waiver Considerations.

According to the AF Medical Standards Directory, the history, or presence of, a malignant tumor, cyst or cancer of any sort is disqualifying for aviation and special duties, as well as for retention. Childhood malignancy considered cured may be considered for waiver on a case-by-case basis. To be considered for a waiver, the malignancy needs to be considered cured, or in remission, by applicable clinical standards. The individual must be off all chemotherapeutic agents for long enough to allow for all the intended clinical effects and for all unintended effects to have resolved. The individual must also have no identifiable aeromedically significant side effects from any treatment modality. Each such case must be submitted to the ACS for review prior to waiver action. All contributing lifestyle issues must be resolved. Generally, waiver will not be considered within six months of cessation of definitive therapies.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for <u>initial waiver</u> should include the following, at a minimum:
A. History of tumor diagnosis, all treatment performed and any side effects from the tumor and/or treatment. Need good time lines.
B. All imaging reports (actual images may be required in some cases).
C. Surgical reports, consults and pathology reports.
D. Clinically relevant labs.
E. Oncology consultation stating malignancy is considered cured, or in remission, and the recommended follow-up schedule for the patient.
F. Tumor board results if accomplished.
G. MEB results.

The aeromedical summary for <u>waiver renewal</u> should include the following:
A. Detailed interim history since last waiver submittal.
B. All applicable labs and imaging studies.
C. Consult from oncologist.

WAIVER GUIDE
Updated: Feb 2015
Supersedes Waiver Guide of Mar 2011
By: LtCol Max Lee (RAM 16), Dr. Dan Van Syoc, and Dr. Eddie Davenport (ACS chief cardiologist)

CONDITION:
Cardiomyopathy (Feb 15)

I. Overview.

The term cardiomyopathy broadly encompasses any disease of the myocardium associated with cardiac dysfunction. Primary cardiomyopathies encompass five disease entities in which the abnormality is intrinsic to the myocardium itself: idiopathic or dilated cardiomyopathy (DCM), hypertrophic cardiomyopathy (HCM), restrictive cardiomyopathy (RCM), arrhythmogenic right ventricular cardiomyopathy/dysplasia (ARVC/D), and unclassified cardiomyopathies. Secondary cardiomyopathies refer to disease states in which the primary abnormality is extrinsic to the myocardium but results in cardiac dysfunction. The most common secondary cardiomyopathies are ischemic cardiomyopathy (ICM) secondary to coronary artery disease, hypertensive cardiomyopathy (commonly isolated diastolic dysfunction), Chagas' disease-related cardiomyopathy, and cardiomyopathy secondary to valvular heart disease. Although different categorization schemes have been proposed, this functional approach to classification has proven to be the most clinically and aeromedically useful and will be used here.[1, 2, 3, 4]

DCM is typically characterized by left ventricular dilation, systolic dysfunction, and a general reduction in overall contractility. The natural history of DCM is not well-established, although the 5-year mortality rate ranges from 20-50%. Individual predictions of morbidity and mortality vary substantially, however disease severity correlates well with outcomes. DCM is most common in middle-aged men, and has an overall incidence of 5-8/100,000/year.[5] Symptoms are generally progressive and include those of left-heart failure (fatigue, exercise intolerance, dyspnea, etc). Associated right-heart failure and/or global chamber enlargement are late signs. Although the final cause of death in individuals with DCM is typically systolic failure, arrhythmias, thromboembolic events, or sudden death may occur at any time.[1, 2, 3, 4] Post-partum cardiomyopathy is a type of DCM with the highest rate of full recovery compared to other forms of cardiomyopathy.[4, 6]

Viral myocarditis is considered the likely etiology for many cases of idiopathic DCM. There may thus be some confusion whether a case is more appropriately considered myocarditis or DCM. ACS review of the case and reference to the *Pericardial Disorders Including Myopericarditis* Waiver Guide will help discern the appropriate aeromedical disposition. Typically, myopericarditis will present acutely with chest discomfort, characteristic ECG changes, elevated cardiac enzymes, and regional or diffuse left ventricular wall motion abnormality. DCM with diffuse hypokinesis may be the end result of viral myocarditis, presenting either with symptoms of left ventricular dysfunction or diagnosed incidentally on echocardiography.

HCM is characterized by hypertrophy of the left ventricle, usually in an asymmetric fashion involving the base of the left ventricular septum. Multiple anatomic variations are known to occur including concentric and apical-only patterns. HCM is characterized by the development of scar tissue and disorganized myofibrils which may lead to ventricular arrhythmias and sudden death.

While HCM is known to be an autosomal dominant heritable disorder with variable penetrance and phenotype expression, roughly half of all cases are spontaneous in nature. Nevertheless, familial screening of identified probands is usually undertaken, particularly in the young. The prevalence of HCM is estimated 0.07 – 0.1%.[7] It is most commonly diagnosed in the 4th and 5th decades, but has been identified in all age groups including stillborns. Although a pressure gradient of the left ventricular outflow tract is a distinctive clinical feature, it is present in only about 25% of patients. Symptoms, when present, commonly include dyspnea, angina, fatigue, presyncope, and syncope. In younger populations, HCM is commonly confused with athlete's heart; HCM will not regress with cessation of athletic activity, however.[1, 2, 3]

Both DCM and HCM may be misdiagnosed locally, because of the unfamiliarity of some clinicians with cardiac variants seen in relatively young and athletic subjects such as our aviator population. Ejection fraction at rest may be low normal or mildly reduced (45-50%) in athletic individuals compared to clinical norms (50-70%), resulting in a misdiagnosis of mild DCM. Additionally, left ventricular wall thickness may be upper normal to mildly increased (12-13 mm) compared to clinical norms (7-11 mm), resulting in a misdiagnosis of pathologic left ventricular hypertrophy or mild HCM.[2, 3] Therefore, ACS review is recommended for all locally diagnosed cardiomyopathies, to confirm (or refute) the diagnosis, followed by recommendations regarding prognosis and waiver eligibility in accordance with approved policy.

The hallmark of restrictive cardiomyopathy (RCM) is severely abnormal diastolic function. The ventricular walls are excessively rigid and impede filling, resulting in pulmonary and systemic venous congestion. RCM must be differentiated from constrictive pericarditis, which can be successfully surgically treated. RCM can be a primary disorder or secondary to infiltrative or scarring processes that involve the myocardium such as amyloidosis, sarcoidosis, or scleroderma. Other rare causes such as hypereosinophilic syndrome and endomyocardial fibrosis are usually seen only in certain geographic areas such as equatorial Africa and South America. Common symptoms include exercise intolerance, dyspnea, fatigability, and weakness. RCM is typically relentlessly progressive, poorly responsive to most therapies, and associated with a high mortality rate.[1, 2, 3]

Arrhythmogenic right ventricular cardiomyopathy/dysplasia (ARVC/D) has received heightened attention in recent years because of its association with ventricular tachycardia and sudden death, particularly in younger populations. It is characterized by fibro-fatty replacement of the right ventricular myocardium.[8] This results in a predisposition towards potentially lethal ventricular arrhythmias, and the usual clinical presentation is sustained or non-sustained ventricular tachyarrhythmias and/or sudden cardiac death.[2, 3, 8]

The term unclassified cardiomyopathy describe disorders that do not readily fit into any of the above categories to include left ventricular non-compaction, stress-induced and cirrhotic cardiomyopathies.[1] Left ventricular non-compaction cardiomyopathy is caused by intrauterine arrest of the cardiac muscle meshwork with continuity between the deep intratrebecular recesses without evidence of communication to the epicardial arterial system. Left ventricular cardiomyopathy has been associated with high incidence of heart failure, thromboembolism, and ventricular arrhythmias. Stress induced cardiomyopathies (broken heart or takotsubo) is characterized by transient systolic dysfunction of the apical and/or mid segments of the LV provoked by stress.[9] Since these may present with chest pain and ST segment elevation, the presumptive diagnosis prior to coronary artery catheterization is often ST elevation MI. The LV is most commonly affected, however involvement the RV or both ventricles results in increased

incidence of heart failure and intra-aortic balloon pump rescue.[9] Cirrhotic cardiomyopathy is associated with myocardial dysfunction independent of alcohol exposure and is defined as unexplained and chronic cardiac dysfunction in patients with cirrhosis with impaired contractile responsiveness to stress and/or diastolic dysfunction.[1]

Finally, secondary cardiomyopathies such as ischemic cardiomyopathy, hypertensive cardiomyopathy, tachycardia induced cardiomyopathy, and valvular cardiomyopathy all have variable prognoses depending on the severity and treatment of the underlying disease. If left untreated, all may progress to a terminal stage of irreversible myocardial dysfunction marked by systolic and/or diastolic failure, dilation, and an increased likelihood of associated arrhythmias, thromboembolic events, or sudden death. The development of a secondary cardiomyopathy is considered an aeromedical endpoint for the above disorders, and is usually not compatible with a return to flight status recommendation. Aeromedical disposition will be based on policies for the underlying disorder (see applicable waiver guides) and the impact of the secondary cardiomyopathy on prognosis.

II. Aeromedical Concerns.

There are two primary military aeromedical concerns for individuals with cardiomyopathy. The first is the risk of sudden incapacitation. The risk of sudden death, arrhythmias, and/or thromboembolic events is generally correlated with the overall degree of cardiac dysfunction, although as noted above some types of cardiomyopathy (notably HCM and ARVC/D) are more likely to be associated with potentially suddenly incapacitating symptoms. Secondly, even mild degrees of myocardial dysfunction may be incompatible with military aviation duties due to an associated reduction in exercise tolerance, the need for complex medical therapy, and the need for frequent access to specialized medical care. Specifically, standard-of-care medical therapy for cardiomyopathy usually involves multiple hemodynamic, vasoactive, chronotropic, and diuretic medications which may alter physiologic responses to the military aeromedical environment such that the aviator cannot perform his or her usual duties without an undue increase in risk to themselves, the crew, or the mission. Device therapies for cardiomyopathies are not waiverable due in part to the unacceptably high complication rates associated with the devices themselves.

III. Waiver Consideration.

Cardiomyopathy is disqualifying for all classes of flying duties. It is disqualifying for retention purposes, and members with all but the most mild degrees of cardiomyopathy will only be considered after the individual has been released to full unrestricted activity and found fit for continued military duty by a medical evaluation board (MEB). Diagnoses of cardiomyopathies may be made following acute symptomatic episodes or in an asymptomatic subject receiving an echocardiogram for a variety of clinical and/or aeromedical indications. Waiver submissions should be made only after resolution of any acute episode, stabilization of the medical regimen, and release of the individual back to full unrestricted activities by the treating cardiologist.
As noted below, ACS review is required for all locally diagnosed cardiomyopathies however, to confirm (or refute) the diagnosis and advise regarding prognosis and waiver eligibility. Mild cases of DCM which resolve over time may be considered for waiver after ACS evaluation. Some secondary cardiomyopathies may be waiver eligible, based on policies for the underlying disorder and the impact of the secondary cardiomyopathy on overall prognosis. Typically, this will involve definitive therapy that results in an aeromedically acceptable outcome, including resolution of the

cardiomyopathy. Resolution of tachycardia-induced cardiomyopathy and return of left ventricular and left atrial size and function to normal after successful surgical repair of severe mitral regurgitation are examples.

Table 1: Waiver potential for Cardiomyopathy**

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	DCM, HCM, RCM, ARVC/D, secondary cardiomyopathy	No AETC	Yes@
II/III*	DCM	Maybe MAJCOM	Yes@
	HCM, ARVC/D, and RCM	No MAJCOM	Yes@
	Secondary cardiomyopathy	Maybe MAJCOM	Yes@
ATC/GBC* MOD*$	DCM	Maybe MAJCOM	Maybe@
	HCM, ARVC/D, and RCM	No MAJCOM	Maybe@
	Secondary cardiomyopathy	Maybe MAJCOM	Maybe@

*Initial training cases should all be treated similar to FC I/IA.
@ACS review or evaluation for initial cases is at the discretion of the waiver authority.
$ Waiver authority for MOD is AFGSC.
** Per AFI 48-123 6.4.1.3, AFMSA remains waiver authority for all initial waivers for conditions that do not meet retention standards, unless 6.4.1.4.1 applies.

AIMWITS search in Feb 2015 revealed 46 cases listed as cardiomyopathy. Breakdown of the cases was as follows: 4 FC I/IA (1 disqualified), 18 FC II (9 disqualified), 20 FC III (5 disqualified), and 4 ATC/GBC (2 disqualified). All cases with waiver recommendations had resolution of any symptoms or radiographic evidence of cardiomyopathy.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after administrative and clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for cardiomyopathy should include the following:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level.
B. Cardiology consult
C. Electrocardiogram (ECG).
D. Chest x-ray report.
E. Official report of all local echocardiograms. Also upload digitally or send CD/DVD copy of the images of the most recent echocardiogram to the ACS. (Notes 1 and 2)
F. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)
G. Results of medical evaluation board MEB (worldwide duty evaluation for ARC members).

The aeromedical summary for waiver renewal for cardiomyopathy should include the following:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level.
B. Electrocardiogram (ECG).
C. Additional local cardiac testing is not routinely required for re-evaluation cases followed at the ACS but may be requested in individual cases. If so, the previous ACS evaluation/review will specify details regarding any requested local testing.
D. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

ICD-9 Codes for cardiomyopathy	
425.4	Other primary cardiomyopathies (hypertrophic, restrictive, idiopathic, familial, not otherwise specified, congestive, constrictive, obstructive, nonobstructive)
425.9	Secondary cardiomyopathy, unspecified
086.0	Chagas' disease with heart involvement

ICD-10 Codes for cardiomyopathy	
I42.8	Other cardiomyopathies
I42.9	Cardiomyopathy, unspecified
B57.0	Chagas' disease with heart involvement

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WAIVER GUIDE
Updated: Feb 2014
Supersedes Waiver Guide of Sep 2010
By: Lt Col David Andrus (RAM XV), Major Tighe Richardson and Dr. Steven Hadley (ACS Ophthalmology branch), and Dr. Dan Van Syoc

CONDITION:
Cataract, Capsular Opacification, And Intraocular Lens Implant (Feb 14)

I. Overview.

The term "cataract" describes an opacification of the eye's natural lens. It may be congenital or acquired and can result from multiple etiologies. Congenital cataracts and cataracts that develop within the first year of life (infantile cataracts) are a fairly common finding with a prevalence of about 1 in every 2000 births.[1] They can be from multiple causes to include hereditary, genetic, metabolic, maternal infections, toxic, or ocular anomalies. Often, however, congenital and infantile cataracts are idiopathic. They can be bilateral or unilateral and range in severity from complete opacification of the lens that necessitates an early cataract extraction to minor opacification without any visual sequelae. Often very minor congenital cataracts will not be found during childhood examinations and are only noted as incidental findings on later exams. Other opacities can exist on the outer surface of the lens capsule, such as embryonic fetal vasculature remnants but these are not considered cataracts and typically do not cause visual problems.[2]

Acquired cataracts in adulthood are the leading age-related cause of blindness and visual impairment in the world. One study has shown that visually significant cataracts were present in 2.6% of women and 0.4% of men ages 43-54. These numbers increase to 10.0% of women and 3.9% of men ages 55-64 and 23.5% of women and 14.3% of men ages 65-74.[3] An earlier study found even higher prevalence of visually significant cataracts with 4.7% of women and 4.3% of men ages 52-64 and 19.3% of women and 16.0% of men ages 65-74.[4]

The lens undergoes multiple changes as it ages. Since the lens continuously adds new layers to the outside, the inner nucleus is compressed and hardened leading to nuclear sclerosis. Other chemical changes increase the pigmentation, hydration and cause proteins to aggregate, all of which promote scattering of light. These changes increase the refractive index of the lens inducing myopia. Also, hardening of the lens with aging leads to a decrease in the lens' accommodative ability and an increase in the lens' anterior-posterior diameter (leading to further refractive changes). These nuclear sclerotic changes are a normal occurrence in adults middle aged or older and do not necessarily impair vision. However, if the changes are excessive, a nuclear sclerotic cataract can result, which can significantly impair vision.

Cortical cataracts arise in the outer layers of the lens but outside the nucleus. These cataracts result from hydration of the cortex and often start as visible vacuoles. The cataract progresses to form spoke like opacities from the peripheral lens inward. These opacities can significantly impair vision and lead to glare complaints.

A posterior subcapsular cataract is located between the posterior capsule and the outer lens cortex. Cells inside the peripheral lens capsule migrate to the posterior inner surface of the capsule and

develop into granular opacities. This can also occur in the anterior subcapsular region. These changes lead to poor central vision and glare that worsens in bright light.

Certain medications also may lead to cataract formation. Long term corticosteroid use has been associated with formation of posterior subcapsular cataracts while other medications such as phenothiazines, miotics and amiodarone have been associated with other types of cataracts. Finally, either blunt or penetrating trauma to the lens or eye, ionizing, infrared or ultraviolet radiation and metabolic diseases, such as, diabetes and Wilson's disease are all associated with cataract formation.[2]

In addition, to glare and declining visual acuity, cataracts can cause other visual complaints. Cataracts may cause depression of visual field sensitivity and/or visual field defects. Also, the lenticular color changes associated with certain cataracts (e.g. the yellowing in nuclear sclerosis) have the potential to cause acquired color vision deficiencies.

Surgery is usually the best option available to restore vision compromised by cataract formation. If a cataract and the surrounding lens capsule are extracted, it is called an intracapsular extraction. This procedure, however, is very rarely performed. The most common procedure for cataract extraction today is called extracapsular cataract extraction and leaves a portion of the lens capsule in place in order to support an intraocular lens implant (IOL). This is typically performed using phacoemulsification which uses an ultrasonic device to break up the cataract so that it can be removed through a much smaller incision, often in the cornea. This technology, coupled with foldable intraocular lenses (IOL) has significantly reduced the size of the incision and complications associated with the procedure. Multiple techniques for incisions can be used for these procedures to enter the eye, including entry through the cornea or the sclera. The cataract is then removed and usually an intraocular lens (IOL) is implanted. These lenses may be placed either in the anterior chamber between the iris and cornea or the posterior chamber; behind the iris, typically within the remaining capsular “bag”. Multiple IOL designs exist, made of different materials that range from rigid to flexible/foldable. Some designs are sewn into place while most remain in place without the need for sutures. A new extracapsular procedure utilizes femtosecond laser energy to create corneal incisions, lens capsulotomies, and assist in the “break up” of the cataract; instead of relying solely on ultrasonic energy for phacoemulsification.[5]

After a cataract extraction, the eye can no longer accommodate, and therefore reading and other near work becomes difficult without the use of reading glasses. Some IOLs, (Refractive Multifocal) with varying power have been designed to help mitigate this problem. These multifocal lenses have multiple refractive zones within the lens that attempt to bring images at distance and near into focus at different times depending on the location of the focal object (length) and the size of the pupil. However, neither distance nor near images are as clear (decreased contrast sensitivity) as they would be with a single vision IOL with reading glasses for near vision.[2] Another newer option involves a hinged IOL (Accommodative), which moves with contraction of the ciliary body and is thought to provide the patient with some accommodative range.[6] Other IOLs that can correct for corneal astigmatism (Toric) are in use and can eliminate or reduce the need for spectacles for distant visual acuity. Even though multifocal, accommodative, and toric IOLs demonstrate the forefront of intraocular lens technology; they all have distinct tradeoffs in vision quality making none of them authorized for use in aircrew.

Since the eye's natural lens filters ultraviolet light, many IOLs have UV blocking ability to help prevent retinal damage. There is also a body of literature that suggests that excess light in the blue portion of the visible spectrum may damage the retina and lead to macular degeneration. Because of this, IOLs are currently available that have a yellow tint and act as "blue blocking" filters. These IOLs have been found to potentially cause acquired color vision deficits and are not authorized for use in aircrew.[7]

Only certain IOLs are approved for use in aircrew members. The selection of the procedure and the IOL should be coordinated with the Aeromedical Consultation Service (ACS) [DSN 798-2676, (937) 938-2676] for members on or planning to enter flying status. Generally, the preferred procedure is an extracapsular cataract extraction with implantation of a posterior chamber IOL at either the ciliary sulcus or in the capsular bag. The IOL should have tissue fixable haptics (polypropylene [PP], polyethylene [PE] or polymethylmethacrylate [PMMA]) with a 6-7 mm optic and ultraviolet filtering properties but without blue blocking tints (i.e., yellow). One piece silicone IOLs are not approved for aircrew use because they do not fix well to the capsular bag and silicone material has been found to be pro-inflammatory in the post operative eye. The multifocal IOLs and the newer accommodating IOLs are also not approved for aircrew use. Finally, any IOLs with plate designs, tints in the visual spectrum including blue-blocking chromophores (i.e., yellow) and positioning holes are not approved.

Although cataract surgery is one of the safest surgeries available, it does have complications, some possibly severe and sight threatening. By far the most common complication is posterior capsular opacification (PCO). This occurs when the cells that are present in the periphery of the lens that usually slowly proliferate throughout life remain in the lens capsule after extraction and migrate to the posterior capsule surface. At this location they can proliferate, cause wrinkling and distortion or cause fibrosis of the posterior capsule. The posterior capsular changes can lead to glare and a decline in visual acuity. PCO varies in incidence and severity but appears to occur at visually significant levels in about 28% of pseudophakic patients at 5 years after surgery. Newer IOL material, shape ("square edged"), and surgical techniques have successfully decreased the incidence of PCO.[8] The incidence of PCO for PMMA IOLs has been reported to be 56% at three years compared to 40% for silicone IOLs and 10% for acrylic IOLs. The typical treatment for visually significant PCO is a Nd:YAG laser posterior capsulotomy that focuses a laser on the posterior capsule and creates a hole through which the light can travel uninhibited. The procedure is fairly benign but does increase the risk of retinal detachments to approximately 2.4%-3.2%. About half of these detachments occur within the first year. In addition to PCO, there are other, some potentially serious complications of cataract surgery. Infections can develop in the post-surgical period that are often serious and can lead to loss of vision, even loss of the eye. Retinal detachments can occur, especially when the posterior capsule is disrupted. The patient may have a reaction to the IOL after it has been placed or it may dislocate and require additional surgery. Further, the cornea, retina, iris and other parts of the eye may have iatrogenic injury that can result in significant permanent visual impairment.[2]

Phakic, aphakic and pseudophakic are terms used to describe the status of an individual's lens. Phakic refers to a person with an intact natural lens while a pseudophakic individual had a lens extracted and an IOL placed. A person is aphakic if the natural lens was extracted and no IOL was implanted. Leaving an individual aphakic is still an option for significantly complicated cases, however, often the distortion of vision that accompanies aphakic spectacles or contact lenses is

intolerable.[2] For such cases, secondary surgically placement of an IOL, often with scleral fixation, provides the best method of visual rehab.

II. Aeromedical Concerns.

Aeromedically, lens changes are defined as *opacities* (developmental lens defects that do not progress) and *cataracts* (lens opacities with the potential to progress and compromise visual function). Developmental opacities of the lens are not disqualifying, whereas cataracts, including congenital polar cataracts, are. Decreased visual acuity, contrast sensitivity or symptoms of glare associated with cataracts have the potential to adversely affect mission effectiveness and flight safety. Even if a lens change does not significantly impact vision at present, any of those defined as cataracts have the potential to progress, some relatively quickly. This progression necessitates, at a minimum, monitoring of any potentially progressive cataract to ensure visual functioning remains unaffected. Some cataractous changes become problematic only under certain environmental conditions, such as in bright lights or at night.

As with any medical problem in USAF aircrew, medical treatment to meet the current standard of care is mandated without the necessity to receive permission from the ACS or waiver authority. However, there are some complicating issues with cataracts in aircrew. Typically, civilian patients are not operated on until the patient deems his or her vision is poor enough to require surgery.[2] Often this level of severity is after the patient's vision has declined significantly below the 20/20 Air Force vision standard. USAF aircrew may require surgery at an earlier point than their civilian counterparts.

Like any medical condition, implanted IOLs have additional concerns in the aviation environment that are not present in typical daily use. A review of FAA records done in 1993 examined the accident risks for pseudophakic pilots versus phakic pilots. This study found a statistically significant increased risk of aviation mishaps associated with pseudophakic pilots. The risk was even greater for pseudophakic pilots under the age of 50. When compared to their corresponding phakic counterparts, pseudophakic pilots under the age of 50 had 3.72 times the risk of having a mishap while the pseudophakic pilots over the age of 50 had 1.41 times the risk.[9]

Another concern for IOLs is the theoretical risk of dislocation of IOLs under the extreme G-forces in the aviation environment. According to ACS records, there has been no known dislocation of an IOL during flight duties in the USAF. Further, study animals with implanted IOLs were subjected to G-forces up to +12 Gz without any signs of dislocation.[10] A case report in August 2000 demonstrated that IOLs may be stable under high G-forces when a pilot with an IOL ejected from a T-6A Texan and the IOL remained stable.[11] Stability of toric IOLs both clinically and operationally remains to be seen and as such, are currently not approved for use in aircrew.

III. Waiver Considerations.

Opacities, cataracts, or irregularities of the lens, which interfere with vision, or are considered to be progressive, are disqualifying for flying classes I/IA, II, and III. For ATC/GBC and MOD duties, cataract is not specifically mentioned as a disqualifying diagnosis, but it would become relevant if the cataract impaired visual acuity. For all classes, no waiver is required if the lenticular opacity is asymptomatic, visually insignificant, and non-progressive (no potential for progression).

Table 1: Waiver potential and required ACS evaluation for cataracts and lenticular opacification.

Flying Class	Condition/Treatment	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	Symptomatic, visually significant, or potentially progressive lenticular opacity or cataract, pseudophakic, aphakic, or capsular opacification	No AETC	No
II/III/*	Symptomatic, visually significant or potentially progressive lenticular opacity or cataract	Yes MAJCOM	Yes, evaluation initially, then possibly review only on subsequent renewals
	Pseudophakic or aphakic	Yes MAJCOM	Yes, evaluation initially, then possibly review only on subsequent renewals
	Asymptomatic, potentially progressive posterior capsular opacification	Yes MAJCOM	Yes, review only or evaluation if requested by MAJCOM initially or on subsequent renewals
	Posterior capsular opacification after treatment, meets vision standards	Yes MAJCOM	Yes†, review with possible evaluation initially with review only on subsequent renewals
ATC/GBC MOD	Cataract affecting visual acuity	Yes MAJCOM#	Only at the request of MAJCOM#

* For initial flying class II and III physicals, waiver is not likely for cataracts deemed potentially progressive or for history of cataract surgery.
† Waiver can be submitted 30 days post laser treatment.
# Waiver authority for MOD personnel is AFGSC.

A Nov 2013 AIMWTS search revealed 267 individuals with the diagnosis of cataract and/or cataract with IOL. Of the total, 11 were FC I/IA, 131 were FC II, 120 were FC III, 4 were ATC/GBC and there was 1 MOD case. There were a total of 60 disqualifications dispositions: 10 FC I/IA, 21 FC II, 28 FCIII, 1 ATC/GBC and 0 MOD. Fewer than half of the disqualified cases

were directly related to the cataract diagnosis and the majority of individuals were disqualified for additional diagnoses.

IV. Information Required For Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for an initial waiver for a potentially progressive but currently asymptomatic (meets vision standards) lenticular opacity without current plans for surgical treatment should include (ACS review required, in-person evaluation may not be required):

A. Any prior history, medical evaluation or treatment of the condition.

B. Full optometry/ophthalmology exam to include:

1. Description of the lens opacity type and severity.
2. Best corrected visual acuities at distance and near
3. Any contact lens or spectacle correction prescriptions
4. Cone contrast test (CCT) scores for each eye individually
5. Humphrey visual field 30-2 testing for each eye.
6. Low contrast acuity testing with Precision Vision 5% acuity chart corrected and uncorrected for each eye.

The AMS for an initial waiver after definitive surgical extraction should include (ACS in-person evaluation required):

A. Any prior history, medical evaluation or treatment of the condition.

B. Full optometry/ophthalmology exam to include:

1. Description of any visual complaints.
2. Ophthalmology exam notes prior to and following the surgical procedure.
3. Operative note.
4. Model numbers and types of intraocular lenses
5. The prescription of aphakic contact lenses or the prescription of aphakic spectacles depending on the optical correction the aircrew member uses.
6. Best corrected visual acuities at distance and near.
7. Dilated retinal exam.
8. Comment on location and stability of IOL.
9. Cone contrast test (CCT) scores for each eye individually.
10. Humphrey visual field 30-2 testing for each eye.
11. Low contrast acuity testing with Precision Vision 5% acuity chart corrected and uncorrected for each eye.

The AMS for initial waiver after posterior capsule opacification treatment with YAG laser should include (ACS review required, in-person evaluation may not be required):

A. Any interval history, procedures or symptoms since the last waiver was granted.

B. Full optometry/ophthalmology exam to include:

1. Operative note.
2. Comment on location and stability of the IOL.

3. Best corrected visual acuities at distance and near.
4. Any contact lens or spectacle correction prescriptions.
5. Humphrey visual field 30-2 testing for each eye.
6. Dilated retinal exam.
7. Low contrast acuity testing with Precision Vision 5% acuity chart corrected and uncorrected for each eye.
8. Cone contrast test (CCT) scores for each eye individually.

The AMS for an initial waiver for a visually significant lenticular opacity or cataract without current plans for surgical treatment should include (ACS in-person evaluation required):
A. Description of any symptoms associated with condition, any noted progression and any prior medical evaluation or treatment for the condition.
B. Full optometry/ophthalmology exam to include:
1. Description of the cataract type and severity.
2. Best corrected visual acuities at distance and near.
3. Any contact lens or spectacle correction prescriptions.
4. Cone contrast test (CCT) scores for each eye individually.
5. Dilated retinal exam.
6. Humphrey visual field 30-2 testing for each eye.
7. Low contrast acuity testing with Precision Vision 5% acuity chart corrected and uncorrected for each eye.

The AMS for a renewal waiver for cataract or visually significant lenticular opacity should include (ACS review required, in-person evaluation may not be required):
A. Brief summary of previous history of the condition, any associated symptoms, any changes or progression and any treatment performed.
B. Full optometry/ophthalmology exam to include:
1. Description of the cataract type and severity / Comment on location and stability of IOL.
2. Best corrected visual acuities at distance and near.
3. Any contact lens or spectacle correction prescriptions.
4. Cone contrast test (CCT) scores for each eye individually.
5. Dilated retinal exam.
6. Humphrey visual field 30-2 testing for each eye.
7. Low contrast acuity testing with Precision Vision 5% acuity chart corrected and uncorrected for each eye.

The AMS for a renewal waiver after definitive surgical extraction and/or YAG capsulotomy should include (ACS review required, in-person evaluation may not be required):
A. Any interval history, procedures or symptoms since the last waiver was granted.
B. Full optometry/ophthalmology exam to include:
1. Comment on location and stability of the IOL
2. Best corrected visual acuities at distance and near.
3. Any contact lens or spectacle correction prescriptions.
4. Cone contrast test (CCT) scores for each eye individually.
5. Dilated retinal exam.
6. Humphrey visual field 30-2 testing for each eye.
7. Low contrast acuity testing with Precision Vision 5% acuity chart corrected and uncorrected for each eye.

Note: Aeromedical summaries may not be submitted any early than 60 days after extraction and IOL implant. ACS evaluation will not be scheduled until 90 days following the procedure; assuming the aircrew member is stable and off medications. If just YAG laser surgery is done for a posterior capsule opacification then aeromedical summary may be submitted 30 days after procedure if asymptomatic and off any medications.

ICD-9 codes for cataract, cataract surgery	
366	Cataract
379.31	Aphakia
743.30	Congenital cataract
V43.1	Lens replaced by other means
V45.61	Cataract extraction

ICD-10 codes for cataract	
H25.011- H25.9	Cataract
H26.8	Other specified cataract
H26.9	Unspecified cataract
H27.0 1, 2, 3	Aphakia, unspecified eye, right eye, left eye, bilateral
Q12.3	Congenital aphakia
Q12.0	Congenital cataract

V. References.

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WAIVER GUIDE
Updated: Aug 2016
Supersedes Waiver Guide of Aug 2012
By: LtCol Anthony Mitchell (RAM 17), LtCol Eddie Davenport (ACS chief cardiologist), and Dr Dan Van Syoc

CONDITION:
Catheter Ablation Of Tachyarrhythmias and/or Pre-Excitation (WPW) (Aug 16)

I. Overview.

Curative therapy of some tachyarrhythmias and/or ventricular pre-excitation by catheter ablation with high success rates and low complication rates, offers the potential to waiver these individuals for initial flight training and return to flying status. Ablation was first performed by surgical interruption of Wolff-Parkinson-White (WPW) accessory pathways. Catheter ablation followed, first with direct current and more recently with radiofrequency energy (RFA) and cryotherapy; the latter often reserved for ablation in close proximity to high risk areas of the heart such as the AV node. By the 1990's, these ablative techniques were being used for curative treatment of WPW accessory pathways, supraventricular tachycardia (SVT) associated with atrioventricular (AV) node reentry, and ventricular tachycardia usually localized to the right ventricular outflow tract (RVOT). It has since been used for the treatment of other supraventricular and ventricular tachyarrhythmias such as atrial fibrillation and ventricular ectopy albeit with much lower success rates.

Joint guidelines were recently published by the American College of Cardiology, American Heart Association and Heart Rhythm Society regarding the management of all supraventricular tachycardias. These guidelines should be followed for all acute tachyarrhythmias in aviators. For long term therapies these guidelines should also be followed in regard to ablation and beta-blocker use however antiarrhythmic medications and non dihydropyridine calcium channel blockers are rarely waiverable for ongoing flight duties. Detailed definitions and criteria for diagnosis of accessory pathways, supraventricular tachyarrhythmias and ventricular tachycardias are also addressed elsewhere in the waiver guide. Waiver guidelines for these conditions without catheter ablation are addressed in their respective waiver guides. This waiver guide chapter specifically addresses the use of ablation for accessory pathways (such as WPW), SVT associated with AV node reentry, other SVT mechanisms, atrial flutter, atrial fibrillation, and ventricular tachycardias.

A. SUPRAVENTRICULAR TACHYARRHYTHMIAS

1. Accessory pathways. These accessory pathways conduct impulses between the atria and ventricles, WPW being the most common type. WPW electrocardiogram (ECG) pattern is the classic ECG findings of short PR interval and delta wave but without documented or suspected SVT. WPW syndrome is the ECG findings plus suspected or documented SVT. About 30% of all SVTs involve an accessory pathway. According to the general cardiac literature, the WPW ECG pattern occurs in 1-3 per 1,000 of the population and an estimated 30-35% will develop a symptomatic arrhythmia during their lifetime. Atrial fibrillation with rapid ventricular response and very high rates of SVT secondary to retrograde conduction, deteriorating into ventricular fibrillation, is considered the likely cause of sudden death. Recent review of the ACS ECG library database showed much lower rates of SVT and SCD and therefore ablation should be reserved for high risk pathways or confirmed WPW syndrome, and not simply ventricular pre-excitation which

is commonly referred to as WPW pattern (see WPW waiver guide). Catheter ablation is potentially curative for accessory pathway tachyarrhythmias with an immediate success rate of 95-99%. Most recent guidelines recommend catheter ablation particularly, if the accessory pathway has a short refractory period that allows rapid antegrade conduction. However, recurrence of a functional accessory pathway occurs in 1-5%, usually within 2-4 months after ablation. Late recurrence is rare.

2. Atrioventricular node reentrant tachycardia (AVNRT). AVNRT is the most common mechanism of SVT (about 60% of all SVT cases). It is caused by a reentry circuit within the AV node. The published experience on catheter ablation for AVNRT is comparable to that of WPW ECG pattern and syndrome, with a success rate approaching 99% and a recurrence rate of 1-2%.

3. Other supraventricular tachycardias. The remaining 10% of SVTs are due to a variety of uncommon mechanisms. These may include reentrant pathways and automatic foci, such as automatic atrial tachycardia and paroxysmal junctional tachycardia. Published experience of ablation regarding these rhythm disturbances is limited.

4. Atrial flutter. Atrial flutter is due to a localized reentry circuit in the right atrium near the tricuspid valve. Curative ablation is very feasible, with success rates matching those of accessory pathways and AVNRT. However, atrial flutter can often be associated with atrial fibrillation and residual atrial fibrillation complicates successful atrial flutter ablation. Careful review of actual electrophysiologic testing, ablation procedure, and chart review is necessary for prognostication.

5. Atrial fibrillation (AF). Lone AF does not mean a single episode of AF. Rather it means idiopathic AF. Lone AF is usually defined as no underlying structural heart disease, hypertension, or hyperthyroidism and age younger than 60 years at time of diagnosis. RFA may be curative for the subset of paroxysmal or chronic lone AF individuals who have one or a few triggering arrhythmogenic sites, most commonly in or near the pulmonary vein ostia. The reported success rates range from 50-80%, much lower than for ablation of WPW or AVNRT. And many of these individuals required one or more repeat ablations to effect a cure. Most centers performing atrial fibrillation ablation do so for quality of life issues – poor control to at least 1 class I or II antiarrhythmic medications, medications or unacceptable symptoms from the rhythm or medications. Successful ablation may then be defined as control of the AF on continued medications but with no or acceptable symptoms/side effects. This would not be an acceptable endpoint for all flying classes. Absence of atrial fibrillation without need for medications would be the desired aeromedical result. There is limited published experience regarding long-term outcomes of RFA of AF. Several procedures have been used; success rates and complications depend partly on the specific technique.

B. VENTRICULAR TACHYCARDIA

Ventricular tachycardia (VT) is defined as three or more consecutive ventricular beats at a rate of 100 beats per minute or faster. Guidelines for VT without ablation are addressed in the ventricular tachycardia waiver guide. Most published experience with ablation for VT deals with ablation performed for sustained VT or hemodynamically symptomatic nonsustained VT, often in the setting of failure of one or more antiarrhythmic medications. Recurrence rates post-RFA vary in the clinical literature from 0% to 30% within 1-2 years. In many reports control of VT on

antiarrhythmic medications is considered an ablation cure. Long-term success, outcomes, recurrence rates and late adverse consequences of the several mechanisms of VT are not well described in the literature. There are several mechanisms for VT and ablation cure rates are very dependent on the VT mechanism and location within the ventricles, as well as presence or absence of underlying cardiac pathology. Most published success rates range between 50% and 75% at 6 to 12 months but very little is known beyond this time frame. Only ablation of idiopathic VT (no underlying cardiac pathology) may be favorably considered for waiver.

II. Aeromedical Concerns.

Sudden cardiac death is the most compelling concern; however, in many tachyarrhythmias this risk is low. The risk of recurrent sustained tachyarrhythmia and associated hemodynamic symptoms is the more likely aeromedical concern. To quantify these risks, the specific tachyarrhythmia, the presence or absence of hemodynamic symptoms and results of electrophysiologic studies and/or RFA must be considered. Careful review of the ablation procedure and corresponding electrophysiologic study is paramount as this will provide details of the mechanisms and characteristics of the ablated pathway. These characteristics as well as response to ablation acutely will provide prognostic information necessary for aeromedical disposition. See individual waiver guides for more details on each specific diagnosis.

III. Waiver Considerations.

Catheter ablation of cardiac tachydysrhythmias is disqualifying for flying class (FC) I/IA, II and III. If catheter ablation is being performed only for aeromedical reasons and not for clinical indications, then ACS review and/or evaluation is highly recommended before RFA to assure that it is aeromedically indicated. The underlying diagnosis may also require a waiver or possible MEB, review the underlying diagnosis waiver guide for further details.

Table 1: Waiver potential for catheter ablation cases

Flying Class	Condition Treated with catheter ablation	Waiver Potential Waiver Authority**	ACS review/evaluation
I/IA	WPW ECG pattern only, WPW syndrome and AVNRT	Yes* AETC	Yes
	Other supraventricular tachycardias to include atrial flutter and RVOT ventricular tachycardia.	Maybe* AETC	Yes
	Atrial fibrillation Ventricular Tachycardia secondary to other cardiac disease process	No AETC	No
II/III (including untrained applicants), RPA pilots	WPW ECG pattern only	Yes# MAJCOM	Yes
	WPW syndrome and AVNRT	Yes* MAJCOM	Yes
	Other supraventricular tachycardias to include atrial flutter and RVOT ventricular tachycardia.	Maybe* MAJCOM	Yes
	Atrial fibrillation	Maybe+ MAJCOM	Yes
	Ventricular Tachycardia secondary to other cardiac disease process	No	No

No observation post-ablation required prior to waiver submission.
* Submit waiver 4 months post-ablation observation.
** Waiver authority is as listed for the ablation procedure itself. However, if underlying condition required an MEB, waiver authority is AFMSA for FCII, RPA Pilot, FCIII, MOD and GBC.
+ Submit waiver 6 months post-ablation observation.

Review of AIMWTS through Mar 2016 for catheter ablation showed 152 cases with 8 total disqualifications. Breakdown of the cases was: 12 FC I/IA cases with 1 disqualification; 83 FC II cases with 2 disqualifications; 48 FC III cases with 4 disqualifications; 5 ATC/GBC cases with 1 disqualification; and 4 MOD cases without any disqualifications.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. If the underlying condition requires an MEB, ensure that the MEB has been completed prior to submitting the waiver.

The AMS for initial waiver should contain the following information:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level.
B. Cardiology consult.
C. Official report of ablation and electrophysiologic study/studies (EPS).
D. Electrocardiogram (ECG) at 2 months, 3 months and 4 months post-RFA for all tachyarrhythmias. A-fib requires an addition ECG at 6 months.
E. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

The AMS for waiver renewal should contain the following information:
A. History – brief summary of previous symptoms and treatment, any interval symptoms, medications, and activity level.
B. Physical – blood pressure and cardiac.
C. Electrocardiogram (ECG).
D. Additional local cardiac testing is not routinely required for re-evaluation cases followed at the ACS but may be requested in individual cases. If so, the previous ACS evaluation/review will specify details regarding any requested local testing.
E. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

Note 1: All studies should be sent electronically through the ECG library. Mailing studies will increase disposition time. However, if necessary, the address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manager for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting cases, we recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD-9 Code for radiofrequency ablation procedure	
37.34	Radiofrequency ablation

ICD-9 Codes for conditions requiring catheter ablation	
426.7	Anomalous atrioventricular excitation (Wolff-Parkinson-White syndrome)
427.0	Paroxysmal supraventricular tachycardia
427.1	Ventricular tachycardia
427.31	Atrial fibrillation
427.32	Atrial flutter

ICD-10 Codes for conditions requiring catheter ablation	
I45.89 I45.6	Anomalous atrioventricular excitation (Wolff-Parkinson-White syndrome)
I47.1	Paroxysmal supraventricular tachycardia
I47.2	Ventricular tachycardia
I48.91	Atrial fibrillation
I48.82	Atrial flutter

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WAIVER GUIDE
Initial Version: Jan 2016
By: Dr Dan Van Syoc
Reviewed by Col Pat Storms, RAM and SG consultant for Gastroenterology

CONDITION:
Celiac Disease (Jan 16)

I. Overview.

There has been increasing interest over the past few years regarding food allergies and sensitivities. Prominent among these concerns are those with wheat-related proteins. At this time, there are three recognized wheat-related illnesses: celiac disease (CD), nonceliac gluten sensitivity, and wheat allergy. There is some overlap in symptoms, but they are separate conditions with distinct characteristics.[1] This waiver guide will focus on CD and the spectrum of symptoms associated with that disorder, as well as aeromedical concerns with this condition.

CD, also known as gluten-sensitivity enteropathy, celiac sprue, nontropical sprue, adult celiac disease, idiopathic steatorrhea, and primary malabsorption, is a chronic small intestine immune-mediated enteropathy precipitated by exposure to dietary gluten in genetically predisposed persons. Therefore, CD is the result of an interesting interplay involving the person's genetic makeup, unique immunologic factors and the ingestion of gluten.[2-5] A recent European definition of CD stated that it is "an immune-mediated systemic disorder elicited by gluten and related prolamines in genetically susceptible individuals and characterized by the presence of a variable combination of gluten-dependent clinical manifestations, CD-specific antibodies, HLA-DQ2 or HLA-DQ8 haplotypes, and enteropathy."[6]

Gluten is a common storage protein found in wheat, rye, and barley, and is very common in many of our foodstuffs.[7] CD affects genetically susceptible persons, with a higher prevalence in females (F/M = 2.5:1).[8] It is generally recognized that CD occurs in approximately 1% of people in western populations, but only about 17% of that 1% are currently diagnosed with the condition.[9] For reasons yet unknown, the prevalence of CD appears to be increasing.

Once thought to be limited to gastrointestinal disease, CD is now characterized by autoimmune injury to multiple organs and the manifestations are varied.[10] Frequent manifestations of CD include chronic diarrhea, weight loss, bloating and gas, distention, and abdominal discomfort. The previous symptoms occur in up to 40% to 50% of adult patients, but as many as half of all CD patients have only extraintestinal symptoms.[11] It is also noteworthy that most recent publications refer to the presence of overt CD, which is silent CD (CD without recognized symptoms) and potential CD (presence of CD antibodies with normal duodenal biopsy results).[12]

CD is seen often in patients with other immune disorder such as type I diabetes mellitus and autoimmune thyroid disease. It has also been noted the CD can be associated with mild asymptomatic elevations of transaminases and is seen in patients with chronic liver disorders such as primary biliary cirrhosis, autoimmune hepatitis, primary sclerosing cholangitis, and others. CD also has complications in other medical areas such as an increased risk for lymphoma. Mortality in patients with CD has been noted in several cohort studies as well.[13]

Intestinal manifestations can include lactose intolerance, numerous malabsorption issues, as well as nutritional deficiencies to include deficiencies of fat soluble vitamins (A, D, E, and K) as well as B vitamins. There can also be problems with absorption of iron, calcium and folic acid. Anemia can be a result of the malabsorption of iron, folic acid and vitamin B_{12}. One of the more common extraintestinal manifestations is dermatitis herpetiformis (DH), which is pathognomonic for CD.[1] It is a severely pruritic rash characterized by symmetrically distributed papulovesicular eruptions most notably on extensor surfaces. All patients with DH have gluten intolerance and hypothyroidism is the most common autoimmune condition associated with DH.[14] The two major treatment options are dapsone or the gluten free diet (GFD); the diet is the cornerstone of treatment, while dapsone can give rapid relief of symptoms.[15, 16] It is important to note that dapsone has no effect on the gastrointestinal symptoms of CD.

The diagnosis of CD requires both a duodenal biopsy demonstrating the characteristic findings of intraepithelial lymphocytosis, crypt hyperplasia, and villous atrophy along with a positive response to a GFD.[17] Serological testing has become more popular and relevant and testing can be targeted towards those who may be considered at increased risk. This would include those with an affected first degree family member, those with type I diabetes or with Down syndrome. A test that is currently utilized is the IgA transglutaminase (TTG) which is highly sensitive and specific for CD.[1] There is a strong push from some in the immunological community to base the diagnosis, largely, if not completely, on serologic tests as the growing feeling is that CD is primarily an immune disorder.[12]

Regardless of the age of the patient at onset or the many academic discussions concerning what causes the disease and whether it is primarily an immunologic or gastrointestinal disorder, the mainstay of treatment is the GFD, and most of the treatment failures are due to a lack of strict adherence to the diet. There is a small percentage of patients that continue to remain symptomatic despite compliance with the diet, but the vast majority will significantly improve if the diet is closely followed. What remains unclear is what actually triggers the disease and why not every patient is equally affected.[18]

II. Aeromedical Concerns.

Many factors need to be taken into consideration before granting a waiver to an aviator with diagnosed CD. Does the member closely adhere to a gluten free diet and is it feasible for them to do so under their current/projected operational demands? Are there any additional associated conditions like dermatitis herpetiformis, diabetes, or occult gastrointestinal malignancies? How often do they need to be clinically evaluated and is good medical care readily available? In general, as long as the aviator is symptom free and can easily get access to gluten free foods, it is most likely reasonable to consider a waiver for Air Force aviators.[19]

III. Waiver Consideration.

Celiac disease is disqualifying for all flying classes to include ATC/GBC and MOD personnel. It is also disqualifying for retention purposes and therefore requires an MEB. In addition, any malabsorption syndrome requiring a specialized diet is disqualifying and requires an MEB.

Table 1: Waiver potential for Celiac Disease

Flying Class (FC)	**Condition**	**Waiver Potential** **Waiver Authority**
I/IA	Diagnosed Celiac Disease	No AETC
II, RPA Pilot, III ATC/GBC	Diagnosed Celiac Disease	Yes* MAJCOM
MOD	Diagnosed Celiac Disease	Yes* AFGSC

*Initial certification of all classes should be addressed like FC I/IA.

AIMWTS search in Jan 2016 revealed a total of 38 members with a diagnosis of celiac disease. Breakdown of the cases revealed: 1 FC I case (disqualified), 16 FC II cases (1 disqualified), 17 FC III cases (8 disqualified), 0 ATC/GBC cases, and 4 MOD cases (2 disqualified). Most of the disqualified cases were for initial certification.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for celiac disease should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Discuss the history of the diagnosis of celiac disease to include all serology, endoscopies, success with the GFD, and any associated conditions.
C. Consultation from all specialists involved in the care of the member, to include gastroenterology, immunology, and general internal medicine.
D. Labs: all serologies, CBC, iron studies, blood sugar and HbA1C.
E. Reports of all endoscopies and tissue biopsies (small intestine, skin, etc.)
F. Medical evaluation board (MEB) reports and narrative.

The AMS for waiver renewal for celiac disease should include the following:
A. Interval history since the last waiver with particular emphasis on adherence to the GFD and any new associated symptoms.
B. All applicable labs and biopsy results as in the initial aeromedical summary.
C. Consultation reports from treating physician(s).

ICD-9 code for Celiac Disease	
579.0	Celiac Disease

ICD-10 code for Celiac Disease	
K90.0	Celiac Disease

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WAIVER GUIDE
Updated: Jun 2013
Supersedes Waiver Guide of Jun 2009
By Capt Marion Powell and Maj Tighe Richardson (ACS Ophthalmology Branch) and Dr. Dan Van Syoc
Reviewed by Col John Gooch, Chief, Aerospace Ophthalmology Branch of the ACS.

CONDITION:
Central Retinal Vein Occlusion/Branch Retinal Vein Occlusion (Jun 13)

I. Overview

Retinal vein occlusion (RVO) is the second most common retinal vascular disorder and a significant cause of loss of vision. Its prevalence is estimated to be between 0.7% and 1.6% of the population, and although it usually occurs over age 50, younger patients can develop RVO as well.[1, 2]

RVO is most often associated with compression of a retinal vein by an adjacent atherosclerotic retinal artery, where the artery and vein share an adventitial sheath, or at the lamina cribrosa, which stiffens with age. Arterial atherosclerotic changes cause increased pressure on the retinal vein, increasing turbulent flow in the vein, and thus, the risk of thrombus formation.[3, 4] Once the occlusion occurs, increased vascular pressure leads to a diffusion gradient causing increased vascular permeability and leakage of fluid into the surrounding retinal tissue. If vitreous traction is also present, cystoid macular edema may develop leading to a progression of inflammation.[5]

Hypertension, venous disease, cerebrovascular disease, diabetes, smoking, obesity, dyslipidemia and open-angle glaucoma are all known risk factors for RVO.[1-7] Hypercoagulable conditions, hyperviscosity, dehydration, blood dyscrasias, platelet dysfunction, vasculitides, optic nerve head drusen, optic nerve head tilting, orbital compression/congestion, and use of diuretics or oral contraceptives can also predispose an eye to RVO. More specifically, a case-control series demonstrated patients experiencing RVO events were more likely than controls to have high homocysteine, anticardiolipin IgM, and Factor VIII levels.[8] In addition, evaluation of women with CRVO who were also taking estrogen or estrogen agonists, suggested an underlying thrombophilia as the likely etiology, leading to further evaluation for these disorders at the time of CRVO diagnosis. These less common etiologies should particularly be considered in younger patients who present with RVO. In patients over the age of 60, RVO might be associated with a higher risk of stroke.[9] Also of note, a recent study conducted in Taiwan indicated sleep apnea as a possible independent risk factor for RVO.[10]

RVO is typically divided into either branch retinal vein occlusion (BRVO), hemiretinal vein occlusion (HRVO), or central retinal vein occlusion (CRVO) depending on where the retinal vein is affected.[2]

CRVO is typically classified into two distinct subtypes, non-ischemic and ischemic, based on the degree of remaining perfusion. Traditionally, perfusion status is determined by fluorescein angiography. Non-ischemic CRVO is defined by mild tortuosity of the central retinal vein with characteristic dot-blot and flame hemorrhages in all quadrants of the retina and fewer than 10 disk areas of retinal nonperfusion on angiography.[4, 5, 11, 12] Macular edema and mild optic disc swelling

may or may not be present, and prolongation of retinal circulation time with an increase in capillary permeability may be seen with fluorescein angiography.[4, 11, 13] Ischemic CRVO is a much more severe variant, with at least 10 disc areas of retinal capillary non-perfusion on fluorescein angiography. Venous dilation is prominent, and cotton wool spots (nerve fiber layer infarcts) are easily seen.[11, 13] If retinal hemorrhages are severe, classic "blood and thunder" appearance of the retina may be observed.[12] Non-ischemic CRVO may progress to the ischemic variety within 4-6 months approximately in 30% of cases.[14] Because of this risk, patients should be instructed to immediately report worsening of their vision to their ophthalmologist.[11]

CRVO typically presents with sudden, painless loss of vision. Patients may have a history of recurrent episodes of transient loss of vision. However, in mild non-ischemic CRVO the patient may be unaware of any visual loss and the disease only discovered on routine dilated exam. Symptoms are typically worse in the morning with the patient noticing improvement throughout the day. Typical exam findings of CRVO consist of dilated, tortuous retinal veins, retinal hemorrhages in all quadrants, optic disk engorgement and cotton-wool spots.[5] Visual acuity outcomes are affected by several factors including the location of the occlusion, etiology, and the degree of visual loss at presentation. Studies have shown in BRVO 34% of eyes achieve visual acuity of 20/40 or better without treatment at three years post-event. Although, untreated cases can be associated with sustained vision loss with visual acuity worse than 20/200, seen in 23% of untreated eyes.[5] In the case of CRVO, untreated recovery of the visual acuity is closely linked to visual acuity at presentation. The Central Vein Occlusion Study group demonstrated 65% of eyes with visual acuity 20/40 or better at presentation, maintained roughly that same acuity at three year follow up. Recovery of visual acuity was found to be poor with worsening visual acuity at presentation.

Differential diagnoses of CRVO include diabetic retinopathy, radiation retinopathy, severe hypertensive retinopathy, papilledema, and ocular ischemic syndrome, associated with carotid occlusive disease. Diabetic retinopathy typically presents bilaterally, and can be differentiated from CRVO by intravenous fluorescein angiography.[13] Any history of irradiation should increase the suspicion for radiation retinopathy, with disc swelling and cotton-wool spots the most obvious clinical features. Acute "malignant" hypertension can also present with disc edema, macular edema, and hemorrhages, but the condition is usually bilateral, unless unilateral carotid artery obstruction spares the ipsilateral retina from the effects of the hypertension. Papilledema also is most often bilateral, but can be unilateral, if prior optic nerve scarring or atrophy prevents swelling on one side. Carotid occlusive disease with ocular ischemia has dilated and irregular veins, but often with lesser tortuosity. Hemorrhages are found in 80% of cases, but are instead mid-peripheral. Ocular or periorbital pain, mild anterior uveitis and/or iris atrophy may occur. Neovascularization of the iris is present in 66% of cases and neovascularization of the posterior segment, in 37% of cases. In addition, with carotid disease, the ophthalmic artery pressure is low and spontaneous pulsations of central retinal artery may occur, whereas in CRVO, the pressure should be normal to increased.[13]

Four functional tests (visual acuity, Goldmann visual fields, relative afferent pupillary defect and electroretinography), taken together, are reliable indicators to differentiate ischemic from non-ischemic CRVO.[15] However, high resolution fluorescein angiography (FA) remains the clinical test of choice to help diagnose CRVO. Intraocular pressure by applanation and gonioscopy should be performed to rule out glaucoma as an etiology, to determine the risk of angle-closure glaucoma, and to look for signs of iris neovascularization.[4, 9, 12, 13] The risk for iris neovascularization in ischemic CRVO is highest during the first 7-8 months, reaching a total risk of approximately 45% after 3

years.[16] Hypertension, diabetes, cardiovascular disease, and cholesterol should all be evaluated and treated if determined to be present.[2] Fasting blood sugar, hemoglobin A1C, complete blood count (CBC) with differential, platelets, prothrombin time (**PT**), partial thromboplastin time (**PTT**), erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), homocysteine, lipid levels, anti-nuclear antibody (ANA), and fluorescent treponemal antibody absorbed (FTA-ABS) are all tests that should be ordered with an initial work-up.[11] In young patients with no obvious cause, or in any patient, when clinically indicated, a more detailed work-up looking for less common etiologies, such as hypercoagulable and hyperviscosity diseases may be indicated. Tests might include hemoglobin electrophoresis, VDRL or RPR, cryoglobulins, antiphospholipid and anticardiolipin antibodies, lupus anticoagulant, serum protein electrophoresis, chest radiograph, protein C and S levels, type 1 plasminogen activator levels, and resistance to activated protein C (which is 90% associated with a single point mutation in the factor V Leiden gene). Antithrombin III levels and/or genetic mutation of the prothrombin gene have not yet been found to be significantly associated with cases of retinal vein occlusion to date.[1]

Treatment for RVO is a complex and controversial area with strategies dependent on type, severity, and presence of complications. Control of any underlying disease is paramount, as ischemic and non-ischemic CRVO exist on a spectrum, and worsening of venous outflow can potentially worsen the patient's condition. Swift actions that should be taken include stopping all medications contributing to a hypercoagulable state, such as oral contraceptives, and changing all diuretics to alternative antihypertensive medications.[13] In cases of hyperhomocysteinemia, consideration of vitamin therapy with folic acid, B6 and B12 may be indicated.[3] Intraocular hypertension should also be aggressively treated due to the independent risk factor of open-angle glaucoma contributing to CRVO. Several methods of treatment have been suggested and researched over the many years of investigation into RVO. Some of these include surgical interventions (pars plana vitrectomy, ateriovenous sheathotomy, laser chorioretinal venous anastomosis, optic nerve sheath decompression, radial optic neurotomy and laser photocoagulation), along with medical interventions (intravitreal corticosteroids or Anti-Vascular Endothelial Growth Factor (VEGF), and thrombolytics). Unfortunately, many of these interventions have not demonstrated profound or long-term benefit, although, recent research into intravitreal Anti-VEGF has shown promising results. In one trial, 56% of eyes treated every four weeks with aflibercept (Anti-VEGF) gained 15 letters or more after 24 weeks compared to a 12% gain in the sham group.[17]

Macular edema is the most common visual threatening complication of CRVO, and close observation and treatment is required to prevent prolonged loss of vision.[18] Evaluation with Optical Coherence Tomography (OCT) has been studied to further define formation of macular edema and sequelae following CRVO. OCT showed a serous retinal detachment in 51% of the cases during the first six months. It also demonstrated increased foveal thickness, specifically in ischemic versus non-ischemic CRVO. When foveal thickness was greater than 700 μm, final best-corrected visual acuity never reached 20/40.[19] Treatment of macular edema has been shown to improve visual acuities. Although the Central Vein Occlusion Study Group M report did not recommend grid laser photocoagulation for CRVO-associated macular edema, with BRVO-associated macular edema, this treatment has been shown to increase visual acuity by 2 or more lines in 65% of treated eyes, and remains the therapeutic option of choice in patients meeting certain indications with this disease.[1, 4, 20, 21] There have also been reports of hyperbaric oxygen improving macular edema and visual acuity in CRVO, but adequate randomized clinical trials sufficient to make a firm recommendation have not yet been done.[22] This finding would seem to correlate well with a recent study demonstrating lower oxygen saturation in retinal venules following CRVO.[23] As discussed earlier,

several larger trials including the CRUISE and BRAVO studies along with the COPERNICUS study have looked at treatment of macular edema with Anti-VEGF intravitreal injections. These studies seem to indicate significant improvement in visual acuity with repeated injections and use of these medications has become a mainstay of treatment.[24]

II. Aeromedical Concerns

The primary aeromedical concerns with CRVO/BRVO are final visual acuity, permanent visual field deficits, complications of neovascular glaucoma or macular edema, and proper management of any predisposing medical conditions. Also, the risk of BRVO developing in the non-affected eye is approximately 10% within three years of initial presentation. The risk of fellow eye involvement in CRVO cases is 1% per year based on published data.[5] A common complication following RVO is the development of neovascular glaucoma in eyes with ischemic CRVO, which approaches 40% over one year.[5] Persistent, chronic macular edema is not waiverable due to the risk of worsening of this condition during flight and associated reduced visual function. Even if vision is adequately restored to meet vision standards, the underlying systemic conditions leading to RVO may pose potential serious risks to safe flight. Therefore, investigation of the underlying cause is critical to both management and aeromedical disposition. Also of aeromedical concern is exposure to the hypoxic environment of altitude. A small case report series discussed the implications of high-altitude as a possible cause to RVO. Though these patients were typically exposed to the high-altitude environment for several weeks, one patient did develop BRVO while ascending to altitude.[25] These occurrences create some concern specifically for recurrence of events especially in light of literature suggesting decreased oxygen saturation in the venous circulation of the retina up to three months following the acute event.[23]

III. Waiver Considerations

Central retinal vein occlusion and branch retinal vein occlusion are disqualifying for all aviation duty in the US Air Force. For ATC/GBC and MOD personnel, these conditions would be disqualifying if there are residual visual symptoms. An Aeromedical Consultation Service (ACS) evaluation is required for aviators for all initial waivers for CRVO/BRVO. The probability of waiver approval is dependent on the final visual acuity, visual field, and absence of other significant pathology or complications. Any underlying contributing pathology must also be waiverable for the individual to be returned to flight status. For waiver renewals, ACS review is required. Depending on the results of local work-up, an ACS evaluation may be required prior to waiver renewal.

Table 1: Waiver potential for Retinal Vein Occlusion

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	RVO resolved without residual visual defects	Maybe* AETC	Yes
	RVO with residual visual defects	No AETC	No
II/III	RVO resolved without residual visual defects	Yes MAJCOM	Yes
	RVO with residual visual defects	Maybe MAJCOM	Yes
ATC/GBC MOD	RVO resolved without residual visual defects	N/A	No
	RVO with residual visual defects	Maybe MAJCOM**	At the discretion of the waiver authority

*Visual outcome needs to have returned to baseline without presence of any recognized risk factors.
** Waiver authority for MOD personnel is AFGSC.

AIMWTS review in Dec 2012 revealed a total of 15 cases. There were no FC I/IA cases, 9 FC II cases and 6 FC III cases. In the FC II category, all were waived except for a pilot with poor visual outcome in the affected eye and in the FC III category; one was disqualified for two unexplained cases of syncope.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

AMS for an initial waiver for a Retinal Vein Occlusion should include:
A. Consideration of any potentially underlying disease etiologies, to include hypertension, heart disease, diabetes, hematologic disease, or collagen vascular disease with appropriate work-up and lab testing.
B. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
C. History of disease, including treatment modalities attempted.
D. Full ophthalmology exam to include:
1. Best corrected visual acuities at distance and near.
2. Humphrey visual field 30-2 testing for each eye.
3. Examination of fellow eye with pertinent findings.

4. Determination of presence or absence of macular edema, significant retinal hemorrhage, neovascularization, and glaucoma. Include Optical Coherence Tomography and/or Fluorescein Angiography if available.
E. Lab testing results for fasting blood glucose, HbA1C, CBC + differential, PT/PTT, ESR, CRP, Lipids, ANA, Treponemal AB, and homocysteine.

The AMS for a waiver renewal for a Retinal Vein Occlusion should include:
A. Interim History since last waiver and ACS visit.
B. Ongoing treatment modalities.
C. Full ophthalmology exam to include items as noted above.

ICD-9 Codes for Retinal Vein Occlusion	
362.35	Central Retinal Vein Occlusion
362.36	Branch Retinal Vein Occlusion

ICD-10 Codes for Retinal Vein Occlusion	
H34.81 1, 2, 3, 9	Central Retinal Vein Occlusion, Right, Left, Bilateral, Unspecified
H34.83 1, 2, 3, 9	Branch Retinal Vein Occlusion, Right, Left, Bilateral, Unspecified
H34.9	Unspecified Retinal Vascular Occlusion

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WAIVER GUIDE
Updated: Oct 2014
Supersedes Waiver Guide of Mar 2011
By: Capt Marion Powell (FS), Maj Tighe Richardson (ACS Ophthalmology), Dr Steve Hadley (ACS Ophthalmology, Branch Chief), and Dr Dan Van Syoc

CONDITION:
Central Serous Chorioretinopathy (Oct 14)

I. Overview.

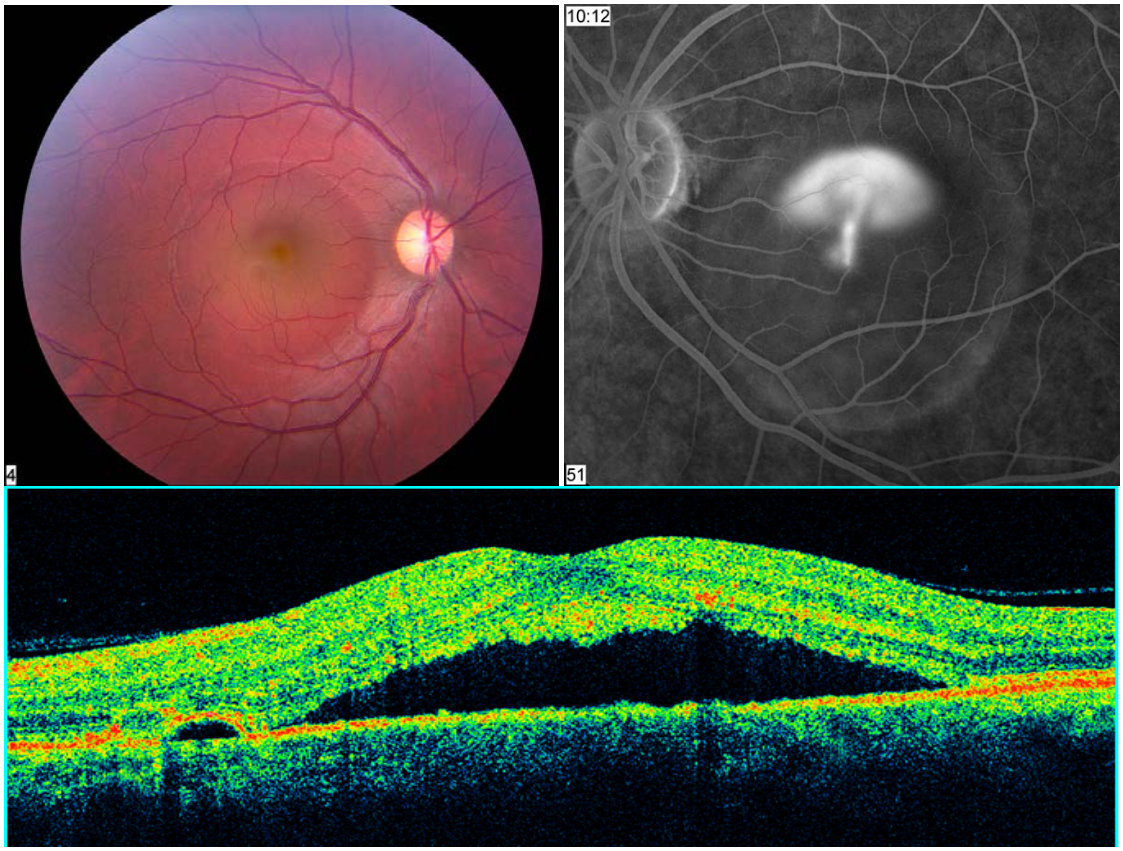
Central serous chorioretinopathy (CSR) is an eye disease which causes visual impairment, often temporary, and usually in one eye.[1] When active, CSR is characterized by the development of a well-circumscribed, serous detachment of the sensory retina.[2] The retinal pigment epithelial layer (RPE) which lies posterior to the neurosensory retina, functions to prevent fluid accumulation under the retina by pumping fluid across Bruch's membrane and into the choriocapillaris, which is a network of capillaries that supply blood to the outer layers of the retina.[3] In CSR, fluid usually accumulates between the outer layer of the retina and the RPE but occasionally the RPE may also separate from the underlying Bruch's membrane and choroid causing what is referred to as a pigment epithelial detachment (PED). CSR can occur in acute or chronic forms, with chronic CSR resulting in potential widespread retinal damage. CSR typically affects central vision causing symptoms that include:

- Metamorphopsia - image distortion or wavy lines on the Amsler grid.
- Blurred or dim vision
- Micropsia -objects appearing abnormally small.
- Color desaturation - colors do not appear as bright in one eye; typically red colors.
- Paracentral scotoma - area of vision that is missing or significantly blurred.

The etiology of CSR is not entirely clear but it appears to be due to abnormal choriocapillary vasculature permeability and RPE defects, leading to leakage from the choroid through the RPE into the sub-retinal space, forming a serous detachment. This leaky vasculature produces serous fluid transudate, but not hemorrhage; therefore, hemorrhage present on fundus exam indicates that a different disease process is likely present.[4] Visual acuity may decline to 20/200 after onset of CSR but is typically preserved around 20/30-20/40. The incidence of CSR, based upon a single population based study in Minnesota, is estimated at 10 cases in 100,000 men and 1.7 per 100,000 woman.[5]

Several factors have been found to have an association with CSR. It tends to occur more commonly between the ages of 25 and 55 and more frequently in males than females in a ratio that ranges from 2:1 to 7:1. Further, use of nasal/inhaled (including Flonase®), topical, or systemic steroids, has been implicated as a possible associated factor.[2] Many other factors have been considered as possible contributing factors including tobacco, alcohol, sildenafil, psychopharmaceuticals, antibiotics, antihistamines, type-A personalities, hypertension and physical/psychological stress.[4, 6, 7] The pathogenesis is thought to be due to elevated circulating cortisol and epinephrine, which affect the autoregulation of the choroidal circulation.[6] Though the relationship between psychosocial factors and CSR is not completely understood, one study demonstrated a significant correlation between type-A personalities, reported stress, and disease.[8]

The differential diagnosis for loss of central vision in one eye includes retinal detachment, so that medical emergency must be ruled out immediately. The diagnosis of CSR is typically made on clinical grounds with ancillary testing used for confirmation. However, as new imaging modalities have emerged, these tests are now becoming essential in the evaluation of CSR. Traditionally, fundus fluorescein angiography (FFA) was the mainstay of evaluating CSR. Sodium fluorescein, a dye that fluoresces when exposed to certain wavelengths of blue light, is injected into a vein and fundus photography is performed to photograph the retina as the fluorescein dye flows through the choroid and into the retinal vessels. In CSR, the dye can be seen leaking into the sub-retinal space through defects in the RPE. Indocyanine green (ICG) angiography can be performed in a similar fashion but uses ICG dye instead of fluorescein. ICG angiography is able to better define the choroid than fluorescein and can be used as a second confirmatory test when a fluorescein angiogram does not yield definitive results.[2, 4] With the advent of optical coherence tomography (OCT) in 2006, this modality is replacing FFA in the primary evaluation of CSR patients. OCT uses light to image the retina and produces a two dimensional cross sectional image, similar to an ultrasound but with resolution measurable in microns. This imaging technique has allowed better evaluation of the RPE and choroid in CSR. Previous theory based upon findings of FFA suggested only 6-10% of CSR cases had retinal pigment epithelium detachments (RPE); however OCT has demonstrated RPE detachments in up to 63% of cases.[9] In addition, enhanced-depth imaging on OCT has been used to evaluate choroidal thickness in CSR. Studies have demonstrated thickening of the choroid in CSR, believed to be related to choroidal vascular disease hyperpermeability.[4]



Above image: Upper left- clinical funduscopic appearance of CSR, Upper right- fluorescein angiogram displaying typical plume of smoke appearance. Below- OCT generated image of the macula, indicating separation of the neurosensory retina from the underlying RPE. (Images used with permission)[10]

Treatment options for CSR are many but observation is usually recommended initially. Any ongoing corticosteroid treatment should be tapered and stopped, where possible. It is important to check current medications, including nasal sprays and creams, for ingredients of corticosteroids, if found seek advice from a medical practitioner for an alternative. CSR is often a self-limiting process with clinical resolution in three to four months in 80-90% of cases with visual acuity returning to normal or near normal levels. However, the full recovery of visual acuity may not occur for a full year. In addition, permanent residual visual symptoms may occur including metamorphopsia, scotoma, color vision deficits and decreased contrast sensitivity. Moreover, 40-50% of affected patients will experience a recurrence either in the same or fellow eye within the first year of initial episode.[2, 4] Some cases of acute CSR can go on to form a chronic form where patients have long-standing subretinal fluid that cannot be reabsorbed. This can lead to photoreceptor death and is more likely to be complicated by choroidal neovascularization, a proliferation of choroidal vessels through the RPE into the retina.[5] CSR associated with a pigment epithelial detachment (PED) or non-resolving sub-retinal fluid, portends a worse prognosis for regaining 20/20 visual acuity in the affected eye. Recurrence of CSR in the same eye also increases the likelihood of permanent visual deficits.[11]

Treatment options for CSR include observation, thermal laser therapy, photodynamic therapy (PDT), and potential medications. Observation continues to be the mainstay of treatment in first time CSR as most of these cases will resolve spontaneously. Laser photocoagulation at the site of fluorescein leakage can speed recovery time but typically does not affect the final visual outcome.[12, 13] Laser photocoagulation may be considered in patients with persistent sub-retinal fluid or recurrences in patients with prior visual deficits from CSR.[2, 4] Although laser photocoagulation may speed recovery, there is risk of permanent damage to normal retinal tissue and photoreceptors in the treatment area, and may cause secondary choroidal neovascularization with risk of permanent visual loss. As such, treatment recommendations should be made cautiously given the potential visual and occupational consequences. For many cases the leak is very near the central macula, where photocoagulation would leave a blind spot or the leakage is widespread and its source is difficult to identify. Foveal attenuation has been associated with more than 4 months' duration of symptoms, however a better long-term outcome has not been demonstrated with laser photocoagulation than without photocoagulation.[1] Laser photocoagulation can permanently damage vision where applied. Therefore, laser photocoagulation is not a preferred treatment for leaks in the central vision and is considered an outdated treatment by some doctors.[14] Photodynamic therapy (PDT) has also been shown to be an effective treatment options for CSR with minimal complications.[5, 15] In these cases, verteporfin is introduced into the eye and activated by a specific wavelength of light. This activation leads to the generation of oxygen radicals that in turn cause local damage to dysfunctional choroid and possibly RPE. Several studies have demonstrated resolution of subretinal fluid and improved visual acuity with the use of PDT.[5, 15] Medications are also currently being assessed as potential treatments for CSR. Of significant interest are the mineralocorticoid receptor antagonists, glucocorticoid antagonists, and anti-vascular endothelial growth factor agents. Early studies with eplerenone have demonstrated a potential benefit and possible pathway for improvement in patients with CSR.[16, 17] A number of recently published papers have explored the use of VEGF inhibitor injection to treat chronic persistent CSR but that treatment currently is not the standard of care and considered experimental or for research only.

II. Aeromedical Concerns.

Normal visual function is crucial in the aerospace environment. Central serous chorioretinopathy (CSR) can adversely impact visual function with symptoms of metamorphopsia (distortion of vision), micropsia (smaller visual images), scotomata (areas of the visual field missing or blurred), blurred vision, color desaturation (reduced brightness of colors), or sub-standard visual acuity. A 1988 Aeromedical Consultation Service (ACS) study that examined 47 rated airmen with 55 eyes affected by CSR found that all but one of the patients was returned to flying status. Fifty-one percent of airmen had recurrent episodes, 86% had better than 20/20 visual acuity after resolution of the CSR, 87% had normal color vision and 90% had normal stereopsis.[18]

The effect of the aerospace environment on active CSR is currently unknown. The presence of sub-retinal fluid introduces new dynamics into the eye that are not present otherwise. The effect of applying G-forces or relative hypoxia upon the pathophysiologic process of CSR is unclear. Further, sub-retinal fluid indicates active disease, which introduces the possibility of fluctuating visual acuity and could have an adverse impact on flight safety. Because of the aeromedical implications of these variables, aircrew members will not be considered for return to flight status until complete resolution of the sub-retinal fluid occurs as demonstrated by ophthalmologic exam and ancillary studies.

For aircrew members that have a history of CSR, regular follow-up care and monitoring are critical for flight safety and continued ocular health. Self-administered Amsler grid testing is the primary method for aircrew to assess for recurrence or worsening of CSR. Aircrew members should obtain an Amsler grid from the local optometrist office and test each eye individually, daily for the first year following the CSR. Any new distortion of the lines or missing parts of lines (scotomas) should be immediately reported to the local flight surgeon with subsequent referral to ophthalmology. If no recurrence has occurred within the first year, then weekly Amsler grid testing is appropriate. In addition to Amsler self-testing, aircrew members with a history of CSR require annual full local ophthalmology evaluations as follow-up. These exams should specifically note visual acuity, Amsler grid testing, OVT depth perception testing, CCT color testing and dilated funduscopic examination results. The result of these exams should be included in the AMS with submission for waiver request.

III. Waiver Consideration.

CSR is disqualifying for all FC I/IA, II, and III aviators and requires ACS evaluation for waiver consideration. CSR is not specifically disqualifying for ATC/GBC and MOD duties, but will be disqualifying if it results in visual acuity problems or significantly alters color vision. After documented resolution of the CSR by a fundus exam and optical coherence tomography (OCT), a waiver may be requested. Even if the airman's vision returns to 20/20 or is correctable to 20/20, a local eye specialist must demonstrate that the sub-retinal fluid has resolved prior to waiver request submission. Waivers may be requested for airmen with best corrected vision less than 20/20 or residual visual symptoms (metamorphopsia, color vision deficits), however, the visual acuity and visual symptoms must be stable (not improving or worsening). If laser photocoagulation is performed the airman must remain DNIF for 30 days following the procedure and requires a full local ophthalmologic exam to include a dilated fundus exam and Humphrey visual field 30-2 testing prior to waiver request submission. The eye exam must demonstrate resolution of the sub-retinal fluid by fundus exam and OCT. If CSR recurs in an airman with a known history of prior CSR, it is

treated the same as an initial occurrence. The airman will require a new waiver request to be submitted prior to return to flight status with a possible ACS review/evaluation. Any treatment of CSR with medications is disqualifying and will not be eligible for waiver until all medications have been discontinued and the member remains stable without recurrence for at least thirty days.

Table 1: Waiver potential for central serous chorioretinopathy

Flying Class (FC)	**Waiver Potential** **Waiver Authority**	**ACS Review/Evaluation**
I/IA	No AETC	No
II/III	Yes* MAJCOM	Yes
ATC/GBC	Yes MAJCOM	Maybe#
MOD	Yes AFGSC	Maybe#

* Waiver in untrained FC II and III individuals is unlikely
# ACS review at the request of the waiver authority

AIMWITS search in Aug 2014 revealed a total of 134 individuals with an AMS including the diagnosis of CSR. There were 2 FC I/IA cases (both disqualified), 82 FC II cases (7 disqualified), 47 FC III cases (7 disqualified), 3 ATC/GBC cases (1 disqualified), and 0 MOD cases. All of the disqualified cases were either due directly to the diagnosis of CSR or were for vision-related causes.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for an initial waiver for CSR following resolution of the sub-retinal fluid and stabilization of visual acuity and visual symptoms:
A. Complete history of symptoms (negatives included), medical or laser treatment, and residual visual complaints.
B. Attach studies (optical coherence tomography [OCT], fluorescein angiograms [FA] or indocyanine green angiograms) if performed.
C. Full ophthalmology exam to include:
1. Documentation of resolution of CSR by fundus exam and an OCT.
2. Documentation of visual acuities at or better than 20/20 in each eye or documented stability of a visual acuity less than 20/20.
3. Results from Amsler grid testing.
4. Results of CCT for each eye individually.
5. OVT-DP results, if not within standards then AO Vectograph results.
6. Humphrey visual field 30-2 testing for each eye if laser photocoagulation was performed (waiver request may not be submitted until 30 days after the procedure).

The aeromedical summary for a renewal waiver for CSR with no intervening episodes, decline in visual acuity or worsening of residual visual symptoms since the last waiver was granted:
A. A brief medical history summarizing the initial occurrence of the CSR, any recurrences and any treatment, as well as a full description of any residual visual complaints.
B. Full ophthalmology exam to include:
1. Documentation of continued resolution of CSR by fundus exam and an OCT.
2. Visual acuity in each eye, uncorrected and corrected.
3. Results from Amsler grid testing.
4. CCT scores for each eye individually.

ICD-9 code for central serous chorioretinopathy	
362.41	Central serous retinopathy

ICD-10 code for central serous chorioretinopathy	
H35.71 1, 2, 3, 9	Central serous retinopathy, right, left, bilateral, unspecified eye

V. References.

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WAIVER GUIDE
Updated: Jun 2016
Supersedes Waiver Guide of Apr 2013
By: Capt Ashley Franz (RAM 17) and Dr. Dan Van Syoc
Reviewed by Col Geoffrey Towers, AF/SG OB/GYN consultant and LtCol Chad Hamilton, GYN oncologist

CONDITION:
Cervical Cancer (Jun 16)

I. Overview.

According to the Surveillance, Epidemiology, and End Results Program (SEER), cervical cancer is currently ranked #21 in the list of the most common types of cancer diagnosed in the United States. This program estimates that in 2015, 12,900 women will be diagnosed with cervical cancer and 4,100 women will die of this disease.[9] Currently in the United States, cervical cancer makes up an estimated 0.8% of new cancers in 2015 and leads to an estimated 0.7% of all cancer deaths in this same year.[1] Cervical cancer was once the number one cause of cancer death in women in the US, but it has since fallen out of the top 10 causes of cancer deaths over the last 40 years, largely due to improved screening with the Papanicolaou (Pap) test.[2] Prior to the introduction of cervical screening with the Pap test in the 1950's, the overall incidence of invasive cervical cancer was 50/100,000 women in the US. In 1975, the incidence decreased to 14.8/100,000 women then to 7/100,000 women in 2004.[3] Incidence rates have been steadily decreasing over the last 10 years, but death rates have not changed significantly since 2002.[1] Between the years 2008 and 2012, 7.7/100,000 women were diagnosed with cervical cancer, and 2.3/100,000 women died of this disease.[9] Cervical cancer rates are higher for areas and populations with limited access to healthcare and screening opportunities.[2]

Most cases of cervical cancer develop in women between the ages of 35 and 44 (48.4%), with an approximate 19.6% of cervical cancer diagnosed in women older than 65.[1] The development of cervical cancer typically begins with infection by at least one of the 15 high risk Human Papillomavirus (HPV) serotypes (especially serotypes 16 and 18).[4, 5, 6] Persistent infection can progress to cancer precursors that include low-grade intraepithelial neoplasia (LSIL) and high-grade intraepithelial neoplasia (HSIL). LSIL on the Pap test often corresponds to a biopsy pathology report finding of cervical intraepithelial neoplasia (CIN) 1, while HSIL corresponds to CIN 2/3.[4] LSIL and HSIL are Pap test cytology results, while CIN 1/2/3, as well as invasive cervical cancer, are biopsy pathology results. However, it should be understood that the findings do not always correspond. For example, LSIL on a Pap test may have the biopsy confirmed CIN 2/3, while HSIL will often have colposcopy and biopsy confirmed CIN 1.
Women younger than age 25 have the highest rates of HPV infection; 50% of the women in this age group will acquire HPV infection within 2-3 years of beginning intercourse. The vulnerability of this population to HPV infection is believed to result from both behavioral and biological factors. Behavioral factors include multiple sexual partners and low condom use. Biological factors include an immature cervix with greater exposure of columnar and metaplastic tissue, and higher rates of cellular mitosis both of which are favorable to viral infection and propagation. As the cervix matures, the transformation zone between columnar and squamous tissues (squamocolumnar junction) moves from the cervical surface into the cervical os where it is more protected. These

factors are surmised to be the reason why the cumulative incidence of HPV infection over 3 decades decreases steadily from a high of 35.7% in women age 15-19 to 8.1% in women >age 45.[5] However, most HPV infections resolve spontaneously. For example, one study found that 91% of infections in adolescents and young women resolved within 2 years without treatment.[7] As noted above, cancerous precursors and cervical cancer can develop in infections that do not resolve. One study of 10,090 Pap tests from women age 12 to age 18 found that 5.7% were LSIL. However, cancer precursors can also spontaneously resolve, although this probability decreases with increasing dysplasia. A study of women age 18-22 with LSIL found that 91% spontaneously resolved while 3% progressed to HSIL.[4] Another study with a median follow-up time of 18 months found that in those women who opted for conservative treatment of CIN II, 65% resolved, 20% remained CIN II, and 5% progressed to CIN III (carcinoma in situ). This study found that no patients progressed to invasive cancer.[5] For ethical reasons, it is difficult to determine the rate of progression from CIN III to invasive cancer since the precancerous lesion is treated. Historical data shows that the latency period between infection and development of carcinoma in situ (CIS) is typically 7-15 years, with invasive cancer requiring an additional 10 years to develop. Also because of the long latency period, cervical cancer in women less than age 20 is rare with an incidence of 0.1/100,000 women.[4, 8] After age 20, the incidence rate of cervical cancer increases linearly to a rate of 16/100,000 women at age 40. Incidence rates remain at 15-17/100,000 women until age 75 when they begin to decline.[1]

Risk Factors

Risk factors for cervical cancer include early age at first intercourse (age 13 years or younger), multiple sexual partners, multiparity, lower socioeconomic standing, cigarette smoking, history of sexually transmitted diseases, and immunosuppression (e.g. HIV positive, organ transplant patients, and long-term corticosteroid use).[9] Race is also a risk factor; cervical cancer occurs twice as often in Hispanic women and 50% more often in black women than in non-Hispanic white women.[8] However, the incidence of cervical cancer decreases for all races with improved access to screening.[4] Cervical cancer is associated with HPV infection, with serotypes 16, 18, 31, 33, 45, and 56 responsible for 80% of invasive cervical cancers.[2] Persistent infection with an oncogenic HPV serotype, especially types 16 and 18 (accounting for 68% of cervical squamous cell carcinoma and 83% of cervical adenocarcinoma), is the single most important risk factor for development of cervical cancer. Penetrative sexual intercourse is the single largest risk factor for acquiring HPV infection.[4, 5, 10]

Symptoms

The symptoms depend on the location and extent of the cancer. Oncogenic HPV infection is asymptomatic. Precancerous lesions, such as LSIL or HSIL, and early stage cancer are usually asymptomatic. In some early stage cancers, and as the lesion progresses to invasive disease, the cancerous cervical tissue becomes friable and may cause irregular bleeding and/or post-coital bleeding. The woman may also have a foul-smelling serosanguinous vaginal discharge. As the cancer invades parametrial tissues, the woman may experience back, pelvic, or abdominal pain. Lymph node involvement may also cause pain in the area of the enlarged lymph nodes.[11]

Primary prevention

For the majority of women, primary prevention principally involves minimizing or eliminating the risk of HPV infection. Most of this effort relied on behavior management (abstinence, long-term monogamous relationship with an uninfected partner, condom use, etc.).[6, 10] The introduction of the HPV vaccine has added to the arsenal of primary prevention.

There are three HPV vaccines that are currently available in the United States: a bivalent vaccine (Cervarix) that targets HPV 16 and 18, a quadrivalent vaccine (Gardasil) that targets HPV 6, 11, 16, and 18, and a 9-valent vaccine that targets HPV 6, 11, 16, 18, 31, 33, 45, 52, and 58. HPV 16 and 18 make up the etiology of 66% of all cervical cancers, while HPV 31, 33, 45, 52, and 58 collectively make up the etiology of an additional 15% of all cervical cancers. HPV 6 and 11 make up the etiology of 90% of genital warts.[12]

According to the CDC, the quadrivalent or the 9-valent vaccine is recommended routinely for girls and boys aged 11-12 years, and can be given as early as age 9. Men and women ages 13-26 who have not yet received the vaccines are encouraged to do so, but the vaccines are not recommended for men or women over the age of 26. The vaccines can and should be given regardless of the patient's history of anogenital warts, Pap/HPV tests, or anogenital precancerous lesions. Routine cervical cancer screening should be continued regardless of vaccination status if the patient is 21 years of age or older.[12]

Secondary prevention

Secondary prevention consists of efforts through screening to detect early cellular changes before they develop into cancer and early cancers when they are most treatable.[8] The sensitivity of a single Pap smear is 51-90%; the reliability ranges from 43-78%.[6] Nevertheless, Pap screening works because of the high rates of spontaneous resolution of infection and early dysplasia and the long latency between infection and invasive cervical cancer in those women who develop persistent HPV infection.

Current screening practice involves use of Pap smears with the addition of HPV testing and/or colposcopy if indicated. In general, guidelines recommend screening begin at age 21 years. Recommendations for routine cervical cancer screening intervals are relatively consistent among the American Cancer Society, U.S. Preventive Services Task Force (USPSTF), and the American College of Obstetrics and Gynecologists (ACOG).[13, 14] Some experts recommend HPV testing versus Pap testing for detection of CIN due to greater sensitivity of the former test.[15] See Table 1 below for a concise summary.

Table 1. Cervical Cancer Screening Guidelines 2012[16]

	American Cancer Society	US Preventative Task Force	American College of Obstetricians and Gynecologists
When to start	Age 21.	Age 21.	Age 21.
Screening Method/Interval (age 21-29) • Cytology • Cytology + HPV	• Every 3 years • Should not be used	• Every 3 years • Should not be used	• Every 3 years • Should not be used
Screening Method/Interval (age 30-65) • Cytology • Cytology + HPV	• Every 3 years • Preferred method; every 5 years	• Every 3 years • An option; every 5 years	• Every 3 years • Preferred method; every 5 years
When to stop	Age >65 with adequate negative prior screening and no history of CIN2 or higher within the last 20 years	Age >65 with adequate screening history and are not otherwise at high risk for cervical cancer	Age >65 years with adequate negative prior screening results and no history of CIN2 or higher
Screening those who have been vaccinated	Continue screening with current guidelines	Continue screening with current guidelines	Continue screening with current guidelines

Staging and Treatment

In addition to cervical biopsy and pathology review, the initial evaluation should include a history and physical, complete blood count (CBC, including platelets), and liver and renal function studies. Chest x-ray, PET scan, and CT/MRI should also be done (optional for stage IB1 and less). Treatment is based on staging. Currently, cervical cancer is staged clinically, not surgically (see Table 2 for stage definitions). Some stages have fertility-preserving treatment options for those women who desire to preserve their fertility. This is an important consideration since 50% of cervical cancers occur in women less than 40 years old.[11, 17] Table 2 lists the cervical cancer stages and descriptions.

Table 2: International Federation of Gynaecology and Obstetrics (FIGO) staging classification for cervical carcinoma[11, 17]

Stage	Definition	TNM Categories
0	Carcinoma in situ	Tis
IA1	Invasive carcinoma, confined to cervix, diagnosed only by microscopy. Stromal invasion ≤3 mm in depth and ≤7mm in horizontal spread	T1a1
IA2	Invasive carcinoma, confined to cervix, diagnosed only by microscopy. Stromal invasion >3 mm and ≤5 mm in depth and ≤7 mm in horizontal spread	T1a2
IB1	Invasive carcinoma, confined to cervix, microscopic lesion >IA2 or clinically visible lesion ≤4cm in greatest dimension	T1b1
IB2	Invasive carcinoma, confined to cervix, clinically visible lesion >4 cm in greatest dimension	T1b2
IIA	Tumor extension beyond cervix to vagina but not to lower third of vagina. No parametrial invasion	T2a
IIB	Tumor extension beyond cervix. Parametrial invasion but not to pelvic side wall and not to lower third of vagina	T2b
IIIA	Tumor extension to lower third of vagina but not to pelvic side wall	T3a
IIIB	Tumor extension to pelvic side wall or causing hydronephrosis or non-functioning kidney	T3b
IVA	Tumor invasion into bladder or rectum	T4
IVB	Distant metastasis	M1
	Regional Lymph Nodes (N)	
NX	Regional lymph nodes cannot be assessed	
N0	No regional lymph node metastasis	
N1	Regional lymph node metastasis	
	Distant Metastasis (M)	
MX	Distant metastasis cannot be assessed	
M0	No distant metastasis	
M1	Distant metastasis	

Stage IA1: If there is no lymphovascular space involvement, treatment options include simple hysterectomy or cervical conization if the woman desires to preserve fertility.[11, 17] If lymphovascular involvement is present, radical surgery or radiotherapy (RT) is the most common management approach. Radiation Therapy (RT) techniques include brachytherapy (intracavity application is favored over interstitial application) for IA1 disease, however higher stages add external photon beam to the pelvis and areas of nodal involvement.[18]

Stages IA2, IB1, and IIA: Either radical hysterectomy or chemoradiation (RT with cisplatin chemosensitization) are options. An important consideration for younger patients is that radical hysterectomy preserves ovarian function, whereas RT does not. An additional option for women desiring to preserve fertility is radical trachelectomy (pelvic lymphadenectomy followed by removal of the cervix with parametrial tissue). To date, women undergoing this procedure had similar cure rates to radical hysterectomy and a greater than 50% chance of becoming pregnant.[11, 17]

Stage IB2: Pelvic RT with cisplatin chemosensitization is generally preferred though in some cases radical hysterectomy may be acceptable.[11, 17]

Stages IA1 thru IB2- additional considerations: Women with a large tumor size, deep stromal invasion, or involvement of the lymphovascular space are at intermediate risk of recurrence. For women with at least two of these risk factors, the addition of RT decreases the rate of recurrence, but a randomized controlled trial showed no improvement in survival. Additionally, women have a high risk of recurrence if they have at least one of the following high risk factors; positive lymph nodes, parametrial invasion, or positive surgical margins. These women benefit from the addition of cisplatin-containing chemoradiotherapy.[11, 17, 19]

Selected bulky Stage IIB2 and IIA cancers, and Stages IIB, IIIA, IIIB, and IVA: If there is no lymph node involvement by surgical dissection or radiologic imaging, or if lymph node involvement is limited to the pelvic lymph nodes, then treatment consists of pelvic RT, concurrent cisplatin-containing chemotherapy, and brachytherapy. If lymph node involvement extends to the para-aortic area, then RT to the para-aortic area is added. If distant metastases are present, systemic chemotherapy is added, and RT should be individualized based on the areas involved.[17]

Stage IVB: Treatment focuses on palliative measures.[4, 19]

Complications

The frequency of adverse effects from RT is 3-5% for stage I and IIA disease, 10% for stage IIB, and 15% for stage III. Ovarian failure will occur in women undergoing pelvic RT.[19] Second malignancies can develop in heavily irradiated areas including the colon, rectum, anus, urinary bladder, ovary, and areas of the genitals.[18] Vaginal dryness, dyspareunia, and sexual dysfunction occur more frequently with RT, but can also occur with surgery alone. Additional chronic complications of RT include proctitis/sigmoiditis and strictures; rectal ulcer; colonic perforation/obstruction; small bowel perforation/malabsorption; rectovaginal/vesicovaginal fistula; vaginal retraction, scarring, necrosis, or ulcer; chronic cystitis, urethral stricture, sterilization, leg edema, pelvic fibrosis; and thrombosis of pelvic vessels.[19]

Cisplatin can cause chronic peripheral neuropathy, renal insufficiency, and high frequency hearing loss.[17]

Surveillance/Follow-up

Surveillance/follow-up guidelines are published by the National Comprehensive Cancer Network (http://www.nccn.org)[16]. Follow-up is focused on early identification for recurrence and monitoring for treatment-related complications. The physical examination should include rectovaginal examination, examination of the lymph nodes (especially the supraclavicular region), and Pap smears. In general, a clinical evaluation and Pap test should be done every 3 months for 1 year, then every 4 months for 1 year, every 6 months for 3 years, then annually. The need for additional

studies such as chest x-ray annually; CBC, BUN, and creatinine every 6 months; and CT/PET scan depends on the stage and clinical presentation of the woman.[19] Additionally, the patient should monitor for and report any pain, vaginal bleeding, genitourinary complaints, abdominal complaints, or bowel problems.[11]

Prognosis

The 5-year survival for all stages of cervical cancer combined is 67.8%.[1] The 5-year survival for the earliest (local) stage is 91.5%, 57.4% for regional spread, 16.5% for distant spread, and 53.2% for unknown spread.[1]

II. Aeromedical Concerns.

Cancer diagnoses of any type may lead to emotional distress and this should be adequately assessed and appropriately managed. The emotional and mental state of the flyer must be considered in any DNIF or return to fly decision. Following treatment, aeromedical concerns primarily surround sequelae of treatment (see complications discussed above), the logistics of surveillance, and the potential for local or metastatic disease recurrence. The level of concern increases with advancing stages of disease.

III. Waiver Considerations.

Abnormal Pap tests are not disqualifying and do not require DNIF unless the flyer has physical or emotional symptoms that warrant grounding until resolved. However, for new accessions, abnormal cervical cytology within the preceding 2 years (excluding ASCUS with HPV and confirmed LSIL) is disqualifying for service entry, as is a current or past history of malignancy. Carcinoma in situ of the cervix which has been adequately excised (as evidenced by pathology report) is exempt from tumor board action (but are reported to the tumor board registry), does not require MEB, and is not disqualifying. All other cancers of the cervix require MEB and are disqualifying. No waivers will be considered for stage IVB disease.

Table 3: Waiver potential of cervical cancer for FC I/IA, II and III.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Stages IA1 thru nonbulky IIA	Yes#† AETC	Yes
II/RPA Pilot	Stages IA1 thru IVA	Yes+*† AFMSA	Yes
III	Stages IA1 thru IVA	Yes+*† AFMSA	Yes

For FC I/IA individuals waiver may be considered after 5 years of remission, asymptomatic.
+ For trained FC II and III individuals waiver may be considered six months after treatment completed, in remission, and asymptomatic.
* For untrained FC II and III, waiver may be considered after 5 years of remission.
† No indefinite waivers.

Review of AIMWITS data through Jun 2016 revealed 11 cases of cervical cancer or cervical carcinoma in situ. Breakdown of the cases: 1 FCI/IA, 3 FC I, 8 FC III, and 1 GBC. Of the 13 cases, only 2 were disqualified; both for medical conditions other than cervical disease.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary, submitted per guidelines in Table 3, for initial waiver for cervical cancer should include the following:
A. History – symptoms, pathology, stage, treatment, including date of last treatment, surveillance plan and activity level.
B. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
C. Physical – genital, rectovaginal exam, lymph nodes, abdomen.
D. Gynecology/oncology consults to include the six month follow-up - all consistent with National Comprehensive Cancer Network (NCCN) guidelines.
E. Any initial and follow-up labs: minimum of CBC and BUN/creatinine.
F. All follow-up Pap test results (frequency per NCCN guidelines).
G. Pathology reports including initial cervical biopsies as well as surgical specimens.
H. Imaging study reports.
I. Tumor board report, military or civilian, if applicable.
J. Medical evaluation board results.
K. List any and all treatment complications that are expected to be chronic. Include information on the functional impact of these complications and the management plan.

The aeromedical summary for waiver renewal for cervical cancer should include the following:
A. History – interim history since last waiver submission.
B. Physical – genital, rectovaginal exam, lymph nodes, abdomen.
C. Gynecology/oncology consults.
D. Labs – any surveillance tests since previous waiver.
E. Imaging study reports since the previous waiver
F. Discuss the status of any previously identified treatment complications. Include a discussion of any new complications that developed since the previous waiver. Include information on the functional impact of these complications and the management plan.

ICD9-Codes for Cervical Cancer	
180	Malignant neoplasm of the cervix uteri
233.1	Carcinoma in situ of the cervix uteri

ICD-10 Codes for Cervical Cancer	
C53.9	Malignant neoplasm of the cervix uteri, unspecified
C53.0	Malignant neoplasm of the endocervix
C53.1	Malignant neoplasm of the exocervix

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WAIVER GUIDE
Updated: May 2014
Supersedes Waiver Guide of Jan 2011
By: Dr Dan Van Syoc
Reviewed by Col Mark Packer, AF/SG Neuro-Otology Consultant

CONDITION:
Cholesteatoma (May 14)

I. Overview.

The term "cholesteatoma" is a misnomer that has persisted since the name was first used by Mueller in 1838. Cholesteatomas contain no cholesterol (chole-), no fat (-steat-), and are a non-neoplastic form of tumor (-toma).[1, 2, 3] Cholesteatomas are an abnormal collection of squamous epithelium and keratin debris that usually involve the middle ear and mastoid but may also involve the external auditory canal.[4-6] Commonly, cholesteatomas are described as, "skin in the wrong place." Incidence of cholesteatoma is reported as 3 per 100,000 in children and 9.2 per 100,000 in adults, with a male predominance of 1.4:1.[2] Middle ear cholesteatomas generally occur in individuals younger than 50 years of age, whereas external auditory canal cholesteatomas (EACC) occur within the 40–70 year old age group.[2, 4, 6] Cholesteatomas consists of three elements: 1) a cystic component, which forms the keratin debris, 2) an epithelial component, which produces the keratin debris, and 3) a subepithelial component, also called the perimatrix.[7, 8] The cholesteatoma matrix gradually erodes surrounding bone, destroying the middle and inner ear, with possible destruction of the facial nerve, invasion of the inner ear or labyrinth, and/or extension into the brain (bone erosion is associated in 80 to 96% of cases).[4, 7-9]

Cholesteatomas are typically classified based upon their pathogenesis, being either acquired or congenital.[5, 10] However, cholesteatomas may be classified upon their location in the tympanic cavity in relation to the tympanic membrane (TM); these include the pars flaccid (attic) cholesteatomas, and the pars tensa (sinus) cholesteatomas; either may be acquired or congenital. Special groups of cholesteatomas include mural cholesteatomas and external auditory canal cholesteatoma.[2]

Acquired cholesteatomas are the most common form of cholesteatoma found in the general population and in USAF aircrews. Acquired cholesteatomas may be further subdivided into primary or secondary. Primary acquired cholesteatomas, which account for up to 80% of all middle ear cholesteatomas, seem to occur behind an intact TM. Secondary acquired cholesteatomas, which account for 18% of middle ear cholesteatoma, seem to "grow" into the middle ear through a perforated TM.[2, 11] Congenital cholesteatomas are rare, and account for only about 2 to 4% of all middle ear cholesteatomas.[1, 12] Mural cholesteatomas create erosions to the middle ear and mastoid, and drain their contents through the TM into the external auditory canal, leaving a matrix behind; this process has been described as an "automastoidectomy."[2] EACC are rare and are typically located on the floor of the external auditory canal. They may be primary or secondary; secondary EACCs have been linked to repeated microtrauma from cotton-tipped applicators and hearing aids; also to decreased circulation (e.g. from smoking).[2, 6, 9]

The pathogenesis of acquired cholesteatoma has been debated for over a century, but the most commonly agreed upon etiological factors include chronic eustachian tube dysfunction, poor

pneumatization of the middle ear and mastoid process, and inflammatory conditions (e.g., chronic otitis media with effusion), and subsequent retraction pocket formation.[1]

Specific theories reported for acquired cholesteatoma formation include:[1, 4, 7]
1. Migration of epithelium from the margin of a perforated or retracted TM into the middle ear.
2. Iatrogenic implantation of the middle ear cavity with mucous epithelium, creating mucocutaneous junctions.
3. Metaplasia and hyperplasia from chronic infection and inflammation resulting in the transformation of middle ear cuboidal cells.
4. Tympanic membrane retraction pockets (most common cause), which appear in areas of the TM where the fibrous layer is missing. The pars flaccida in the attic is the most common area of the TM affected.

The most commonly accepted pathogenic theory for *congenital* cholesteatoma is embryonic epithelial rests developing in areas of the fetal temporal bone into cholesteatomas (similar tissue in non-temporal bone areas of the body is responsible for epidermoid cysts).[2, 12]

Diagnosis of cholesteatoma requires a high index of suspicion. Acquired cholesteatomas may appear as a pearly gray or yellow, well-circumscribed lesion, or present as soft waxy discolored inflammatory tissue. Symptoms tend to develop insidiously over long periods of time (weeks to years). Cholesteatoma may be difficult to distinguish from chronic otitis.[4, 13] Presenting symptoms are generally nonspecific, making the diagnosis a challenge. Chronic foul-smelling ear discharge is present in 33 to 67% of cases (culture and sensitivity of the drainage will often grow *Pseudomonas aeruginosa*).[4] Some form of hearing loss is present in 60 to 87% of patients, and hearing loss tends to occur late in the course of primary cholesteatomas.[3] Otalgia or ear irritation (e.g., itching) is present in 50% of cases. Vertigo occurs in 30 to 60% of cases. Facial nerve paralysis rarely occurs with middle ear cholesteatomas.[2, 9] Congenital cholesteatomas are most commonly seen in children who present with an asymptomatic pearly white mass behind an intact tympanic membrane, without a history of otitis; a conductive hearing loss may also be present.[1, 4, 12]

If cholesteatoma is suspected, an immediate referral to otolaryngology (ENT) is required. Workup for cholesteatoma should include audiometric testing (with air and bone conduction studies). When surgical exploration is needed, high-resolution computed tomography (CT) with 1-mm cuts in both the axial and coronal views may be obtained to evaluate suspected complications, and magnetic resonance imaging (MRI) can be useful to assess central nervous system involvement.[2, 4] Attention should be given to the status of the scutum and ossicles, evidence of dehiscence of the tegmen (dura), evidence of lateral semi-circular canal fistula, evidence of facial nerve dehiscence, the status of the antrum/mastoid, and the position of the sigmoid sinus.[2, 14] An MRI may help in differentiating cholesteatoma from an encephalocele (brain herniation) into the temporal bone.[2]

Treatment for cholesteatoma is surgical.[7, 15] The most common procedure performed is a tympanomastoidectomy, the success of which is dependent upon surgical skill.[16] Depending on the extent of the disease, patients may require an atticotomy, a canal wall up (CWU), or canal wall down (CWD) procedure. Newer techniques utilize the endoscope which allows for improved access to the tympanic cavity.[17] In either case, staging of the ear may be required. Generally, this is done to ensure no residual cholesteatoma is present before reconstructing any ossicular chain deficit.[8, 16, 18, 19] Reconstruction is normally done 6 months to 1 year after cholesteatoma removal surgery. For those ears not requiring ossicular reconstruction, a relook may be performed with the

use of rigid endoscopes. However, if a silastic middle ear spacer was placed, endoscopy is of limited value.[5, 8, 15, 20]

Recidivism is classified as either residual or recurrent. Residual is secondary to incomplete removal of the cholesteatoma, and recurrence is due to the formation of a retraction pocket. Recidivism rates range from 14 to 45% with CWU and 2 to 12% with CWD. In children less than 15-years of age, the recidivism rates range from 35 to 50% with CWU procedures. Recidivism can occur as late as 15 years after the initial procedure. As a result, patients are generally committed to extended follow-up.[13, 15, 21]

II. Aeromedical Concerns.

Aeromedical concerns include hearing loss, vertigo, facial paralysis, intracranial suppurations, recidivism, persistent eustachian tube dysfunction, and otalgia (aggravated with headset or helmet use). Improved surgical techniques have decreased morbidity and mortality from this disease; however, patient outcome depends on the extent of the disease at the time of surgery and the skill of the surgeon. Although many patients will have normal ear function for decades after surgical excision, cholesteatoma may recur and require multiple operations and result in diminished hearing.[16] In most patients, the underlying cause, e.g., eustachian tube dysfunction, will persist.[11]

III. Waiver Consideration.

History of cholesteatoma or history of surgical removal of cholesteatoma is disqualifying for flying class duties. Cholesteatoma is not specifically mentioned for ATC/GBC and MOD duties in the MSD other than for "Infections of ears or mastoids. When satisfactory performance of duty is prevented or because of the requirement for extensive and prolonged treatment." Due to the requirement for long-term follow-up, it is recommended that initial waivers be limited to one year. Patients with cholesteatoma will require regular and prolonged follow-up with ENT while on flying status. Recidivism is best managed when caught early. Indefinite waivers will be uncommon.

Table 1: Summary of cholesteatoma waiver potential and required post-treatment waiting period.

Flying Class	Waiver Potential Waiver Authority	Waiting Period Post-Treatment
I/IA	Maybe† AETC	Minimum 2 years
II/III	Yes† MAJCOM	Minimum 6 months*
ATC/GBC MOD	Yes† MAJCOM**	Minimum 6 months*

† For FC I/IA, initial FC II/III, surgery for cholesteatoma must have occurred at least two years previous to waiver submission with documentation indicating the cholesteatoma was completely removed; hearing profile must be H-1. AETC is the certification authority for all untrained assets except for MOD candidates which go to AFGSC. Indefinite waiver may be considered for cases that occurred years prior to consideration if there has been no recidivism and hearing is excellent.
***** After 6 months, individuals must demonstrate normal eustachian tube function (i.e., a normal valsalva), and a stable or waiverable hearing profile (if a conductive hearing loss is present). For non-trained assets an H-2 hearing profile requires waiver submission, and for trained assets an H-3 requires waiver. Individuals will need close ENT/flight surgeon observation during the first year post-op.
** AFGSC is the waiver authority for MOD personnel.

AIMWITS search In Feb 2014 revealed a total of 42 members with an AMS containing the diagnosis of cholesteatoma. There were four cases resulting in a disqualification disposition. Breakdown of the cases revealed: 5 FC I/IA cases (no disqualifications), 12 FC II cases (no disqualifications), 21 FC III cases (3 disqualified), 1 ATC/GBC case (no disqualifications), and 3 MOD cases (1 disqualified).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the <u>initial waiver</u> should include the following:
A. History of risk factors (i.e., eustachian tube dysfunction, pressure equalization (PE) tubes, age at first and subsequent PE tube placement, a history of other ear surgeries, episodes of otitis media, smoking status, etc.). Symptoms, including pertinent negatives, should be addressed, (e.g., dizziness, vertigo, facial paralysis, eustachian tube dysfunction, etc., treatments, and prognosis).
B. Physical exam: Valsalva results, status of TM.
C. Audiogram. (If an audiogram profile is not H-1, a full audiology evaluation is needed).
D. ENT consultation; attach referral report.
E. Copy of surgery report.

F. Results of post-op imaging studies of temporal bone (high-resolution CT with 1-mm cuts axial/coronal, MRI if obtained) to provide a base line.

The AMS for the waiver renewal should include the following:
A. Assessment for recurrence (e.g., otorrhea, otalgia, hearing loss, etc.).
B. Physical exam: Valsalva results and status of TM.
C. Audiogram. (If an audiogram profile is not H-1, a full audiology evaluation is needed).
D. ENT consultation; attach referral report.
E. Results of temporal bone imaging studies if ordered by otolaryngologist.

ICD-9 codes for cholesteatoma	
385.3	Cholesteatoma of middle ear and mastoid
385.30	Cholesteatoma, unspecified
385.31	Cholesteatoma of attic
385.32	Cholesteatoma of middle ear
385.33	Cholesteatoma of middle ear and mastoid
385.35	Diffuse cholesteatoma
383.32	Recurrent postmastoidectomy cavity

ICD-10 codes for cholesteatoma	
H71.9 0, 1, 2, 3	Unspecified cholesteatoma, right, left, bilateral
H71.0 0, 1, 2, 3	Cholesteatoma of attic, unspecified ear, right, left, bilateral
H71.1	Cholesteatoma of tympanum, unspecified ear
H71.2 0, 1, 2, 3	Cholesteatoma of mastoid, unspecified ear, right, left, bilateral
H71.30	Diffuse cholesteatoma, unspecified ear
H95.00	Recurrent cholesteatoma of postmastoidectomy cavity, unspecified ear

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WAIVER GUIDE
Updated: Jul 2013
Supersedes Waiver Guide of Mar 2009
By: Dr Dan Van Syoc
Reviewed by Maj Joshua Sill, chief ACS Pulmonologist and Lee A. Baggott MD MS, staff ACS pulmonologist

CONDITION:
Chronic Obstructive Pulmonary Disease (Jul 13)

I. Overview.

Chronic obstructive pulmonary disease (COPD) affects 5% of the U.S. adult population, is the third leading cause of death in the U.S., and its incidence is increasing with 12 million people currently diagnosed, and another 12 million estimated with early undiagnosed disease.[1] It is estimated that over 120,000 deaths annually in the US are attributed to COPD and it is the 19th most common diagnosis made during visits to family physicians in the US.[2, 3] COPD is a syndrome of progressive airflow limitation caused by chronic inflammation of the airways and lung parenchyma that is not fully reversible.[4] Smoking is the major causal factor for COPD in approximately 80% of cases, chronic obstructive asthma and non-tobacco particulate exposure in approximately 15%, with alpha-1 antitrypsin deficiency, matrix metalloproteinase 12 (MMP12) and other causes as the etiology in the remainder.[5-7] COPD is defined as a common, preventable and treatable disease, characterized by persistent airflow limitation that is usually progressive, and associated with an enhanced chronic inflammatory response in the airways and lung parenchyma to noxious particles or gases. Exacerbation frequency and co-morbidities contribute to the overall severity in individual patients.[8] Historically, COPD has been described as the presence of chronic bronchitis and/or emphysema, but it is now understood to have a complex pathogenesis.[7] COPD includes emphysema and chronic bronchitis, which are distinct disease entities with different pathogenesis and clinical courses. Emphysema involves destruction of the alveoli, with airway obstruction resulting from loss of elastic recoil. Chronic bronchitis requires a chronic cough with sputum production for at least 3 months in each of 2 consecutive years, and causes airflow obstruction due to neutrophilic airway inflammation and thickening, mucus production, and often increased airway reactivity.

Spirometry, including pre and post-bronchodilator evaluation, is required for a confident diagnosis of COPD, and provides information regarding disease severity that helps guide treatment and risk assessment.[8-10] The diagnostic criteria for airway obstruction is a forced expiratory volume in the first second of exhalation/forced vital capacity ratio (FEV1/FVC) of <70%, with relative severity of obstruction determined by the FEV1 % predicted. Spirometry should be done while the patient is in a stable state (i.e., at least 6 weeks after an exacerbation). If patients have a reduced forced vital capacity (FVC), lung volume studies with diffusing capacity (DLCO) are required to distinguish hyperinflation or poor effort from possible restriction as the cause of the decreased FVC. Spirometry is recommended in all persons at risk for COPD, defined as having both symptoms (chronic cough, dyspnea and/or wheeze) and disease risk factors (smoking > 10 pack-years, family history, and/or extensive particulate exposure). Routine screening of asymptomatic persons is not cost-effective for COPD diagnosis, and clinical exam has been proven to under-estimate the disease, which still remains under-diagnosed and under-treated. Due to the increased aeromedical risk of hyperinflation, lung volume studies by plethysmography ("body box") technique, which detects

trapped air with greater accuracy than nitrogen washout or helium dilution techniques, are part of assessing airmen with COPD.

Standard of care for COPD involves prescribing treatment specific for an individual's COPD severity.[11-25] In this waiver guide, we concentrate on mild to moderate COPD due to the younger, fit and healthy population that comprise USAF members, and because severe COPD is not eligible for waiver. Determination of COPD severity requires both spirometry and clinical assessment using a dyspnea score and counting the number of exacerbations in the past year.[8] Using actual FEV1/FVC <70% is known to underestimate COPD in those under age 45, but is a reasonable indicator to trigger further assessment by a busy flight surgeon.

In adults after age 30, the FEV_1 typically declines about 30 ml per year. COPD is associated with an accelerated decline in FEV_1, but the decline is still gradual enough that patients rarely note symptoms until disease is of moderate or worse severity. Symptoms include productive cough, sputum production, wheeze, and/or dyspnea.[26] While most patients have a mixture of emphysema and chronic bronchitis, it is also true that one or the other usually predominates; this has important implications both for presentation, treatment and for aeromedical disposition. The classic emphysema patient develops gradual airflow obstruction from loss of elastic recoil, with or without associated airway reactivity or sputum production. In affected areas of the lung, alveolar and capillary loss occur simultaneously, preserving ventilation/perfusion matching and oxygenation until emphysema is severe. However, the formation of emphysematous bullae (air cavities) increases risk for barotrauma in the aeromedical environment relatively early in the disease. In chronic bronchitis, airway inflammation and thickening, sputum production, mucus plugging and airway obstruction on spirometry increase aeromedical risk, also due to air trapping behind non-communicating bronchi. Since the airflow obstruction of COPD is often partially reversible, distinguishing chronic bronchitis from persistent asthma can be difficult. For patients with chronic bronchitis, arterial hypoxemia may be encountered earlier in the disease than for emphysema.

Assessment of clinical risk in COPD requires classification of severity, dyspnea and exacerbation frequency in the past 1-2 years. This clinical assessment tool is listed below:

Severity Classification of airflow limitation in COPD[8]:
FEV1/FVC (actual) < 70%, AND:

Mild	FEV1≥ 80% predicted
Moderate	FEV1 50-79% predicted
Severe	FEV1 30-49% predicted, disqualifying
Very severe	FEV1 <30% predicted, disqualifying

The Modified Medical Research Council questionnaire for dyspnea assessment for stable COPD (i.e., not for use during exacerbations until recovered to baseline):
MMRC Grade 0: "I only get breathless with strenuous exercise."
MMRC Grade 1: "I get short of breath when hurrying on the level or walking up a slight hill."
MMRC Grade 2: "I have to stop for breath when walking at my own pace on the level, or I walk slower than people of the same age on the level because of breathlessness."
MMRC Grades 3-4: not applicable to active duty members; disqualifying.

An exacerbation of COPD is defined as an acute worsening of respiratory symptoms, beyond usual day to day variation, that require a change in medication to include (respiratory) antibiotics and/or

oral corticosteroids. Although the clinical relevance of frequent exacerbations in mild COPD is not yet known due to insufficient data, in moderate COPD 2 or more exacerbations per year is associated with 11-20% increased risk of hospitalization and 11% increased risk of 3-year mortality.[11, 27]

Current GOLD (**G**lobal Initiative for Chronic **O**bstructive **L**ung **D**isease) guidelines provide insight into the association between symptoms, airflow limitation and risk of exacerbations, which would require oral corticosteroids and would therefore be acutely incapacitating for aircrew duty.
COPD Group A is at low risk (mild to moderate airflow obstruction, 0-1 exacerbation per year, MMRC 0-1). This group is potentially waiverable provided that the medications used for maintenance therapy are aircrew-approved. The member must be DNIF during exacerbations.
COPD group B is at low risk (mild to moderate airflow obstruction, 0-1 exacerbation per year, MMRC 2 or more). This group is potentially waiverable provided that the medications used for maintenance therapy are aircrew-approved and the member's functional capacity is compatible with the job description.
COPD groups C-D are at high risk (severe airflow obstruction, 2 or more exacerbations per year, MMRC 2 or more) and disqualifying for aviation.

Goals of COPD management include smoking cessation, risk factor avoidance, symptom relief, improvement of physiologic function, prevention of exacerbations and limitation of complications. Smoking cessation is the only intervention known to modify disease progression, and can lead to a 50% sustained reduction in the decline rate of lung function in COPD patients.[28] Nicotine replacement therapy (NRT) is approved for aircrew use; varenicline (Chantix®) is not. Consistent application of smoking cessation recommendations can produce a sustained 1-year quit rate of 35% and a 5-year sustained quit rate of 22%, so is an essential part of every patient interaction.[27-29] For mild airway obstruction (FEV1/FVC<70% and FEV1≥80%) a short acting bronchodilator is recommended as first choice for relief of symptoms. Regular medical treatment should be reserved for patients with symptoms and moderate airway obstruction (FEV1/FVC <70 and FEV1 50-79%). Long acting bronchodilators (including long acting anticholinergic and long acting β-2 agonists) are superior to PRN short acting bronchodilators in COPD with moderate airway obstruction, but are not currently aircrew-approved.[19-21, 24, 30] Other treatment options include inhaled corticosteroids, which are recommended for severe airway obstruction (which is itself disqualifying) but may be considered for mild to moderate airway obstruction with a positive bronchodilator response.[9] Generally, long term monotherapy with inhaled corticosteroids is not recommended in COPD because it is less effective than the combination of inhaled corticosteroids with long acting β-2 agonists.[13, 15, 18, 19, 23] Patients with chronic hypoxemia usually have severe COPD, and would be disqualified prior to considering supplemental oxygen.[31]

There is strong evidence that COPD exacerbations and hospitalizations, and the resulting accelerated decline in lung function, can be prevented by smoking cessation, influenza and pneumococcal vaccinations, long acting inhaled bronchodilators administered with good technique, (with or without inhaled corticosteroids). Early pulmonary rehabilitation for moderate or worse airflow obstruction improves health status, reduces exacerbations and hospitalizations for COPD.

II. Aeromedical Concerns.

The aerospace environment includes physiological stressors such as decreased barometric pressures, hypoxic cabin altitudes, and accelerative forces. Patients with COPD, especially chronic bronchitis,

have abnormal lung ventilation/perfusion which can cause arterial hypoxemia in the aerospace environment, affecting higher cognitive functions (i.e., sensory perception, judgment, and memory), psychomotor skills, and exercise tolerance. Smoking cessation is a must for any afflicted aviator desiring a waiver for COPD. They must also be physically fit and have a chest X-ray that is normal or near-normal.[26]

The aircraft life support environment is designed with the normally oxygenated individual in mind. Cabin altitudes that allow acceptable oxygenation in normal individuals may be insufficient for COPD patients. While several papers have addressed the tolerance of COPD patients to commercial cabin altitudes, they were exploring the issue of acute cardiopulmonary decompensation, and were not designed to address cognitive ability or exercise tolerance. Thus, the USAF requires near normal arterial oxygenation at rest for military aviation. It is important when evaluating baseline oxygenation to account for ambient altitude, so that the aviator in Colorado meets the same standard as the aviator in Delaware. The alveolar-arterial (A-a) gradient is the most reasonable measure of oxygenation. Normal A-a gradient is about 8 mm Hg at age 20, rising to 16 mm Hg in normal 60 year olds. A-a gradients of equal to or less than 20 mm Hg are considered acceptable for FC II.

Dyspnea is a distressing symptom, and if present in any significant degree, is likely to be aeromedically incapacitating. In COPD, mechanisms contributing to dyspnea are complex. Accelerative forces can further aggravate ventilation/perfusion defects, causing even more unoxygenated blood to be shunted into the systemic circulation, leading to increased hypoxemia. During ascent to altitude and rapid decompression, emphysematous bullae and areas of trapped air may rapidly expand, compressing adjacent lung tissue or causing a pneumothorax, leading to sudden incapacitation.[32] In addition, hypoxia is the single strongest stimulus for increasing pulmonary vascular resistance, potentially leading to acute pulmonary hypertension and more serious sequelae such as right-sided heart failure, arrhythmia, and syncope.

III. Waiver Consideration.

COPD is disqualifying for all flying classes. Waiver consideration is based on the severity of the disease process, the medications required for treatment and the degree of functional limitation. Most patients with moderate or severe airflow obstruction in COPD will not be suited for the aviation environment, though an occasional patient with moderate emphysema may be considered for FCIIA waiver. An aviator with mild-moderate, Group A or Group B COPD, could qualify for flying as long as he or she stops smoking, meets fitness standards, has a normal chest x-ray, and has adequate oxygenation. Any pharmacotherapy must also be approved for use in aircrew. The use of long acting β2 agonists and long acting anticholinergics are not approved. COPD is not specifically addressed for ATC/GBC or MOD personnel, but retention standards do state that significant fatigue or dyspnea on mild exertion supported by appropriate pulmonary function and blood gas studies is disqualifying. However, because these personnel would not be exposed to hypobaric environments or accelerative forces, a waiver for those with mild to moderate (COPD Groups A & B, formerly GOLD stages 1 and 2) disease may be considered on a case-by-case basis.

Table 1: Waiver potential for COPD*

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Evaluation Required
I/IA	No AETC	N/A
II/III	Yes MAJCOM	Yes
ATC/GBC MOD**	Yes MAJCOM	Only at the request of the waiver authority

*No indefinite waivers; case should be reviewed at least every 2-3 years.
**Waiver authority for MOD personnel is AFGSC.

AIMWTS review done in Jun 2013 revealed seven cases with a history of COPD. There were no FC I cases, three FC II cases, three FC III cases, and one ATC case. Three of the cases were disqualified due to significant disease (one FC II, one FC III and the one ATC case). The waivered cases were mild and did not require pharmacologic therapy. Since there are currently very few waivered airmen with COPD, staging of COPD severity was only recently standardized, data regarding treatment, outcomes and clinical course in mild COPD is very limited, and data on mild COPD in the aeromedical environment is minimal, a structured approach to COPD is warranted, and ACS evaluation is required for all flyers with COPD.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for COPD should include the following:
A. Detailed history and physical to include smoking history and statement that member has discontinued smoking, exercise tolerance (including MMRC score above), types of medication usedand the number of exacerbations requiring antibiotics and/or oral corticosteroids in the past 2 years..
B. Consultation report from pulmonary or internal medicine specialists.
C. Spirometry results including pre- and post-bronchodilator challenge and lung volume studies by plethysmography.
D. All chest x-ray reports.
E. Arterial blood gas at room air with calculated A-a gradient.
F. Medical evaluation board report prior to ACS evaluation.

The AMS for waiver renewal for COPD should include the following:
A. Interim history and physical, to include smoking history and statement that member has discontinued smoking, exercise tolerance (including MMRC score above), current medications and the number of exacerbations requiring antibiotics and/or oral corticosteroids in the past 2 years.
B. Consultation report from pulmonologist or internal medicine.
C. Subsequent spirometry results, repeat ABGs and A-a gradient, and chest x-ray reports.

ICD-9 Codes for COPD	
491.20	Chronic bronchitis
492.8	Emphysema
493.20	Chronic obstructive asthma
496	Chronic airway obstruction

ICD-10 Codes for COPD	
J42	Unspecified chronic bronchitis
J43.9	Emphysema, unspecified
J45.998	Other asthma
J44.9	Chronic obstructive pulmonary disease,unspecified

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WAIVER GUIDE
Updated: Jun 2015
Supersedes Waiver Guide of Aug 2014
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CONDITION:
Color Vision Deficiencies (Jun 15)

I. Overview.

Color vision is a complex capability involving intricate interactions between the external environment, the eye, and the psyche. As such, any one of these systems can attribute to deficiencies in what an individual perceives as color. This has important ramifications when applied to occupational medicine, specifically in the aerospace environment. Believed to be one of the first documented mishaps attributed to a color vision deficiency, the Lagerlunda train collision was a springboard for the development of color vision screening in the workplace.[1] The importance of color vision would be stressed many years later with the development of the Army Air Corps, leading to an extensive history of color vision testing in the Air Force.[2] As modern weaponry and systems continued to be developed, the importance of "normal" color vision became paramount. At the center of the need for color vision remained the difficulty of how to assess the impact of color vision deficiency on operations. Entities such as the Federal Aviation Administration (FAA) and the United Kingdom Civil Aviation Authority (CAA), alongside the DoD have continued the search for the most valid and reliable test to appropriately screen individuals in color sensitive duties.[3,4] In 1981, the National Research Council formed Working Group 41 from the Committee on Vision to specifically examine the validity of then current color vision screening tools.[5] Since that time, further advances in our understanding of color vision and improvements in technology, both in and out of the operational environment, have led to the development of new tests. To understand these tests, one must first understand the basic physiology behind color vision.

Vision can be thought of in a stepwise schematic involving the flow of light information from the stimulus through the eye and then on to the visual cortex. This process can be broken into prereceptoral, photoreceptor, and postreceptoral processes. Changes in any of these processes can cause apparent changes in color vision. For example, color discrimination is reduced at low retinal illuminance, so variations in pupil size can affect performance on color vision tests.[6] The human retina is composed of many cells involved in normal vision. Of these, rod and cones (photoreceptors) are the two types involved with the actual processing of light. Though cones are generally thought to provide color perception exclusively, some research has proposed rods may have a limited role. Cones are generally thought of in regard to their ability to absorb certain wavelengths of light. In the normal human retina there are three classes of cones with distinct absorption spectra; specifically short, medium, and long wavelengths. These are generally known as blue (short), green (medium), and red (long) cones. The combined input from all three-cone types responding normally to their specific wavelength range is needed to have normal color vision.[7] There is some overlap of these normal sensitivity curves, but in some areas of the visible spectrum, a single cone type may be stimulated exclusively. The interaction generated by stimulation of the individual cone types provides input signals to the brain which are centrally integrated and processed to determine what colors are being perceived. This three cone system is known as normal trichromacy. Current theory suggests that these cones respond to stimuli forming

channels of information that produce color vision. These channels specifically target changes in red-green, blue, and luminance.

The most common form of color vision defect is an inherited X-chromosome-linked red-green defect, affecting 8-10% of males and 0.4-0.5% of females. In congenital color vision deficiencies, alterations (shifts) in the normal wavelength sensitivities of any of the cone types lead to color vision defects. A person with normal color vision mediated by all three cones is termed a trichromat. The largest group of color deficient individuals (5-6%) is trichromatic, but they have anomalies in their individual cone sensitivity curves. These sensitivity curves have shifts from their normal position in the visual spectrum towards one of the other cone types.[8] Since all three cone types are still present, they are called anomalous trichromats. If the shift occurs in the M-cone (green) moving it closer to the L-cone (red) spectrum, these are termed deuteranomalous trichromats. If the max absorption wavelength of the L-cone (red) moves toward the M-cone (green), these are termed protanomalous trichromats. Important to realize is anomalous trichromats can exist within this continuum of spectral shifts, resulting in variable performance on color vision tests. The partial overlap of the curves produces aberrant input and alters the accuracy of color perception. Both deuteranomalous and protanomaloous groups have trouble distinguishing between reds and greens, and often confuse reds and greens with yellows and whites, if severe enough. Since these color defects are congenital, they typically remain stable throughout life and usually occur bilaterally and symmetrical.

Dichromacy exists when either the L-, M-, or S-cone pigment is absent. Congenital tritan (blue or S-cone) defects are extremely rare, occurring in approximately 0.005% of the population. Approximately 2% of males exhibit dichromacy either involving the L- or M-cones. These individuals are termed protanopes (L-cones) or deuteranopes (M-cones), respectively. Such individuals typically have significantly altered color perception often confuse reds and greens with brown in daily life.

Acquired color vision defects can be caused by a myriad of pathologies from normal aging and coloring of the lens to intracranial masses. Typical acquired color defects present with S-cone deficiencies, though several disorders affecting red-green color vision have been noted. For instance, central serous retinopathy can lead to an alteration in the position of photopigments in the macula leading to a detectable narrowing of the absorption spectra, termed pseudoprotanomaly. In addition, drug toxicity from digitalis, chemotherapeutic agents, or chloroquine have been associated with red-green and blue color defects. Color vision changes can also be an early indicator of ocular pathology, to include glaucoma, optic neuritis, and ischemic optic neuropathy. In the past, color vision screening tests did not specifically identify acquired color defects, especially those associated with tritan abnormalities.

In general, most color vision screening tests involve one of three types: pseudo-isochromatic plates [or PIP (e.g. Ishihara)], an arrangement test (e.g. D-15 or FM-100), or an operationally derived test (e.g. FALANT). While these tests are appropriate for screening purposes, they are highly dependent on proper administration and they are not designed to quantify severity of color deficiencies. To address these concerns, USAF School of Aerospace Medicine scientists developed the computer-based Rabin Cone Contrast Test (CCT). A study with aircrew applicants demonstrated that the CCT significantly improves sensitivity relative to pseudo-isochromatic plates and provides quantification on the level of color deficiency.[9] Due to these advances, **the CCT is now the only acceptable device for evaluating color vision of USAF aircrew and applicants to**

aircrew positions. A passing score on the CCT is 75 or greater for all cone types with each eye. Given the rarity of tritan deficiencies (blue or S-cone deficiencies) and the difficulty of finding affected personnel, there is limited validation of what is considered a passing score for blue testing using the CCT. It simply represents that member's individual threshold to perceive the presented stimulus. On-going validation is required to definitively set a "passing" score for the blue cone type. To ensure the most accurate results, testing should be accomplished with the patient optimally corrected for the test distance (36 inches). It is appropriate to use a reading lens for presbyopic patients as needed. Alignment of the monitor should be confirmed using the alignment tube and the patient should not be allowed to move their head during the test sequence (refer to the KX for further guidance). Improper test administration can result in false positive and false negative results.

II. Aeromedical Concerns.

Color deficient individuals are at a distinct disadvantage in terms of receiving and processing information in an efficient manner in the aviation and occupational environment. This can be demonstrated in aviation history as witnessed in the FedEx mishap in 2002, where color vision was found to be a contributing factor.[10] Several other examples have been cited in a work on military aviation history and color vision. With regards to aviation, color defectives are more vulnerable to low-light and hypoxic effects on color vision than normals.[11] Additionally, one must consider the compounding effects induced by certain required protective or performance enhancing optical appliances that can potentially degrade existing levels of color perception even further. These currently include blue-blocker sunglasses, yellow high-contrast visors, and assorted laser eye protection devices. While these devices cause changes in color perception with color normal subjects, the impact is far more profound with subjects who have an underlying color deficit.[12] This finding is the basis for restriction from use of the yellow high contrast visor by color defective members, as stated in AFI 48-123.

In addition to concerns with flying members, color vision can pose a significant risk for ground personnel. Color discrimination is an integral capability in the function of many ground based duties, to include remotely piloted aircraft operations and air-traffic control duties. Previous studies have demonstrated the importance of normal color vision in performing crucial tasks in air-traffic control.[13]

III. Waiver Consideration.

All color vision deficiencies are disqualifying for FC I/IA, II, III ATC/GBC, and MOD personnel. As stated above, a CCT score below 75 is considered evidence of a color vision deficiency for red and green cone types. Blue cone type scores below 75 should not be considered a congenital color vision deficiency due to the rarity of the condition as well as the lack of validation for normal versus abnormal test scores. AFMSA retains certification/waiver authority for all color vision deficiencies unless otherwise delegated; enlisted flying criteria are guided by the AFSC Career Field Manager at AF/A3. Trained aircrew can be considered for a waiver for defective color vision. ACS review/evaluation is required as part of the waiver consideration for trained aircrew. Waiver recommendations and management are primarily dependent on the etiology, severity of the color deficiency and can only be made on a case by case basis. Indefinite waivers for color vision loss are not authorized due to the need for continued evaluation for possible worsening color perception

and new acquired defects. **For trained aircrew with a new color vision deficit and otherwise normal optometric exam, DNIF is not required pending waiver approval.**

TABLE 1: Flying Class Waiver Policy and Requirements for Color Vision Deficiencies

Flying Class	Required Testing	Waiver Potential Waiver Authority	Special Circumstances Tests
FC I/IA	CCT	No AFMSA	All MFS/FC I failures require review by ACS
Initial FC IIU	CCT	No AFMSA	
Initial FC III/ATC/GBC	CCT	Maybe# AFMSA	
Initial FC II (FS)*	CCT	Yes* AFMSA	Initial ACS review if unrestricted FC II waiver is requested; otherwise, FC IIC
FC II/IIU$ (Trained Pilots/RPA Pilots/Navs)	CCT	Yes FCIIC@ AFMSA	Initial ACS Ophthalmology review, trained pilots only; RPA Pilots – ACS review at the discretion of AFMSA.
FC III ATC/GBC MOD	CCT	Yes# AFMSA	ACS evaluation at the discretion of AFMSA

FC III waivers may be considered on a case-by-case basis, as approved by AFMSA and the career field manager.

*Flight Surgeon (FS) candidates with color vision defects may be be granted a restricted FC IIC waiver. These members must make squadron aware on arrival and pilot aware prior to flight of color deficiency. They must also continue to have the most current version of the Cone Contrast Test administered during the annual PHA in order to monitor the stability of color vision defect. If member's color vision remains stable, ACS Ophthalmology case review at the time of waiver renewal is not required. Use of the yellow (high contrast) helmet visor is strictly prohibited. AFMSA is the waiver authority for all these cases.

@ Flying Class IIC waiver restricted to all previously flown aircraft. If selected to cross train into a new airframe, or assigned to a previous airframe that has undergone a significant cockpit upgrade that requires interpretation of different color symbology, an operational evaluation is recommended to verify capability to accurately recognize and respond to all display information. This operational evaluation should be performed by an instructor pilot in the new airframe.

AIMWTS search in Jun 2015 revealed a total of 2896 individuals with an AMS containing a diagnosis of color deficiency. Of that total, 1260 were disqualified. Breakdown of the cases was as follows: 361 FC I/IA (358 DQ), 726 FC II (46 DQ), 1285 FC III (515 DQ), 305 ATC/GBC (191 DQ), and 219 MOD (150 DQ). Within the DQ category, there were 13 ETP cases (3 FC I, 9 FC III,

and 1 MOD). Of this total, 11 were denied and 2 were granted (both FC III). Of the three FC I/IA cases granted a waiver, one was a student pilot from another allied nation that met his nation's standards, another was a student pilot who had a gap in time before starting training – he met standards with his IFC I exam and then failed with the introduction of the CCT before actually beginning training, and the last was a FC IA candidate and there was a note that the waiver was good for IA only.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for an initial waiver for color vision defects should include the following:

A. History – history of previous color vision testing results (MEPS, commissioning, initial flying physicals, preventive health assessments), family history of color vision defects, medications, and any impact on job/daily life.
B. Physical – Full eye exam to include fundoscopic results and current color testing results on the most recent CCT version (ensure proper positioning and alignment with best corrected visual acuity).
C. Optometry/ophthalmology consultation report.

Waiver renewal requires an interval AMS with particular attention to clinical changes.

ICD-9 codes for color vision deficiency	
368.51	Protan defect
368.52	Deutan defect
368.59	Color vision deficiencies, unspecified

ICD-10 codes for color vision deficiency	
H53.54	Protanomaly
H53.53	Deuteranomaly
H53.50	Unspecified color vision deficiencies
H53.59	Other color vision deficiencies

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WAIVER GUIDE
Updated: May 2013
Supersedes Waiver Guide of Jan 2009
By: LtCol Jay Allen (RAM 13) and Dr. Dan Van Syoc
Reviewed by LtCol Mark Scherrer, AF/SG Consultant for Colon and Rectal Surgery

CONDITION:
Colorectal Cancer (May 13)

I. Overview.

Colorectal cancer (CRC) is the third most common cancer in the US. In 2012 it is estimated that there will be 103,170 new cases of colon and 40,290 new cases of rectal cancer while 51,690 deaths (colon and rectal combined) will be attributed to the disease. CRC is the third leading cause of cancer deaths in both men and woman. Prior to age 50, men and woman have essentially equal incidence and mortality rates. After age 50, the rates are higher in men. Racial and ethnic groups have differing incidence and mortality rates. African Americans have the highest rates while Hispanics and Pacific Islanders have the lowest.[1] The overall 5-year survival in the US continues to improve mostly from increased utilization of screening tests.[1, 2] The disease is often insidious in development and common symptoms are fatigue, anemia, altered bowel function, pain and weight loss. The most common acute surgical problem is bowel obstruction.

CRC has been linked to both genetic and environmental factors. Those genetic factors that influence screening recommendations include: hereditary colorectal cancer syndromes, familial adenomatous polyposis, MUTYH-associated polyposis, Lynch syndrome, and a family or personal history of sporadic colorectal cancer. Although inherited susceptibility results in the most striking increases in risk, the majority of CRCs are sporadic rather than familial, with the hereditary syndromes accounting for less than 10% of cases.[3, 4]

Most CRCs are adenocarcinomas and arise from existing adenomatous polyps. Other than increasing age and male gender, well documented predictors of increased CRC risk are alcohol use, smoking and increased body mass index.[4] There is ongoing research concerning evidence that supports the role of inflammatory bowel disease, abdominal radiation, acromegaly, renal transplantation, diabetes mellitus and cholecystectomy to an individual's risk of disease. Substantial data exists that a lifestyle with regular exercise, and containing a diet that is high in fruits and vegetables, can lower ones risk for colorectal cancer. More research is necessary before conclusions can be made on calcium, vitamin B6, folic acid, fiber and fish consumption.[3]

Current screening recommendations are for all Americans to have an initial screening starting at age 50. Options for screening from the US Multisociety Task Force on Colorectal Cancer include: (1) annual fecal occult blood test, (2) flexible sigmoidoscopy every five years, (3) combination of (1) and (2) above, (4) colonoscopy every ten years, and (5) air contrast barium enema very five years. This has led to the reduced mortality for CRC seen in most US populations.[8] If polyps were removed via sigmoidoscopy or colonoscopy showing evidence of an advanced adenoma, then the recommendation would be to repeat the test in three years.[5] Screening should begin at age 40 for those with a first degree relative with colon cancer and the interval is every 5 years if that first degree relative was less than 60 when diagnosed (the American College of Gastroenterology treats history of cancer and adenomas the same for the purpose of screening initiation and intervals). The

USPSTF gives the following recommendations: **screening for CRC using fecal occult blood testing, sigmoidoscopy, or colonoscopy, in adults, beginning at age 50 years and continuing until age 75 years, the risks and benefits of these screening methods vary; recommends against routine screening for CRC in adults age 76 to 85 years, there may be considerations that support colorectal cancer screening in an individual patient; against screening for CRC in adults older than age 85 years; concludes that the evidence is insufficient to assess the benefits and harms of computed tomographic colonography and fecal DNA testing as screening modalities for CRC.[10]**

Colonic adenomas are the precursors to almost all CRCs and are found in up to 40% of all persons by the age of 60. As most colonic polyps are adenomas and more than 90% of adenomas probably do not progress to CRC, it is not currently possible to reliably identify those polyps that will progress. Oncologists have recognized that a larger polyp size and more advanced histologic features are more predictive of progressing to invasive cancer and are now using the term "advanced adenoma" to refer to adenomas larger than 1 cm and have some advanced histologic features (tubolovillous, villous or high-grade dysplasia).[5] There is also consensus that most subcentimeter polyps are not adenomatous and only a small fraction of all adenomas are advanced which has led to much discussion to more selective alternatives to universal polypectomy.[7]

This has led to the reduced mortality for CRC seen in most US populations. If there are polyps removed via sigmoidoscopy or colonoscopy showing evidence of an advanced adenoma, then the recommendation is be to repeat the test in three years.[5] Screening should begin at age 40 for those with a first degree relative with colon cancer and the interval is every 5 years if that first degree relative was less than 60 when diagnosed (the American College of Gastroenterology treats history of cancer and adenomas the same for the purpose of screening initiation and intervals). A recent analysis of screening intervals concluded that persons previously screening with colonoscopy without evidence of colorectal neoplasia, the 5-year risk of CRC is extremely low.[8] The study did not go out to ten years, but the findings were not inconsistent with the rationale for a ten-year interval in those screened negative.[10] There has been some shift on how to best screen individuals. There is now advocacy for computed tomographic colonography (CTC) rather than beginning with colonoscopy, but the US Preventative Task Force did not endorse CTC for screening. There is a small, but real risk of colonic perforation with colonoscopy and none with CTC. It has also been shown that both methodologies result in similar detection rates for advanced neoplasia.[6] Detection of polyps smaller than one centimeter is not as high with CTC.

Staging of Colorectal Cancer

Table 1. American Joint Committee on Cancer (AJCC) Colon Cancer Staging System[11]

Stage (T)	Primary Tumor (T)
TX	Primary Tumor cannot be assessed
T0	No evidence of primary tumor
Tis	Carcinoma in situ: intraepithelial or invasion of lamina propria
T1	Tumor invades submucosa
T2	Tumor invades muscularis propria
T3	Tumor invades through the muscularis propria into the subserosa, or into non-peritonealized pericolic or perirectal tissues
T4	Tumor directly invades other organs or structures, and/or perforates visceral peritoneum
	Regional Lymph Nodes
NX	Regional lymph nodes not assessed
N0	No regional lymph node metastasis
N1	Metastasis in 1 to 3 regional lymph nodes
N2	Metastasis in 4 or more regional lymph nodes
	Distant Metastasis
MX	Distant metastasis cannot be assessed
M0	No distant metastasis
M1	Distant metastasis

Tab le 2 Stage Grouping for Colorectal Cancer

Stage	Primary Tumor (T)	Regional Lymph Nodes (N)	Distant Metastasis (M)	Dukes	MAC
0	Tis	N0	M0	-	-
I	T1	N0	M0	A	A
	T2	N0	M0	A	B1
IIA	T3	N0	M0	B	B2
IIB	T4	N0	M0	B	B3
IIIA	T1-T2	N1	M0	C	C1
IIIB	T3-T4	N1	M0	C	C2/C3
IIIC	Any T	N2	M0	C	C1/C2/C3
IV	Any T	Any N	M1	-	D

Surgery is the cornerstone of therapy for CRC and 70 to 80 percent of patients with tumors can be resected with curative intent. Among patients who have undergone resection for localized disease, the five-year survival rate is 90%. The survival rate decreases to 65% when metastasis to regional lymph nodes is present. Most recurrences occur within three years, and 90% occurs within five years. The most common sites of recurrence are the liver, the local site, the abdomen and the lung.[12] Prospective studies have demonstrated that the use of chemotherapy in patients with

metastatic disease prolongs survival and enhances quality of life in comparison to palliative care alone. Fluorouracil has been the backbone of therapy for CRC for many years. It is normally administered with leucovorin, a reduced folate, which enhances the effectiveness of the fluorouracil. Newer agents are now being used in advanced disease states and the most promising protocol now utilizes fluorouracil, leucovorin and oxaliplatin in a regimen known as FOLFOX, which has quickly become the standard of care for chemotherapy for CRC.[12] The use of oxaliplatin and a similar agent, irinotecan, has significantly prolonged median survival by several months.[2] Adjuvant radiation therapy is frequently used for treatment of rectal cancer, and is considered for cases in which resection of T3 and T4 lesions leaves potentially positive resection margins. Also, the treatment of choice for any metastatic lesion if possible is surgery. Chemotherapy is used in conjunction, but resection of liver, lung, or any recurrent lesion is the standard and no patient should be offered chemotherapy without the consideration for resection. Chemotherapy alone will not cure any patient; up to 50% of patients with liver metastasis are long term survivors post surgical resection.

There has been much debate over the years on how best to follow patients post-treatment for CRC. After it has been concluded that the colon is free of cancer and polyps, colonoscopy is recommended every three to five years in most patients. Physician visits with targeted exams are recommended every 3 to 6 months for the first three years with decreased frequency thereafter for 2 years. There is also consensus that patients be tested every 3 to 6 months for up to 5 years with a carcinoembryonic-antigen test, as most recurrences will first be detected with this lab.[12] A recent UK study has shown that more intensive follow-up (as outlined above) is cost-effective and results in improved survival with absolute survival effects of 7-9%.[14]

II. Aeromedical Concerns.

Of significant concern with CRC is the potential for sudden incapacitation as the initial presentation; emergent obstruction or perforation. Chronic anemia presents more insidiously and can cause in-flight problems if undetected. CRC has a late age onset and slow progression, thereby removing most USAF aviators from the high risk window. Regular screening may decrease late presentations; however this screening begins at an age outside the majority of our aviators.

Once diagnosed and treated, the potential for recurrence becomes an important health and aeromedical concern. It has been shown that 80 to 90 percent of all recurrences following curative resection occur within the first 2-3 years and that 95% occur within five years. The five-year survival point can be used as a reliable mark of cure as most CRC recurrences do so within the first five postoperative years. The presence of colostomy or ileostomy is not compatible with military aviation.

III. Waiver Considerations.

CRC or a history of CRC is disqualifying for all classes of flying in the US Air Force. It is not listed specifically as disqualifying for ATC/GBC and MOD personnel, but for retention, the following verbiage applies: “Malignant neoplasms (including carcinomas in-situ). Malignancies that respond to treatment may require follow-up care that impacts deployability. Malignant neoplasms that are unresponsive to therapy, or have residuals of treatment, are in themselves unfitting under other provisions of this chapter.”

Table 3: Waiver potential of colorectal cancer in FC I/IA, II and III

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Stages I or II	Yes#† AETC	Yes
	Stage IIIA, B, or C	No AETC	No
	Stage IV	No AETC	No
II/III	Stages I or II	Yes+*† AFMSA%	Yes
	Stage IIIA, B, or C	Maybe$†& AFMSA%	Yes
	Stage IV	No AFMSA%	No
ATC/GBC MOD**	Stages I or II	Yes† AFMSA%	Yes
	Stage IIIA, B, or C	Maybe† AFMSA%	Yes
	Stage IV	No AFMSA%	No

For FC I/IA individuals, waiver may be considered after five years of remission, asymptomatic.
+ For trained FC II and III individuals waiver may be considered as early as six months after treatment completed, in remission, surveillance is ongoing, and asymptomatic.
* For untrained FC II and III, waiver may be considered after five years of remission.
** Waiver authority for MOD personnel is AFGSC.
& For trained FC II and III, serial carcinoembryonic-antigen testing must all be normal, all imaging tests normal and a clean colonoscopy; will be considered as early as the six month post-surveillance without evidence of disease or side effects from treatment.
$ For untrained FC II and III, serial carcinoembryonic-antigen testing must be all normal, all imaging tests normal and a clean colonoscopy; will be considered after five years from diagnosis and treatment
% All waivers need to go to MAJCOM who will then route them to AFMSA after appropriate review at their level.
† No indefinite waivers.

AIMWTS review in Apr 2013 revealed a total of 36 submitted cases of CRC. Breakdown of the cases was as follows: one FC I case (disqualified), 21 FC II cases (3 disqualified), 12 FC III cases (2 disqualified), 2 MOD cases (1 disqualified), and 0 ATC/GBC cases. Of the 7 disqualified cases, 5

were disqualified due to advance disease, one for multiple medical problems and the FC I case since it was too soon to consider.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for CRC should include the following:
A. History – initial symptoms, colonoscopy (or CTC) findings, pathology, stage, treatment, surveillance plan, and activity level.
B. Physical – abdominal, rectal, and all imaging studies.
C. GI and surgeon reports to include all follow-up studies.
D. Labs – Serial CBCs and carcinoembryonic-antigen test results.
E. Tumor board report, military or civilian, if applicable.
F. Medical evaluation board results.

The AMS of waiver renewal of CRC should include the following:
A. History – brief summary of stage, treatment, frequency of surveillance and results, any symptoms, activity level.
B. Physical – abdominal and rectal exams and imaging studies, if done.
C. Oncology consult(s).
D. Labs – all CBCs and carcinoembryonic-antigen test results since previous waiver.
E. Evidence that the level of follow-up care is consistent with current NCCN standards.

ICD-9 Codes for Colorectal Cancer	
153.0	Malignant neoplasm of hepatic flexure
153.1	Malignant neoplasm of transverse colon
153.2	Malignant neoplasm of descending colon
153.4	Malignant neoplasm of cecum
153.6	Malignant neoplasm of ascending colon
153.7	Malignant neoplasm of splenic flexure
153.8	Malignant neoplasm of other specified sites of large intestine
153.9	Malignant neoplasm of colon, unspecified
154.0	Malignant neoplasm of rectosigmoid junction
154.1	Malignant neoplasm of rectum
154.8	Malignant neoplasm of other sites of rectum, rectosigmoid junction, & anus

ICD-10 Codes for Colorectal Cancer	
C18.3	Malignant neoplasm of hepatic flexure
C18.4	Malignant neoplasm of transverse colon
C7A.023	Malignant carcinoid tumor of the transverse colon
C18.6	Malignant neoplasm of descending colon
C7A.024	Malignant carcinoid tumor of the descending colon
C18.0	Malignant neoplasm of cecum
C7A.021	Malignant carcinoid tumor of the cecum
C18.2	Malignant neoplasm of ascending colon
C7A.022	Malignant carcinoid tumor of the ascending colon
C18.5	Malignant neoplasm of splenic flexure
C18.9	Malignant neoplasm of colon, unspecified
C7A.029	Malignant carcinoid tumor of the large intestine, unspecified portion
C18.7	Malignant neoplasm of sigmoid colon
C7A.025	Malignant carcinoid tumor of the sigmoid colon
C20	Malignant neoplasm of rectum
C7A.026	Malignant carcinoid tumor of the rectum
C18.8	Malignant neoplasm of overlapping sites of the colon

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WAIVER GUIDE
Updated: Feb 2015
Supersedes Waiver Guide of Sep 2011
By: Dr Dan Van Syoc, LtCol Steven Gore and Maj Eddie Davenport (ACS chief cardiologist),

CONDITION:
Congenital Heart Disease (Feb 15)

I. Overview.

Congenital heart disease (CHD) is estimated to involve up to 1% of live births in the US.[1, 2] CHD in adults includes common and uncommon defects, with and without correction by surgery or catheter-based interventions. Consideration of waiver for continued military flying duties or training require normal or near-normal cardiovascular status, acceptably low risk of aeromedically pertinent events, and no significant residua. Since the advent of reparative surgery for congenital cardiac defects, it is estimated that 85% of affected children survive into adulthood.[3] In 2010, researchers estimated there are approximately 1.1 million Americans over the age of 18 with congenital heart disease.[12] Longitudinal studies estimate that approximately 20% of individuals with CHD will experience tachyarrhythmias during their lifetime which can possibly become an aeromedical concern.[2]

Bicuspid aortic valve is discussed in the Bicuspid Aortic Valve Waiver Guide. Otherwise, the most common congenital disorders that will require aeromedical consideration are the atrial septal defect (ASD), ventricular septal defect (VSD), and patent foramen ovale (PFO) with/without associated atrial septal aneurysm (ASA). Patent ductus arteriosus (PDA) and coarctation of the aorta may also be seen. Hemodynamically significant defects are likely to be detected and corrected during infancy or childhood, especially VSD and PDA. Other, more complicated congenital disorders will be very unusual because most will be detected in infancy or childhood and, even if corrected, will be unacceptable for entrance into military service.

<u>ATRIAL SEPTAL DEFECT (ASD)</u>
There are three types of ASD; ostium secundum (75%) [failure of the septum primum to cover the fossa ovalis], ostium primum (15%) [inadequate development of the endocardial cushion, thus failing to close the ostium primum], and sinus venosus (10%) [abnormal embryologic evolution of the sinus venous and sinus valves]. ASDs allow shunting of blood flow from the left to right atrium, with resultant right-sided volume overload and enlargement of the right atrium and ventricle. Presence and time course of symptom development depends on the magnitude of the shunt with shunts greater than a 1.5 pulmonary to systemic flow ratio (Qp:Qs) generally producing significant volume overload with resultant symptoms, including easy fatigue, dyspnea, and arrhythmias, especially atrial fibrillation. Straining, coughing, Valsalva, anti-G straining maneuvers or positive pressure breathing may cause the blood flow to reverse, which could serve as conduit for embolic material. Moderate and even large sized ASDs may not be detected until adulthood. Many patients are minimally symptomatic during the first three decades of life although more that 70% became somewhat impaired by the fifth decade.[4] Prognosis after successful and uncomplicated closure of significant secundum and sinus venosus ASD is normal if accomplished before age 25.[5-7] Closure later in life increases the risk of atrial fibrillation, stroke, and right heart failure.

VENTRICULAR SEPTAL DEFECT (VSD)

Hemodynamically significant defects are likely to be detected and corrected during infancy or childhood. Hemodynamically insignificant VSDs will also likely be detected in infancy or childhood due to the very characteristic murmur but may not be recommended for closure because of insignificant shunting and a high likelihood of spontaneous closure over time. VSDs repaired before age 2 have a good long-term prognosis.[7]

PATENT DUCTUS ARTERIOSUS (PDA)

PDAs classically produce a prominent continuous "machinery" murmur heard at the second left intercostal space. Small PDAs may escape detection until adolescence or adulthood but are unusual. In the past, even small PDAs were often recommended for surgical or catheter-based closure due to anticipated long-term risks of heart failure, endocarditis and pulmonary hypertension. Recently, a trend has developed to follow small PDAs, especially silent PDAs, without correction/closure. The proper course of therapy for small PDAs is not yet established and there is disagreement among experts as to the theoretical increased risk of endocarditis in small and silent PDAs.

COARCTATION OF THE AORTA

Coarctation of the aorta results in elevated blood pressure in the upper limbs, with normal or low pressure in the lower limbs. Associated abnormalities with coarctation include bicuspid aortic valve, congenital aneurysms of the circle of Willis, and aortic aneurysms. Unrepaired coarctation with a resting gradient $\geq$ 20 mm Hg between the upper and lower extremities carries an increased risk for progressive left ventricular hypertrophy and subsequent left ventricular dysfunction, persistent systolic hypertension, and premature atherosclerotic cerebrovascular and coronary heart disease. Coarctation of the aorta is usually diagnosed in childhood, but up to 20% of cases are reportedly not detected until adolescence or adulthood. Long-term prognosis is related to the age of repair, with the best outcome for correction being before age 9.[8]

PATENT FORAMEN OVALE (PFO) and ATRIAL SEPTAL ANEURYSM (ASA)

Patent foramen ovale (PFO) and atrial septal aneurysm (ASA) are anatomic anomalies of the interatrial septum. PFO occurs in 25-30% of the general population. At that prevalence, it can be considered a normal variant. ASA is present in about 1-2% of the general population. PFO and ASA may be present alone or may occur together. Asymptomatic PFO and/or ASA are typically incidental findings discovered on echocardiogram evaluation performed for unrelated indications. Aeromedically, these are considered normal anatomic variants and therefore are qualifying for all classes of flying duties including initial training.

Despite these defects being considered normal anatomic variants for aeromedical evaluation, PFO and ASA, alone or in combination, have been associated with possible paradoxical embolic events, notably stroke and transient ischemic attack. Although the relative risk for such an event may be increased, the absolute risk is low. The 2010 published CLOSURE trial showed no decrease in recurrent stroke after PFO closure (via percutaneous device) and a possibly significant vascular complication rate and increased risk of atrial fibrillation after PFO closure.[9] Additionally, there was still a 3.1% stroke rate in both the medical and PFO closure arms of the trial. More recently, the 2013 published PC and RESPECT trials both found that device closure of a PFO did not offer a significant benefit over medical therapy for the prevention of recurrent ischemic stroke.[14, 15] Therefore, asymptomatic and hemodynamically insignificant PFO by itself is considered a normal variant and does not require waiver UNLESS it has been surgically (to include percutaneously)

closed. TIA/CVA is not usually waiverable. Aeromedical concerns and recommendations for PFO and/or ASA associated with stroke or transient ischemic attacks are also discussed in the Transient Ischemic Attack (TIA) and Stroke (CVA) Waiver Guide. All aeromedical instructions in this waiver guide regarding PFO associated with CVA/TIA apply equally to ASA associated with CVA/TIA.

II. Aeromedical Concerns.

Aeromedical concerns for all congenital heart disease are primarily related to the long-term effects of shunting with volume overload. These include atrial and ventricular dilation and dysfunction, tachydysrhythmias, endocarditis or endarteritis. For those treated surgically, favorable results need to be well demonstrated.

III. Waiver Consideration.

Congenital heart defects, uncorrected or corrected by surgical or catheter-based procedures, are disqualifying for flying class (FC) I/IA, II, and III. Congenital and structural anomalies of the heart that are not normal structural variants, other than PFO are not qualified for retention, so ATC/GBC and MOD personnel would need a waiver as they require an MEB. These defects are not specifically disqualifying for ATC/GBC and MOD duties, but any of the significant sequelae would be disqualifying. Also, any history of cardiac surgery or catheter-based therapeutic intervention (including closure of PFO) is disqualifying for all flying classes. ASD, VSD and PDA successfully corrected by surgery or catheter-based techniques, especially in childhood, may be favorably considered for waiver for all classes of flying duties, as may uncorrected, but hemodynamically insignificant ASD and VSD. Because the appropriate treatment of hemodynamically insignificant PDA is unsettled; uncorrected small PDAs will be considered on a case-by-case basis. Coarctation of the aorta will also be considered on a case-by-case basis.

Table 1: Waiver potential for congenital heart defects**

Flying Class	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Hemodynamically insignificant ASD, VSD, PDA	Yes AETC	Yes
	Hemodynamically significant ASD, VSD, PDA (uncorrected)	No AETC	No
	Hemodynamically significant ASD, VSD, PDA (corrected)	Yes# AETC	Yes
	Coarctation of aorta	Maybe*# AETC	Yes
	PFO surgically closed	Maybe AETC	Yes
	PFO asymptomatic/incidental finding	N/A (not DQ)	No
II/III Including untrained assets	Hemodynamically insignificant ASD, VSD, PDA	Yes MAJCOM	Yes
	Hemodynamically significant ASD, VSD, PDA (uncorrected)	No MAJCOM	No
	Hemodynamically significant ASD, VSD, PDA (corrected)	Yes# MAJCOM	Yes
	Coarctation of aorta	Maybe# MAJCOM	Yes
	PFO surgically closed	Maybe*# MAJCOM	Yes
	PFO asymptomatic/incidental finding	N/A (Not DQ)	No
ATC/GBC	Any congenital heart defect	Maybe MAJCOM	No
MOD	Any congenital heart defect	Maybe AFGSC	No

Must wait at least six months after surgery before submitting waiver.
* Not waiverable if PFO closed due to TIA or CVA episode. See TIA/CVA Waiver Guide.
** Per AFI 48-123 6.4.1.3, AFMSA remains waiver authority for all initial waivers for conditions that do not meet retention standards, unless 6.4.1.4.1 applies.

AIMWTS search in Feb 2015 revealed 96 aeromedical summaries with a diagnosis of ASD, VSD, PFO, PDA, or coarctation. Breakdown of the cases revealed: 12 FC I/IA cases (2 disqualified), 32

FC II cases (4 disqualified), 45 FC III cases (12 disqualified), 3 ATC/GBC cases (no disqualifications), and 4 MOD cases (1 disqualified). Only 5 of the 19 disqualified cases were disqualified specifically for the congenital abnormality.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after administrative and clinical disposition have been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, treatment, medications, and activity level.
B. Cardiology consultation.
C. Electrocardiogram (ECG).
D. Official report of all local echocardiograms. Also send videotape/CD copy of the images of the most recent echocardiogram to the ACS [if recent surgery, echocardiogram should be done close to six months after surgery]. (Notes 1 and 2)
E. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)
F. Operative report, if recent surgery.
G. Results of medical evaluation board (MEB) (worldwide duty evaluation for ARC members), if congenital abnormalities not satisfactorily treated by surgical correction.

The aeromedical summary for waiver renewal should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, treatment, medications, and activity level.
B. Electrocardiogram (ECG).
C. Additional local cardiac testing is not routinely required for re-evaluation cases followed at the ACS but may be requested in individual cases. If so, the previous ACS evaluation/review will specify details regarding any requested local testing.
D. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manager for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

Note 2: State in AMS when studies were sent to ACS.

ICD-9 Codes for congenital heart diseases	
745.4	Ventricular septal defect
745.5	Patent foramen ovale and ostium secundum atrial septal defect
745.6	Ostium primum atrial septal defect
745.9	Unspecified defect of septal closure
747.0	Patent ductus arteriosus
747.1	Coarctation of aorta

ICD-10 Codes for congenital heart diseases	
Q21.0	Ventricular septal defect
Q21.1	Atrial septal defect, patent foramen ovale, ostium primum atrial septal defect, and ostium secundum atrial septal defect
Q21.9	Congenital malformation of the cardiac septum, unspecified
Q25.0	Patent ductus arteriosus
Q25.1	Coarctation of aorta

V. References.

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Medical Therapy in Patients With a Stroke or Transient Ischemic Attack Due to Presumed Paradoxical Embolism Through a Patent Foramen Ovale. *Stroke, 2010; 41: 2872-83.*

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15. Carroll JD, Saver JL, Thaler DE, et al. Closure of Patent Foramen Ovale versus Medical Therapy after Cryptogenic Stroke. N Eng J Med, 2013; 368: 1092-1100.

WAIVER GUIDE
Updated: Feb 2014
Supersedes Waiver Guide of May 2010
By: Lt Col Talib Y. Ali (RAM 13) and Dr. Dan Van Syoc
Reviewed by LtCol Edith Canby-Hagino, AF/SG Consultant for Urology and Maj Eric Barnes, AF/SG Consultant for Nephrology

CONDITION:
Congential Urinary Anomalies (Feb 14)

I. Overview.

This waiver guide specifically addresses medullary sponge kidney, horseshoe kidney, autosomal dominant polycystic kidney disease, congenital absence or atrophy of the kidney, and congenital obstruction of the ureteropelvic junction (UPJ). The kidneys and urinary tract are host to numerous survivable congenital abnormalities. Most abnormalities present early in life with mass, infection, or decreased renal function. Others remain clinically silent, to be discovered incidentally later in life. The most common reasons for discovery of silent cystic and congenital abnormalities of the urinary tract include microscopic hematuria, recurrent urinary tract infections, nephrolithiasis, and investigation of unrelated pathologies such as during cardiac catheterizations or CT scans.

Medullary Sponge Kidney
Medullary sponge kidney (MSK) is a congenital condition which is usually an incidental finding noted on imaging of the abdomen, commonly by intravenous urography (IVU). CT scan and sonographic appearances are nonspecific. A significant number of patients with MSK are asymptomatic, and remain undiagnosed throughout life. As a result, the true incidence of this condition is unknown. Among patients undergoing intravenous urography for various indications, 1 in 200 was found to have MSK. The majority of patients with MSK disease have normal kidney function. The principal findings are dilated intrapapillary collecting ducts and small medullary cysts, which range in diameter from 1 to 8 mm. The cross-sectioned kidney therefore has the appearance of a sponge. Some describe the appearance as that of small brushes or "bouquets of flowers". Although many cases of MSK are asymptomatic, it can present with renal colic from stones, urinary tract infections, or gross hematuria. Symptoms rarely occur prior to age 20. The complications from MSK, such as nephrolithiasis and infections, require management more so than the underlying condition. It is estimated that MSK is found in up to 20% of patients with nephrolithiasis and that more than 70% of patients with MSK will develop kidney stones. Treatment includes antibiotics for acute pyelonephritis and thiazides and potassium citrate to reduce stone formation.[1, 2] Patients with MSK frequently have calciuria, which can lead to secondary hyperparathyroidism and hypercalcemia in addition to nephrolithiasis.

Horseshoe Kidney
The horseshoe kidney is probably the most common of all renal fusion anomalies, occurring in 0.25% of the population. The anomaly consists of two distinct renal masses lying vertically on either side of the midline that are connected at their respective poles (usually the lower poles) by a parenchymatous or fibrous isthmus that crosses the midplane of the body.[3] Horseshoe kidneys are frequently associated with other congenital anomalies, including skeletal, cardiovascular and central nervous system defects, as well as other genitourinary anomalies such as hypospadias, undescended testes, bicornuate uterus and vaginal anomalies. The male to female ratio is approximately 2:1. The

most common associated finding in these patients is UPJ obstruction, which occurs in up to 35% of patients. For many patients, the horseshoe kidney remains asymptomatic, and often it is an incidental finding during radiological examination. Symptoms, when present, are usually due to obstruction, nephrolithiasis, or infection. In children, urinary tract infection is the most common presenting symptom. Aviators with horseshoe kidney pose no threat to flight safety. However, associated anomalies or recurrent stone formation, infections, or discomfort may interfere with the safe performance of flying duties and pose a risk to flight safety. The risk of severe pain due to a renal colic or the need for frequent treatment or complications may compel the flight surgeon to ground the flyer and refer for treatment.[4] If nephrolithiasis is present, the waiver guide for Renal Stones will also need to be consulted.

Polycystic Kidney Disease

Autosomal dominant polycystic kidney disease (ADPKD) is the most common form of polycystic disease and occurs in about 1 in 800 live births. There may be associated abnormalities in the liver, pancreas, brain, arterial blood vessels, or a combination of these sites (liver cysts develop in up to 80% of these patients). Affected patients have numerous fluid-filled cysts in the kidneys which may become hemorrhagic, and the cysts may also be the site of pyogenic infection. Patients often present with hypertension, hematuria, polyuria, flank pain, and even anemia and are prone to recurrent urinary tract infections and renal stones. The development of hypertension indicates that the disease is progressing and should be treated aggressively with target blood pressure goal of less than 130/80 mm Hg according to JNC 7 and the KDOQI Clinical Practice guidelines on hypertension. Currently, no treatment has proven to prevent or delay progression of ADPKD.[5, 6] Because so many patients with polycystic kidney disease will develop hypertension, the diagnosis should be entertained, especially in younger aviators who are hypertensive but are otherwise healthy. Usually in the fourth decade of life, kidney function starts to decline. Renal transplantation is the treatment of choice for end stage renal disease in ADPKD.[6] The continue-to-fly decision must be judged on an individual basis in close consultation with a nephrologist. The presence of mild anemia or proteinuria should not pose a threat to flight safety, but when renal impairment increases or the patient has frequent discomfort due to enlarged kidneys or ruptured cysts, or urinary tract infections requiring treatment, continued flight duties become problematic. In particular blood pressure must be carefully monitored and controlled.[4]

Congenitally Absent or Atrophic Kidney

The congenital absence of a kidney occurs in approximately 1 in 1200 live births. Males predominate in a ratio of 1.8:1. The absent kidney is most often from the left side. Even though the anomaly is more common in males, associated anomalies are more common in females; about 30% of females with a congenitally absent kidney have an abnormality of the internal genitalia. In general, there are no specific symptoms heralding an absent kidney. The diagnosis should be suspected during a physical examination when the vas deferens or body and tail of the epididymis are absent in males. Likewise, the diagnosis should be considered when a septate, or hypoplastic vagina occurs with a unicornuate or bicornuate uterus. There is no clear-cut evidence that patients with a solitary kidney have an increased susceptibility to other diseases.[3] In general, the absence of a kidney is not a contraindication to flight duties as long as the remaining kidney is functioning normally and there is no evidence that its continued normal function is being threatened by underlying disease.[4]

Congenital Obstruction of the Ureteropelvic Junction

The diagnosis of UPJ obstruction results in a functionally significant impairment of urinary transport from the renal pelvis to the ureter. Although most cases are probably congenital, the problem may not become clinically apparent until much later in life. Congenital UPJ obstruction most often results from intrinsic abnormality of the ureter. A frequently found defect is the presence of an aperistaltic segment of the ureter, perhaps similar to that found in primary obstructive megaureter. UPJ obstruction may also be acquired. In children, vesicoureteral reflux can lead to upper tract dilatation with subsequent elongation, tortuosity, and kinking of the ureter. In older children or adults, intermittent abdominal or flank pain, especially during periods of increased hydration or urine production, associated with nausea or vomiting, is a frequent presenting symptom. UPJ obstruction may not become apparent until middle age or later. Hematuria, either spontaneous or associated with otherwise relatively minor trauma, may also be a presenting symptom. Laboratory findings of microhematuria, pyuria, or frank urinary tract infection might also bring an otherwise asymptomatic patient to the urologist. Radiographic studies should be performed with a goal of determining both the anatomic site and the functional significance of an apparent obstruction. Ultrasonography particularly during an acute painful episode to demonstrate the hydronephrosis remains a reasonable first-line option for screening. Often the sonogram is normal when the pain resolves. Intravenous pyelography is performed less commonly now. A CT Urogram may be a helpful initial study; however, it is not the preferred diagnostic given the radiation exposure. If UPJ obstruction is suspected, a MAG3 lasix renal scan (nuclear medicine diuretic renography) should be ordered to assess differential renal function and the degree of obstruction.

Indications for intervention for UPJ obstruction include the presence of symptoms associated with the obstruction, impairment of overall renal function or progressive impairment of ipsilateral function, development of stones or infection, or rarely, causal hypertension. The primary goal of intervention is relief of symptoms and preservation or improvement of renal function. Open operative intervention for UPJ obstruction has historically provided a widely patent, dependently positioned, and well-funneled UPJ. In addition, the option to reduce the size of the renal pelvis is readily available with this approach. Although the procedure has stood the test of time with a published success rate of 95%, several less invasive alternatives to standard operative reconstruction are available. The advantages of endourologic approaches include a significantly reduced hospital stay and postoperative recovery. However, the success rate does not approach that of standard open or laparoscopic pyeloplasty; the success rate has often been less than 70%, and these procedures are declining in popularity.[7] With the refinement of robotic-assisted and laparoscopic techniques, the robotic-assisted laparoscopic pyeloplasty has now supplanted both endourologic and open repairs, enjoying the same high degree of success as open repairs.

II. Aeromedical Concerns.

Depending on the underlying condition, a number of symptoms may occur which could impair flying performance and mission completion. These include flank pain, renal stones, urinary urgency, urinary frequency, urinary obstruction, and dysuria all of which have the potential of sudden incapacitation. Also fever, malaise, and subtle declines in general health and cognition can occur with congenital urinary anomalies. Pyelonephritis may occur that can lead to cortical scarring and potentially compromise renal function. In addition, these conditions may require close subspecialty follow-up which is incompatible with worldwide flying duties.

III. Waiver Consideration.

Each of the congenital urinary anomalies noted above are disqualifying for all flying classes in the US Air Force. After careful evaluation, most of these conditions can be considered for a waiver and will depend on the status of the underlying disease. For ATC/GBC and MOD personnel, the following retention standards apply: congenital anomaly, resulting in frequent or recurring infections or when there is evidence of obstructive uropathy not responding to medical or surgical treatment; cystic kidney (polycystic kidney), when renal function is impaired, or is the focus of frequent infection; and hypoplasia of the kidney, associated with elevated blood pressure or frequent infections or reduction in renal function

Table 1: Waiver potential for Congenital Urinary Anomalies

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Yes* AETC	At the discretion of AETC
II/III	Yes* MAJCOM	At the discretion of MAJCOM
GBC/ATC	Yes* MAJCOM	No
MOD	Yes* AFGSC	No

*Waiver for initial certification needs to be considered very carefully. If the condition has a very low probability of leading to stone disease or decreasing renal function, then the candidate can be considered for a waiver.

AIMWTS search in Jan 2014 revealed a total of 88 cases submitted with a diagnosis of polycystic kidney, horseshoe kidney, atrophic or congenitally missing kidney, medullary sponge kidney, congenital obstruction of ureteropelvic junction, and other miscellaneous congenital kidney or ureteral obstructions. There were 6 FC I/IA cases, 47 FC II cases, 33 FC III cases, and 2 ATC/GBC cases. There were a total of 7 disqualifications. Most disqualifications were the result of advanced medical renal disease (chronic kidney failure) or active processes like pain or current stones.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for congenital urinary anomalies should include:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history. Discuss how condition discovered, all associated symptoms, treatments initiated, and any side effects.
C. Exam: GU exam and result of all imaging tests.
D. Laboratory: urinalysis, BUN, creatinine and all other tests that the particular condition requires. Need careful assessment of renal function and mention of presence or absence of stone disease.
E. Consult: Urology and/or nephrology report.

The AMS for waiver renewal for congenital urinary anomalies should include the following:
A. Interim history to include change in symptoms (particularly renal function), medication usage, and side effects.
B. Exam: GU exam and result of all imaging tests.
C. Current treatment doses and documentation of therapeutic benefit.
D. Report from treating physician.

ICD-9 codes for congenital urinary anomalies	
753.0	Absence of kidney
753.12/13	Polycystic Kidney
753.17	Medullary Sponge Kidney
753.19	Other specified cystic kidney disease
753.20	Unspecified obstruction of renal pelvis and ureter
753.21	Atrophic kidney
753.3	Horseshoe kidney

ICD-10 codes for congenital urinary anomalies	
Q60.0	Renal Agenesis, unilateral
Q61.2	Polycystic Kidney, adult type
Q61.5	Medullary Sponge Kidney
Q61.8	Other cystic kidney diseases
Q61.9	Cystic kidney disease, unspecified
Q62.39	Other obstructive defects of renal pelvis and ureter
Q60.5	Renal hypoplasia, unspecified
Q63.1	Lobulated, fused, and horseshoe kidney

V. References.

1. Pope JC. Renal Dysgenesis and Cystic Disease of the Kidney. Ch. 118 in *Wein: Campbell-Walsh Urology*, 10th ed., Saunders, 2011.

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3. Shapiro E, Bauer SB, and Chow JS. Anomalies of the Upper Urinary Tract. Ch.117 in *Wein: Campbell-Walsh Urology*, 10th ed., Saunders, 2011.

4. Rayman RB, Hastings JD, Kruyer WB, et al. *Clinical Aviation Medicine*, 4th ed. New York; Professional Publishing Group, Ltd. 2006, pp. 282-84.

5. Grantham JJ. Autosomal Dominant Polycystic Kidney Disease. N Eng J Med, 2008; 359: 1477-85.

6. Torres VE and Harris PC. Autosomal Dominant Polycystic Kidney Disease – the Last 3 Years. Kidney Inter, 2009; 76: 149-168.

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WAIVER GUIDE
Updated: May 2013
Supersedes Waiver Guide of: Nov 2009
By: Maj Daniel LaMar (RAM 13) and Dr Dan Van Syoc
Reviewed by Col John Gooch, Chief, Aerospace Ophthalmology Branch of the ACS.

CONDITION:
Conjunctivitis (May 13)

I. Overview.

Conjunctivitis, or inflammation of the conjunctiva, is a general term that refers to a diverse group of diseases and disorders that primarily affect the conjunctiva. It is not a diagnosis but rather a description of a clinical syndrome.[1] Conjunctivitis can be classified as infectious or non-infectious and/or as acute, chronic, or recurrent. Infectious conjunctivitis etiologies include both bacterial and viral pathogens. Non-infectious conjunctivitis is further classified into allergic, mechanical/irritative/toxic, immune-mediated, and neoplastic.[2] Correct diagnosis can usually be made by taking a careful history and performing a basic eye examination. Occasionally, cultures are indicated in chronic or recurrent cases. Key questions to ask include association with pain, history of any preceding trauma, seasonal or recurrent nature of the condition, changes in the eyelid, contacts lens use, and use of any eyedrops.[3] Dry eye syndrome can present with symptoms similar to conjunctivitis. If dry eye syndrome is diagnosed please refer to that waiver guide for specifics on diagnosis, treatment, and proper waiver submission criteria.

Viral conjunctivitis is one of the more common eye conditions seen in primary care settings. These patients present with hyperemia and edema of the conjunctiva, a watery discharge, and a pruritic eye. They may present with aggregates of submucosal lymphocytes on the conjunctiva which are seen clinically as round whitish follicular lesions. Visual disturbances and photophobia are rarely seen in this setting.[4] These patients classically present with preauricular lymphadenopathy and are typically contagious for up to two weeks. Family and friends need to be educated in appropriate hygiene, particularly meticulous hand-washing. Treatment, designed to relieve symptoms, is composed of artificial tears, cold compresses, and vasoconstrictor-antihistamine combinations for severe pruritus. Antibiotics should be avoided in cases of viral infection.[5]

Bacterial conjunctivitis is ubiquitous and more common in warmer months and regions. Classic symptoms are tearing, irritation, and a sticky discharge that can cause the eye to be matted shut upon awakening. While both viral and bacterial conjunctivitis commonly cause the eyes to be matted shut in the morning, symptoms that should make a physician think of bacterial conjunctivitis include ocular stinging or burning, a beefy-red conjunctiva, or a mucoid or mucopurulent discharge (rather than the clear discharge from viral conjunctivitis). The most common bacterial pathogens are *Staphylococcus aureus*, *Streptococcus pneumoniae*, and *Haemophilus influenzae*, although in adults, *S. aureus* is the most common etiologic agent.[6] It is commonly a self-limiting infection, but topical antibiotic treatment can speed resolution of symptoms and decrease the chance for recurrent infections. Antibiotic options include ophthalmic bacitracin/polymyxin B, trimethoprim, erythromycin, or tobramycin.[4] Another option is azithromycin 1% which shows adequate bacterial eradication and clinical resolution with a good safety profile.[7]

Allergic conjunctivitis is usually one component of a generalized immediate allergic-type response. Many affected patients also have nasal or sinus symptoms, and can also have asthma, urticaria, or eczema. In studies of allergic rhinitis, allergic conjunctivitis is reported in over 75% of patients, while asthma was reported in the range of 10% - 20%. This has led many allergy experts to state that the eye is probably the most common site for the development of allergic inflammatory disorders.[8] There are numerous subtypes of allergic conjunctivitis, with the most common ones being seasonal and perennial allergic conjunctivitis. Common outdoor allergens to which seasonal sensitivities can develop include trees, grasses, and ragweed, and common perennial allergens include pet hair and dander, molds, and dust mites.[9] Current estimates are that up to 40% of the general population suffers from some aspect of allergic conjunctivitis.[10]

The mast cell, as in other forms of allergic inflammation, plays a key role in allergic conjunctivitis. Histamine is also found in fairly high concentrations in the eyes of afflicted individuals, and is most likely the etiology of the intense pruritus these patients can experience. Typical symptoms are low-grade ocular and periocular itching, tearing, burning, stinging, photophobia, and watery discharge, while redness and itching seem to be the most common symptoms.[10] Another related disease process is vernal conjunctivitis. This is an IgE mediated Type I hypersensitivity reaction that results in a bilateral, seasonal, external ocular inflammatory disease. These patients have intense itching, tearing, photophobia, and mucous discharge, and usually demonstrate cobblestone papillae on their superior tarsal conjunctiva and limbal conjunctiva. It is normally a self-limiting process, but secondary keratopathy can develop. Corneal scarring leading to decreased vision is a potential complication in inadequately treated eyes. Pharmacotherapy options include mast cell stabilizers, immunosuppressive agents, corticosteroids, and antihistamines.[11]

Seasonal and perennial allergic conjunctivitis are the two diagnoses most likely to lead to a waiver request. The most commonly used medications are the ophthalmic antihistamines, mast cell inhibitors, the combination antihistamines/mast cell inhibitors, and topical NSAIDs.[9] Patanol® (olopatadine ophthalmic) has been approved for use in aviators with a MAJCOM waiver. It is a relatively selective H_1-receptor antagonist and mast cell inhibitor combination agent with over 15 years of use in the US. Aeromedical considerations associated with this product are that it is commonly misused to treat contact lens related over-wear and intolerance, including use with Giant Papillary Conjunctivitis, and its use is inappropriate in other causes of "red eye." It is critical that contact lens overuse and intolerance not be treated with Patanol. Patanol use requires a waiver, which will not be considered if the aircrew member is actively using contact lenses. In addition, the diagnosis of allergic conjunctivitis and the improvement of symptoms on Patanol must be confirmed by an ophthalmologist. Patanol use is only waiverable in FC II, FC III, RPA pilots, ATCs and GBCs, and is not allowable in FC I/IA applicants.

II. Aeromedical Concerns.

The aeromedical issues relate to the infectious potential, subjective annoyance (i.e. itching and tearing), discomfort, and visual decrements from the progressive nature of the various etiologies. For infectious etiologies, continued aviation duties can create a public health concern with crewmates. The dry air of most cockpits can exacerbate symptoms in some affected airmen, leading to additional decrements in visual performance that might not be apparent during a clinic evaluation. Nasal involvement can lead to ear or sinus block. Regarding treatment, there are numerous ophthalmic preparations that are effective against most types of conjunctivitis. Infectious conjunctivitis typically requires grounding until the infection has resolved and the aircrew member

is free of symptoms and sequelae. Resolved infectious conjunctivitis does not require waiver action unless complications resulted that caused corneal opacification, neovascularization or disrupted normal visual function (i.e. reduced visual acuity, chronic dry eyes or elevated intraocular pressure) or the natural course of the disease results in recurrence (e.g. herpes simplex).

The vast majority of non-infectious conjunctivitis cases in aircrew will be one of the allergic subtypes. Waiver requirements for allergic conjunctivitis are described below. Other non-infectious causes will not require waiver once the symptoms have resolved and visual function is normal.

III. Waiver Consideration.

Chronic and allergic conjunctivitis are disqualifying for all flying in the US Air Force. Conjunctivitis is not listed as disqualifying for ATC/GBC or MOD duties, nor is it listed as disqualifying for retention in the Air Force. Therefore, ATC/GBC and MOD personnel do not require a waiver for the history of conjunctivitis. Most cases of infectious conjunctivitis will only need to be placed in a DNIF status and then returned to aviation duties, rather than going through the waiver process.

Table 1: Waiver potential for allergic conjunctivitis

Flying Class (FC)	**Waiver Potential** **Waiver Authority**	**ACS Review/Evaluation**
I/IA#	Maybe AETC	On request
II*/III*	Yes MAJCOM	On request
ATC/GBC	N/A	N/A
MOD	N/A	N/A

* Use of any ophthalmic medications needs to be on the current Approved Medications List.
# Medications required to control symptoms is not waiverable.

AIMWTS review in Feb 2013 revealed a total of 97 cases submitted for waiver consideration with the diagnosis of conjunctivitis. There was 1 FC I case, 50 FC II cases, 39 FC III cases, 5 ATC/GBC cases, and 2 MOD cases. Only 4 of the total cases were disqualified; a FC II waiver was disqualified for diplopia, a FC III case was disqualified for excessive astigmatism, another FC III case was disqualified for painful dysphonia, and a third FC III case was disqualified for asthma. Waiver requests should not be submitted for aircrew on medications unless the medication is on the approved list (which is currently only Patanol). There were no waiver requests for infectious conjunctivitis, and there were no FC I waivers requested for candidates requiring medications for conjunctivitis.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for an initial waiver for conjunctivitis should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History – history of all conjunctivitis/red eye symptoms such as itching, discharge, irritation, pain, photophobia, and blurred vision; any underlying causative factors, duration of symptoms, exacerbating factors, history of contact lens wear, all treatments attempted and effectiveness of the therapy (medical and surgical), and any impact on job/daily life.
C. Physical – full eye exam to include visual acuity measurement, an external examination, slit-lamp examination, presence or absence of regional adenopathy, and fundoscopic examination. In addition, results of any special tests such as cultures or allergy testing need to be included.
D. Consultation report from an eye care specialist. If the member is using topical medications for allergic conjunctivitis there needs to be a report from an ophthalmologist confirming the diagnosis and resolution of symptoms.

Waiver renewal, if necessary, requires an interval AMS with particular attention to clinical changes, aeromedical impact, and proper use of medications. If on topical medications for allergic conjunctivitis, it requires a report from an eye care specialist.

ICD-9 codes for conjunctivitis	
372.0	Acute conjunctivitis
372.1	Chronic conjunctivitis
372.14	Other chronic conjunctivitis
372.30	Conjunctivitis, unspecified

ICD-10 codes for conjunctivitis	
H10.0 0, 1, 2, 3	Acute conjunctivitis, unspecified, right, left, bilateral
H10.40 0, 1, 2, 3	Chronic conjunctivitis, unspecified, right, left, bilateral
H10.42 0, 1, 2, 3	Simple chronic conjunctivitis, right eye, left, bilateral, unspecified eye
H10.409	Unspecified chronic conjunctivitis, unspecified eye

V. References.

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WAIVER GUIDE
Updated: Dec 2015
Supersedes Waiver Guide of Mar 2011
By: Dr Dan Van Syoc
Reviewed by: LtCol Eddie Davenport, Chief ACS Cardiologist

CONDITION:
Coronary Artery Calcium Testing (Dec 15)

I. Overview.

Coronary artery calcium (CAC) testing has recently emerged as a powerful non-invasive assessment of the future risk of coronary heart disease and related events.[1] Some recent studies have indicated that it is a great tool to predict coronary stenosis of greater than 50 percent.[2] The test is commonly misused and results misinterpreted, however, leading to confusion in the clinical and aeromedical arenas.

The pathophysiology of coronary artery calcium is deceptively simple. When cholesterol deposits in the arterial wall, the typical physiological response is an outward thickening of the wall such that the cross-sectional area of the lumen is preserved (positive remodeling).[3] Some of these arterial atheromas undergo a process of calcification. These calcium deposits, if significant enough, can be seen with x-ray-based imaging such as routine chest x-rays, fluoroscopy, and computed tomography (CT scans). In the absence of arterial plaque, however, there is no opportunity for calcification in the arterial wall. *Thus, the presence of any amount of coronary artery calcium confirms the presence of atherosclerotic coronary heart disease.*[4] As such, CAC-testing is simply a non-invasive assessment of the presence of coronary heart disease. It is important to note that while the presence of CAC confirms the diagnosis of coronary heart disease, the converse is not true: it is possible to have coronary atheromas that have not calcified and thus are not detected by this type of testing.

CT-based tests for CAC have emerged as a powerful predictor of future coronary heart events.[5] Although there are many different CT-based types of CAC tests (electron beam CT [EBCT], multi-slice CT [MSCT], multi-detector CT [MDCT], multi-row CT [MRCT]), all produce a unit-less number which correlates to the amount of coronary artery calcium detected. Scoring of the amount of coronary calcium detected has been standardized and is highly reproducible amongst the different CT types and in serial studies. Thus, the higher the number, the greater the amount of calcification detected, and the greater the overall burden of coronary disease.[6] The reported CAC score is a total CAC burden, the sum of the scores of all individual calcium deposits. Recent data has emerged illustrating that even minor amounts of detectable coronary artery calcium result in significant coronary event rates, while more substantial CAC results in higher event rates.[7, 8] This predictive value of CAC testing is particularly useful for younger, asymptomatic populations with low to moderate Framingham risk profiles.[5] In particular, recent studies have noted that in a healthy cohort of roughly 2,000 active-duty army personnel, the presence of any amount of detectable coronary artery calcium increased coronary heart events by nearly 12-fold.[7] All the events in this cohort occurred in personnel between ages 40 and 50 years old with a Framingham risk score less than 10%, and with CAC scores as low as 10. Of interest, the appears to be no correlation between coronary calcium and the physiologic or anatomic significance of a stenosis.[9] Note that because this is a direct anatomic assessment, the typical false-positive and false-negative concerns associated with traditional cardiac testing do not apply. Rather, CT-based CAC testing is best

viewed as a direct radiologic assessment of abnormal structures. The most recent American College of Cardiology and American Heart Association assessment of cardiovascular risk states that the CAC score is strong predictor of actual coronary artery disease.[10]

The Aeromedical Consultation Service (ACS) has been using the assessment of coronary artery calcium in its non-invasive assessment of aviators since 1982 (cardiac fluoroscopy). In-house data derived from a cohort of almost 1500 aviators with complete invasive and non-invasive assessments revealed that the presence of coronary artery calcium was the test most predictive of future cardiac events. Thus, current aeromedical policy ties the decision of whether to proceed to cardiac catheterization heavily to the presence of detectable CAC. The published data of comparable clinical cohorts with CT-based CAC testing reveal event rates of roughly 1% per year for individuals with a CAC score of 10 to 99, 2% per year for scores of 100-399, and above 3% per year when the CAC score is 400 or greater.[11] These event rates mirror the event rates in the ACS database for aviators with angiographically proven minimal coronary artery disease (CAD), moderate CAD, and severe CAD, respectively.[12]

II. Aeromedical Concerns.

Because CAC testing is an anatomic assessment of the presence of CAD, and because the event rates for individuals with abnormal CAC tests mirror those of aviators with angiographically proven CAD, the aeromedical concerns surrounding abnormal CAC tests are the same as those for individuals with angiographically proven asymptomatic CAD. The major aeromedical concerns are myocardial ischemia presenting as sudden cardiac death, acute myocardial infarction, stable or unstable angina, or ischemic dysrhythmias, any of which could cause sudden incapacitation or significantly impair flying performance or mission completion. Additional concerns surround the need for invasive cardiac procedures and revascularization, frequent contact with cardiac specialists, and comprehensive medication regimens. At present, there is no reliable method of detecting asymptomatic progression of CAD short of frequent noninvasive monitoring, combined with periodic invasive testing.

III. Waiver Consideration.

Any degree of coronary artery disease is disqualifying for all flying classes, to include ATC/GBC and MOD personnel. *CAC tests with a score of **10 or greater** are considered abnormal and require waiver submission*. For the purpose of aeromedical disposition, scores of 0-9 are considered normal and therefore qualifying for all classes of flying duties. While a positive CAC test is a non-invasive assessment of the presence of CAD, we do not recommend local aeromedical cardiac catheterization for asymptomatic individuals. Aviators who received a CAC test as part of a local evaluation for symptoms suggestive of CAD should complete their evaluation as directed by the local cardiologist.

Table 1. Summary of CAC Test Scores and ACS Requirements

CAC Score	Flying Class	Waiver Potential Waiver Authority	Required ACS Review and/or ACS Evaluation
0-9	FC I/IA, II and III	No waiver necessary†	No
10-99	FC I/IA II, RPA Pilot and III	No AETC Yes MAJCOM	No Yes - evaluation initially and every 1-2 years thereafter*#
100-399	FC I/IA II, RPA Pilot and III+	No AETC Yes MAJCOM	No Yes - evaluation initially and annually*#
400+	FC I/IA II, RPA Pilot and III+	No AETC Yes MAJCOM	No Yes - evaluation initially with mandatory cardiac catheterization; re-evaluation dictated as per results#

† Reminder: All cardiology tests (e.g., Holter, CAC testing, echocardiogram, ECG, treadmill, cardiac catheterization) on FC I/IA, FC II and RPA Pilot personnel must be sent to the ECG library. Call the ACS for the correct mailing address for the ECG Library.
* Need for cardiac catheterization will be based on CADE (coronary artery disease equation) score at the ACS evaluation.
# If cardiac catheterization accomplished then follow Coronary Artery Disease waiver guide.
+ Waiver for untrained FC II and III unlikely.

AIMWTS search in Dec 2015 revealed 9 cases with a code indicating that coronary artery calcium testing led to a diagnosis. Breakdown revealed 1 FC IA cases, 7 FC II cases (3 disqualified) and 1 FC III case. One of the three disqualified cases was due to TIAs and the other two were for multiple medical issues. It is estimated that there are many more cases in which coronary artery calcium testing was accomplished, but it was not captured in the diagnosis section of AIMWTS.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver should contain the following information:
A. Complete history and physical examination – to include detailed description of any symptoms, exercise history, and CAD risk factors (positive and negative). *Also include the reason the CAC test was obtained.*
B. Report of the CAC score. (Notes 1 and 2)
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. echocardiography, treadmill, nuclear stress imaging). (Notes 1 and 2)
D. Additional local cardiac testing is not routinely required but may be requested in individual cases.

The aeromedical summary for waiver renewal for abnormal coronary artery calcium should include the following:
A. History – brief summary of previous CT results and findings at ACS. Address interim cardiac symptoms (including negatives), exercise/activity level, and coronary artery risk factors and any medications.
B. Local follow-up cardiac testing is not routinely required prior to ACS re-evaluation. If requested for individual cases, it will have been specified in the report of the previous ACS evaluation.
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manager for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

ICD-9 code for coronary artery calcium testing	
V81.2	Special screening for other and unspecified cardiovascular conditions

ICD-10 code for coronary artery calcium testing	
Z13.6	Encounter for screening for cardiovascular disorders

V. References.

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WAIVER GUIDE
Updated: Dec 2015
Supersedes Waiver Guide of Mar 2012
By: LtCol Hui Ling Li (RAM 16) and Dr Dan Van Syoc
Reviewed by: LtCol Eddie Davenport, Chief ACS Cardiologist

CONDITION:
Coronary Artery Disease (Dec 15)

I. Overview.

This waiver guide addresses only asymptomatic coronary artery disease that has not been treated by revascularization (e.g. stent, bypass surgery). Refer to the Coronary Artery Revascularization waiver guide for revascularization cases.

Coronary artery disease (CAD) is the result of coronary artery plaque development, reducing oxygen supply to the myocardium.[1] It is the leading cause of death and premature, permanent disability of American males and females.[2, 3] It accounts for approximately 16% of all deaths each year.[4] In spite of tremendous progress regarding CAD therapy, about 50% of initial and recurrent acute events continue to be fatal. Risk factors included older age, male sex, hypertension, hyperlipidemia, diabetes, obesity, smoking, and sedentary lifestyle.[5, 6] Initial symptoms may include incapacitating angina, dyspnea, arrhythmia with altered consciousness or sudden death. Heat stress, hypoxia, high +Gz maneuvers and other features of the unique military cockpit/aircraft environment may provoke ischemia in individuals with pre-existing coronary artery lesions. CAD is the leading cause of disqualification for aviators.[7]

Coronary angiography is the golden standard for determining the presence and extend of CAD.[6] Clinically, significant CAD is defined as one or more lesions with ≥50% stenosis (diameter reduction) by coronary angiography.[7] In the clinical literature, such disease is nearly always symptomatic, since it would rarely be identified otherwise. When treated medically, patients with this degree of disease are reported to show >5% per year annual cardiac event rates in favorable prognostic subgroups. Although the term significant coronary artery disease (SCAD) has historically also been applied to aviators discovered to have a maximal stenosis ≥50%, event rates encountered in the clinical population may not accurately predict prognosis in the younger and relatively healthier aviator population with *asymptomatic* CAD.

To evaluate the actual risk associated with asymptomatic CAD, the Aeromedical Consultation Service (ACS) analyzed initial and long-term follow-up data from approximately 1,500 asymptomatic military aviators with coronary angiography. For aviators with SCAD as defined above, average annual cardiac event rates exceeded 2.5% per year at 2, 5 and 10 years of follow-up. To further stratify risk, the SCAD group was divided into two subsets of SCAD severity, SCAD50-70 (worst lesion 50-70%) and SCAD>70 (worst lesion >70%). Detailed examination of the SCAD50-70 subset revealed that extent of disease (aggregate of lesions) at the time of index coronary angiography could further be stratified into a low-risk versus high-risk subjects. This new stratification used an aggregate of lesions defined as the arithmetic sum of all graded lesions, e.g. 60% lesion + 20% lesion + 30% lesion = aggregate of 110%. Aggregate <120% identified a lower-risk SCAD50-70 subgroup with an average annual event rate <1% per year at ten years of follow-up. Subsequent analysis of the group with minimal coronary disease (MCAD, defined at that time

as maximal stenosis <50%) also showed that aggregate was significantly predictive of events albeit low.

Because aggregate successfully stratified cardiac risk, all groups with any CAD (combined SCAD and MCAD) with a maximal lesion ≤70%, was submitted to a similar analysis. In this combined group, aggregate was highly predictive of event-free survival ($p<0.00004$). Specifically, aviators with an aggregate <50% showed an average annual event rate of 0.6% per year, while those with an aggregate ≥50% but <120% had an average annual event rate of 1.1% per year. (Although a rate of 1.1% slightly exceeds the 1%/year threshold, the data reviewed predated the routine use of lipid-lowering therapy for secondary prevention, which would be expected to reduce events by an additional 30-40%).

By way of comparison, clinical literature reports annual cardiac event rates of about 0.5% per year in general population studies of apparently healthy asymptomatic males aged 35-54 years. Similarly, follow-up studies of male subjects with normal coronary angiography, who in most cases presented with a chest pain syndrome, report annual cardiac event rates of 0.2-0.7% per year. Annual cardiac event rates in apparently healthy USAF aviators have been reported by the ACS as ≤0.15% per year for males aged 35-54 years although more recent data approaches the expected 0.5% per year rate.

From this database analysis, the current aeromedical classification of asymptomatic CAD is based on aggregate, with minimal CAD (MinCAD) defined as an aggregate <50%, and moderate CAD (ModCAD) defined as an aggregate ≥50% but <120%. Significant CAD is now defined as an aggregate ≥120%. A demonstrated maximum lesion >70% is also considered SCAD.

Graded lesions in the left main coronary artery are treated more cautiously due to the unfavorable prognosis associated with left main disease. Left main coronary artery lesions <50% stenosis are defined as ModCAD, assuming that other criteria for that classification are met. Left main lesions ≥50% stenosis are considered SCAD.

An additional category of CAD was more recently identified from the ACS database – luminal irregularities (LI) only. LI only describes coronary angiography with irregular arterial edges due to atherosclerotic plaque but less than gradable 10-20% stenosis (diameter reduction). LI only represents a subset of CAD with event rates higher than those with truly normal coronary angiography (smooth arterial edges). A review of the ACS database showed that aviators with LI only on coronary angiography had no events in the first five years after diagnosis. However, between 5 and 10 years follow-up, cardiac event rates were 0.54% per year compared to 0.1% per year for those with truly normal coronary angiography. This represents a risk similar to MinCAD in the first five years of follow-up.

II. Aeromedical Concerns.

The aeromedical concern is myocardial ischemia presenting as sudden cardiac death, acute myocardial infarction, stable or unstable angina or ischemic dysrhythmias, any of which could cause sudden incapacitation or significantly impair flying performance. At present, there is no reliable method of detecting asymptomatic progression of CAD short of frequent noninvasive monitoring, combined with periodic invasive testing.[8]

Because cardiac catheterization of asymptomatic aviators with abnormal noninvasive testing is only recommended if the risk of CAD exceeds a predetermined threshold, local catheterization of asymptomatic aircrew for aeromedical indications alone is strongly discouraged. Where catheterization is indicated for clinical reasons, then of course the aviator should be managed as any other clinical patient would be.

III. Waiver considerations.

CAD is disqualifying for all classes of flying duties to include RPA Pilot, ATC/GBC personnel and MOD personnel. CAD is disqualifying for retention if associated with myocardial infarction, major rhythm disturbances, congestive heart failure, angina, silent ischemia or for maintenance on any medication for prevention of angina, CHF or rhythm disturbance. Waiver is not recommended for FC I/IA or for unrestricted FC II/III duties. Depending on the severity and extent of disease as discussed above, waiver may be considered for categorical FC II/III duties (restricted to low performance aircraft defined as <2.5 sustained +Gz). Waiver may be considered for Initial FC II for RPA Pilot training and Flight Surgeons, but will be similarly restricted. The only exception is that LI only may be considered for unrestricted FC II/III duties. Additionally, modifiable risk factors **must** be acceptable, including but not limited to no use of tobacco products, no diabetes, controlled hypertension (per ACC/AHA guidelines), acceptable lipid profile (treated or untreated per ACC/AHA guidelines), and compliance with medications. These risk factors **must** be acceptable to both gain **and** maintain the waiver.

Table 1: Summary of CAD Categories and ACS Requirements

CAD Category Classification	Flying Class	Waiver Potential Waiver Authority	Required ACS Review and/or ACS Evaluation
Luminal irregularities (LI) only (no graded % stenoses) $*	FC II/III/RPA Pilot ATC/GBC MOD**	Yes MAJCOM	ACS evaluation initially and four years later, then every two years***
MinCAD$# Aggregate <50% No left main disease	FC IIA rated aviators RPA Pilot ATC/GBC MOD** Restricted FC III	Yes AFMSA Yes MAJCOM	ACS evaluation initially and annually*** ACS evaluation initially and annually
ModCAD$+@ Aggregate ≥50% and <120%, and/or any gradable left main disease	FC IIC pilots FC IIA navigators & flight surgeons Restricted FC III RPA Pilot ATC/GBC MOD**	Yes AFMSA Yes MAJCOM	ACS evaluation initially and annually*** ACS evaluation initially and annually
SCAD$∫ Aggregate ≥120% or max lesion >70% or left main ≥50%	All Flying Classes	No AFMSA	N/A
Any CAD	FC I and FC IA Initial FC II/III, ATC/GBC and MOD**	No AETC	N/A

* Luminal irregularity only is eligible for unrestricted FC II/III waiver.
** Waiver authority for MOD personnel is AFGSC.
*** ACS evaluation not indicated for ATC/GBC and MOD personnel unless specifically requested by waiver authority.
# MinCAD is eligible for FC IIA waiver.
+ ModCAD is eligible for FC IIC waiver for pilots, limited to low performance aircraft with another qualified pilot. For navigators and flight surgeons, waiver is FC IIA.
@ MinCAD and ModCAD are eligible for restricted FC III waiver, limited to low performance aircraft.
∫ SCAD (aggregate ≥120%) is disqualifying without waiver recommended. SCAD with a maximum lesion >70% (SCAD>70) and CAD with a left main coronary lesion ≥50% are also disqualifying without waiver recommended.
$ No indefinite waivers

Individuals with a waiver for LI only will be reevaluated at the ACS four years after diagnosis, then every two years thereafter. Individuals with a waiver for MinCAD and ModCAD will be reevaluated at the ACS annually. Successful modification of cardiac risk factors must be demonstrated for LI only, MinCAD and ModCAD. Additional criteria for waiver of LI only and MinCAD include, but may not be limited to: no history suggestive of ischemic symptoms, no prior cardiac events (e.g. unstable angina, myocardial infarction) and normal left ventricular function. Repeat coronary angiography will not be required for LI only or for MinCAD in the absence of any suggestion of CAD progression or symptoms suggestive of ischemia. Additional criteria for waiver of ModCAD include, but may not be limited to: only one lesion of 50-70% stenosis, normal nuclear stress imaging study in the distribution of the 50-70% lesion, no history suggestive of ischemic symptoms, no prior cardiac events (e.g. unstable angina, myocardial infarction) and normal left ventricular function. Follow-up coronary angiography will be performed for ModCAD every five years routinely, or sooner depending on degree of risk factor improvement, complexity of disease, or for symptoms suggestive of ischemia or deterioration in noninvasive testing.

AIMWTS review in Dec 2015 revealed a total of 246 cases with known coronary artery disease. This total includes those with MI and revascularization as well. Breakdown of cases was as follows: 160 FC II cases (56 disqualifications), 75 FC III cases (29 disqualifications), 6 ATC/GBC cases (2 disqualifications), and 5 MOD cases (2 disqualifications). Of the total of 89 disqualified cases, the vast majority were disqualified primarily for cardiac disease.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for <u>initial waiver</u> for coronary artery disease should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, blood pressure, medications, and activity level.
B. Cardiology consult.
C. Electrocardiogram (ECG).
D. Report and CD copy of coronary angiography to the ACS. (Notes 1 and 2)
E. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)
F. Results of MEB or worldwide duty evaluation (for ARC members), if required (e.g. on medications or MI, etc.).

The AMS for waiver <u>renewal</u> should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, medications, and activity level.
B. Electrocardiogram (ECG).
C. Additional local cardiac testing is not routinely required for re-evaluation cases followed at the ACS but may be requested in individual cases. If so, the previous ACS evaluation/review will specify details regarding any requested local testing.

D. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manager for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD-9 Codes for Coronary Artery Disease	
414	Other forms of chronic ischemic heart disease
414.0	Coronary atherosclerosis
414.8	Other specified forms of chronic ischemic heart disease
414.9	Chronic ischemic heart disease, unspecified

ICD-10 Codes for Coronary Artery Disease	
I25.89	Other forms of chronic ischemic heart disease
I25.10S	Atherosclerotic heart disease of native coronary artery without angina pectoris
I25.9	Chronic ischemic heart disease, unspecified

V. References.

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Additional References:

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WAIVER GUIDE
Updated Jun 2016
Supersedes Waiver Guide of Aug 2012
By: *LtCol (Dr.) Paul DeFlorio, LtCol (Dr.) LtCol Eddie Davenport (ACS Chief Cardiologist) and Dr. Dan Van Syoc*

CONDITION:
Coronary Artery Revascularization (Jun 16)

I. Overview.

Coronary artery revascularization addresses occlusive coronary artery disease (CAD) via either coronary artery bypass graft (CABG) surgery or percutaneous coronary intervention (PCI), which most commonly includes the catheter-based techniques of angioplasty and stent placement. Because these techniques are palliative, not curative, any new cardiac events 6-12 months after successful revascularization are primarily caused by progression of disease.[1]

Two large trials with long term follow up were designed to compare outcomes of PCI versus CABG.[2-3] With a median follow up of 4.6 years, the BEST trial measured a primary end point of death, myocardial infarction (MI), and target-vessel revascularization. The PCI group rate was 15.3%, and the CABG rate was 10.6% at 4.6 years.[3] The SYNTAX trial reported five year event data, with a composite end point of death, MI, stroke, and repeat revascularization. Their PCI group suffered events at a rate of 37.3%, with the CABG group reported as 26.9%.[2] For both trials revascularization drove the primary endpoint and neither death nor MI were independently significantly different with MI and mortality rates of approximately less than 2% per year. Kaplan-Meier curves in both trials also showed an early spike in complication rates, with a more linear curve after 6-12 months, which reinforces historical waiver guide recommendations that patients only be assessed after a minimum of six months post-procedure. Although both trials favor CABG over PCI, it is important to note this was driven by target vessel revascularization and reinforces policy that either CABG or PCI can be done in aviators. Data with newer-generation drug-eluting stents is ongoing.

The applicability of these and similar trials to the military aviator is very limited, as they universally study older patients with high rates of comorbidities. In addition, they also record post-intervention complications that fall within the first 6-12 months, which would not be applicable to military aviators. In an attempt to address these shortcomings, one older study re-examined the large post-CABG database and extracted a "simulated aviator population" of males under 60 with no history of cardiovascular comorbidities and no major complications within 12 months. Of these, the two youngest cohorts (ages 20-39 and 40-49) best resemble the military aviator population. Their five year cardiac event-free rate was found to be 94 +/-3% and 91 +/-2% respectively.[4]

A retrospective review of ACS data studied 122 former military aviators with no prior cardiac events who underwent coronary artery revascularization.[5] About half the group had CABG and the other half had PCI, primarily angioplasty. There were no cardiac deaths within five years and only two myocardial infarctions, both beyond two years follow-up. After excluding repeat revascularization within six months of the index revascularization, cardiac event rates at one, two, and five years were 1.0%, 2.7% and 3.6% per year respectively. Individuals meeting the below

waiver criteria have estimated cardiac event rates of 2-3% per year for up to five years after revascularization.

Recently a selected group of 30 aviators that presented to ACS (2000-2008) while on active duty, after having had coronary revascularization, were chosen for a retrospective study to determine the time to event and resulting annual event rate. Out of these, only two progressed requiring revascularization.[6] There were no deaths and no MIs. The annual event rate was 2.1% (CI 1.2% - 3.0%). The event free survival was 97% at two years and 88% at 5 years. Both of these patients needing repeat intervention would likely have been identified during the annual ACS reevaluation as required by policy. Neither would have manifested as an incapacitating event.

II. Aeromedical Concerns.

The aeromedical concern is myocardial ischemia presenting as sudden cardiac death, myocardial infarction, angina or ventricular dysrhythmias, all of which may cause sudden incapacitation or seriously impact performance of flight duties. Detecting the asymptomatic progression of CAD reliably without frequent invasive testing or noninvasive monitoring is the aeromedical challenge.

III. Waiver Considerations.

Coronary artery disease and coronary artery revascularization are disqualifying for all classes of flying duty and retention. The events triggering revascularization are critical, as there is greatly increased morbidity and mortality in the setting of MI. If there is evidence of myocardial infarction (ECG changes, or cardiac enzymes elevation) then they must meet criteria for the myocardial infarction waiver policy. In general, revascularization should not be done for asymptomatic coronary artery disease. ACS review and evaluation is required for waiver consideration. Waiver restricted to low performance aircraft may be considered for all flying classes. Coronary artery revascularization is also disqualifying for ATC/GBC/MOD duty as well as for retention purposes, and MEB and waiver is required before return to duty.

Waiver for pilots, limited to FC IIC (low performance aircraft with another qualified pilot) was approved by the Aerospace Medicine Corporate Board in 2008. Criteria for waiver consideration for all aviators include (must meet all of the below):
A. Normal left ventricular wall motion and systolic function,
B. Complete revascularization; all lesions with $\geq$50% stenosis successfully treated,
C. The sum of all remaining stenosis should be less than 120%,
D. No reversible ischemia on noninvasive testing (off cardioactive medicines),
E. For PCI, no restenosis over 50%,
F. Successful risk factor modification,
G. A minimum DNIF observation period of six months post procedure.

ACS evaluation for initial waiver consideration will include complete noninvasive testing and follow-up coronary angiography. If waiver is recommended and granted, waiver will be valid for one year with annual ACS re-evaluation required for waiver renewal consideration. In addition, routine serial coronary angiography *is required at five year intervals*. Follow-up coronary angiography may be recommended sooner if indicated by symptoms, noninvasive test results, or failure to control risk factors.

Table 1: Coronary Artery Revascularization and Waiver Potential

Flying Class	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Not Waiverable	NA
II (unrestricted)	Not Waiverable	NA
IIA (flight surgeon) IIC (pilot) RPA Pilot (trained)	Yes* AFMSA	Yes, Annual
III	Yes* MAJCOM**	Yes, Annual
ATC/GBC	Yes* MAJCOM**	Review possible***
MOD	Yes* AFGSC**	Review possible***

* Must meet following criteria for consideration: 100% revascularization, <50% single lesion, <120% aggregate, normal LVEF, no wall motion abnormality. Adequate medical management may include statin, aspirin, nitroglycerin, and/or ACE inhibitor, as clinically appropriate. Additionally, patient must have controlled hypertension, no diabetes, no other significant co-morbidities, and controlled risk factors. Low performance aircraft defined as <2.5 sustained G, with another qualified pilot. No altitude restriction in low performance aircraft.
** AFMSA is the waiver authority for all initial waivers.
*** Annual testing may be done locally and sent to ACS for review at the request of the MAJCOM, alternatively all testing and follow-up can be done during annual ACS evaluations.

AIMWTS review through Jun 2016 revealed 143 submitted cases with a history of revascularization. There were 0 FC I/IA cases; 89 FC II cases (39 disqualified), 48 FC III cases (18 disqualified); 4 ATC/GBC cases (disqualified); and 2 MOD cases (1 disqualified).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for coronary artery revascularization should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of CAD and procedures.
C. Consultation notes from a cardiologist.
D. Imaging: Copy of the cardiac catheterization report and copy of the images (CD, cineangiogram or videotape); copy of the revascularization procedure report (CABG or PCI) and for PCI copy of the images (CD, cineangiogram or videotape); copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram, treadmill, nuclear myocardial stress perfusion imaging).
E. Additional local cardiac testing is not routinely required, but may be requested in individual cases. Copies of reports of any such testing will be required.
F. Results of MEB returning member to worldwide duty.

The AMS for waiver renewal for coronary artery revascularization should include the following:
A. Interval history since last waiver.
B. All applicable and imaging tests and reports that have been completed since last waiver/renewal. If annual ACS evaluation is required, no local testing is required unless clinically indicated as follow-up testing will be done at annual ACS evaluation.
C. Consultation (any follow-up exams) from local cardiologist.

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manager for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD-9 Codes for coronary artery disease	
414.00	Coronary artery disease
36.10	Coronary artery bypass graft (CABG)
36.06	Coronary artery stent placement
36.09	Coronary artery angioplasty

ICD-10 Codes for coronary artery disease	
I25.10	Coronary artery disease without angina
Z95.1	Coronary artery bypass graft (CABG)
Z98.61	Coronary artery angioplasty with or without stent placement

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WAIVER GUIDE
Updated: Oct 2013
Supersedes Waiver Guide of Jun 2010
By: Dr Dan Van Syoc
Reviewed by Col Pat Storms (RAM 05) and gastroenterologist

CONDITION:
Crohn's Disease (Oct 13)

I. Overview.

Crohn's disease is a chronic, relapsing inflammatory condition of unknown etiology that can affect any portion of the gastrointestinal (GI) tract from mouth to perianal region. It is manifested by a broad spectrum of clinical symptoms and pathological patterns due to its transmural involvement, variability of organ distribution, and extent of disease.[1] Crohn's disease and ulcerative colitis (UC) result from an aggregate effect of genetic and environmental factors leading ultimately to a state of perpetual and inappropriate activation of mucosal T cells driven by the presence of normal enteric flora. The incidence of Crohn's disease is approximately 5/100,000 and the prevalence is 50/100,000. There is a 1.2:1 female-to-male ratio in the US population. The age distribution of Crohn's disease is bimodal with a peak between the ages of 15-40 and then 50-80 years of age. Ten to twenty-five-percent of patients who are affected also have an affected primary relative with inflammatory bowel disease.[2]

Crohn's disease is manifested by focal, asymmetric, transmural, and occasionally granulomatous inflammation of the GI tract. The pathophysiology of this disease begins with crypt inflammation and abscesses progressing to small focal aphthoid ulcers. These ulcers may progress deep into the tissue and spread longitudinally and transversely with intervening mucosal edema. This process can create the characteristic appearance of patchy ulceration with relatively normal intervening mucosa, seen on endoscopy of the bowel. As the inflammation continues, thickening of the bowel wall and mesentery occurs which can result in fibrosis, stricture formation, and ultimately lead to bowel obstruction. Abscesses and fistulae are commonly encountered.[3] Fistulae may be colocutaneous, coloenteric or colovesical, and may be a considerable source of morbidity for patients.

Clinically, Crohn's disease is characterized by intermittent exacerbations of disease with periods of remission. Typical symptoms include diarrhea (most common presenting symptom), colicky abdominal pain, weight loss, and a low-grade fever. However, these symptoms are highly variable and depend on the pattern and severity of disease. Though any segment of the luminal gut may be involved, major anatomical areas of involvement are: 80% with small bowel involvement, 33% exclusively with ileitis, 50% with ileocolitis, and 20% with only colonic involvement.[4] Crohn's may be manifest as aggressive fistulizing disease, or as a predominantly scarring disease characterized fibrostenotic strictures. It is important to note that these divisions are not mutually exclusive and that one can develop both fistulae and strictures. Complications include intestinal obstruction, hemorrhage, acute perforation, development of fistulae and abscesses, and toxic megacolon.[5]

Extraintestinal symptoms can include reactive arthropathies, ankylosing spondylitis, eye involvement with uveitis and episcleritis, erythema nodosum, pyoderma gangrenosum, thromboembolism, and primary sclerosing cholangitis. Malabsorption can lead to anemia,

cholelithiasis, nephrolithiasis, vitamin deficiencies, and osteoporosis.[6] Patients with long-term active Crohn's disease may have an increased (but still rare) risk of small bowel adenocarcinomas, and in the case of longstanding Crohn's colitis, a slightly increased risk of colon cancer.[5]

The differential diagnosis of Crohn's disease is broad. If the disease involves the colon, it may be differentiated from ulcerative colitis based on the involvement of the small bowel, sparing of the rectum, absence of gross bleeding, and the presence of bothersome perianal disease. Also, the focality of gross and microscopic lesions, the presence of granulomas, or the occurrence of fistulae must be considered. Several diseases can present with a clinical picture similar to Crohn's: appendicitis, diverticulitis, ischemic colitis, intestinal tuberculosis, and lymphoma. If the patient presents acutely with a new onset of bloody diarrhea then an infectious etiology must be considered such as Shigella, Salmonella, E. coli 0157:H, and Yesinia, among others.[5, 7]

Diagnosis is currently based upon the clinical presentation combined with endoscopic findings. Colonoscopy is the procedure of choice for evaluation of the presence and extent of ileocolonic involvement. Intestinal biopsy is confirmatory rather than diagnostic, and is usually nonspecific. Approximately 10-15% of patients with colonic involvement alone will be diagnosed with indeterminate colitis when Crohn's disease cannot be distinguished from UC. Importantly, some patients may be initially diagnosed as having UC with subsequent consideration leading to a change in diagnosis to Crohn's.[3] C-reactive protein can be helpful in determining the degree of inflammation present, and may be a more accurate indicator of intestinal inflammation than the Erythrocyte Sedimentation Rate. The use of serologic testing in Crohn's, such as pANCA, ASCA, and a variety of other IBD-associated antibodies, is still evolving.[8] Such testing is not routinely used in the assessment or treatment of Crohn's patients.

The natural history of Crohn's reflects intermittent exacerbations followed by periods of remission. Approximately 10 to 20% of patients experience a prolonged remission after initial presentation.[9] Without therapy, 30% relapse within 1 year and 50% in two years.[7, 10] Common patient concerns are lack of energy, loss of control, body image, fear and isolation, feeling unclean, and an inability to meet their full potential.[5]

Treatment is aimed at obtaining a clinical remission and restoring well-being. The approach to treatment is often based on the severity of the disease, anatomic location, severity, and complications. Medical management is generally used to treat acute and recurrent disease, while surgical therapy is reserved for intestinal obstruction, unresponsive and symptomatic fistulae, perforation, and medically intractable disease.[6, 11] Post-operative disease recurrence is high with a 10-15% per year clinical recurrence rate.

Medical treatment protocols for patients with Crohn's disease can be roughly grouped into "Step-Up" or "Top-Down" strategies. The traditional approach to medical therapy, described as "Step-Up", begins with the use of a 5-aminosalicylic acid preparation (5-ASA) such as mesalamine, in patients with mild disease, moving on to topical or systemic corticosteroids in 5-ASA-refractory patients or those presenting with moderate-severe disease, and culminating in the use of immunosuppressives such as azathioprine or 6-Mercaptopurine when response to steroids is poor or when patients recur rapidly upon reduction in steroid doses. Anti-tumor necrosis factor (TNF) agents such as infliximab or adalimumab are then used in patients with a suboptimal response to immunosuppressives with/without concomitant steroids/5-ASA. "Top-Down" therapy begins with the use of an anti-TNF agent with/without a concomitant immunosuppressive. The rationale for

"Top-Down" therapy is grounded in the natural history of Crohn's disease. Patients progress in a stepwise fashion from inflammatory lesions to irreversible structural disease (strictures/fistulae). Strong interventions before irreversible structural disease is present could yield a better long-term outcome.[12] At present, currently published practice guidelines from the American College of Gastroenterology (2009) reflect the use of a "Step-Up" approach to treatment of Crohn's disease.[13]

II. Aeromedical Concerns.

Crohn's disease is incurable, progressive, and unpredictable with the very real potential for progressive systemic degradation. The uncertain nature of the disease, side effects of medication and need for surgery are obvious aeromedical concerns. Crohn's disease can affect any part of the GI tract, and relapses frequently follow remissions. Maintenance drug therapy to prevent relapse has met with mixed results. Issues related to the aerospace environment include: abdominal pain, bowel obstruction, abscesses, chronic diarrhea, anemia, predilection to gallstones and kidney stones, GI perforation, and chronic medication use with its potential side effects. These issues can lead to impairment secondary to pain and GI upset. Flyers with infrequent symptoms not requiring long-term medical therapy may do well and it may be safe to consider a waiver for such cases, but in general, prognosis for a full career staying on flight status is guarded.[14]

Bowel obstruction is a generally recognized complication of Crohn's disease, can evolve over a short period of time, and is particularly worrisome as a cause of incapacitation due to severe pain, distention, and vomiting. Abscesses occur in 15-20% of patients, fistulae occur in 20-40% of patients, and gallstones occur in 25% of Crohn's patients with the relative risk for gallstones almost double compared with the general population. Hypersensitivity reactions may include rash, fever, aplastic anemia, agranulocytosis, hepatitis, pancreatitis, nephrotoxicity, pulmonary fibrosis and hemolysis. Because most sulfasalazine toxicity is due to the sulfa component, time-pH release formulations of mesalamine (i.e., Pentasa, Asacol) are preferred. Crohn's disease confined strictly to the colon is less problematic from an aeromedical standpoint, and for waiver purposes is handled in a fashion similar to ulcerative colitis.

III. Waiver Consideration.

A history of Crohn's disease is disqualifying for all flying classes. It is not specifically mentioned under ATC/GBC and MOD duties, but will require a waiver and MEB as it is disqualifying for retention. Table 1 highlights waiver potential for common situations and the Aircrew Medication List provides an up to date list of aeromedically acceptable medications. After a second exacerbation of Crohn's disease with small bowel involvement, a FC IIC (fly only with another qualified pilot) waiver may be considered after 12 months remission off of all unapproved anti-inflammatory and immunosuppressive medications. Individuals treated with approved TNF-alpha inhibitors (infliximab, adalimumab) will also receive a restricted waiver (not worldwide qualified, TDY requires access to transport and refrigeration of adalimumab). Crohn's disease is disqualifying for FC I/IA applicants and waiver is NOT recommended.

Table 1: Waiver potential for Crohn's Disease

Flying Class (FC)	Condition	Waiver Potential*** Waiver Authority‡
I/IA	History of Crohn's disease at any site	No AETC
II	Crohn's Colitis*&+	Yes MAJCOM**+
	Crohn's with Small Bowel disease†&+	Yes MAJCOM**+
III	Crohn's Colitis*&+	Yes MAJCOM**+
	Crohn's with Small Bowel disease†&+	Yes MAJCOM**+
GBC/ATC	Crohn's Disease+	Yes AFMSA**+
MOD	Crohn's Disease	Yes AFMSA

*Unrestricted waiver is possible if disease is in complete medical remission for at least three months; no fistulas, strictures or abscess; and use only authorized medications.
**Waiver authority is AETC for untrained applicants.
***No indefinite waivers.
† Must be asymptomatic for 6 months; have no fistulas, strictures, or abscess; no history of more than two surgical procedures; use only authorized medications. If flyer is a pilot, will get a restricted FC IIC waiver restricting flying only with another qualified pilot. For unrestricted FC II waiver, pilot needs to be asymptomatic for at least one year; have no fistulas, strictures, or abscess; use only authorized medications.
& Any extraintestinal manifestations should be addressed as a separate diagnosis & will require individual work-up.
+ Waiver restricted for individuals treated with adalimumab or infliximab (not worldwide qualified, TDY requires access to transport and refrigeration of adalimumab). Observe for 3 to 6 months on therapy before consideration of waiver to allow for assessment of response/adverse effects. MEB required. Initial waiver is for one year, thereafter usually three years. Forward to ACS for review. Waiver authority is AFMSA for TNF inhibitors.
‡Waiver restricted for individuals treated with adalimumab or infliximab (not worldwide qualified, TDY requires access to transport and refrigeration of adalimumab); MEB required.

A search of AIMWTS in Sep 2013 revealed 64 individuals with waiver dispositions with the diagnosis of Crohn's disease. There were 2 FC I/IA cases (both disqualified), 38 FC II cases (10 disqualified), 11 FC III cases (6 disqualified), 10 ATC/GBC cases (3 disqualified), and 3 MOD cases (0 disqualified). All of the disqualified cases were due to factors relating to the Crohn's disease process.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for Crohn's disease should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of the condition and all treatments used to date. The AMS needs to address the presence or absence of any extraintestinal symptoms.
C. Consultation from a gastroenterologist to address disease course, current therapy, and documentation of related complications
D. Labs: CBC, C-reactive protein, B_{12}, iron studies (if anemic), folate, LFTs, and albumin should be reported. Hypoalbuminemia may be an indicator of malnutrition and chronicity of disease, but may also reflect its status as an acute phase reactant.
E. Imaging: Provide results of all imaging tests. Proper imaging studies of the bowel (colonoscopy +/- biopsy, contrast radiography of the small bowel) to delineate disease extent and complications are necessary for initial waiver consideration; imaging studies may or may not be required for renewal waivers depending on disease course.
F. Ophthalmologic evaluation should be obtained to rule out uveal involvement at time of initial waiver and thereafter if ocular symptoms develop.
G. A statement that the aviator is in complete clinical remission, that he/she has not suffered any complications and that he/she is tolerating a regular diet, having normal bowel movements and is capable of normal activities.
H. For individuals treated with adalimumab or infliximab, results of chest x-ray and IPPD.

The AMS for waiver renewal for Crohn's disease should include the following:
A. Interval history specifically noting any changes in disease course and treatments since the last waiver submission.
B. All applicable labs and imaging tests as in the initial aeromedical summary.
C. Consultation from a gastroenterologist to address disease course, current therapy, and documentation of related complications.
D. Ophthalmology evaluation as with initial summary.

ICD-9 codes Crohn's Disease	
555.0	Crohn's disease, small intestine
555.1	Crohn's disease, large intestine
555.9	Crohn's disease, not otherwise specified

ICD-10 codes Crohn's Disease	
K50.00	Crohn's disease, small intestine without complications
K50.10	Crohn's disease, large intestine without complications
K50.9	Crohn's disease, unspecified without complications

V. References.

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WAIVER GUIDE
Updated: Jul 2014
Supersedes Waiver Guide of Dec 2010
By: Col Joe Connolly (RAM XV), Col Roger Hesselbrock (ACS Neurologist), and Dr Dan Van Syoc
Reviewed by Col Michael Richards, AF/SG consultant for Undersea and Hyperbaric Medicine

CONDITION:
Decompression Sickness and Arterial Gas Embolism (Jul 14)

I. Overview.

Decompression sickness

Decompression sickness (DCS) can occur from decompression during flight, from altitude chamber exposure, from flying at high altitudes, from diving, from working in pressurized tunnels or caissons, or from hyperbaric chamber exposure. The reported incidence of in-flight DCS is fortunately rather rare, possibly because of extremely reliable aircraft pressurization systems. By contrast, DCS is much more commonly reported with altitude chamber operations employed for aircrew training and research (0.1% per exposure for trainees, higher for inside observers). DCS varies widely in its clinical presentation from minor skin itching, through joint or limb pain to serious neurologic, cardiopulmonary, and inner ear involvement. Older classification systems, categorizing less severe DCS symptoms as Type I and more severe as Type II, have been dropped in favor of simple symptom descriptors. Symptoms of severe DCS include any neurologic sign or symptom consistent with injury or dysfunction of the CNS including vertigo, headache, disorientation, slurred speech, incoordination; pulmonary symptoms (chokes) including chest pain, cough, and SOB; and circulatory collapse. Since there are no pathognomonic signs or symptoms or definitive laboratory tests, diagnosis depends on a high index of suspicion and a very careful history for recent credible exposure. Neurologic DCS presents in one of two forms: a peripheral form and a central nervous system form. The central nervous system DCS includes spinal cord DCS and cerebral DCS, and cerebellar DCS. The peripheral form often consists of parasthesias in upper or lower limbs (commonly in the same limb affected with musculoskeletal pain), which resolves quickly with treatment. In some case of spinal DCS, what seems like peripheral neurologic symptoms on the trunk can progress rapidly to paraplegia, so caution (in the form of aggressive treatment) is warranted. Involvement of the central nervous system can lead to permanent neurologic deficit if not recognized early and treated appropriately. It is critical to perform a thorough neurologic exam to detect subtle findings including neurocognitive deficits. Oftentimes patients judged to have only peripheral complaints prior to recompression will admit to a "haze" being lifted during recompression – this "haze" (mild disorientation, flat affect, personality change) should be considered a CNS symptom. Current literature suggests it is rare for DCS symptoms to begin more than 24-48 hours following decompression exposure. However, DCS should still be considered in the differential diagnosis for any individual presenting with DCS symptoms even beyond this period of time if they had a credible exposure (i.e. at or above 18,000 ft or hyperbaric exposure). Three factors have been well established through both human use protocols and flight operations as predictors of altitude induced DCS. These are altitude of exposure, duration of altitude exposure, and physical activity level while at altitude. A fourth very important but not quantifiable factor is personal variability, i.e., some personnel are very susceptible whereas other personnel are highly resistant to developing DCS. Potential sensitizing or predisposing factors for DCS that are commonly mentioned but less well validated include hypoxia, obesity, caffeine, smoking, alcohol

consumption and recent injury or trauma.[1-3] Exercise enhanced pre-breathing (EEP) with 100% oxygen prior to exposure is an effective countermeasure to developing DCS and is used routinely in U-2 operations.

The pathophysiology of decompression illness is not entirely understood. The pathophysiology behind neurologic DCS is likewise unknown as is the period of increased susceptibility (if any) to recurrent injury following an initial episode of neurologic DCS. In general, inert gas bubbles (most commonly nitrogen) cause harm through vascular obstruction, ischemia, and stimulation of inflammatory processes following damage to the endothelium. Subsequent reperfusion injury may also occur. The bubbles arise as a result of exposure to decreased ambient pressure either following hyperbaric exposure, e.g. SCUBA diving, prolonged exposure to underground environments, or by altitude exposure. It is believed bubbles causing DCS almost exclusively arise within the venous system and are shunted to the arterial circulation through pulmonary shunts or more rarely atrial defects such as a patent foramen ovale (PFO) causing harm through mechanical distortion of tissues, pulmonary vascular obstruction, or stimulation of inflammatory processes that leads to tissue edema, hemoconcentration, and hypoxia.[1, 2, 4] Neurologic deficits may be transient or permanent. Published studies on divers indicate a two-fold increased incidence of white matter hyperintensities (WMH) on brain MRI compared to controls even in the absence of a history of neurological DCS.[5, 6] Similar WMH have been noted in 7 of 13 (54%) clinically evaluated high altitude U-2 military fliers that have experienced neurological DCS.[7] Data on a 50 U-2 pilots collected at the ACS and Research Imaging Center (RIC) of the University of Texas at San Antonio Health Science Center revealed no lesions detected by 3.0 Tesla (T) MRI (research MRI) if the 1.5 T MRI (standard clinical MRI) did not detect lesions. Additional lesions were, however, detected by the 3.0 T MRI when one or more lesions were noted on 1.5 T MRI.[8] Furthermore, these lesions were unique in their morphology and were not seen in the normative data base maintained by the RIC of the 133 age 20 to 40 year-old subjects with no history of neurologic insult, hypertension, hyperlipidemia, or diabetes mellitus nor in the entire study base population of 800 community-based subjects.[9] A study comparing 102 U-2 pilots (overlap with above studies, some with some without history of DCS) with 92 normative controls demonstrated increased white matter hyperintensity volume (394%; p 5 0.004) and number (295%; p, 0.001) in the U-2 pilots vs. controls.[10] The clinical significance, both immediate and long term, of these lesions is currently unknown.

Recompression by hyperbaric oxygen therapy is the definitive treatment for DCS. Symptoms of altitude related DCS often resolve upon descent to lower altitudes and/or the administration of 100% oxygen. Less severe cases of DCS manifest as joint or limb pain. When these symptoms of the "bends" resolve on descent or administration of 100% oxygen, they do not mandate hyperbaric therapy. Specific guidelines for treatment of pain only DCS with ground level oxygen can be found in AFI 48-112. However, DCS symptoms that persist or recur after initial recovery, and all cases of neurologic DCS (whether resolved with descent and oxygen or not) and chokes, require hyperbaric treatment as soon as possible. Even in severe cases, expeditious treatment with hyperbaric oxygen has been associated with a high rate of recovery.[1, 2, 11]

Arterial gas embolism

For an air embolism to occur there must be a direct communication between a source of air and the vasculature and a pressure gradient favoring the movement of air into the circulation. Arterial gas embolism (AGE) is seen in trauma, the placement of central lines, surgery, positive pressure

breathing, ascent in diving (breath holding), and rarely in aviation ascent (rapid decompression usually associated with positive pressure breathing and/or anti G-straining maneuver). The symptoms may be difficult to separate from DCS; however in AGE the onset of symptoms is in general more rapid (within 10 minutes of ascent) and can be life-threatening with air bubbles obstructing the systemic or pulmonary arterial circulation. Hyperbaric treatment is the only definitive treatment for AGE.[1, 2, 11]

II. Aeromedical Concerns.

DCS is a normal response to an abnormal condition. If an individual is subjected to conditions sufficient to produce DCS often enough, he or she will eventually develop symptoms. The major aeromedical concern is incapacitation in flight as well as any residual neurologic, neurocognitive, or neuropsychologic impairment. The risk of recurrent injury or increased susceptibility to subsequent injury following an initial episode of DCS is unknown as is the short and long term risk of permanent neurocognitive impairment following repeated episodes of neurologic DCS. Permanent subcortical dementia following a single episode of neurologic DCS in an aviator has been documented at the ACS. The risk of seizures following altitudinal DCS is unknown. In saturation divers 18% of divers were noted to have abnormal EEGs as compared to 5% of controls; however this study did not compare the incidence of seizures of divers compared to controls.[12] Furthermore it is unknown if data from saturation divers can be applied to altitudinal DCS. Seizures are known to occur following stroke in young adults (~ 5-11% incidence over the first 3-years); whether the pathophysiology of DCS with presumed arterial occlusion and/or focal endothelium inflammatory change predisposes to subsequent seizures is unknown.[13, 14] Additionally the MRI lesions noted following altitudinal DCS have a unique morphology and may not present the same risks of seizures as the typical stroke lesions. Consensus statement from the 2010 DCS-AGE Workshop noted the risk of seizures is unknown with currently no medical evidence indicating increased risk of seizure. This committee also concluded aspirin 81mg may potentially lessen the incidence of neurologic DCS secondary to its platelet inhibition effect. Large vessel occlusion from AGE in the aviation environment is rare. If it does occur, the pulmonary rupture that caused the AGE needs to heal before returning to flying duties. Furthermore, a pulmonary pathologic condition, a predictor of recurrence, should be ruled out (chest x-ray). While theoretically a PFO could also predispose the risk of DCS, there is no current evidence neurologic DCS is increased in the presence of a PFO in altitude induced DCS. Current practice suggests closure of the PFO does not significantly decrease the risk of subsequent AGE or DCS.[1, 15]

III. Waiver Consideration.

Per MSD L 44, the following are disqualifying for FC I/IA, FC II, FC III and Operational Support Flying Duty. Decompression sickness (DCS) or air embolism with neurologic involvement by history, physical examination or evidence of structural damage on imaging studies. Hypobaric chamber-induced neurologic DCS with symptom resolution within 2 weeks does not require waiver for RTFS. Any altitude-induced DCS/AGE episode that requires recompression therapy and symptoms are not resolved within two weeks requires a waiver.

Current medical knowledge does not permit clear delineation of susceptibility to repeat DCS nor does it allow precise definition of risk of sudden incapacitation or of neurocognitive impairment. As a consequence the Aeromedical Standards Working Group (ASWG) recommended the following pending acquisition of data that will permit further refinement of risks. Current ASWG

recommendations are a minimal 72-hours DNIF following a chamber exposure, a mininum 2 week DNIF following an altitudinal exposure with complete resolution of symptoms within 2-weeks of exposure and with acceptable studies as listed below, and a minimal 6-month DNIF following altitudinal exposure without complete resolution by 2-weeks or without acceptable studies as listed below.

Table 1: DCS RTFS Requirements for FCI, FCII, FC IIU, FCIII, ATC/GBC, MOD, and altitude chamber personnel.

	DCS/AGE with no CNS* or pulmonary involvement	DCS/AGE categorized as severe, including CNS* or pulmonary involvement
Chamber-induced DCS. All Symptoms Resolved In <2 Weeks	**No Waiver Required** May be RTFS by local flight surgeon after consultation with base SGP, USAFSAM Hyperbaric Medicine Branch and MAJCOM/SGP. Requires a minimum 72-hour DNIF following resolution of all symptoms.	**No Waiver Required** May be RTFS by local flight surgeon after consultation with base SGP, USAFSAM Hyperbaric Medicine Branch and MAJCOM/SGP. Requires a minimum 2 week DNIF following resolution of all symptoms. Required studies: (1) Documentation of symptoms and response to recompression therapy. (2) Neurological exam performed by a neurologist or hyperbaricist. (3) MRI (minimum 1.5T unit) within one month of episode; images sent to ACS and reviewed. (4) Consultation with USAFSAM Hyperbaric Medicine Branch. (5) ACS review required.
Altitude-induced DCS. All Symptoms Resolved In < 2 Weeks	**No Waiver Required** May be RTFS by local flight surgeon after consultation with base SGP, USAFSAM Hyperbaric Medicine Branch and MAJCOM/SGP. Requires a minimum 72-hour DNIF following resolution of all symptoms.	**Waiver Required** Requires a minimum 1-month DNIF following resolution of all symptoms if all results below are acceptable upon review at ACS, or a minimum 6-month DNIF if not acceptable. In cases of altitude-induced pulmonary AGE, 1-month DNIF is required with CXR (PA and LAT) to rule out parenchymal disease. If AGE includes CNS complaints, items (2)-(4) below are also required. Waiver request requires: (1) Documentation of symptoms and response to recompression therapy. (2) Neurological exam performed by a neurologist or hyperbaricist. (3) Neurocognitive testing at one month to include Microcog and MAB; results sent to ACS and reviewed. (4) MRI (minimum 1.5T unit) within one month of episode; images sent to ACS and reviewed. (5) Consultation with USAFSAM Hyperbaric Medicine Branch. (6) ACS review required.

	DCS/AGE with no CNS* or pulmonary involvement	DCS/AGE categorized as severe including CNS* or pulmonary involvement
Altitude-induced DCS. All Symptoms NOT Resolved In <2 Weeks	Focused symptom workup by appropriate specialty and aeromedical disposition per AFI	**Waiver Required** Requires a minimum 6-month DNIF. Waiver request requires: (1) Documentation of symptoms and response to recompression therapy. (2) Neurological exam performed by a neurologist or hyperbaricist. (3) Neurocognitive testing at one month to include Microcog and MAB; results sent to ACS and reviewed. (4) MRI (minimum 1.5T unit) within one month of episode; images sent to ACS and reviewed. (5) Consultation with USAFSAM Hyperbaric Medicine Branch. (6) ACS review required.

*Although peripheral neurological complaints as presenting symptoms require TT6 (or equivalent dive) treatment, if symptoms completely resolve with recompression, a full 2 week or 1 month DNIF is not warranted. Required studies include examination by neurologist or hyperbaricist and consultation with USAFSAM Hyperbaric Medicine Branch.

Table 2: Waiver potential for DCS and AGE cases.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review or Evaluation
I/IA	DCS/AGE with resolution of symptoms within 2 weeks and no neurological involvement.	N/A	N/A
	DCS/AGE with residual symptoms for greater than 2 weeks or with CNS involvement	Maybe AETC	Yes
II/III	DCS/AGE with resolution of symptoms within 2 weeks and no CNS involvement.	N/A	N/A
	DCS/AGE with residual symptoms for greater than 2 weeks or with CNS involvement.	Maybe† MAJCOM+	Yes

† If symptoms resolved (after the two weeks) or not severe enough to interfere with performance of aircrew duties then aeromedical waiver is likely.
+ If symptoms are functionally significant, waiver authority is AFMSA.

Review of AIMWTS through Mar 2014 showed 46 cases of decompression sickness; 28 were FC II, nine were FC III and nine were aerospace physiologist technicians (9C). A total of nine were disqualified; three FC II, one FC III and five aerospace physiologist technicians. Four physiologist technicians were disqualified because of recurrent DCS during chamber flights, one aerospace physiologist technician was disqualified due to other medical problems as was the FC III, one of the FC II was disqualified due to severe residual neurological deficits and the other two were disqualified for other medical problems. AIMWTS review also showed one case of air embolism in a FC III aviator secondary to diving; waiver granted.

IV. Information Required for Waiver Submission.
The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for DCS should include the following:
A. History to include risk factors, exposures, initial symptoms, treatment, residual symptoms and signs and functional limitations.
B. Physical – neurological exam.
C. Neurology consult.
D. Neurocognitive testing – Multidimensional Aptitude Battery (MAB), MicroCog
E. MRI (minimum 1.5T unit) if clinically indicated

F. Statement that USAFSAM hyperbaric medicine physician consulted.
G. Chest x-ray (PA and LAT) to rule out lung parenchymal pathology in cases of aviation induced pulmonary AGE only.

Reports and copies of images from any MRI studies should be sent to ACS for review and reference. These may be uploaded to the USAFSAM ECG Library PACS server or mailed on CD to the ACS.

ICD-9 codes for Decompression sickness	
993.3	Caisson disease
958.0	Air embolism

ICD-10 codes for Decompression sickness	
T70.3 (generic) T70.3XXA (initial encounter) T70.XXD (subsequent encounter) T70.3XXS (sequelae)	Decompression Sicknes Aeroembolism

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WAIVER GUIDE
Updated: May 2014
Supersedes Waiver Guide of Sep2010
By: Lt Col Eneya Hugh Mulagha (RAM XV) and Dr Dan Van Syoc
Reviewed by Maj Amy Gammill, ACS Internal Medicine Branch Chief

CONDITION:
Deep Venous Thrombosis/Pulmonary Embolism (May 14)

I. Overview.

Venous thromboembolism (VTE) is the clinical entity that encompasses both deep venous thrombosis (DVT) and pulmonary embolism (PE). The pathophysiology of VTE reflects the interplay of hemostasis, vascular endothelial injury, and hypercoagulability (Virchow's triad).[1] The largest study estimating the incidence of VTE is the Longitudinal Investigation of Thromboembolism Etiology (LITE) study, which estimated the age-standardized incidence of first-time VTE at 1.92/1000 person-years. The incidence was higher in men than women and increased with age.[2] In this particular study, the population was ≥ age 45. Based on the average age of the USAF aviator, it is reasonable to assume that the incidence in our population is lower.

There are several risk factors for VTE. Transient risk factors increase the risk of VTE for a discrete period of time, and VTE that occurs in this setting is generally considered provoked. Examples of transient risk factors include surgery and non-surgical events such as pregnancy, major trauma, prolonged immobilization, and oral contraceptives. When venous thrombosis occurs in the absence of an identifiable thrombotic risk factor, the VTE is classified as unprovoked.[3] Treatment length for VTE is based in part on the underlying etiology; therefore, it is important to distinguish provoked versus unprovoked VTE whenever possible.

Air travel has been studied extensively to determine the risk for VTE. A 2007 meta-analysis suggested that flights less than 6 hours do not increase risk of symptomatic VTE, while flights greater than 8 hours do increase the risk. However, the overall risk of symptomatic VTE in this meta-analysis was still low, with symptomatic DVT in 0.05% of passengers and 27 PE per 1 million flights. The risk of asymptomatic VTE was higher, occurring in 1.2% of travelers in the studies reviewed.[4] In a cohort study of 8,755 travelers performing long-haul flights (defined as greater than 4 hours), the incidence rate of VTE was 3.2/1,000 person-years (highest in the first two weeks and decreasing to baseline over eight weeks). This risk was higher with increased exposure to flights in a short duration of time and with increasing duration of flights.[5]

The incidence of hereditary thrombophilias in Caucasian patients presenting with DVT is 24% to 37%, based on data from various studies, compared to 10% in controls.[6] The most common inherited thrombophilias (in order of prevalence, greatest-to-least) are factor V Leiden, prothrombin gene mutation, protein S deficiency, protein C deficiency and antithrombin deficiency.[7] Presence of an inherited thrombophilia may predispose an individual to VTE, but the thrombophilia remains only one portion of Virchow's triad. Current studies have demonstrated no significant difference in recurrence rates between those with and without identifiable inherited thrombophilias.[8,9] Some authorities would recommend lifelong anticoagulation after one unprovoked thrombotic episode in a patient with antithrombin deficiency or in patients with multiple defects, but consensus does not exist. Multiple defects do seem to increase the risk of recurrence, but combined defects are

identified in only 1-2% of those with idiopathic VTE.[10] The 2012 American College of Chest Physicians (ACCP) guidelines state that the presence of hereditary thrombophilias is not used as a major factor to guide duration of anticoagulation because evidence from prospective trials suggest the hereditary thrombophilias are not a major determinant of the risk of VTE recurrence.[11] For these reasons, screening for the hereditary thrombophilias is not generally recommended for the first-time VTE patient, particularly in patients with a provoked VTE. Evaluation for acquired thrombophilia (antiphospholipid syndrome) should depend on the setting and if confirmed present would alter duration of therapy. In general, testing for the following thrombophilias may be indicated in certain patients (such as those who present with abnormal baseline coagulation studies or with a strong family history of VTE): antiphospholipid antibodies, factor V Leiden, prothrombin gene mutation, and protein C, protein S, and antithrombin deficiency.

Malignancy is a major risk factor for VTE, which raises the question of whether all patients with VTE should be screened for cancer. Most VTE events associated with malignancy occur in patients with known cancer. Therefore, if a detailed history and physical examination and baseline laboratory studies fail to suggest cancer, no additional evaluation for occult neoplasm is required in most situations. Age appropriate cancer screening should be up-to-date, and it may be reasonable to include screening for prostate cancer in males over age 50 years with PSA and digital rectal examination.

Historically, the long-term treatment for VTE has been systemic anticoagulation with a vitamin K antagonist (warfarin). Under this paradigm, once the diagnosis of VTE is made and if no contraindications to anticoagulation are present, rapid treatment with unfractionated heparin, low-molecular-weight heparin, or fondaparinux (factor Xa inhibitor) should be initiated immediately. For most patients, warfarin should be started simultaneously with heparin or fondaparinux. Treatment with heparin or fondaparinux should be continued for at least 5 days – and can be discontinued on day 5 or 6 if the INR has been therapeutic (INR 2-3) for 2 days.

New oral anticoagulants are now available: direct inhibitors of either thrombin (dabigatran) or factor Xa (rivaroxaban, apixaban, edoxaban). These drugs all share a short half-life (8 to 16 hours) and do not require monitoring for the anticoagulant effect or have dietary interactions, unlike warfarin. Currently, only rivaroxaban is FDA-approved for treatment of VTE. Rivaroxaban may be used for acute, long-term, and indefinite anticoagulation, but the convenience of this therapy is counterbalanced by cost. Additionally, there is no antidote on the market to reverse bleeding, and experience in large patient populations is lacking.[3] While aviators with VTE may be treated with a direct inhibitor of thrombin or factor Xa during their DNF period, these medications are not approved for flying status. Aviators on warfarin therapy may receive a restricted flying waiver in certain situations (see “Waiver Considerations”). Individuals treated with warfarin should be instructed on the dietary challenges necessary to keep INR levels stable due to the multiple interactions of food and warfarin. The major risk of anticoagulation treatment is hemorrhage. The risk increases directly with increasing INR and precipitously climbs when the INR is greater than 5.[12]

The duration of anticoagulation for VTE is driven by consideration of the risk of recurrent thrombosis balanced against the risk of bleeding on therapy. The risk of VTE recurrence varies depending on whether the VTE was provoked (lower risk) or unprovoked (higher risk) and whether the VTE is a first event or repeat episode. The 2012 ACCP guidelines recommend that a first VTE occurring in the setting of a transient risk factor should be treated for at least 3 months with

anticoagulation. An idiopathic VTE (first episode) should be considered for at least 6 months of anticoagulation therapy. Recurrent idiopathic VTE should generally be treated with lifelong anticoagulation unless bleeding risk outweighs risk of recurrent thrombosis.[11]

II. Aeromedical Concerns.

The presence of a symptomatic DVT primarily causes pain and swelling. If either or both of these are present during a critical phase of flight, it is possible that control service inputs could be difficult or inadequate. Additionally, the presence of DVT places the aviator at risk for PE. The aeromedical concerns for PE include dyspnea, hypoxia, chest pain, and (in rare cases of massive PE) hypotension and even death.

Once VTE has been diagnosed, the aeromedical concern revolves around both the risk of recurrence and the risk of bleeding secondary to anticoagulation treatment. In flight, recurrent disease may also lead to acute incapacitation through PE. Alternatively, spontaneous hemorrhage could lead to sudden incapacitation. Given the narrow therapeutic window on warfarin therapy, aviators *must* be followed by a specialized anticoagulation management service. Patients followed by these services see a reduction in the annual rate of adverse events by more than 60%.[13]

III. Waiver Consideration.

Any history of venous thromboembolism (DVT or PE) is disqualifying for all flying classes (FC I/IA/II/III) in both initial and trained assets (see Section G *and* Section N of the MSD). History of PE or DVT is not disqualifying for ATC/GBC and MOD duties unless recurrent, unresponsive to therapy or treated with prolonged anticoagulation (waiver is required to perform GBC or MOD duties on warfarin). MEB is required for PE, or for DVT with repeated attacks necessitating treatment or prophylaxis.

Waiver is not allowed during the first 3 months of treatment following diagnosis of VTE for all flying classes. A waiver will be considered after 3 months for an initial provoked VTE, or for aircrew who need to be treated longer and are continuing therapy, provided that they meet the following criteria:

1) The aviator must be followed by a specialized anticoagulation management service.
2) Airman must be non-world-wide qualified while on anticoagulation.
3) A multi-pilot cockpit is required for FC IIC waiver consideration.
4) Airman may not fly in a high-performance aircraft while on anticoagulation therapy.

Table 1: Waiver potential for venous thromboembolism

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	Provoked VTE (Transient Risk Factor)&	Yes* AETC
	Unprovoked VTE (Idiopathic)	No AETC
	Recurrent VTE	No AETC
II III	Transient Risk Factor Anticoagulation therapy: 3 months†	Yes MAJCOM
	Unprovoked (Idiopathic) Anticoagulation therapy: 6 months**†	Yes MAJCOM
	Recurrent VTE Anticoagulation therapy: Indefinite**†	Yes, FC IIC AFMSA
GBC/ATC*** MOD***	Transient Risk factor Anticoagulation therapy: 3 months†	Not disqualifying once anticoagulation therapy completed. Waiver is required to perform GBC/MOD duties on warfarin.
	Unprovoked (Idiopathic) Anticoagulation therapy: 6 months**†	
	Recurrent VTE Anticoagulation therapy: Indefinite**†	Yes AFMSA+

*For significant transient risk factors. A history of only minor risk factors will be handled on a case-by-case basis.

**Waiver may be considered after 3 months of therapy provided they are treated in accordance with existing treatment guidelines. Aviator must be followed by a specialized anticoagulation management service.

***May be deemed disqualifying if the condition leads to, or is at risk of leading to incapacitation while performing duties, or if waiver is desired on anticoagulation (warfarin).

†Duration of anticoagulation should be determined in concert with Hematology consultation. Length of therapy should be tailored to the individual's risk factors for VTE recurrence.

+Waiver authority for MOD personnel is AFGSC.

AIMWTS review in Feb 2014 revealed that 187 individuals have been reviewed for waiver consideration for VTE; 45 of the 187 cases were disqualified. Breakdown of the cases was as follows: 7 FC I/IA cases (3 disqualified), 94 FC II cases (13 disqualified), 69 FC III cases (25 disqualified), 5 ATC/GBC cases (2 disqualified), and 12 MOD cases (2 disqualified). About half of the DQ cases were disqualified for reasons other than VTE. Anticoagulation therapy was approved for waiver consideration in 2006, and it is possible that some of those previously disqualified because of their long-term anticoagulation requirement would be eligible for a class FC IIC or FC III waiver today.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for VTE should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of the VTE event, the risk factors associated with the VTE and the course, duration and complications (if any) of anticoagulation treatment.
C. Current physical exam - should be focused on affected areas as well as signs suspicious for underlying malignancy.
D. Consultation is not routinely required for provoked VTE with a clearly transient risk factor. Hematology consultation should be considered in other instances, particularly in the setting of unprovoked VTE, recurrent VTE, or if a thrombophilia is suspected. If waiver is being submitted *on* warfarin therapy, then include a report from the anticoagulation service regarding the adequacy of/compliance with treatment.
E. Labs: CBC, coagulation studies (PT, aPTT, INR), LFTs, verification of age-appropriate cancer screening to include PSA if male over age 50, antiphospholipid antibody screen if there is a high clinical index of suspicion (abnormal initial coagulation studies, thrombocytopenia or multiple premature deliveries or spontaneous abortions).
F. Imaging: Results of compression ultrasound, CT, and/or pulmonary imaging studies used to diagnose the venous thromboembolism.

The AMS for waiver renewal for VTE should include the following:
A. Interval history.
B. All applicable physical exam, labs, and imaging tests as in the initial aeromedical summary.
C. Consultation from specialized anticoagulation management service if applicable.

ICD-9 codes for Deep Venous Thrombosis	
453	Venous embolism and thrombosis of deep vessels
453.40	Venous embolism and thrombosis of unspecified deep vessels of LE
415.1	Pulmonary embolism and infarction
415.11	Iatrogenic pulmonary embolism and infarction
415.19	Other pulmonary embolism and infarction

ICD-10 codes for Deep Venous Thrombosis	
I82.409	Acute embolism and thrombosis of unspecified deep veins of unspecified lower extremity
I26	Pulmonary embolism and infarction

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WAIVER GUIDE
Updated: Jul 2015
Supersedes Waiver Guide of Mar 2012
By: Lt Col Max Lee (RAM 16) and Dr Dan Van Syoc
Reviewed by Lt Col Dan LaMothe, Chief, Aerospace Ophthalmology Branch of the ACS

CONDITION:
Defective Depth Perception/Stereopsis (Jul 15)

I. Overview.

The visual perception of depth or the third dimension is derived from the interpretation and integration of a number of monocular and binocular cues.[1] As such, defects or acquired abnormalities in any portion of the visual axis may adversely affect the perception of depth. Monocular depth perception relies on learned cues such as physical appearance of an object or the size relationship to other objects. Examples of monocular cues include motion parallax and perspective. Although monocular cues to depth and distance are the primary cues utilized beyond 200 meters (m), they are subject to visual illusion.[2] The precision of monocular depth perception is highly variable, depending on stimulus, lighting and motion of the object, but is generally accepted to be inferior to binocular depth perception (stereopsis).

True binocular stereoscopic vision (stereopsis) represents the finest level of depth discrimination and refers to the ability to determine depth perceived spatial relationships through detection and interpretation of retinal disparity.[3] The ability to discern depth accurately seems to develop at about three months of age in normal infants. However, this ability is dependent on accurate projection of an image upon the retina of both eyes simultaneously, and ultimately upon the correct interpretation of that stimulus. Any disruption of accurate retinal imaging will adversely affect depth perception. Some individuals are unable to accurately perceive depth secondary to developmental abnormalities of the neuro-retinal pathway. The most common example of such a defect is childhood amblyopia (also called "lazy" eye), which includes strabismic amblyopia (a misalignment of the optical axes), anisometropic amblyopia (due to retinal image size disparity or clarity differences secondary to differential refraction between the two eyes) and deprivation amblyopia (from opacities or blockage of the optical media such as cataract, ptosis or uniocular retinal disorder). Some of these individuals may have transient misalignments of the visual axis sufficient to cause strabismic suppression of one of the misaligned images across such a small portion of the visual axis as to be undetectable by the individual, and detectable only with specific testing.[4] Similarly, acquired disorders, such as imperfect refraction or uniocular visual disruption from ocular conditions, such as a cataract, can adversely affect the depth perception in a previously normal individual. Sources of depth perception defects commonly seen among aviators and aviator applicants include defective ocular muscle balance, uncorrected refractive errors, microtropia, anisometropia and monofixation syndrome.

Although some defects in stereoscopic vision may be ameliorated with correction of the visual abnormality, individuals with corrected childhood amblyopia (by eye patching and/or strabismus surgery) often continue to exhibit a high prevalence of reduced depth perception capability. History of strabismus surgery generally results in fluctuating exam findings and variable levels of stereopsis which are prone to decompensate in the aerospace environment. These individuals will not be favorably considered for a waiver to enter aviation training.

Microtropia and monofixation syndrome represent defective forms of binocular vision in which there is preservation of peripheral extramacular fusion but an absence of central macular fusion and fine stereopsis.[5] This results from subtle misalignment of the eyes (microstrabismus), but can also occur in some individuals whose eyes appear straight. Patients with these conditions have the inability to use both foveas simultaneously (bifixation) and must resort to fixating with one eye at a time (monofixation). Failure to have simultaneous bifoveal fusion always results in degraded development of normal stereopsis.

Diagnosis of microtropia is based on the presence of a facultative macular scotoma, a stereopsis deficit (though it may be mild), and a tropia of less than or equal to 8 prism diopters of deviation. In monofixation syndrome, a manifest tropia may not be detected during cover testing.[6] Both microtropia and monofixation syndrome may either present with good visual acuity in the deviated eye, or with reduced best-corrected visual acuity (amblyopia). There is usually no treatment indicated for microtropia or monofixation syndrome. Near stereopsis tests should never be used alone to qualify any aircrew member as many microstrabismus cases may have defective distance stereopsis but maintain normal near stereopsis and vice versa. Additionally, distance stereopsis capability is more important aeromedically.

The USAF utilizes the VTA-DP, or its newer replacement, the Optec 2300 (OVT-DP), for assessment of depth perception in aviators.[7] Passing this test requires the ability to discern depth based on a disparity of at least 25 seconds of arc (line D), although the test is capable of scoring as low as 15 seconds of arc (line F). The limit of human stereopsis capability is around 5 seconds of arc. The Verhoeff test, which measured intermediate stereopsis, is no longer authorized as a screening test for USAF aircrew. The AO Vectograph and Howard-Dolman tests are other distant stereopsis that are available, and are utilized by the Aeromedical Consultation Service (ACS) to determine the waiver potential for substandard stereopsis cases. The AO Vectograph is an approved low cost alternate test to monitor stability of stereopsis performance in defective depth perception waiver cases.[8, 9]

Test	**Passing Scores**
OVT-DP and VTA-DP	Line D, E or F
AO Vectograph	4/4 (60 arc secs); in some cases after ACS review or evaluation 3/4 (120 arc secs)

II. Aeromedical Concerns.

Stereopsis is generally not considered to be a factor in the perception of depth beyond 200 m, as monocular cues tend to prevail at these distances. In aviation, accurate perception of spacing or depth within 200 m is critical in a number of situations, such as aerial refueling, formation flying, holding hover rescue type operations, taxiing, and parking. Stereopsis also facilitates closure maneuvers and rejoins. Microtropia and monofixation syndrome may be intermittent in nature and susceptible to decompensation in the aerospace environment due to such exposure as relative hypoxia and fatigue over time.[10] Therefore, individuals need to be monitored throughout their aviation career. Fourth cranial nerve (superior oblique) palsy has been shown by ACS experience to more likely decompensate over time in aircrew with resultant diplopia than the horizontal microtropias.

III. Waiver Consideration.

All FC I/IA with VTA-DP or OVT-DP failure (unable to accurately read line D) who are otherwise qualified are required to either be evaluated or have the case reviewed by the Aeromedical Consultation Service (ACS). If these individuals meet waiver criteria they are placed in the Prospective Defective Stereopsis management group. As part of the Prospective Defective Stereopsis management group they will require an ACS case review of current local testing as outlined below prior to waiver renewal after completion of undergraduate pilot or navigator training.

All FC II and FC III aircrew positions that require depth perception to safely clear their aircraft or self (e.g. free fall) from objects or other aircraft in the air or on the ground within 200 meters (scanner duties), e.g. boom operators, flight engineers, loadmasters, who newly fail the annual required depth perception testing (VTA or OVT), or who have failed in the past and never been evaluated at the ACS for defective stereopsis are required to have an ACS review and possible evaluation before granting of waiver. These aviators will be placed into the ACS Monofixation/Microtropia management group rather than the Prospective Defective Stereopsis management group noted above.

At the annual preventive health assessment; if the trained aviator has previously failed the VTA or OVT, has undergone a prior ACS review or evaluation with existing waiver, and can currently either pass the VTA or OVT, or achieve a passing score 4/4 (60 arc sec) on the AO Vectograph distance stereopsis test, or achieve a previously waivered baseline score on the AO Vectograph (as determined by the ACS); no further workup is needed and ACS review is not required. Waiver authority in these cases will remain with the MAJCOM. If depth perception capability has declined from the previously waivered level or if binocular fusional control has diminished (i.e., onset of diplopia), full workup should be accomplished as outlined below in the Information Required for Waiver Submission section.

At waiver renewal accomplish all tests as outlined below in Section IV. If depth perception capability has declined from the previously waivered level or additional abnormalities are found then an ACS review or evaluation is required prior to waiver renewal.

Defective depth perception is not waiverable for initial FC III applicants for the following career fields: 1A0, 1A1, 1A2, 1A3, and 1A7.

For GBC/ATC personnel, only Tactical Air Control Party (TACP) (1C4X1) and Air Liaison Officers (13LX) are required to meet depth perception standards. There are no standards for MOD personnel.

Table 1: Waiver potential for Defective Depth Perception

Flying Class (FC)	Waiver Potential Waiver Authority	Required ACS Review/Evaluation
I/IA	Yes[4] AETC	Yes[2]
II III[1]	Yes[4] MAJCOM	Yes[3]
ATC/GBC[5]	Yes*[4] MAJCOM	No
MOD	N/A	N/A

1. Aircrew positions that require depth perception (scanner duties), e.g. boom operators, flight engineers, loadmasters, etc.
2. Member of the ACS Prospective Defective Stereopsis management group (review/evaluation initially and review after UPT, thereafter not required unless ACS determines to be at higher risk for decompensation, or if depth perception or tropia worsens from previously waivered level).
3. ACS review/evaluation required only if new failure on annual depth perception testing and never evaluated at the ACS for this or depth perception declined from previously waivered level or cases determined by the ACS to be at higher risk for decompensation.
4. If spectacles were needed to pass depth perception testing, regardless of unaided visual acuity (e.g. 20/20) then spectacles are required for aviation duties, to meet depth perception standards.
5. Only required for following career fields: 1C4X1 and 13LX.
* Waiver is unlikely for untrained personnel.

A review of AIMWTS through May 2015 showed 4909 cases of defective depth perception. There were a total of 823 cases disqualified (16.8%), the majority which were either for another unrelated diagnosis or for untrained assets. There were 820 FC I/IA cases, 1408 FC II cases, 2527 FC III cases, 139 ATC/GBC cases, and 15 MOD cases.

In a 2005 retrospective study conducted by the Ophthalmology Branch of the ACS, 524 aviators were evaluated for defective stereopsis/depth perception. The final ACS diagnosis in this group ranged from a vergence or phoria in 31%, microesotropia in 29%, monofixation in 24%, microexotropia in 10% and vertical microtropia in 1%. The initial aircrew positions were divided among 345 FC II, 139 FC I/IA and 40 FC III. The outcome for these aviators after their initial ACS visit resulted in a 93% return to flying duties. Many of the waivered aviators shared a clinical history of subtle defects in depth perception not detected until late in their careers.

IV. Information Required for Waiver Submission.

The most common cause of an acquired depth perception defect is uncorrected refractive error. Depth perception testing should not be attempted until optimal correction has been achieved. Failure of depth perception with best corrected visual acuity is disqualifying, but may be considered for waiver.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using the best current clinical guidelines/recommendations. Underlying conditions such as microtropia, monofixation syndrome,

and anisometropia that are identified during evaluation by the local optometrist or ophthalmologist should be listed as a separate disqualifying condition along with a diagnosis of defective stereopsis. It should be noted that if after a thorough examination no underlying diagnosis is found, a disqualifying diagnosis of defective stereopsis is sufficient for AMS submission.

A complete AMS with a local ophthalmologist/optometrist work-up to include all of the following is required for initial waiver consideration and first renewal waiver of Prospective Defective Stereopsis Management group (pilots just completing UPT).
A. Complete ocular history noting particularly any history of eye patching, spectacle wear at an early age, strabismus, eye surgery and previous depth perception testing performance.
B. Ductions, versions, cover test and alternate cover test in primary and six cardinal positions of gaze.
C. Optimal refraction with further testing, including repeat VTA-DP or OVT-DP, to be accomplished with best optical correction of any refractive errors, regardless of unaided visual acuity.
D. AO Vectograph stereopsis test at 6 meters (4 line version) (distant stereopsis)*
E. AO suppression test at 6 meters.
F. Randot or Titmus stereopsis test (near stereopsis tests).
G. Red lens test.
H. Four-diopter base-out prism test at 6 meters.
I. Direct/indirect macula and optic nerve exam.

***Note: Use only the American Optical (AO) version of the vectograph projection slide graded in 60 arc sec increments (60, 120, 180, 240 arc sec).**

The AMS for renewal of defective depth perception waiver (not including first renewal of Prospective Defective Stereopsis Management group (pilots just completing UPT) should include the following:
A. Summary of waiver history (including ACS eval) and pertinent findings (OVT-DP and AO Vectograph).
B. If fails OVT-DP then results of AO Vectograph.
C. If fails AO Vectograph (previous waived value) then eye exam listed above (B, E, F, G, H and I).

ICD-9 Code for Defective Stereopsis (Depth Perception)	
368.3	Other disorders of binocular vision

ICD-10 Codes for Defective Stereopsis (Depth Perception)	
H53.30	Unspecified disorder of binocular vision
H53.34	Suppression of binocular vision

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WAIVER GUIDE
Updated: Aug 2014
Supersedes Waiver Guide of Nov 2010
By: LT Ajiri Ikede (RAM XV), Maj Amy Gammill (Chief, ACS Internal Medicine Branch), and Dr. Dan Van Syoc
Reviewed by LtCol Mark True, AF/SG consultant for Endocrinology

CONDITION:
Diabetes Mellitus (Aug 14)

I. Overview.

Diabetes mellitus is an endocrine disorder of blood glucose regulation leading to progressive hyperglycemia if left untreated. This disease is prevalent in many parts of the world, and in the U.S. the prevalence continues to rise. Over 25.8 million Americans are currently estimated to have diabetes mellitus. Approximately 21 million people are diagnosed with diabetes, while an estimated 8.1 million remain undiagnosed.[1] Diabetes is primarily classified as type 1 or type 2, with the vast majority of cases falling into these two broad categories. Individuals who have hyperglycemia not sufficient to meet criteria for diabetes are still at increased risk for progression and should also be identified. These individuals may be categorized as having impaired fasting glucose (IFG) or impaired glucose tolerance (IGT), or their hemoglobin (Hgb) A1C may be above normal but below the threshold for diagnosis of overt diabetes.[2] At least 86 million Americans (35% of adults aged 20 year or older) are "pre-diabetic" and may develop clinical diabetes if the condition is not diagnosed and treated early.[1]

Type 1: Absolute insulin deficiency related to pancreatic beta cell destruction. This classification accounts for approximately 5% of cases and occurs in <1% of the U.S. population.[1]
Type 2: Characterized by insulin resistance and/or relative insulin deficiency. Type 2 diabetes affects 8.3% of the U.S. population,[1] and a family history is often present.
IGT, IFG, Hgb A1C 5.7-6.4%: Intermediate metabolic states between normal glucose homeostasis and diabetes.

In all cases of diabetes, the elevation in blood glucose results from the improper production and/or use of insulin by the body -- insulin secretion either becomes deficient secondary to destruction of the pancreatic β-cells, or insulin resistance occurs. Several pathogenic processes are involved in the development of these defects; regardless, both type 1 and type 2 diabetes lead to hyperglycemia.[2]

The classic symptoms of hyperglycemia include polyuria, polydipsia, weight loss with or without polyphagia, and blurred vision. However, the presentation varies in both type 1 and type 2 diabetics, and some patients do not clearly fit either classification. Additionally, disease progression varies considerably, and while some patients experience a late onset and slow progression of disease, other patients may deteriorate rapidly.

Uncontrolled diabetes can lead to severe hyperglycemia with acute, life-threatening consequences such as ketoacidosis or nonketotic hyperosmolar syndrome. Diabetes mellitus also results in macrovascular and microvascular disease over time.[3] These complications include atherosclerotic cardiovascular disease, nephropathy leading to renal failure, retinopathy with potential loss of vision, peripheral neuropathy with risk of foot ulcers and amputation, peripheral artery disease,

cerebrovascular disease, and autonomic neuropathy causing gastrointestinal, genitourinary, and cardiovascular symptoms and sexual dysfunction. Generally, diseases of the coronary arteries, peripheral arteries, and carotid vessels are considered to be macrovascular in nature, while nephropathy, neuropathy, and retinopathy are microvascular complications. Because of the chronic morbidity secondary to diabetes, this disease accounts for almost 14 percent of U.S. health care expenditures, and over half are related to complications such as myocardial infarction, stroke, end-stage renal disease, retinopathy, and foot ulcer.[4] Diabetes is presently the seventh leading cause of death in the U.S., with about 50% of individuals with diabetes dying from coronary artery disease.[5]

The diagnosis of diabetes can be made in one of four ways, as listed in Table 1 below. In the absence of unequivocal hyperglycemia, the diagnosis should be confirmed on a subsequent day by repeat measurement, preferably using the same test.

Table 1. *Criteria for the diagnosis of diabetes mellitus[6]

1. Symptoms of diabetes plus random plasma glucose concentration ≥200 mg/dl. Random is defined as any time of day without regard to time since last meal. The classic symptoms of diabetes include polyuria, polydipsia, and unexplained weight loss.
2. FPG ≥126 mg/dL. Fasting is defined as no caloric intake for at least 8 hours.
3. Hgb A1C ≥ 6.5%.
4. A 2-hr post-load glucose ≥200 mg/dL during an OGTT. The test should be performed as described by the World Health Organization using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.

*If any of the above criteria are met and confirmed on repeat testing, diabetes can be diagnosed.

Individuals with hyperglycemia who do not meet the above criteria are at increased risk for progression to overt diabetes. The Expert Committee on Diagnosis and Classification of Diabetes Mellitus has recognized this intermediate group as defined in Table 2 below.

Table 2: Categories of increased risk for diabetes ("pre-diabetes")[2]

Diagnostic Test/Criteria	Normal	Increased Risk ("Pre-diabetes")	Diabetes
Fasting Plasma Glucose	<100 mg/dL	≥100 and <126 mg/dL (IFG)	≥126 mg/dL
Oral Glucose Tolerance Test (2 hour plasma glucose)	<140 mg/dL	≥140 and <200 mg/dL (IGT)	≥200 mg/dL
Hgb A1C	<5.7%	5.7-6.4%	≥6.5%

The importance of identification and treatment of "pre-diabetes" was highlighted by the Diabetes Prevention Program (n=3234) Study. In this study, eleven cases of impaired fasting glucose or impaired glucose tolerance per 100 person-years progressed to type 2 diabetes within a 3-year period. Conversely, of those who received lifestyle modification (diet and exercise), only five cases per 100 person-years developed type 2 diabetes. Lifestyle interventions led to a 58% relative reduction in the incidence of diabetes.[7] Obviously, prevention of the development of type 2 diabetes in the flyer with "pre-diabetes" is important for long-term health, but it can also help preserve a flying career. Early intervention with the appropriate lifestyle modifications is

paramount. Suggested lifestyle interventions include referral to a dietician to achieve weight loss to an ideal body weight (if the patient is overweight) and a monitored exercise program.

In individuals who have developed type 2 diabetes, multiple aspects of the disease must be addressed to optimize treatment and limit micro- and macrovascular complications. Stable glycemic control should be established in accordance with American Diabetic Association guidelines (goal Hgb A1C < 7%).[6] Current treatment guidelines recommend metformin as first-line therapy in conjunction with diet and exercise.[3] Aggressive control of cardiac risk factors is also warranted. The National Cholesterol Education Program (NCEP) considers diabetes a coronary heart disease (CHD) equivalent,[8] in part because studies have shown that diabetes places a patient at similar risk for CHD events (such as myocardial infarction) as demonstrated in patients with known CHD.[9] Glycemic control alone will not eliminate the additional risk of CHD in diabetic subjects, and blood pressure and lipids should also be targeted. The American Diabetic Association (ADA) modified its recommendations for statin use and lipid monitoring with the release of the 2015 version of "Standards of Medical Care in Diabetes." Current ADA guidelines for the initiation of statin therapy are now in closer concurrence with the 2013 American College of Cardiology/American Heart Association guidelines. Both the ADA and ACC/AHA recommend at least moderate-intensity statin therapy for most diabetics, with specific treatment choices based on age and risk factors (for those aged 40 to 75 years). [6,10] Both the Eighth Joint National Committee (JNC 8) and the ADA recommend treatment of blood pressure in diabetics to less than 140/90 mmHg based on current evidence.[3,11] This blood pressure goal refect changes in the 2015 ADA guidelines. The ADA also recommends that aspirin (75 to 162 mg daily) should be considered for primary prevention of cardiovascular events in diabetics with a ten-year risk score, such as Framingham, greater than 10 % (generally, males > 50 years and females > 60 years with one additional cardiac risk factor).[6]

Diabetics should be screened on a regular basis for the microvascular complications of the disease: retinopathy, neuropathy, and nephropathy. A dilated retinal exam is recommended annually, as well as a comprehensive foot exam (visual inspection for lesions, assessment of pedal pulses and neurologic sensory testing, such as with a monofilament). The urine albumin-to-creatinine ratio should be measured once a year to screen for microalbuminuria (30 to 300 mg/day) or overt proteinuria (>300 mg/day).[6] Increased urinary protein excretion is an early marker of diabetic nephropathy, and it can be effectively treated with an angiotensin-converting enzyme (ACE) inhibitor or an angiotensin II receptor blocker (ARB).[12,13] Glycemic control is also important for limiting diabetic nephropathy.[14]

As with patients who have "pre-diabetes," all diabetics should be counseled about lifestyle interventions. The importance of weight loss in overweight individuals and of regular exercise cannot be overstated. These changes not only help achieve glycemic control, but also improve many of the cardiovascular risk factors common in diabetics, such as hypertension and hyperlipidemia. Finally, individuals with pre-diabetes or diabetes who smoke must make every effort to stop, in particular to lower their risk of cardiovascular disease.

Metformin and sitagliptin are the only diabetic medications approved for use in U.S. Air Force flyers. If an aviator is started on metformin for IFG or IGT, that aviator will also require a waiver for the medication usage, but not for the diagnosis. Metformin reduces intestinal absorption of vitamin B12 in up to 30 percent of patients and lowers serum vitamin B12 concentrations in 5 to 10 percent, although megaloblastic anemia is uncommon.[15] Lactic acidosis is extremely unlikely in

those without chronic kidney disease or other significant co-morbidities.[16] Recommended lab monitoring for metformin therapy is an annual renal panel and CBC.[17] In any diabetic patient who develops neuropathy, B12 deficiency should be investigated before diabetic neuropathy is assumed if the patient is on metformin. Oral agents other than metformin and sitagliptin are not approved for use in Air Force aircrew, nor is insulin due to the risk for hypoglycemia even in the best of circumstances. While subcutaneous insulin pumps allow for tight control of blood glucose, hypoglycemia is still a significant concern with this therapy and waiver is not allowed.

II. Aeromedical Concerns.

There is limited evidence for a direct relationship between individuals with diabetes and the occurrence of aviation accidents. Of primary concern is the risk for hypoglycemia in diabetics who require medication to control their blood glucose. Symptoms of hypoglycemia include excess perspiration, shakiness, nervousness or anxiety, dizziness and/or lightheadedness, sleepiness, confusion, difficulty speaking, and weakness. These symptoms are likely with moderate to severe hypoglycemia and are incompatible with flying duties. Prolonged hyperglycemia is an additional concern as it can cause polyuria, dehydration, nausea, fatigue, and changes in visual acuity. Diabetics are at increased risk for coronary artery disease and related cardiac events, such as myocardial infarction, syncope due to arrhythmia, or stroke.

III. Waiver Considerations.

Diabetes mellitus is disqualifying for all flying duties, as well as for ATC/GBC and MOD duties. It is also disqualifying for retention, therefore an MEB/IRILO is required.

1. Type 1 diabetes mellitus: Waiver will not be considered.
2. Type 2 diabetes mellitus:
FC I: Waiver will not be considered.
FC II, III, and ATC/GBC: A waiver will be considered if there is evidence of good control* on diet alone, or on metformin or sitagliptin. The waiver will reflect the limitations, if any, imposed by the MEB. Those applying for initial training for FC II, III, ATC/GBC, and MOD will not be considered for a waiver.
3. Categories of increased risk for diabetes (IGT, IFG, and borderline Hgb A1C): Not disqualifying, no waiver required unless being treated with metformin or sitagliptin.

*Good control is defined as listed below:
A. Pre-prandial glucose of 80-130 mg/dL and peak post-prandial glucose of <180 mg/dL (based on self blood glucose monitoring).
B. Hgb A1C < 7% (report bi-annual data points unless therapy changed within one year).
C. Lipid panel targeted to ADA or ACC/AHA guidelines, which guide therapy in patients over age 40. For individuals under age 40 with additional cardiovascular risk factors, the ADA recommends considering moderate or high intensity statin therapy in addition to lifestyle therapy.
D. Blood pressure controlled to goals established by the ADA and JNC 8 (<140/90mmHg).
E. No diabetes-related complications that interfere with safety of flight / mission completion.

Note: Type 1 and 2 diabetes mellitus are disqualifying for continued military service and require a Medical Evaluation Board (MEB). Aircrew will not be considered for waiver until the MEB has

been initiated. In addition, aircrew diagnosed with diabetes and with coronary artery disease are not eligible for a waiver.

Table3: Waiver potential for Diabetes Mellitus

Flying Class	Condition/Treatment	Waiver Potential Waiver Authority*	ACS Evaluation/Review
I/IA	Type 1 or 2 DM, requiring insulin or oral medication (including metformin or sitagliptin)	No AETC	No
	Type 2 DM, not requiring medications	No AETC	No
II/III$	Type 1 or 2 DM, requiring insulin or oral medications other than metformin or sitagliptin	No MAJCOM	No
	Type 2 DM, controlled by diet/exercise or requiring metformin or sitagliptin for control	Yes†! MAJCOM	Yes
ATC/GBC MOD#	Type 1 or 2 DM, requiring insulin or oral medications other than metformin or sitagliptin	No MAJCOM	No
	Type 2 DM, on metformin or sitagliptin, or not requiring medications	Yes† MAJCOM	At the request of waiver authority

† Diabetes must be under good control as defined in "Waiver Considerations" above. No indefinite waivers for diabetes.
* Initial DM waiver authority is AFMSA for ALL classes
! FC IIC waiver (no single-seat aircraft) if on metformin or sitagliptin. Unrestricted waiver possible if diet-controlled.
#AFGSC is waiver authority for MOD personnel..
$ Not eligible for FC II/III waiver if CAD also diagnosed.

A review of the AIMWITS database in Jul 14 from Aug 2010 (the month metformin was approved for use in type 2 diabetes) through Jul 2014 revealed 91 individuals with an AMS containing the diagnosis of DM. Forty-eight individuals (52.7%) were disqualified. Breakdown of the cases was as follows: 0 FC I/IA cases, 41 FC II cases (20 disqualified), 35 FC III cases (18 disqualified), 10 ATC/GBC cases (6 disqualified), and 5 MOD cases (4 disqualified).

IV. Information Required for Waiver Submission:

Waiver should only be submitted after the MEB process has been initiated and the member has achieved good control (as previously defined in this waiver guide). Waiver will not be considered until member has been on metformin for at least 30 days.

The aeromedical summary for initial waiver for diabetes mellitus must include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History – include symptoms on presentation, dietary history, family history, list of all cardiac risk factors (including smoking and family history of CHD), documentation of appropriate dietary, weight loss and diabetic counseling.
C. Physical – complete physical exam including blood pressure, weight and diabetic foot exam.
D. Endocrinology or Internal Medicine consult if complete diabetic care is not offered in the aviator's primary care clinic.
E. Labs – BUN/Cr, urine albumin-to-creatinine ratio, fasting lipid panel, Hgb A1C and fasting glucose levels. Also submit a renal panel if on sitagliptin and a renal panel plus CBC or B12 level if on metformin.
F. Reports of most recent annual eye exam (including dilated retinal exam).
G. ECG.

The aeromedical summary of waiver renewal of diabetes should include the following:
A. History – interim history, changes in weight or diet, medication changes since last waiver.
B. Physical – include blood pressure, weight and diabetic foot exam.
C. Endocrinology or Internal Medicine consult if complete diabetic care is not offered in the aviator's primary care clinic.
D. Labs – Hgb A1C, fasting blood glucose, urine albumin-to-creatinine ratio, BUN/Cr, lipid panel. Also submit a renal panel and CBC or B12 level if on metformin.
E. Annual dilated eye exam report.

ICD-9 Code for Diabetes Mellitus	
250	Diabetes mellitus

ICD-10 Code for Diabetes Mellitus	
E11.9	Diabetes mellitus without complications

V. References.

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WAIVER GUIDE
Updated: Aug 2016
Supersedes Waiver Guide of Aug 2012
By: Capt Chris McLaughlin (RAM 17) and Dr Dan Van Syoc
Reviewed by: Col Pat Storms, Gastroenterology consultant to AF/SG

CONDITION:
Diverticular Disease Of The Colon (Aug 16)

I. Overview.

Colonic diverticular disease is quite common, accounting for 300,000 hospitalizations and 1.5 million outpatient visits annually in the United States.[1] It appears to be a condition unique to western developed countries, as it is nearly absent in rural Africa and Asia.[2] The left colon is involved in more than 90% of patients[3], with transverse and ascending portions of the colon involved in decreasing order of frequency. Diverticular disease has less than a 5% incidence in persons less than age 40 but the incidence increases rapidly thereafter, with about 60% of the general population developing the condition by age 80. The true incidence is difficult to ascertain as most patients are asymtomatic[4, 5], but recent studies suggest an increasing prevalence of diverticular disease, especially in patients under the age of 50.[6] Low dietary fiber intake, elevated BMI and physical inactivity are traditionally linked to the development of diverticulosis[7], but a 2012 study with 2104 participants actually demonstrated an inverse correlation, in that a high fiber diet and more frequent bowel movements were associated with an increased rather than decreased prevalence of asymptomatic colonic diverticulosis.[8] Further, their data did not demonstrate any association between fat, red meat, or physical activity and the presence of diverticulosis. In an accompanying editorial, it was noted that there have been large studies demonstrating an association between low fiber intake and diverticular complications, whereas the cited study focused on asymptomatic diverticulosis.[9]

The pathogenesis of diverticular disease is unknown, but is thought to reflect an interplay of anatomical factors in conjunction with increased intraluminal pressure, resulting in herniations of the colonic mucosa and submucosa through the colonic muscular layer.[10] Technically, these lesions are actually pseudodiverticula because all layers of the colon are not involved.[11] Diverticulosis is thought to be asymptomatic in 80% of individuals, and the remaining 20% can be divided into two categories: symptomatic diverticulosis and diverticulitis.[12] Symptomatic diverticulosis is characterized by episodic pain, altered bowel habits and a lack of inflammation, and may mimic symptoms produced by irritable bowel syndrome. The diagnostic approach to patients with abdominal pain and altered bowel function generally includes colonoscopy in order to assess for significant mucosal pathology. Traditional medical treatment includes a high-fiber diet consisting of wheat bran and/or commercial bulking agents, but research findings bring these recommendations into question. A systematic review of 11 studies that investigated probiotics as a treatment for symptomatic diverticulosis found that the quality of studies and strength of evidence lacked sufficient weight to recommend for or against their use.[13] Antispasmodics such as dicyclomine (Bentyl®) can bring symptomatic relief in patients with cramping discomfort due to diverticulosis, but narcotic analgesics should be avoided.

Patients with diverticulitis often present with left lower quadrant pain and tenderness, nausea, fever, and leukocytosis. Plain abdominal films can identify free air in the abdomen indicative of

perforation, but a CT scan with oral and intravenous contrast is the preferred imaging modality for confirming the diagnosis. Treatment is based on the overall health of the patient and the severity of the disease. Stable, uncomplicated patients who tolerate liquids can be treated as outpatients with oral antibiotics. The success rate of such conservative treatment in patients with acute uncomplicated diverticulitis is greater than 90 percent.[1] There is growing discussion regarding the value of antibiotics in treatment of uncomplicated diverticulitis, but the evidence is not strong enough to recommend against treating with antibiotics.[1, 14, 15, 16] Older patients, those with comorbid conditions, and anyone unable to tolerate oral fluids should be hospitalized with IV antibiotics and fluids. Those with complications such as perforation, abscess formation, fistulization, sepsis or partial obstruction should be hospitalized for medical and/or surgical treatment. About 10% of hospitalized patients require surgical treatment.[3]

After the first episode of acute diverticulitis, approximately 25% of medically-treated cases will experience a recurrence.[5] With each additional recurrence, the risk of further recurrence and complications increases. Physicians have historically stressed the avoidance of nuts, seeds and popcorn to reduce the risk of recurrent diverticulitis. Some recent studies have refuted this notion as a cause of diverticular complications, and these dietary restrictions should no longer be routinely recommended.[17] Historically, surgical resection of the affected colon was recommended after the second uncomplicated episode of acute diverticulitis in those over age 50 and after the first episode in those under age 50. This was based on studies showing younger patients with more virulent disease and a greater overall risk of recurrence due to a longer lifespan. However, new data has questioned these assumptions and the decision to perform an elective colectomy should be determined based on each patient's own set of circumstances and treatment preference. Such patients should be counseled on the risks and benefits of accepting or declining elective segmental-colectomy for diverticular disease as several studies have shown that up to 25% of patients experienced persistent symptoms after elective surgery.[18, 19]

Acute diverticular hemorrhage can be dramatic and can lead to acute incapacitation and hemorrhagic shock. In left-sided colonic diverticulosis, this bleeding is often seen as bright red blood per rectum. Slower rates of bleeding or bleeding from the more proximal colon may result in darker blood or clots in the stool. The mechanism for diverticular hemorrhage is poorly understood, but the bleeding is arterial in nature and is thought to relate to endothelial damage. Bleeding stops spontaneously in up to 90% of cases but can recur during the index hospitalization, or post discharge in up to 38% of patients. Current treatment has shifted from angiography and urgent surgery to mechanical colonoscopic interventions.[20]

II. Aeromedical Concerns.

Acute diverticular hemorrhage or perforation are capable of causing in-flight physical incapacitation, but altered bowel habits, abdominal distention, episodic pain, nausea, and flatulence related to symptomatic diverticulosis could be a distraction and affect crew availability. An aviator with acute diverticulitis would be ill-suited to fly due to fever and pain. Once resolved and stable without residual symptoms, returning the pilot to flying duties should not present a hazard to flying safety, the individual's health, or mission completion.[21]

III. Waiver Consideration.

Diverticulitis or symptomatic diverticulosis is disqualifying for FCI/IA, FCII, RPA Pilot, and FCIII duties. Before waiver consideration, aviators should have complete resolution of symptoms and be taking no medications incompatible with flying. For ATC/GBC duties, diverticular disease is not in and of itself a disqualifying condition, but any gastrointestinal hemorrhage, regardless of cause is disqualifying. For MOD duties, neither diverticular disease nor gastrointestinal hemorrhage is disqualifying.

Table 1: Waiver potential for colonic diverticular disease

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority#**
I/IA	History of symptomatic diverticulosis or diverticulitis, resolved+	Yes AETC
	Symptomatic diverticulosis or diverticulitis	No AETC
II, RPA Pilot and III, including untrained	History of symptomatic diverticulosis or diverticulitis, resolved+	Yes MAJCOM*
	Symptomatic diverticulosis or diverticulitis	No MAJCOM*
ATC/GBC	Any gastrointestinal hemorrhage (excluding minor hemorrhoidal bleeding)	Yes MAJCOM

*Waiver authority for untrained aviators is AETC
+ Can consider indefinite waiver for untrained aviators with remote history of diverticular disease
# ACS evaluation at discretion of waiver authority

A review of AIMWTS through Jul 2016 showed 210 cases of diverticulitis. Breakdown was as follows: 2 FC I cases, 127 FC II cases (7 disqualified), 77 FC III cases (4 disqualified), 3 ATC/GBC cases, and 1 MOD case. Of the 11 disqualified members, 4 were for severe disease requiring surgical resection (3 FC II and 1 FC III), 1 was disqualified for multiple recurrent cases of diverticular disease (FC III) and the other 6 were primarily disqualified for other medical conditions.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for diverticular disease should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.

B. Complete history of the problem to include all consultants seen, medications used and procedures, if any.
C. Physical exam results.
D. Labs – evidence of no rectal bleeding; any colonoscopy results, if performed
E. Gastroenterology or surgical consultation reports to include any imaging studies.
F. Current treatment to include all medications and dates started.
G. Detail of all other medical problems, if applicable.

The AMS for waiver renewal for diverticular disease should include the following:
A. Updated history since last waiver
B. Physical exam results.
C. Labs – any new labs, imaging tests and colonoscopy results since last waiver.
D. Any pertinent consults and study results.
E. Current treatment to include all medications and dates started.

ICD-9 code for diverticular disease	
562.1	Diverticula of colon

ICD-10 code for diverticular disease	
K57.30	Diverticulosis of large intestine without perforation or abscess without bleeding

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WAIVER GUIDE
Updated Jul 2013
Supersedes Initial Waiver Guide of Nov 09
By: Dr.Sanjay A. Gogate (RAM 13) and Dr Dan Van Syoc
Reviewed by Col John Gooch, Chief ACS Ophthalmology Branch

CONDITION:
Dry Eye Syndrome (Jul 13)

I. Overview.

Dry eye syndrome refers to a group of disorders of the tear film that are either due to reduced tear production (aqueous tear dysfunction, ATD) or excessive tear evaporation (evaporative tear dysfunction, ETD).[1] It is often associated with ocular discomfort and/or visual symptoms and may cause disease of the ocular surface.[2] Many affected individuals complain of eye discomfort, burning, irritation, photophobia, blurred vision, foreign body sensation, contact lens intolerance, and an inability to produce emotional tears.[3] Dry eye syndrome is a fairly common disease, particularly among older individuals. Current estimates are that it affects approximately 1.0 to 4.3 million people in the 65 to 84 year old age group. A recent Veteran's Affairs study showed a prevalence of 12% in men and 22% in females over the age of 50.[4] Along with older age, female gender and smoking have been identified as risk factors for this condition. Other identifiable risks are arthritis and other autoimmune disorders, hormone replacement therapy, a history of refractive surgery, Vitamin A deficiency, radiation therapy, rosacea, and Hepatitis C infection.[2, 5] A study in 2000 found decreased quality of life for all severity levels of dry eye syndrome, with an effect on quality of life for severe dry eye comparable with that reported for moderate angina.[2]

The ocular tear film is composed of three layers: an outermost lipid layer, an aqueous tear fluid middle layer, and a mucous coating of the epithelium (the inner layer). A deficiency of any layer can result in dry eye syndrome. There are many causes of dry eye syndrome as listed below.[6]

Table 1 – Causes of Dry Eye Syndrome

Layer	Outer (Lipid)	Middle (Aqueous)	Inner (Mucin)
Source	Meibomian glands (minor contribution from glands of Zeis and Moll)	Accessory and main lacrimal glands	Goblet cells of conjunctiva
Cause	Chronic blepharitis Radiation	Bilateral: Congenital lacrimal gland absence Cri du chat syndrome Keratoconjunctivitis sicca Riley-Day Syndrome Multiple endocrine neoplasia Congenital alacrima Systemic autoimmune disease (e.g. rheumatoid arthritis) LASIK Unilateral: Seventh cranial nerve paresis Viral dacryoadenitis Lacrimal gland injury or radiation Anhidrotic ectodermal dysplasia	Hypovitaminosis A Ocular pemphigoid Cicatricial conjunctivitis Stevens-Johnson Syndrome Chemical and thermal burns Drug-induced Trachoma

Dry eyes constitute a significant portion of the symptom profile of many diseases. Sjögren syndrome is one of the three most common systemic autoimmune diseases, afflicting as many as 1 to 2 million Americans, and is defined by the quatrad of ATD, anti-nuclear antibodies, hypergammaglobulinemia, and rheumatoid arthritis.[1] It primarily affects middle-age women and has a mean age of onset of 52.7 years. The pathogenesis of the syndrome is obscure and the classic presentation of the syndrome is the combination of dry eyes and dry mouth. The histological hallmark of Sjögren syndrome is lymphocytic infiltration of the exocrine glands leading to acinar gland degeneration. There is no cure and treatment focuses on relieving the disease symptoms.[7] One recent small study used proteomics to look for biomarkers such as Lacrimal Proline Rich 4 (LPRR4) Protein in the tear fluid as a potential biomarker for dry eye syndrome, which showed to be down-regulated with statistical significance in patients with dry eye syndrome versus matched controls. LPRR4 and other eye-specific proteins such as lacritin, Immunoglobulin J, and mammaglobulin B precursor could someday be used as screening tests to be ordered for diagnosis.[8] Dry eye syndrome can also be seen in previously undiagnosed thyroid eye disease (TED). Most TED patients have normal aqueous production and the mechanism of dry eye symptoms in TED remains unclear.[9]

Dry eyes following corneal refractive surgery (specifically PRK and LASIK) can be a significant problem. The population undergoing this procedure is usually younger and thus a more likely presentation of dry eye syndrome in the USAF aircrew seeking care. During the LASIK procedure trigeminal afferent sensory nerves are severed. Afferent corneal nerves are critical in the tearing process as they signal the need for more tears. The nerves are also damaged with PRK, but the symptoms are less common following PRK and the re-innervation process is quicker after PRK since the ablated nerve endings are located close to the epithelial surface.[10]

In addition to the decreased quality of life from eye irritation, dry eye patients often report vague problems such as sensitivity to light, a decrease in reading ability, night driving difficulties, or ocular fatigue. A common clinical finding in dry eye syndrome is a decreased tear breakup time. This can result in a substantial interblink degradation of vision. A tear break-up time of less than ten seconds is highly suggestive of mucin-deficient dry eyes.[6] Individuals with this deficiency tend to blink more frequently to compensate, which leads to increased eye fatigue.[5] In fact, dry eye syndrome is recognized as a growing public health problem and one of the most frequent reasons for seeking eye care. Associated symptoms lead to problems with common tasks such as computer use, professional duties, as well as watching television and spectator sports.[11]

An attempt to grade severity of dry eye symptoms is depicted in Table 2. The results of this grading scheme may drive the level of treatment. However, symptoms of dry eye syndrome do not necessarily reflect the severity of the disease. The lack of concordance between signs and symptoms presents a problem not only in the diagnosis but also in the construction of a treatment plan and when designing adequate clinical trials.[5]

Table 2 - Dry Eye Disease Severity Grading Scheme[5]

Dry Eye Severity level	**1**	**2**	**3**	**4**
Discomfort, severity, and frequency	Mild and/or episodic; occurs under environmental stress	Moderate, episodic, or chronic; stress or no stress	Severe, frequent, or constant without stress	Severe and/or disabling and constant
Visual Symptoms	None or episodic mild fatigue	Annoying and/or activity-limiting, episodic	Annoying, chronic, constant limiting activity	Constant and/or possibly disabling
Conjunctival injection	None to mild	None to mild	Mild	Moderate to Severe
Conjunctival staining	None to mild	Variable	Mild to Moderate	Marked
Corneal staining(severity/ location)	None to mild	Variable	Marked central	Severe punctuate erosions
Corneal tear signs	None to mild	Mild debris, decreased meniscus	Filamentary keratitis, mucus clumping, increased tear debris	Filamentary keratitis, mucus clumping, ↑ tear debris, ulceration
Lid/meibomian glands	MGD variably present	MGD variably present	Frequent	Trichiasis, keratinization, symblepharon
TBUT (seconds)	Variable	≤ 10	≤ 5	Immediate
Schirmer score (mm tears/5 minutes)	Variable	≤ 10	≤ 5	≤ 2
MGD = meibomian gland disease TBUT = tear film break-up time				

The physical exam for patients with symptoms of dry eye includes a visual acuity measurement, an external examination, and slit-lamp examination. The slit lamp exam can identify a decreased tear meniscus along the lower lid margin, an increase in corneal tear film debris, viscous mucin threads, scurf along the lid margins, inspissated or clogged meibomian glands, or other indications of dry eyes.[6] Bulbar conjunctival hyperemia is also a common finding, and it is important not to confuse a "red eye" due to contact lens overuse or infection as a chronic dry eye. In addition, further diagnostic testing should include tear film break-up time, ocular surface dye testing (with rose Bengal, fluorescein, or lissamine green) and the Schirmer tests.

The Schirmer test reflects the adequacy of the aqueous layer only. The tests consist of three basic measurements: Schirmer's test I (measures total basic and reflex tear secretion), basic secretion test (measures basic tear secretion), and Schirmer's test II (measures reflex tear secretion). The Schirmer tests need to be done after any ocular-surface dye staining as they can disrupt tear film stability.[6]

Dry eye syndrome is a difficult condition to treat. Any known causative factors must be identified and addressed. It is important to set realistic therapeutic goals with the patient and to educate them on the nature of their disease process and its prognosis. Early treatment usually involves artificial tear agents. As the severity of the disease progresses it may become increasingly impractical to use them with the increased need. Non-preserved tear substitutes are preferred in most cases. For moderate to severe disease, tear substitutes will not be sufficient to alleviate symptoms. Topical cyclosporine 0.05% (Restasis®) has been used very effectively for the past fourteen years and has shown significant improvements in both subjective and objective measures. Its action is thought to occur through its effect on reducing subconjunctival and lacrimal gland inflammation.[12] Decreasing the inflammatory component of the dry eyes tear film decreases the destruction of lacrimal acini and increases neural responsiveness (and hence improves lacrimal secretion).[1] Cyclosporine has been approved for aircrew duties with waiver. Other therapeutic options include topical corticosteroids, systemic omega-3 fatty acids, vitamin A eye drops, and application of a lipid layer to lid margins.[13] Punctal plugs are becoming more commonly used and newer plugs such as the FCI Ophthalmics' silicon based "Punctal Plug F" has shown to have a better retention rate which leads to better symptom control.[14] Cholinergic agents such as pilocarpine can be very effective in severe cases and with Sjögren's syndrome.[2] However, artificial tears, punctual plugs and Restasis® are the only current waiverable options for treatment of mild to moderate dry eye syndrome. Severe cases and those requiring other therapeutic options are not eligible for waiver.

Surgical options include punctal occlusion and blepharoplasty.[1,6] Temporary punctual occlusion can be obtained by placing collagen or silicone plugs in the puncti bilaterally. Permanent closure of the puncti can be performed with cauterization. This should only be done on patients with severe dry eyes and should be a joint decision made between the patient and their ophthalmologist.[6] If the underlying cause of the dry eye symptoms is a lid abnormality such as entropion or ectropion, surgical correction can correct the eyelid malposition and decrease dry eye symptoms.[2, 10] Another surgical option is to reduce the palpebral aperture through a lateral or medial tarsorrhaphy.

II. Aeromedical Concerns.

The aeromedical issues relate to the subjective annoyance of dry eye symptoms and also with visual performance decrements. In more severe cases individuals can have significant visual impairment and should not participate in military aviation duties. The dry air of most cockpits will exacerbate symptoms in most affected airmen. The increase in use of contact lens among aircrew has significantly increased the incidence of dry eyes, and it is vitally important that new dry eye medications are not inappropriately used to treat contact lens intolerance or contact lens related dry eyes. Most artificial tear drops are safe in the aviation environment, as are punctal plugs if declared stable by the treating ophthalmologist.

III. Waiver Consideration.

Dry eye is disqualifying for all classes of flying per AFI 48-123. Quality of vision can easily be compromised with chronic dry eye syndrome, so visual acuity standards apply. Generally, Grade 1 Dry Eye Syndrome does not require waiver action as it is easily controlled by lid hygiene and occasional use of artificial tears. Grade II and III dry eyes would require waiver action if controlled with artificial tears, waiverable topical medications, or punctual plugs. Chronic topical steroids should not be used to treat Dry Eye Syndrome due to the associated complications and is not a

waiverable treatment for aircrew. Grade IV Dry Eye Syndrome would generally not be waiverable. There is no disqualification for ATC/GBC or MOD personnel with Dry Eye Syndrome.

Table 3: Waiver potential for Dry Eye Syndrome

Flying Class (FC)	**Waiver Potential** **Waiver Authority**	**ACS Review/Evaluation**
I/IA	Yes* – Grade 1 only (may not be considered disqualifying) No – Grade 2 or worse AETC	At the request of AETC
II	Yes* – Grade 2 and 3 No – Grade 4 MAJCOM	At the request of the MAJCOM
III	Yes* – Grade 2 and 3 No – Grade 4 MAJCOM	At the request of the MAJCOM

* Vision needs to be stable and the flyer cannot be on any medication not approved for aircrew use.

AIMWTS review in Jul 2013 revealed a total of 47 cases submitted for waiver consideration with the diagnosis of dry eye with 42 cases currently approved for waiver. Breakdown of the cases revealed 3 FC I/IA cases (no disqualifications), 24 FC II cases (3 disqualifications), 18 FC III cases (1 disqualification), and 2 ATC/GBC cases (1 disqualification). There were 20 cases (all approved) utilizing Restasis® drops. There were also three cases with a diagnosis other than dry eyes utilizing Restasis® drops (all approved).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. **All Dry Eye Syndrome cases treated with Restasis® will require waiver approval to return to flight duties**.

The AMS for an initial waiver for dry eye syndrome should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History – history of all dry eye symptoms; any underlying causative factors, all treatments attempted and effectiveness of the therapy (medical and surgical), and any impact on job/daily life. History of contact lens use, including length and pattern of wear must be included in history.
C. Physical – full eye exam to include visual acuity measurement, an external examination, and slit-lamp examination. In addition, include results of the tear film break-up time, ocular surface dye testing, and the Schirmer test.
D. Ophthalmology consultation report (cornea specialist preferred).

Waiver renewal, if necessary, requires an interval AMS with particular attention to clinical changes.

ICD-9 code for Dry Eye Syndrome	
375.15	Dry eye syndrome

ICD-10 code for Dry Eye Syndrome	
H04.12 1, 2, 3, 5	Dry eye syndrome of lacrimal gland, right, left, both, unspecified

V. References.

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WAIVER GUIDE
Updated: Sep 2015
Supersedes Waiver Guide of Mar 2011
By: Capt Joanna Nelms (RAM 16) and Dr Dan Van Syoc
Reviewed by Col Geoffrey Towers, AF/SG Consultant for OB/GYN

CONDITION:
Dysmenorrhea (Sep 15)

I. Overview.

From the Greek "bad-monthly-flow," dysmenorrhea is pain with menstruation. The prevalence of dysmenorrhea is estimated at 40-90% of women, with 15% of adolescent females reporting severe dysmenorrhea.[1, 2] It is considered the leading cause of absenteeism from work or school in female adolescents and young women.[1] Dysmenorrhea is recurrent, crampy lower abdominal pain that occurs during menses. Dysmenorrhea is classified as either primary or secondary based on the absence or presence of an underlying cause. Primary dysmenorrhea occurs in patients with normal anatomy and without a known cause of pain. Symptoms also may include low back and thigh pain, sweating, tachycardia, headaches, nausea, vomiting, diarrhea, and tremulousness. The symptoms begin just before or during menses, lasting 12 to 72 hours. Primary dysmenorrhea begins with menarche, usually once ovulation starts.[2] Most adolescents experience dysmenorrhea in the first 3 years after beginning menses. Nulliparity (also no prior vaginal deliveries), smoking and heavy menstrual flow are risk factors for dysmenorrhea. Dysmenorrhea improves in most women after a full-term pregnancy.[2, 3]

Secondary dysmenorrhea is associated with pelvic conditions that cause pelvic pain in conjunction with menses, such as endometriosis, adenomyosis, uterine fibroids, and chronic pelvic inflammatory disease. The onset of secondary dysmenorrhea is usually in the patient's 20s to 30s, after relatively painless menstrual cycles in the past. Symptoms can occur at times other than during menses.[3]

A. Pathophysiology – primary dysmenorrhea.

The release of prostaglandin by the endometrium causes the symptoms associated with the menstrual period. The direct effects of prostaglandin on the uterus itself cause ischemia and intense contractions, thus the symptoms of cramping, lower abdominal pain or inner thigh pain. Prostaglandin in the bloodstream causes systemic symptoms, such as headache, nausea, diarrhea and myalgias. However, for this cascade of events to occur, prostaglandin must be produced and activate receptors.[4, 5]

In short, in order for the endometrium to release prostaglandin, estradiol from a developing ovarian follicle stimulates endometrial growth. After ovulation, progesterone from the corpus luteum converts the endometrium to the secretory phase, and when the progesterone levels drop, the menstrual period begins. Lastly, in order for the released prostaglandin to have an effect, it has to activate prostaglandin receptors. Women with very severe dysmenorrhea appear to both produce more prostaglandin and have more receptors. Conversely, if the cycle is anovulatory (decreased estradiol and progesterone), there is usually little pain.

B. Pathophysiology – secondary dysmenorrhea.

It is useful to view secondary dysmenorrhea as a mechanical problem of the uterus, or as something not involving the uterus at all. Polyps or fibroids in the uterine cavity may cause increased cramping as the uterus tries to push these out. Fibroids or endometrial glands invading the uterine muscle (adenomyosis) may disrupt the blood flow and the uterus may be far more susceptible to ischemia. Endometrial tissue outside of the uterus and growing on the abdominal/pelvic peritoneum (endometriosis) bleed at the time of the menstrual period, causing peritoneal pain. Varicosities in the uterine blood vessels can interfere with uterine blood flow (pelvic congestion syndrome). Cervical stenosis is narrowing of the cervical canal, usually at the level of internal os, which impedes the menstrual flow and thus uterine pressure increases at the time of menses. Severe cramping of the intestines (e.g., irritable bowel syndrome) can be worse during the menstrual period, and misdiagnosed as dysmenorrhea; or bladder pathology may present as perceived dysmenorrhea (as in Painful Bladder Syndrome, formerly called Interstitial Cystitis). Pelvic pathologies suggesting toward secondary dysmenorrhea include: onset after age 25, abnormal uterine bleeding, non-midline pelvic pain, absence of nausea/vomiting/headaches/GI symptoms during menstruation, dyspareunia or dyschezia, and progression of symptom severity.[4, 5] This waiver guide primarily deals with primary dysmenorrhea; see Uterine Fibroid, Endometriosis, and Pelvic Inflammatory Disease waiver guides for disposition of secondary dysmenorrhea.

C. Treatment.

Understanding the mechanisms above helps clarify the treatment options.

1. Reduce the endometrium. Less endometrium means less prostaglandin produced. Use of hormonal contraceptives, such as oral contraceptives (OCs), Nuva-Ring®, Ortho Evra® patch, Implanon®, or Depo-Provera® result in less endometrium. The estradiol in the combined oral contraceptives prevents ovarian follicle development and results in less ovarian estradiol to stimulate the uterine lining. OCs relieve the symptoms of primary dysmenorrhea in 90% of individuals treated.[3] Progestins also block estrogen receptors and thus inhibit endometrial growth. Contraceptives such as the intrauterine devices (IUDs) containing progestin (Mirena®) are also effective in reducing dysmenorrheal with approximately 50% reduction in prevalence.[6] Contrarily, IUDs without hormones may increase symptoms.

2. Prevent endometrial shedding. The progesterone-primed endometrium does not produce prostaglandin until the progesterone is withdrawn. If the progesterone is not withdrawn, then the uterus does not slough the endometrium and no release of prostaglandin occurs. Continuous progestin exposure, such as Depo-Provera® or continuous (without the one-week pause) cycles of an oral contraceptive, the ring, or the patch, work well for this. The disadvantage of continuous hormone contraception is breakthrough bleeding.

3. Prevent the prostaglandin production. Prostaglandin is not stored, but released at the time of the menstrual flow. Prostaglandin synthesis inhibitors, such as non-steroidal anti-inflammatory drugs (NSAID) and cyclooxygenase (COX-2) inhibitors reduce prostaglandin production. Therefore, these medications should be taken the day before the period begins or as soon as possible once the period begins to be effective. The levels need to stay elevated during the peak flow days, which is generally only 1-2 days. The doses used are at the upper limits for the drugs; typically ibuprofen 800 mg q 6-8 hours, naproxen 500 mg initially and then 250 mg q 6-8 hours, or mefenamic acid 500

mg loading dose followed by 250 mg q 6 hours.[3] NSAIDs provide relieve in 72% of treated women.[6]

4. Combinations. Most women do well using either NSAIDs or hormonal contraceptives, but some need to combine the two therapies. If hormonal and NSAIDs do not control the symptoms then further evaluation for secondary dysmenorrhea should occur.

5. Surgical. Women with primary or secondary dysmenorrhea that is not responsive to medical therapy should see a gynecologist for further evaluation to search for other causes of pelvic pain such as endometriosis. In the very rare condition when primary dysmenorrhea does not respond to medications and childbearing is not a consideration, the uterus can be removed. If the patient desires to preserve her uterus and the severe dysmenorrhea does not respond to medical management, cutting the pain nerves to the uterus (e.g., presacral neurectomy (PSN) and laparoscopic uterosacral nerve ablation (LUNA)) has been shown to help some patients.[6, 7]

6. Other. There are other modalities that are commonly used by primary care physicians as well as gynecologists that can be very efficacious. Locally applied heat can be as effective as oral analgesics for relief of pain. There are a few studies indicating that some dietary and vitamin regimens can reduce the severity of menstrual pain, but data is not yet conclusive. Other researchers have shown that exercise reduces menstrual symptoms as well. Behavioral interventions like biofeedback and relaxation techniques are useful with some women. Use of alternative medicine modalities such as acupuncture and yoga has been touted by some to be useful, but more data is needed before they can be widely recommended. Lastly, transcutaneous electrical nerve stimulation (TENS) has been found in several studies to be more effective than placebo for the treatment of primary dysmenorrhea.[6]

II. Aeromedical Concerns.

Primary dysmenorrhea can cause menstrual pains severe enough to distract or even incapacitate, thus affecting safety and mission completion. The additional symptoms of dysmenorrhea such as nausea, vomiting, diarrhea, headaches, myalgias, etc. may interfere with mission completion and safety.

III. Waiver Consideration.

Symptomatic dysmenorrhea is disqualifying for all flying classes, as well as for ATC/GBC and MOD duties, as well as retention if it meets the MSD criteria. Current wording in the MSD states: "Dysmenorrhea, menopausal, premenstrual symptoms, and/or abnormal uterine bleeding leading to inability to perform duties, frequent absences from duty or the need for ongoing specialty f/u more than annually." Most medications used to prevent or treat dysmenorrhea are compatible with flying duties. Hormonal contraceptives and the use of NSAIDs (ibuprofen, naproxen, and aspirin) for less than 72 hours are approved for flying and do not require waiver (see chart below).

Table 1: Waiver potential for dysmenorrhea

Flying Class (FC)	Condition†	Waiver Potential Waiver Authority
I/IA	Primary dysmenorrhea controlled with NSAIDs (ibuprofen, naproxen, aspirin) and/or hormonal contraceptives	N/A
	Primary dysmenorrhea not controlled on approved NSAIDs and/or hormonal contraceptives	No AETC
II, III ATC/GBC MOD**	Primary dysmenorrhea controlled with NSAIDs (ibuprofen, naproxen, aspirin) and/or hormonal contraceptives	N/A
	Primary dysmenorrhea not controlled on approved NSAIDs and/or hormonal contraceptives	Maybe* AFMSA

* Waiver in untrained FC II and FC III is unlikely; waiver authority for such cases is AFMSA.
† For dysmenorrhea resulting from secondary causes see waiver guides for Endometriosis, Uterine Fibroid and Pelvic Inflammatory Disease.
** Waiver authority for MOD cases is AFGSC.

AIMWTS search in Sep 2015 revealed 19 cases with a diagnosis of dysmenorrhea. There was 1 FC I/IA case (no disqualifications), 1 FC II case (no disqualifications), 12 FC III cases (3 disqualifications), 2 ATC/GBC cases (no disqualifications), and 3 MOD cases (no disqualifications). Two of the disqualification cases were due to intractable pelvic pain. The third disqualification was overturned after resubmission of accompanying TBI waiver.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for primary dysmenorrhea should include the following:
A. History – age of menarche, onset of pain, relation with onset of menstrual flow, severity, location of pain, additional symptoms, impact on activities, presence of pain not related to menses, prior medical and surgical treatment and effectiveness.
B. Pelvic exam.
C. Gynecology consult, if NSAIDs and/or OCs do not control pain or abnormal pelvic exam.

D. MEB results if required.

The aeromedical summary for waiver renewal for primary dysmenorrhea should include the following:
A. Interval history since last waiver submission.
B. Pelvic exam.
C. Consultation from treating physician.

ICD-9 code for dysmenorrhea	
625.3	Dysmenorrhea

ICD-10 codes for dysmenorrhea	
N94.4	Primary dysmenorrhea
N94.5	Secondary dysmenorrhea
N94.6	Dysmenorrhea, unspecified

V. References.

1. French L. Dysmenorrhea. Am Fam Physician, 2005; 71:285-91.

2. Morrow C and Naumburg EH. Dysmenorrhea. Prim Care Clin Office Pract, 2009; 36: 19-32.

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4. Smith RP and Kaunitz AM. Primary dysmenorrhea in adult women: Clinical features and diagnosis. UpToDate. Apr 2015.

5. Coco AS. Primary Dysmenorrhea. Am Fam Physician, 1999; 60:489-96.

6. Smith RP and Kaunitz AM. Treatment of primary dysmenorrhea in adult women. UpToDate. Feb 2014.

7. Howard F. Treatment of chronic pelvic pain in women. UpToDate. Feb 2015.

WAIVER GUIDE
Updated: Jan 2016
Supersedes Waiver Guide of Oct 2011
By: Col Elizabeth Anderson-Doze (RAM 16), Neuropsychiatry branch staff & Dr. Dan Van Syoc

CONDITION:
Eating Disorders (Jan 16)

I. Overview.

Basic Features
Eating disorders are characterized by a persistent disturbance of eating behavior resulting in altered consumption or absorption of food that impairs health or psychosocial functioning. Five adult eating disorder diagnoses are recognized in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5): anorexia nervosa, bulimia nervosa, binge-eating disorder, other specified feeding or eating disorder, and unspecified feeding or eating disorder.[1] Comorbidity with a wide range of other mental health disorders (e.g., substance use disorders, mood disorders, anxiety disorders) is common in eating disorders. The average age of onset is 18 years, but patients may present from late childhood through adulthood.[2]

Anorexia Nervosa
Food restriction leading to significantly low body weight, intense fear of gaining weight with corresponding behavior that interferes with weight gain, and cognitive distortions about one's weight are the three essential features of anorexia nervosa. Multiple medical conditions, such as hypotension, hypothermia, and bradycardia are associated with anorexia nervosa due to the semi-starvation and purging behaviors.[1] Less than 50% of anorexics recover within 10 years, 25% become chronic, and mortality can be as high as 25%.[3] Completed suicides are a documented consequence of anorexia nervosa and can reach rates of 12 per 100,000. Prevalence is much higher in females than males (10 to 1) with a 12-month prevalence of approximately 0.4% in young females.[1]

Bulimia Nervosa
Similar to anorexia nervosa, bulimia nervosa has three prominent features - recurrent episodes of binge eating, utilizing inappropriate behaviors (e.g., self-induced vomiting, laxatives, excessive exercise) to avoid gaining weight, and excessively emphasizing one's body in self-evaluation. Laboratory abnormalities are common as a result of the purging behavior and have been linked to hypokalemia which can provoke arrhythmias, and hyponatremia, which increases the risk of seizures. Twelve month prevalence in young females is 1-1.5%.[1] Prognosis for bulimics is better than anorexics. However, fewer than 70% recover within 10 years, while 30% continue to binge eat and purge.[4]

Binge-Eating Disorder
Recurrent episodes of consuming an abnormally large amount of food combined with a sense of helplessness to control one's eating behavior are the defining characteristics of binge-eating disorder. The episodes occur weekly for at least three months and the binge-eating is not followed by inappropriate methods of weight loss. Binge-eating disorder is more common in men than the aforementioned eating disorders, with females twice as likely as males to have the disorder (prevalence of 1.6% and 0.8% respectively).[1]

Other Specified Feeding or Eating Disorder
This diagnosis is used when the symptoms present cause significant distress or functional impairment but do not meet full criteria for the other eating disorders. DSM-5 gives guidance on possible cases, such as Atypical Anorexia Nervosa and Purging Disorder.[1]

Unspecified Feeding or Eating Disorder
Similar to Other Specified Eating Disorder, this category is used when clinically significant symptoms are present that do not meet full criteria for one of the other eating disorders. It is useful for situations in which the clinician does not have sufficient information for a more specific diagnosis.[1]

Treatment Options
Common treatment options include education on eating disorders and how they may manifest in a particular person's life, lifestyle changes, psychotherapy, and medications. Medications are typically recommended only if other measures are not effective and are generally less helpful in eating disorders as compared to other psychiatric conditions. They are often more helpful with co-occurring psychiatric illness than the eating disorder.

Healthy lifestyle interventions (exercise, relaxation, deep breathing, meditation, bibliotherapy, healthy eating, meaningful social connections, etc.) should always be considered in treatment planning.

II. Aeromedical Concerns.

A significant concern is the comorbidity of physical and emotional difficulties that lower the person's stamina for managing the high stress of military flying. For example, eating disorders can cause life-threatening metabolic alkalosis, hypokalemia, seizures, dehydration, and hypotension which impact readiness, mission completion, and flying safety. Anxiety and depression are comorbidities highly associated with eating disorders, and there exists an increased risk of suicide. Another area of concern is the strong association between eating disorders and personality disorders.[5, 6] Problematic personality characteristics common in eating disorders, such as emotional reactivity and perfectionism, may interfere with crew resource management and other aspects of crew relations essential to successful flying. Further, the course and outcome of these disorders is highly variable and marked by relapse with periods of remission alternating with recurrences.

III. Waiver Consideration.

Eating disorders are disqualifying for all flying classes to include ATC/GBC and MOD duties, and may be disqualifying for continued service. Untreated or undertreated eating disorders may have potentially disastrous consequences. If the diagnostic criteria are met for anorexia nervosa, bulimia nervosa, binge-eating disorder, other specified feeding or eating disorder, or unspecified feeding or eating disorder, the aviator is disqualified.

To be considered for waiver, a mental health evaluation with accurate diagnosis per the DSM-5 is the vital first step. USAF psychologists/psychiatrists familiar with aeromedical standards are the preferred choice for evaluation and potential development of the treatment plan.

Table 1: Waiver potential for eating disorders.

Flying Class (FC)	Waiver Potential Waiver Authority	Waiting Period Post-Treatment
I/IA	Maybe AETC	> 2 year†*
II, RPA Pilot and III, untrained	Yes MAJCOM	> 2 year†*
II, RPA Pilot and III, trained ATC/GBC, trained MOD, trained†	Yes MAJCOM	> 1 year#*

† For FC I/IA and all other untrained candidates with a history of eating disorders must have a minimum of two years remission, and documentation of successful treatment.
# For trained FC II, RPA Pilot, FC III, ATC/GBC and MOD with a history of eating disorders must have a minimum of one year remission and documentation of successful treatment.
* Patients with eating disorders must meet minimum aviation weight standards.
** Waiver authority for MOD personnel is either AETC or AFGSC

NOTE: Recommend that initial waiver be granted for only one year due to the high rate of relapse. Do NOT recommend an indefinite waiver.

A review of the AIMWTS database through Jan 2016 revealed 48 cases of eating disorders. Of the 48 cases, 31 (65%) were disqualified. Breakdown of the cases revealed: 5 FC I/IA cases (3 disqualifications), 5 FC II cases (3 disqualifications), 23 FC III cases (16 disqualifications), 3 MOD cases (1 disqualification), and 12 ATC/GBC cases (8 disqualifications). Of the 31 disqualified, 20 had a history of bulimia, 4 with anorexia nervosa and 7 with eating disorder unspecified or other specified.

IV. Information Required for Waiver Submission.

Submitting a Mental Health Waiver Guide:

AFI 48-123 –Chapter 6, USAF Medical Standards Directory, Section Q, and the Aeromedical Consultation Service (ACS) Waiver Guide addresses waiver evaluations

Step 1 - Is the aviator ready for waiver submission?

A. A waiver is submitted when the member is asymptomatic (back to best baseline functioning), as applicable to diagnostic category, for the specified time-frame below (Note: medications/psychotherapy for optimal therapeutic benefit are permissible and often advisable after initial symptom resolution):

☐ 1 Year—Eating Disorders, Psychotic Disorders & Somatic Symptom and Related Disorders

B. To be considered for an aeromedical waiver, any disqualifying condition must meet the following criteria per AFI 48-123 Section 6B, 6.2.1.1 through 6.2.1.6. (pg. 31):

☐ Not pose a risk of sudden incapacitation
☐ Pose minimal potential for subtle performance decrement, particularly with regard to the higher senses
☐ Be resolved, or be stable, and be expected to remain so under the stresses of the aviation environment
☐ If the possibility of progression or recurrence exists, the first symptoms or signs must be easily detectable and not pose a risk to the individual or the safety of others
☐ Cannot require exotic tests, regular invasive procedures, or frequent absences to monitor for stability or progression
☐ Must be compatible with the performance of sustained flying operations

Step 2 - Before beginning the Aeromedical Summary (AMS), Flight Surgeon must obtain Mental Health consultation and ensure it contains items specified below:

Instructions for the Mental Health Provider

The mental health evaluation must include a **comprehensive written report** addressing:

☐ Consultation must address each criteria in Step 1B
☐ Clinical mental health history (description of symptoms, treatment modality, frequency and compliance with treatment, relevant personal and family history, and perceived impact on occupational duties)
☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
☐ Appropriate laboratory results (i.e., thyroid, liver function tests, drug screen, CDT**, chemical profile…) ***** ***for alcohol cases, please comment on Carbohydrate-Deficient Transferrin (CDT) results*****
☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, input from line leadership, if possible, and please address current state of any triggers for the mental illness)
☐ Current and past aviation related duties and any history of current and past occupational performance difficulties (to include perceived impact of mental health condition on performance of duties)
☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)

- ☐ Summary and interpretation of psychological/neuropsychological testing results (recommend MMPI-2, NEO PI-III, PAI, or similar personality test, as well as cognitive testing/screening).
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly or engage in special duty operations (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)
- ☐ Please forward copies of all mental health or behavioral health records (Mental health, Behavioral Health, civilian provider, ADAPT, FAP, and/or inpatient treatment records) including the raw scores, standard scores, and in some cases T-scores from completed psychological or neuropsychological testing, in addition to the written report to ACS Neuropsychiatry Branch (address is below) when member completes the attached Release of Information form (information will be reviewed by ACS Clinical Psychologist)

Step 3 - Items for the Flight Surgeon to include in the AMS:

- ☐ AMS must clearly address each criteria in Step 1B and the risk to the member, mission, and safety
- ☐ Summarize Mental Health history and focus on occupational impact
  ***** If 2 or more months have passed since the comprehensive evaluation/report was completed, the flight surgeon should address how the member has done since and consult with the mental health provider if the member has been seen at mental health since the evaluation*****
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Appropriate laboratory results (i.e., thyroid, liver function tests, drug screen, CDT**, chemical profile…)
  ***** for alcohol cases, please comment on Carbohydrate-Deficient Transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, if possible - please address current state of any triggers for the mental illness)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)

Step 4 - Additional items to complete the waiver package:

NOTE:
DO NOT SEND AHLTA NOTES AS A SUBSTITUTE FOR MENTAL HEALTH

- ☐ Letter of support from command
- ☐ Have member complete/sign a **Release of Information** f
  Clinic (where treatment was provided) for processing. Instruct the MHC to release copies of MH record (provide MHC with ACS Neuropsychiatry Branch contact information, if necessary) and send to:

ACS Aerospace Medicine Branch, USAFSAM/FECA
c/o Neuropsychiatry Branch
2510 Fifth Street Bldg 840
Wright Patterson AFB, OH 45433-7913
Fax: (937) 904-8753 DSN: 674-8753

AUTHORIZATION FOR DISCLOSURE OF MEDICAL OR DENTAL INFORMATION

PRIVACY ACT STATEMENT

In accordance with the Privacy Act of 1974 (Public Law 93-579), the notice informs you of the purpose of the form and how it will be used. Please read it carefully.
AUTHORITY: Public Law 104-191; E.O. 9397 (SSAN); DoD 6025.18-R.
PRINCIPAL PURPOSE(S): This form is to provide the Military Treatment Facility/Dental Treatment Facility/TRICARE Health Plan with a means to request the use and/or disclosure of an individual's protected health information.
ROUTINE USE(S): To any third party or the individual upon authorization for the disclosure from the individual for: personal use; insurance; continued medical care; school; legal; retirement/separation; or other reasons.
DISCLOSURE: Voluntary. Failure to sign the authorization form will result in the non-release of the protected health information.
This form will not be used for the authorization to disclose alcohol or drug abuse patient information from medical records or for authorization to disclose information from records of an alcohol or drug abuse treatment program. In addition, any use as an authorization to use or disclose psychotherapy notes may not be combined with another authorization except one to use or disclose psychotherapy notes.

SECTION I - PATIENT DATA

1. NAME *(Last, First, Middle Initial)*	2. DATE OF BIRTH *(YYYYMMDD)*	3. SOCIAL SECURITY NUMBER

4. PERIOD OF TREATMENT: FROM - TO *(YYYYMMDD)*	5. TYPE OF TREATMENT *(X one)*
ALL	[ ] OUTPATIENT [ ] INPATIENT [ ] BOTH

SECTION II - DISCLOSURE

6. I AUTHORIZE *(Name of Facility/TRICARE Health Plan)* **TO RELEASE MY PATIENT INFORMATION TO:**

a. NAME OF PHYSICIAN, FACILITY, OR TRICARE HEALTH PLAN	b. ADDRESS *(Street, City, State and ZIP Code)*
Neuropsychiatry Branch - Aeromedical Consultation Service USAF School of Aerospace Medicine	2510 5th Street, Bldg 840, Area B Wright-Patterson AFB, OH 45433-7913
c. TELEPHONE *(Include Area Code)* (937) 938-2766	d. FAX *(Include Area Code)* (937) 904-8753

7. REASON FOR REQUEST/USE OF MEDICAL INFORMATION *(X as applicable)*

[ ] PERSONAL USE [ ] CONTINUED MEDICAL CARE [X] OTHER *(Specify)* **AEROMEDICAL CONSULTATION SERVICE WAIVER PACKAGE**
[ ] INSURANCE [ ] RETIREMENT/SEPARATION [ ] SCHOOL

8. INFORMATION TO BE RELEASED
All Mental/Behavioral Health (Sections A-F), ADAPT, FAP, and/or civilian records (when applicable). Please include any and all of the records to include, but not limited to: background questionnaires, intake forms, psychological/personality testing (standard, raw, T scores/reports), OQ-45 questionnaires, PCL-M, inpatient records, treatment notes (not AHLTA copies), etc.

9. AUTHORIZATION START DATE *(YYYYMMDD)*	10. AUTHORIZATION EXPIRATION DATE *(YYYYMMDD)*	ACTION COMPLETED
	[ ]	[ ]

SECTION III - RELEASE AUTHORIZATION

I understand that:
a. I have the right to revoke this authorization at any time. My revocation must be in writing and provided to the facility where my medical records are kept or to the TMA Privacy Officer if this is an authorization for information possessed by the TRICARE Health Plan rather than an MTF or DTF. I am aware that if I later revoke this authorization, the person(s) I herein name will have used and/or disclosed my protected information on the basis of this authorization.
b. If I authorize my protected health information to be disclosed to someone who is not required to comply with federal privacy protection regulations, then such information may be re-disclosed and would no longer be protected.
c. I have a right to inspect and receive a copy of my own protected health information to be used or disclosed, in accordance with the requirements of the federal privacy protection regulations found in the Privacy Act and 45 CFR § 164.524.
d. The Military Health System (which includes the TRICARE Health Plan) may not condition treatment in MTFs/DTFs, payment by the TRICARE Health Plan, enrollment in the TRICARE Health Plan or eligibility for TRICARE Health Plan benefits on failure to obtain this authorization.
I request and authorize the named provider/treatment facility/TRICARE Health Plan to release the information described above to the named individual/organization indicated.

11. SIGNATURE OF PATIENT/PARENT/LEGAL REPRESENTATIVE	12. RELATIONSHIP TO PATIENT *(If applicable)*	13. DATE *(YYYYMMDD)*
	self	

SECTION IV - FOR STAFF USE ONLY *(To be completed only upon receipt of written revocation)*

14. X IF APPLICABLE:	15. REVOCATION COMPLETED BY	16. DATE *(YYYYMMDD)*
[ ] AUTHORIZATION REVOKED		

17. IMPRINT OF PATIENT IDENTIFICATION PLATE WHEN AVAILABLE	SPONSOR NAME: SPONSOR RANK: FMP/SPONSOR SSN: BRANCH OF SERVICE: PHONE NUMBER:

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for an initial waiver for eating disorders should include the following:
A. History - Address pertinent positives and negatives such as symptoms of amenorrhea, constipation, abdominal pain, cold intolerance, lethargy and excess energy (activity level), and any social, occupational, administrative or legal problems associated with the case. Comment regarding stability of patient's weight.
B. Physical - height and weight, blood pressure, skin, cardiovascular, abdominal and neurologic.
C. Lab work including: complete blood count (CBC), chemistry 16 (electrolytes, glucose, calcium, magnesium, phosphorous, blood urea nitrogen, and creatinine), urinalysis, and ECG.
D. Psychiatric evaluation and treatment summary by a doctoral level provider. The evaluation should include objective psychological testing of the person's emotional and cognitive disposition, such as the most recent edition of the Minnesota Multiphasic Personality Inventory (MMPI) and the Wechsler Adult Intelligence Scales, fourth edition (WAIS-IV).
E. Dental evaluation for bulimia nervosa and others that purge.
F. Medical evaluation board (MEB) reports if applicable.
G. Input from the individual's commander/supervisor regarding the aviator's current status.

The AMS for a renewal waiver should include the following:
A. History - assessment for recurrences. Comment regarding stability of patient's weight.
B. Physical exam: height and weight, blood pressure, skin, cardiovascular, abdominal, and neurologic.
C. Psychiatric evaluation for first renewal and if clinically indicated on subsequent renewals.

ICD-9/ICD-10 codes for eating disorders	
307.1/F50.01/.02	Anorexia nervosa
307.51/F50.2	Bulimia nervosa
307.51/F50.8	Binge-eating disorder
307.59/F50.8	Other specified feeding or eating disorder
307.50/F50.9	Unspecified feeding or eating disorder

V. References.

1. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed. American Psychiatric Publishing, Arlington, VA, 2013.

2. Hudson JI, Hiripi E, Pope HG Jr, and Kessler RC. The Prevalence and Correlates of Eating Disorders in the National Comorbidity Survey Replication. Biol Psychiatry, 2007; 61: 348-58.

3. Bergh C, Brodin U, Lindberg G, and Södersten P. Randomized controlled trial of a treatment for anorexia and bulimia nervosa. Proc Natl Acad Sci USA, 2002; 99(14): 9486-91.

4. Keel PK, Mitchell JE, Miller KB, et al. Long-term Outcome of Bulimia Nervosa. Arch Gen Psychiatry, 1999; 56: 63-69.

5. Herzog, David B.; Keller, Martin B.; Lavori, Philip W.; Kenny, Gina M.; Sacks, N. R. The prevalence of personality disorders in 210 women with eating disorders. Journal of Clinical Psychiatry, Vol 53(5), May 1992, 147-152.

6. Lilenfeld, R. R., Wonderlich, S., Riso, L. P., Crosby, R. & Mitchell, J. Eating disorders and personality: a methodological and empirical review. Clinical Psychology Review, 2006; 26, 3: 299-320.

WAIVER GUIDE
Updated: Sep 2015
Supersedes Waiver Guide of Mar 2011
By: Dr Dan Van Syoc
Reviewed by LtCol Eddie Davenport, Chief ACS Cardiologist

CONDITION:
Ectopy, Supraventricular and Ventricular and Pairing (Sep 15)

I. Overview.

This waiver guide discusses isolated ectopy and paired ectopy (pairs, couplets) and assumes no associated hemodynamic symptoms. Supraventricular and ventricular tachyarrhythmias are discussed in separate waiver guides. Ectopy and pairs include premature supraventricular and premature ventricular contractions (PVCs). In this discussion, the term ectopy will refer to both supraventricular and ventricular ectopy unless otherwise specified. Supraventricular ectopy includes premature atrial contractions (PACs) and premature junctional contractions (PJCs). The term PAC will be used to refer to all supraventricular ectopy.

Ectopy is quantified as a percentage of total beats on a Holter monitor and is graded as rare (<0.5%), occasional (0.5% - 1%), frequent (>1%), and very frequent (>10%). Pairs are similarly graded as rare, occasional, or frequent by total number of pairs on a Holter monitor. Aeromedical disposition is determined by the grading of ectopy and pairs on a Holter monitor. Typically, Holter monitor will have been requested to evaluate ectopy on a 12-lead electrocardiogram, ectopy appreciated during physical examination, or to evaluate subjective complaints of palpitations.

On 12-lead electrocardiogram (ECG), PACs have been reported in about 0.6% of aviators and 0.4%-3.0% of civilian populations. PVCs have been reported in about 0.8% of aviators and 2.0%-7.0% of various civilian populations. Evaluating ectopy on 12-lead ECG is thus not a problem of large numbers but is nevertheless made difficult by the significant frequency of ectopy reported on 24-hour Holter monitors performed on apparently healthy subjects. Holter findings were reported on 303 male military aviators with no structural heart disease and no referral diagnoses of arrhythmia; only 12% had no ectopy. Rare and occasional PACs and PVCs occurred in about 75% and 50%, respectively. Frequent PACs and PVCs only occurred in about 2.5% and 3.5%, respectively. PAC pairs occurred in about 15%. Otherwise, more complex ectopy was unusual.

The presence of more than one PAC and/or PVC in 10 seconds (standard 12-lead ECG page) requires additional evaluation with a 24-hour Holter as outlined in the following table. DNIF is not required pending the 24-hour Holter.

Table 1: Guide to necessity for Holter monitor

ECG/Rhythm Strip	24-hour Holter Required[1]
PACs, PJCs < 2 PACs, PJCs ≥2	No Yes
Paired PAC, PJC or PVC ≥ 1	Yes

[1] Holter monitor results to include **interpreted report summary, representative tracings, and patient diary** must be forwarded to ECG library.

In summary, Holter monitor is required for two or more isolated premature beats and for one or more paired premature beats on a standard (10 second) single page of ECG paper, 12- lead or rhythm strip, regardless of the age of the aviator/aircrew. Holter monitor is no longer required for one isolated atrial, junctional or ventricular premature beat on a single page of ECG paper, 12- lead or rhythm strip.

The results of the 24-hour Holter will determine requirement for further work-up. IAW AF policy, waiver for isolated and paired ectopy is not required for any class of flying duties if local evaluation specified by and reviewed by the ECG Library discloses no other disqualifying findings. By ECG Library review, if isolated ectopic beats on the Holter are frequent or less (< 10% of total beats) and if ectopic pairs are occasional or less (10 total pairs or fewer), no further testing is required and the findings are aeromedically acceptable and considered normal variant. If ectopic beats are very frequent (>10% of total beats) and/or ectopic pairs are frequent (>10 pairs total), a treadmill test and echocardiogram should be performed with appropriate reports and tracings/images referred to the ECG Library for review. The aviator does not need to be DNIF during this assessment.

II. Aeromedical Concerns.

If isolated or paired ectopy itself causes hemodynamic symptoms, then aeromedical disposition is determined by the symptoms as well as by the presence and severity of underlying heart disease. In the absence of hemodynamic symptoms, there are three basic aeromedical concerns. One, does the ectopy represent a risk for sustained tachydysrhythmias? Two, does the ectopy represent a risk for cardiac events? And three, does the ectopy predict underlying cardiac disease?

In an ACS database of 430 aviators evaluated for nonsustained or sustained supraventricular tachycardia (SVT), frequent PACs, PAC pairs and nonsustained SVT were not predictive of hemodynamically symptomatic SVT or of recurrent sustained SVT. In a similar database of 193 aviators with nonsustained ventricular tachycardia, neither frequent PVCs nor PVC pairs predicted sustained ventricular tachycardia or associated hemodynamic events. These data suggest that frequent isolated ectopy and paired ectopy do not present an increased risk for tachyarrhythmic events in the absence of structural heart disease.

The predictive value of ectopy for underlying cardiac disease is less clear. The considerable frequency and variability of ectopy in normal subjects makes it difficult to determine its predictive value for disease. PACs may occur in association with some disease states, such as mitral valve prolapse, but prognosis is not related to the PACs. On the other hand, frequent and complex PVCs in the presence of coronary and some other heart diseases clearly confer a poorer prognosis. This is

true in clinical populations with significant, usually symptomatic disease. It may be less so in asymptomatic populations such as aircrew. However, some ACS databases do suggest increased prevalence of cardiac disease in the presence of significant ectopy.

III. Waiver Consideration.

Symptomatic ectopy which is significant enough to interfere with satisfactory performance of duty or requiring any medication for control is disqualifying for all flying classes as well as retention. For asymptomatic ectopy, waiver is not required if further evaluation specified by and reviewed by the ECG Library discloses no other disqualifying conditions.

Table 2: Policy for asymptomatic supraventricular and ventricular ectopy and pairing

Findings on 24-hour Holter	**Additional Local Testing**	**Flying Class/ Waiver Required Waiver Authority#**	**ECG Library makes final determination**	**ACS Review/ Evaluation**
PACs/PVCs ≤10% and/or 1-10 pairs	None	FC I/IA No AETC FCII/III and ATC/GBC & MOD No MAJCOM#	Yes Yes	No No
PACs/PVCs >10% and/or >10 pairs	Echocardiogram and treadmill test*	FC I/IA, II/III No (if normal studies) AETC ATC/GBC & MOD No (if normal studies) MAJCOM#	Yes Yes	Yes No

* Studies to be submitted to the ECG library, if found aeromedically acceptable no further work-up required.
# AFGSC is waiver authority for all MOD personnel.

AIMWTS search in Sep 2015 revealed a total of 155 cases carrying a diagnosis of supraventricular and ventricular ectopy and pairing. There were a total of 22 cases that were disqualified. Breakdown of the cases revealed: 4 FC I/IA cases (3 disqualified), 102 FC II cases (13 disqualified), 42 FC III cases (4 disqualified), 6 ATC/GBC cases (2 disqualified), and 1 MOD cases. Most of the disqualifications were due to other cardiac diagnoses.

IV. Information Required for Waiver Submission.

None, unless other disqualifying findings are found on further evaluation performed clinically or as specified by the ECG Library. In those cases, refer to the applicable waiver guide and/or as directed by the ECG Library. For symptomatic ectopy/pairing that is significant enough to interfere with satisfactory performance of duty, ensure MEB results are included in AMS.

ICD-9 Codes for **Supraventricular And Ventricular Ectopy And Pairing**	
427.60	Premature beats unspecified
427.61	Supraventricular premature beats
427.69	Other premature beats

ICD-10 Codes for **Supraventricular And Ventricular Ectopy And Pairing**	
I49.4	Unspecified premature depolarization
I49.1	Atrial premature depolarization
I49.2	Junctional premature depolarization
I49.49	Other premature depolarization

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WAIVER GUIDE
Updated: Aug 2014
Supersedes Waiver Guide of Mar 2011
By: Dr Dan Van Syoc
Reviewed by LtCol Patrick Ellison, AF/SG consultant in Dermatology

CONDITION:
Eczematous Dermatitis (Eczema) including Atopic, Contact, Nummular, Dyshidrotic, and Seborrheic Dermatitis (Aug 14)

I. Overview.

Dermatitis is a generic term that describes inflammatory conditions of the skin, and can have an acute or chronic course. "Eczema" and "dermatitis" are frequently used interchangeably. Eczema (eczematous inflammation) is the most common inflammatory skin disease.[1] The more commonly encountered eczemas (dermatitis) are atopic dermatitis (AD), contact dermatitis (CD), nummular dermatitis, dyshidrotic dermatitis (dishydrosis), and seborrheic dermatitis. History and physical exam are often all that is required to make these diagnoses.

Atopic dermatitis: AD, also known as atopic eczema, is a chronic relapsing skin condition characterized by intense itching, dry skin, and inflammation. AD is one of the most common skin diseases worldwide, with a prevalence up to 30%.[2] Prevalence in the United States is approximately 17%.[3] Over half (60%) of the cases are diagnosed in the first year of life and over 80% by age five.[3, 4] It is genetically transmitted and can affect up to 10-20% of the pediatric population.[5] AD develops as a result of a complex interrelationship of environmental, immunologic, genetic, and pharmacologic factors and may be exacerbated by infection, psychologic stress, seasonal/climate changes, irritants, and allergens. The disease often moderates with age, but patients carry a life-long skin sensitivity to irritants, and predisposition to occupational skin disease.

AD is diagnosed based on a constellation of clinical findings, mainly pruritus, chronic/relapsing dermatitis, personal/family history of atopic disease, and facial/extensor involvement in infants/children and flexural lichenification in adults. AD is often intensely pruritic and acutely characterized by erythematous papules with excoriation, vesicles, and exudate, with later scaling and thickened plaques, and chronic disease manifesting with lichenification and fibrotic papules. The disease is exacerbated by dry climates and affected individuals may have an increased susceptibility to contact irritants. Complications include ocular problems (eyelid dermatitis, chronic blepharitis, disabling atopic keratoconjunctivitis, vernal conjunctivitis, intense pruritus, keratoconus, cataracts), recurrent skin infections, hand dermatitis (aggravated by wet work), and potentially life-threatening exfoliative dermatitis. AD is frequently associated (up to 70%) with allergic rhinitis and/or asthma.[6] A recent Swedish study confirms the high co-morbidity of eczema and asthma.[7]

AD is often perceived as a minor condition. However, studies have shown that AD has a greater effect on quality of life than other common skin diseases, such as psoriasis. There is no complete cure for AD, so medical treatment focuses on avoidance of triggers, skin hydration, and reduction of skin inflammation.

Contact dermatitis: CD is a delayed-type reaction to an exogenous substance that serves to "trigger" a skin reaction. Irritant contact dermatitis (ICD) represents about 80% of all contact-related dermatoses and results from non-immunologic physical or chemical damage to the skin and can occur in any individual.[8] Allergic contact dermatitis (ACD) is an immune system reaction, delayed (type IV) hypersensitivity. While anyone with a normal cell-mediated immune response can develop ACD, it appears that the ability to respond to certain antigens has a genetic predisposition.[9] The most common sensitizer in North America is urushiol found in poison ivy, poison oak and poison sumac.[10] It is estimated that over 70% of the US population would acquire ACD if casually exposed to these plants.[11] Other common sensitizers include nickel (jewelry), formaldehyde (permanent press clothing), fragrances, preservatives (quarternium-15), rubber, latex, and topical antibiotics (neomycin and bacitracin).[9]

ICD is correlated with exposure to offending agents, and may cause a stinging or burning sensation initially followed by induration, blisters, erythema, or chapping in acute stages; it can also progress to the chronic findings listed for AD. ACD may be acute presenting with vesicles and erythema or chronic with lichenification and scale. It is characterized by pruritus and correlates with allergen exposure.

The diagnosis of ACD can be confirmed by patch testing. Confirmatory tests for the diagnosis of ICD are not available, but patch testing can be used to rule out ACD.

Table 1: Characteristics of atopic dermatitis (AD), irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD)

Characteristics	**Atopic Dermatitis**	**Irritant Contact Dermatitis**	**Allergic Contact Dermatitis**
Identifiable, controllable trigger	Possibly	Yes	Yes
Patch test confirms diagnosis	No	No	Yes
Genetic contribution	Yes	No	Yes
Percent of contact dermatology cases	N/A	80%	20%
Environmental, psychological or seasonal variation	Yes	No	Possibly

Nummular dermatitis: Nummular dermatitis/eczema consists of intensely pruritic coined-shaped, erythematous patches, consisting of papules, vesicles, scaling, crusting and some serous oozing (eczematous dermatitis). Lesions can number from a few to as many as 20 to 50, varying in size from 2 to 10 cm diameter, usually on the trunk and extremities. Nummular dermatitis occurs most frequently in individuals in their 50s to 60s and equally among sexes.

Dyshidrotic dermatitis: Dyshidrosis is intensely pruritic chronic recurrent dermatitis involving the lateral sides of the fingers, palms and soles. The typical finding is multiple small vesicles that

gradually desquamate over one to two weeks, leaving erosions and fissures that slowly resolve. An "id reaction" to active foot dermatophytosis and scabies must be considered in the differential.

Seborrheic dermatitis: Seborrheic dermatitis is a common problem of erythematous patches with fine, greasy-appearing scales, located usually on the nasofacial area, eyebrows, mid forehead, ears, mid chest/back and scalp. Dandruff of the scalp is a mild form of seborrheic dermatitis with minimal inflammation.[7]

Treatment: Treatment of dermatitis requires a systematic, multi-pronged approach that incorporates careful skin cleaning and hydration, elimination of flare factors and potentially medical therapy. Individualized skin care is essential in dermatitis patients. Regular use of emollients to manage dry skin helps to maintain skin barrier function and prevent flare-ups. Eliminating exposure to a triggering factor or material may not be possible due to the difficulty in determining the factor or removing from a patient's life.

If prevention or over the counter treatment fails, first-line therapy is topical prescription corticosteroids for AD, ICD, ACD, nummular eczema, dyshidrosis, and non-scalp seborrheic dermatitis.[12] For severe cases systemic corticosteroids may be required. Antihistamines have been used to treat the pruritus, however the evidence supporting use is relatively weak.[13, 14] Other immuno-modifying medications such as cyclosporine, azathioprine, mycophenolate and interferon gamma have been used in severe cases of AD.[14] Ultraviolet (UVB or PUVA) light therapy is usually reserved for severe cases of AD and as a second- or third-line treatment. New topical agents for AD such as pimecrolimus and tacrolimus can be used as second-line treatments, and act as cutaneous immunosuppressants by inhibiting calcineurin, a calcium-activated phosphatase. Pimecrolimus (Elidel®) is approved for aircrew, ATC/GBC, and SMOD use for AD. Tacrolimus (Protopic®) is not approved due to plasma levels with topical use that approach those seen in systemic therapy. While evidence of clinical systemic toxicity with topical therapy has been largely limited to constitutional symptoms, subclinical neurotoxicity has not been addressed.[15] Seborrheic dermatitis of the scalp is treated with daily shampooing with an antiproliferative (tar, selenium sulfide, zinc pyrithione) or antimicrobial (ketoconazole, ciclopirox) shampoo. In addition to topical corticosteroids non-scalp seborrheic dermatitis can be treated with topical antifungal agents.

II. Aeromedical Concerns.

Aeromedical concerns include the risk of in-flight distraction/reduced performance as well as disease progression and medical treatment incompatibility due to the military aviation environment. Discomfort from pruritus or pain can be significant and the resulting distraction may jeopardize flight safety or optimal performance. AD is associated with allergic rhinitis and asthma and aircrew require a thorough evaluation of those conditions for compatibility with flying duty. Complications from AD involving the eyes can occur and keratoconus (elongation and protrusion of the corneal surface) is believed to be more common in the atopic patients. Affected skin in areas where there is constant pressure or rubbing from aviation equipment (helmet, gloves, mask, harnesses, and seat) may cause disease progression, and therefore, additional performance decrement.

Use of systemic corticosteroids, high potency topical steroids, and antihistamines may cause side effects that would jeopardize flight safety. In the short term, PUVA light therapy (not UVB) has side effects that include nausea, dizziness, headache, and photosensitivity. Long term side effects include pruritus, skin damage, and increased skin cancer risk. UV therapy may require several

treatments per week, and could be unavailable in a deployed setting, and may require excessive time lost from flying duty. If the trigger or flare factors cannot be identified and avoided, there is a potential for recurrence that may be incompatible with worldwide qualification and/or flying duties. In short, the severity of the dermatitis and treatment utilized determines the waiverability of the case.[14]

III. Waiver Consideration.

Atopic dermatitis or eczema after the eighth birthday is disqualifying for entry into the US Air Force, therefore these individuals would also not qualify for initial training in any career field to include FC I/IA, II, III, ATC/GBC, and MOD. Flyers that are asymptomatic with minimal potential for flare-ups and those controlled with topical therapy for areas not interfering with aviation equipment can expect a waiver. The following conditions require a **medical evaluation board** prior to waiver submission: Atopic dermatitis, severe or requiring frequent hospitalization, and eczema, chronic, regardless of type, when there is moderate involvement or when there are repeated exacerbations in spite of continuing treatment.

Those with severe symptoms or triggers that cannot be avoided are unlikely to obtain a waiver even if returned to worldwide duty

Table 2: Waiver potential for dermatitis

Flying Class (FC)	Disqualifying Condition/Treatment	Waiver Potential Waiver Authority
I/IA	Any chronic skin disorder, which is severe enough to cause recurrent grounding from flying duties, or is aggravated by, or interferes with, the **wearing of military equipment**.	No AETC
	Atopic dermatitis/eczema controlled with topical steroids, topical pimecrolimus, and/or oral non-sedating antihistamines (Fexofenadine or loratadine).	No AETC
	Atopic dermatitis/eczema controlled with topical tacrolimus, oral steroids, oral cyclosporine, or PUVA.	No AETC
	Eczema, chronic and resistant to treatment	No AETC
	Verified history of atopic dermatitis or eczema after age 8	No AETC
II, III	Any chronic skin disorder, which is severe enough to cause recurrent grounding from flying duties, or is aggravated by, or interferes with, the **wearing of military equipment**.[1]	No[1] MAJCOM
	Atopic dermatitis/eczema controlled with topical steroids, topical pimecrolimus, and/or oral non-sedating antihistamines (fexofenadine or loratadine).	Yes[2] MAJCOM
	Atopic dermatitis/eczema controlled with topical tacrolimus, oral steroids, oral cyclosporine, or PUVA.	No[2] MAJCOM
	Eczema, chronic and resistant to treatment	No MAJCOM
ATC/GBC, MOD[4]	Atopic dermatitis/eczema controlled with topical steroids, topical pimecrolimus, and/or oral non-sedating antihistamines (Fexofenadine or loratadine).	No waiver required[2,3]
	Atopic dermatitis/eczema controlled with topical tacrolimus, oral steroids, oral cyclosporine, or PUVA.	No[2] MAJCOM

1. If change in aircraft could eliminate exposure to protective equipment then categorical waiver may be possible and AFMSA is waiver authority.
2. Please see 'Approved Aircrew Medications' and 'Approved Space and Missile Operator Medications' lists for current medication restrictions.
3. DNIF/DNIC/DNIA may be required for ground trial and/or adequate control of symptoms.
4. Waiver authority for MOD personnel is AFGSC.

AIMWITS search in Jul 2014 revealed a total of 297 members with an AMS containing the diagnoses of eczematous dermatitis or seborrheic dermatitis. There were a total of 59 disqualifications. Breakdown of the cases revealed: 67 FC I/IA cases (19 disqualified), 114 FC II cases (9 disqualified), 101 FC III cases (29 disqualified), 13 ATC/GBC cases (2 disqualified), and 2 MOD cases (0 disqualified)**.**

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial and renewal waivers should include the following:
A. A thorough history to include time of onset, location, frequency, identification and ability to avoid flare factors, and treatments.
B. Skin exam describing lesions and locations.
C. Information about deployability, duty limitations, and comments addressing interference with use of aviation equipment or jeopardy to mission safety.
D. Copy of dermatology consultation, in moderate/severe cases.
E. Confirmation of presence or absence of history/current asthma and allergic rhinitis.
F. Optometry/ophthalmology consult if eyes involved.
G. Medical evaluation board (MEB) results if severe atopic dermatitis or chronic moderate/severe eczema with repeated exacerbations in spite of treatment.

ICD-9 codes for dermatitis	
690	Seborrheic dermatitis
691	Atopic dermatitis and related conditions
692	Contact dermatitis and other eczemas

ICD-10 codes for dermatitis	
L21.9	Seborrheic dermatitis, unspecified
L20.9	Atopic dermatitis and, unspecified
L25.9	Unspecified contact dermatitis, unspecified cause

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WAIVER GUIDE
Updated: Feb 2015
Supersedes Waiver Guide of Sep 2011
By: Lt Col Paul Puchta (RAM 16), CDR Michael Acromite (Navy RAM and ObGyn), and Dr. Dan Van Syoc

CONDITION:
Endometriosis (Feb 15)

I. Overview.

Endometriosis is defined as proliferation of endometrial glands and stroma outside the endometrial cavity. The ectopic endometrial implants are associated with pain and typically located in the pelvic region, but can occur anywhere in the body.[1] The prevalence of endometriosis in reproductive age women is 6-10% and as high as 35-50% in women with pain or unexplained infertility.[2] Morbidity rates with endometriosis are significant. Endometriosis is the underlying cause in a significant percentage of patients presenting with pelvic pain. In fact, endometriosis is felt to be the underlying cause in approximately 15% of cases of pelvic pain. Pain is the most common symptom associated with endometriosis and approximately three quarters of symptomatic patients experience pelvic pain and/or dysmenorrhea.[3] In addition to the pelvic pain associated with menstruation, the pain can be located in the lower abdomen and/or lower back and associated with exercise, micturition, or defecation.[4] The range of symptoms include: chronic pelvic pain, dysmenorrhea, deep dyspareunia, subfertility, abnormal menstrual bleeding, chronic fatigue, low back pain and bowel or bladder symptoms, often cyclical and associated with dyschezia, bloating, constipation, rectal bleeding, diarrhea, and hematuria.[3, 5]

Endometriosis was first described in 1860 and has confounded clinicians ever since.[6] In the 1990s, it was the third most common gynecological diagnosis identified in patient summaries amongst women 15 to 44 years of age.[7] Although endometriosis is one of the most researched gynecological entities, many aspects of its etiology still remain elusive. The classical theories for the development of endometriosis include "coelomic metaplasia theory" and the "theory of embryonic cell remains," which suggest that the endometriosis lesions develop from pluripotent tissue of embryonic origin. Another is the "theory of lymphovascular metastases" which implies that endometrial cells spread like metastatic tumor cells via lymphatic and blood vessels as evidenced by rare findings of endometriosis in distant sites such as the lung and brain. Today, the theory most commonly considered is the "implantation theory." It suggests that during menstruation, endometrial cells from uterus enter the abdominal cavity by retrograde flow through the fallopian tubes to implant in other tissues within the abdomen or pelvis.[8]

The etiology of endometriosis is not fully understood and is probably multifactorial. Multiple births, extended intervals of lactation, and late menarche (after age 14) decrease the risk of being diagnosed with endometriosis, whereas nulliparity, early menarche/late menopause, short menstrual cycles, prolonged menses, and müllerian anomalies increase the risk.[9, 10] Furthermore, there are also suggestions of a genetic predisposition for endometriosis in some women.[11]

Symptomatic endometriosis is generally a progressive disease. Its clinical manifestations are variable and unpredictable in both presentation and course.[11] Its painful symptoms commonly begin in the late teens or later with cyclic perimenstrual pain. Hormonal contraception started to

control menstrual pain or for contraception may suppress progression of the disease and its symptoms until these suppressive medications are discontinued later. The endometriosis implants grow within the pelvis or abdomen in response to endogenous hormonal cycles in a way that is similar to endometrial tissue within the uterus. The growing and menstruating ectopic endometriosis tissue irritate the abdominal and pelvic peritoneum resulting in scar tissues that progress to symptomatic adhesive disease and often infertility. These pain symptoms can be independent of the menstrual cycle at this stage. As such, clinical diagnosis can be clouded since the symptomatic endometriosis can start as cyclic menstrual pain, remain sub-clinical under hormonal suppressive therapy, and/or progress later to non-cyclic and unpredictable pain syndromes admixed with the severe menstrual pain.

The physical exam may reveal adnexal or uterine tenderness, a pelvic mass, or tender rectovaginal nodules. However, many patients have a normal pelvic examination. While the diagnosis can be made clinically, the diagnosis is definitively made by direct visualization and biopsy during laparoscopy.[11] The surgical findings are often disparate from the clinical pain symptoms. Debilitating symptoms are often found in women with few endometriosis lesions identified at surgery, while others are asymptomatic with significant endometriosis lesions and pelvic adhesions.

Medical control of endometriosis may be accomplished through suppressing endogenous estrogen production by suppressing ovarian function. The endometriosis implants proliferate in response to endogenous or exogenous estrogen in a way similar to the endometrium. Progesterone suppresses the growth of endometriosis implants similarly to its suppression of endometrial tissues. Hormonal contraceptives suppress ovarian function by their progesterone-dominant effect inhibiting ovarian function through the hypothalamus-pituitary-ovarian axis. Gonadotropin releasing hormone (GnRH) agonists also decrease systemic estrogen by halting ovarian function during treatment by reversibly discontinuing stimulus to the ovaries and effectively inducing a temporary medical menopause. Surgical evaluation is commonly used for diagnosis. Surgical treatment is commonly required to eliminate endometriosis implants, reduce adhesions, remove one or both ovaries, and in some cases remove the uterus.

Current guidelines for the treatment of endometriosis recommend combined hormonal contraceptives (CHC) as first-line agents. Although these medications include a progestin and an estrogen, they are progesterone dominant and generally provide adequate suppression with little side effects.

Administration of progestin-only medications, orally, intramuscularly (Depo-Provera®), or subcutaneously (Implanon®) are also effective and considered a first-line therapy.[12] These are effective in treating the symptoms of endometriosis with minimal side effects in most women. The androgenic medication danazol has been historically used, but infrequently used today due to its significant androgenic side-effects. Non-steroidal anti-inflammatory drugs (NSAIDs) are also commonly used alone or as an adjuvant therapy to manage pain symptoms.

Second line medical therapies include GnRH analogs such as Lupron Depot® or Zoladex®. These reversibly stop ovarian function and ovarian estrogen by inducing a reversible medical menopause. These are administered by injection monthly or every three months based on the dose. They are gonadotropin releasing hormone agonists and as such, initially stimulate ovarian function and increase estrogen production transiently (few days) before reversibly suppressing and ceasing ovarian function and estrogen production. The initial transient increased estrogen production may

induce a flare of painful symptoms prior to the expected relief from subsequent potent suppression. They induced reversible menopause and use is generally limited to six months or less, but occasionally is continued beyond this time limit by adding a small dose of estrogen add-back therapy. The add-back therapy is used due to the risk of osteoporosis from induced menopause. Although these treatments are very effective in suppressing endometriosis implants, they are associated with other significant adverse side effects. These side effects vary across individuals and include typical menopausal symptoms such as vasomotor symptoms (hot flushes), mood lability, vaginal dryness, and fatigue, each of which can occur in unpredictable patterns. While these symptoms are acceptable when compared to the pain of endometriosis, the symptoms and their unpredictability are generally considered unacceptable in the aviation environment.

Other oral medications, such as aromatase inhibitors, are less commonly used but have been used with benefit when used in combination with progestins.[11] Although the aromatase inhibitors work differently from GnRH analogs, they should be aeromedically managed similarly to GnRH analogs.

While endometriosis can be diagnosed empirically based on symptoms and without surgery, laparoscopy remains the gold standard for diagnosis and treatment. Surgery for endometriosis diagnosis has a sensitivity of 69% and specificity of 83%. While surgical visualization is often adequate for diagnosis, biopsy that confirms ectopic endometrial glands and stroma is definitively diagnostic. Surgical treatment is generally reserved for those in whom medical treatment has failed.[12] Laparoscopic management should be individualized by maintaining an approach toward disease, while protecting function of pelvic structures.[13] Minimally invasive surgical treatment is used to reduce, remove, or destroy ectopic endometrial implants and remove adhesions, which can provide the necessary relief. When necessary, further surgical treatments include primarily removing one or both ovaries, and may also include removing the uterus. Each surgical method may require subsequent adjuvant hormonal suppression.

II. Aeromedical Concerns.

Endometriosis is a progressive disease and any history is considered disqualifying for FC I/IA. It is disqualifying for retention, as well as flying classes II and III, GBC, MOD and OSF when it is results in an inability to perform duties, requires frequent absences from duty or requires ongoing specialty follow-up more than annually. There is little correlation between the physical extent of the disease and severity of symptoms women report.[14] The pain associated with endometriosis usually begins as low grade discomfort and may progress over hours or days to a severe discomfort that is distracting. The pain may initially be predictable and occur in a cyclic perimenstrual fashion, but often progresses over time. Endometriosis often requires control with aeromedically approved medications. In these cases, it is not expected to be acutely incapacitating and continued flying should not be problematic for patients with symptoms that are well controlled with approved medications.[15] However, when the disease progresses and/or is poorly controlled, the cyclical pain may begin to include non-cyclic pains that can be severe and distracting in an unpredictable pattern. In these cases, more aggressive medical therapy or surgical treatment may be required. A more aggressive therapy, GnRH analogs are administered monthly or every three months depending on the dose, but have persistent effects throughout the dosing period. These medications are often associated with significant and unpredictable side effects that are aeromedically unacceptable. As such, these medications are not aeromedically approved and generally not considered for waiver. A requirement for surgical treatment can be an indicator of the disease severity and failure of medical therapy. Although a history of pelvic surgery is not considered disqualifying when uncomplicated,

the severity of the endometriosis of these cases remains disqualifying. Although removal of one or both ovaries may be therapeutic, removal of both ovaries and uterus is generally definitive treatment. In either case, residual or recurrent endometriosis, or an adjuvant treatment requirement still remain possibilities requiring aeromedical monitoring for possible symptom recurrence. Menorrhagia is often associated with endometriosis, and can cause an anemia. Evaluation of the hematocrit and/or hemoglobin levels is necessary in an aeromedical assessment. The primary goal is to treat these patients to the standard of care and the secondary goal is to use a treatment that may be considered for waiver.

III. Waiver Consideration.

A history of endometriosis is disqualifying for FC I/IA. Endometriosis is disqualifying for retention, as well as all flying classes when it results in inability to perform duties, or requires frequent absences or ongoing specialty care greater than annually.

Table 1: Waiver potential for endometriosis

Flying Class	**Medication/Treatment Required for Symptom Control of Endometriosis**	**Waiver Potential Waiver Authority**
I/IA	Documented history of endometriosis	No AETC
II/III	NSAIDs, estrogen/progesterone combinations, DepoProvera#	Yes MAJCOM
	Danazol, GnRH*	No AFMSA
	Surgery	Yes MAJCOM
ATC/GBC MOD**	NSAIDs, estrogen/progesterone combinations, DepoProvera#	Yes MAJCOM
	Danazol, GnRH*	No MAJCOM
	Surgery	Yes MAJCOM

*GnRH-gonadotropin releasing hormone agonists.
**Waiver authority for MOD personnel is AFGSC.
All medications and medication combinations need to be themselves approved for use in aircrew.

Review of AIMWTS through Dec 2014 showed 47 endometriosis cases submitted; 12 of these cases were disqualified. Of the cases disqualified, three had symptoms that were not controlled or required non-waiverable medications, four were initial FC III with either a recent diagnosis and/or had an inadequate period of symptom control, and four had other disqualifying diagnoses.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed, all appropriate treatments have been initiated using current clinical guidelines/recommendations, and after an adequate period of symptom control with evidence of treatment tolerance and without adverse side effects.

The AMS for the initial waiver for endometriosis should contain the following:
A. Complete history of symptoms and degree to which they incapacitate the patient
B. Treatments utilized, last symptoms, current medications, and any procedures.
C. Gynecological evaluation report.
D. Labs to include the most recent hematocrit.
E. MEB results if applicable.

The AMS for waiver renewal for endometriosis should include the following:
A. Interval history including treatments, tolerance, and any adverse side effects.
B. All applicable labs, particularly most recent hematocrit.
C. Consultation from gynecologist or primary care physician.

ICD-9 Code for Endometriosis	
617.9	Endometriosis, site unspecified

ICD-10 Code for Endometriosis	
N80.9	Endometriosis, unspecified

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WAIVER GUIDE
Updated: Mar 2015
Supersedes Waiver Guide of Feb 2012
By: LtCol Michelle R. Brown (RAM 16) and Dr. Dan Van Syoc
Reviewed by Col Pat Storms (RAM 05 and USAF Gastroenterologist)

CONDITION:
Eosinophilic Esophagitis and Eosinophilic Gastroenteritis (Mar 15)

I. Overview.

The eosinophilic gastrointestinal disorders are comprised of eosinophilic esophagitis (EoE) and eosinophilic gastroenteritis (EG), both which can be seen in adults or children, along with eosinophilic enteritis and colitis. Eosinophils are not distributed homogeneously throughout the gastrointestinal tract. Typically, the highest numbers are found in the cecum and appendix, while the esophageal epithelium is unique in being devoid of eosinophils under normal conditions.[1] Eosinophilic inflammation of the GI tract may represent a primary process or may be secondary to other diseases. The finding of eosinophils in the squamous epithelium of the esophagus is abnormal, according to the American College of Gastroenterology (ACG), who strongly recommends identification of etiology.[2]

Esophageal eosinophils were long thought to be a hallmark of gastroesophageal reflux disease (GERD), but it is now acknowledged that esophageal eosinophilia can appear in response to a variety of stimuli.[3] EoE may be associated with allergy (atopic) or may occur in isolated fashion (idiopathic). Esophageal eosinophilia was first reported in an adult patient in 1975, but it was not until 1995 that unique cases were identified and EoE described as a clinical entity.[4] Despite being a newly recognized entity, it is likely accelerating in incidence.[3] The majority of cases have been in men and occurs in all ages with a peak in the fifth decade of life; the disease can affect all spectrum of age, race or sex.[5, 6] Individual and/or family histories of allergic diseases (food allergies, atopic dermatitis, asthma, allergic rhinitis, allergic conjunctivitis) have been noted in over 50% of individuals with EoE. The most common symptom for EoE is dysphagia to solid food, and esophageal foreign body impaction is now recognized as a major presenting feature of EoE, accounting for over 50% of such episodes.[3, 7] Indeed, having EoE was the strongest predictor of having multiple foreign body impactions.[8] Some researchers have pointed to evidence supporting a familial predisposition to EoE which may explain the strong male preponderance.[9, 10]

EoE may mimic GERD and can be differentiated from GERD on the basis of the magnitude of mucosal eosinophilia and the lack of response to acid suppression.[4] Some experts feel that EoE and GERD commonly coexist and may be almost indistinguishable from one another.[6] In some cases, the diagnosis was prompted by a poor response to surgical treatment of presumed GERD through fundoplication. Symptoms have usually been present for 4.5 years prior to diagnosis, and are not always associated with a defined esophageal stricture, though proximal strictures in EoE may occur. Endoscopic findings seen with EoE include strictures (frequently proximal), linear furrows, a small-caliber esophagus and multiple white papules (eosinophilic microabscesses). Clinical guidelines for EoE were established in 2013 by the ACG. Diagnostic criteria include both clinical and pathologic information. Esophageal biopsies are required for diagnosis and the ACG strongly recommends two to four biopsies be obtained from both proximal and distal esophagus.[2]

Treatment of EoE is based on limited clinical experience, case series and small controlled trials. The endpoints include resolution of clinical symptom and a reduction in the eosinophilic infiltrate.[2] Acid suppression is usually not successful or at best achieves a partial response.[11] It is, however, commonly used in an effort to combat the pyrosis these patients often report. Systemic or topical corticosteroids have been shown to improve symptoms. Topical steroids, such as fluticasone or budesonide swallowed for eight weeks, are first-line pharmacologic therapy based on strong evidence.[2] Fluticasone is generally administered via metered dose inhaler at a dose of two 220 mcgm puffs swallowed twice daily (880 mcgm/day). Doses as high as 1760 mcgm/day have been used in those refractory to the standard dose.[12] The high relapse rate (~65%) noted in one study in children suggests that chronic or repeated therapy may be needed.[13] There is some evidence for the use of systemic steroids in non-responders to topical steroids and in patients that require rapid improvement in symptoms.[2] Elimination diets and, in particular, elemental diets, have shown improvement in children and adolescents and may be considered as an initial therapy (moderate evidence).[2] Esophageal biopsy and symptom improvement should be used to assess the effectiveness of dietary treatment (recommendation conditional, evidence low).[2]

Dilation of strictures may be initial therapy for individuals with dysphagia and food impaction or used in symptomatic patients with strictures who have failed medical and dietary therapy, but care is warranted, as patients with EoE have delicate esophageal mucosa, prone to tearing, and often have narrowed luminal diameters.[13] Post-dilation substernal pain out of relation to the extent of dilation is commonly encountered in EoE patients, and repeating EGD after a dilation may reveal long mucosal rents with a very worrisome appearance. No esophageal perforations were reported in one series in which 70 dilations were performed in a group of 36 patients, but post-procedure chest pain and demonstrated mucosal rents warrant a careful approach to dilation in these patients. Antihistamines, cromolyn and montelukast (at doses of about 100 mg/day), and mepolizumab have been used; their efficacy has not been established.[14] Long-term prognosis is unknown. The relatively recent recognition of EoE as a clinical condition has impacted the clear definition of its natural history, but EoE appears to be a chronic disease with a waxing and waning course, as suggested by a noteworthy relapse rate of 80% in an eight-year follow-up of children with EoE, and similarly high rate of recurrent symptoms and chronic therapy in adults.[1]

Eosinophilic infiltration may occur in one or more segments of the GI tract with signs and symptoms related to the layer (mucosa, muscle, and/or subserosa) and extent of bowel involved. In published reports, the stomach (26 to 81%) and small intestine (28 to 100%) are the predominant areas affected.[1] The pathogenesis is not well understood. EG affects 22-28 per 100,000 persons and typically presents with symptoms of abdominal pain, nausea, vomiting, and diarrhea.[15] Endoscopic biopsy is used to confirm eosinophilic infiltration. Symptoms suggesting gastric outlet and intestinal obstruction are common due to a gut made thick and rigid from the eosinophilic infiltration. In subserosal disease, individuals may present with eosinophilic ascites. Peripheral eosinophil counts are elevated in 80% of patients and are frequently seen in mucosal and subserosal disease.[15] EG is associated with atopy manifest as asthma and allergies in 50% of cases.[15] It has a peak onset in the third decade and affects males slightly more than females.[15] Treatment is primarily oral steroids. Cromolyn, montelukast and elimination diets have shown mixed results in published trials. Compliance is of primary concern with elimination diets. The natural history of EG is not well known. Some individuals have no recurrence, while a few will flare concurrently with or immediately after prednisone taper, and still others may experience periodic flares months to years after the initial episode.

II. Aeromedical Concerns.

Symptoms relevant to aviation include dysphagia, food impaction, nausea, vomiting, and chest and/or abdominal pain. The symptoms are of concern primarily due to the potential impact while performing aircrew duties and the effects on mission safety and completion.

Topical corticosteroid therapy, administered via MDI as described earlier, is acceptable for waiver. Montelukast therapy is waiverable, although of uncertain benefit. Approved antihistamines, loratadine (Claritin®) or fexofenadine (Allegra®) and cromolyn are acceptable for waiver. Waiver is not recommended while on systemic steroids. If the individual is asymptomatic after a course of systemic steroids, waiver could be considered after the pituitary axis has returned to normal function (based on Cortrosyn® stimulation testing; see Waiver Guide – Systemic Glucocorticoid [Steroid] Treatment).

III. Waiver Consideration.

EoE or EG is not listed by name specifically in the Medical Standards Directory. Chronic or recurrent esophagitis not controlled by approved medications or with complications including stricture or reactive airway disease is disqualifying for all classes. It is not waiverable in FCI/IA and unlikely to be waivered in untrained FC II and III candidates. It is potentially waiverable in FC II and III if the individual has no aeromedically significant complications and remains asymptomatic on or off waiverable medications. Gastritis, severe/chronic (confirmed by gastroscopic examination), with repeated symptoms requiring frequent lost duty time is also disqualifying for all classes as well as for retention, and persistent and severe esophagitis is also disqualifying for retention in the US Air Force.

Table 1: Waiver potential for EoE and EG

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority**
I/IA Untrained II/III	Eosinophilic esophagitis	No AETC
	Eosinophilic gastroenteritis	No AETC
II/III	Eosinophilic esophagitis	Yes MAJCOM
	Eosinophilic gastroenteritis	Yes MAJCOM
ATC/GBC MOD	Eosinophilic esophagitis or eosinophilic gastroenteritis if severe	Yes MAJCOM*

*AFGSC is the waiver authority for MOD personnel.

AIMWTS search in Feb 2015 revealed a total of 67 cases with a listed diagnosis of either eosinophilic esophagitis or eosinophilic gastroenteritis. There were a total of 6 disqualifications.

Breakdown of the cases was as follows: 5 FC I/IA cases (4 disqualified), 38 FC II cases, 20 FC III cases (2 disqualified), 3 ATC/GBC cases, and 1 MOD case.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for eosinophilic esophagitis or gastroenteritis should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History with special attention to symptoms, frequency, duration, treatment, precipitating factors, action taken to mitigate recurrence.
C. Gastroenterology consult - evaluation and treatment recommendations.
D. Endoscopy report.
E. Pathology report of biopsies of esophagus, antrum and duodenum.
F. Allergy consult – addressing possible food allergies.
G. MEB results if applicable

The AMS for waiver renewal for eosinophilic esophagitis or gastroenteritis should include the following:
A. Brief summary of symptoms, treatment, original endoscopy and pathology results and any intervening symptoms or signs (including pertinent negatives e.g. dysphagia, food impaction).
B. Gastroenterology consult.
C. Endoscopy report.
D. Pathology report of biopsies.

ICD-9-codes for eosinophilic esophagitis and eosinophilic gastroenteritis	
530.13	Eosinophilic esophagitis
530.19	Other esophagitis
535.70	Eosinophilic gastritis, without mention of hemorrhage
535.71	Eosinophilic gastritis, with hemorrhage

ICD-10-codes for eosinophilic esophagitis and eosinophilic gastroenteritis	
K20.0	Eosinophilic esophagitis
K20.8	Other esophagitis
K52.81	Eosinophilic gastritis or gastroenteritis

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WAIVER GUIDE
Updated: Jan 2014
Supersedes Waiver Guide of May 2010
By: Dr Matt Ramage (RAM XV) and Dr Dan Van Syoc
Reviewed by Col Pat Storms, AF RAM and gastroenterologist

CONDITION:
Esophagitis (Jan 14)

I. Overview.

Esophagitis refers to inflammation of the esophageal mucosa. It can be caused by the reflux of gastric contents, infectious organisms, corrosive agents, irradiation, or direct contact with swallowed pills.[1] In looking at the burden of digestive diseases in the US, gastroesophageal reflux disease (GERD) ranks second in prevalence, but is first in annual direct costs.[2] In 2004, 48% of digestive system prescriptions were for GERD; however, this is likely an underestimation as over the counter medication is not included in this calculation.[3] Additionally, in 2004 GERD was listed as causal or first line contributory for 1,150 deaths resulting in 6,000 years potential life lost, and was the leading gastrointestinal ambulatory care diagnosis.[3] In our aviator population, the vast majority of cases will be the result of the progression of GERD to erosive esophagitis (EE). Therefore, the potential impact of esophagitis in the general US population and among our aircrew is substantial. It is estimated that 40% of the U.S. population experiences symptoms of gastroesophageal reflux at least once a month, with 7% experiencing symptoms daily. The integrity of the esophageal mucosa in normal individuals reflects the balance between injurious forces (acid reflux, potency of refluxate) and defensive forces (esophageal acid clearance, mucosal integrity). For one or more reasons, this balance becomes impaired in patients who develop GERD.[4] The prevalence of severe EE increases with age, but the severity of the heartburn symptoms is an unreliable indicator of the severity of erosive disease, particularly in an elderly population.[5]

The mechanisms of GERD and its complications are not completely understood. Most clinicians feel that transient lower esophageal sphincter (LES) relaxation is the key motility disorder in mild to moderate disease. It has been suggested that impaired esophageal clearing of refluxed gastric contents during times of sleep has a significant causative role in reflux esophagitis.[6] In addition, there are indications that esophageal motor dysfunction in patients with reflux esophagitis is a primary phenomenon.[7] There are also some significant racial differences regarding reflux esophagitis and its complications. Barrett's esophagus (BE), a precursor to adenocarcinoma of the esophagus, is more common in non-Hispanic whites than in African Americans. Similarly, heartburn is the primary indication for endoscopy in the non-Hispanic white population, while upper GI bleeding is the primary indication for African Americans.[8]

BE is a complication of GERD and erosive esophagitis and is a premalignant condition. BE can be defined simply as columnar metaplasia of the esophagus and is seen in 8% to 20% of patients with chronic GERD. Many gastroenterologists feel that the major reason to evaluate a patient with longstanding GERD is to be able to recognize BE. The overall incidence of BE in the general population is difficult to estimate as approximately 25% of BE patients have no symptoms of reflux. One multi-center study demonstrated that the prevalence of BE was 6.8% in evaluation of patients with or without the symptoms of heartburn, and rose to 15% if they had erosive esophagitis on endoscopy. Epidemiologic data also indicate that men are at greatest risk and, although Barrett's

esophagus can be found at any age, the prevalence increases with advancing age until a plateau is reached in the 60s. While there is insufficient evidence of morbidity or mortality benefit, of those who received endoscopic evaluation for the indication of chronic GERD, 3-15% were found to have BE.[9-12]

Dyspeptic substernal distress may reflect conditions other than GERD. Physical examination, laboratory testing, and radiographic imaging aid in the exclusion of alternate diagnoses. Chief among diseases to be excluded are coronary artery disease, gallbladder disease, peptic ulcer disease and pill esophagitis. In the simplest case, when symptoms are typical and the patient responds to therapy intended to address those symptoms, no diagnostic tests are required. Rather, diagnostic testing is invoked in 3 broad scenarios: (1) to avoid misdiagnosis, (2) to identify complications of reflux disease, and (3) in the evaluation of empirical treatment failures." The concept of alarm features is commonly cited as a screening mechanism to decide whether diagnostic tests are necessary. "Alarm features include, evidence of gastrointestinal blood loss, involuntary weight loss, dysphagia.[13]

Proton pump inhibitors (PPIs) are considered the most effective short-term treatment for GERD. PPIs are well tolerated, with headaches and diarrhea described as the most common side effects. Histamine-2 Receptor Antagonists (H2RAs) have also long been used effectively to treat symptoms of GERD and reflux esophagitis. They tend to be less successful than are the PPIs in more severe disease states with healing rates rarely exceeding 60% after up to 12 weeks of treatment. The dosage of the H2RA agents often has to be significantly increased to approach healing rates of the PPIs, and PPIs generally provide better symptom control and better mucosal healing. There is an increased risk of hip fractures with long term use of PPIs when compared to H2RA and nonusers of secretion inhibitors alike over the age of 50. The risk of fracture increases with increased cumulative duration of PPI exposure.[14] As ubiquitous as PPIs are, they should not be employed without careful consideration of risk versus benefit for the individual patient. Prokinetics, such as bethanechol, a cholinergic agonist; metoclopramide, a dopamine antagonist; and cisapride, a serotonin (5-HT4) receptor agonist that increases acetylcholine release in the myenteric plexus, have been used in the past in treatment of GERD, but have fallen out of favor, or are no longer available. These drugs improve reflux symptoms by increasing LES pressure, acid clearance, and/or gastric emptying. While these agents provide modest benefit in controlling heartburn, they are unreliable in healing esophagitis unless combined with acid inhibiting drugs. Prokinetic drugs are also significantly limited by their side-effect profiles.[15-17] Sucralfate, an aluminum sucrose polysulfate, potentiates cytoprotection and mucosal resistance and is safe to use in initial and maintenance therapy, though its efficacy is limited in treating GERD symptoms. Some patients with significant GERD and erosive esophagitis may need to consider surgical solutions such as the laparoscopic Nissen fundoplication procedure.

Medication-induced esophagitis is an increasing problem in our country. The types of medications causing direct esophageal injury can be divided into antibiotics, anti-inflammatory agents and others. Tetracyclines are the most common antibiotic to induce esophagitis, particularly doxycycline. Taking tetracycline with a full glass of water, and avoiding a recumbent posture for several hours after taking the medication provides the best opportunity to avoid esophageal injury. All of the currently used anti-inflammatory agents can damage the esophagus, with the highest number of reported cases with aspirin. The flight surgeon also needs to be aware of problems with nutritional supplements. A recent surge in the use of compounds such as NANO^{X9} has led to increased esophagitis symptoms in military members (anecdotal story), impacting seven members

in one deployed location. The mechanism of injury is believed to be due to prolonged contact of the caustic contents of the medication with the esophageal mucosa. Most cases of medication-induced esophageal injury heal without intervention within a few days. Thus, the most important aspect of therapy is to make the correct diagnosis and then to avoid reinjury with the agent.[18]

II. Aeromedical Concerns.

Increases in intra-abdominal pressure, changes in gravitational position, and abdominal muscle contraction all increase the pressure gradient between the abdomen and the thorax, worsening GERD and potentially inducing GERD symptoms. Furthermore, with the increasing prevalence of obesity in the general population, a similar trend is seen in the aviator population. A 2009 meta-analysis shows that there is an increased risk of BE in patients with a BMI ≥30 compared to those with a BMI <30.[19] Reflux symptoms are of aeromedical concern because they can distract the aircrew member, though they are normally not disabling. The symptoms can be potentially disabling if the aviator has intractable coughing and aspirates, this is of major concern in the high-performance cockpit in which there are little to no crew redundancies. The availability of OTC medications can mask symptoms of severe disease until the flyer presents with significant medical complications like hemorrhage or stricture. Acute hemorrhage secondary to mucosal ulcers may occur in aircrew with chronic GERD and severe esophagitis, and can be disabling. Acute esophageal obstruction, caused by food impaction in the face of a peptic stricture, can also be disabling. In addition, medications used to control esophagitis may cause disqualifying side effects. The prokinetic agents metoclopramide and cisapride are not compatible with flying duties and should not be used as first line agents. Typical antacids are safe to use in an aeromedical environment, but their use may be a marker of worsening or breakthrough symptoms. Members requiring frequent antacids may warrant more aggressive care. Some H_2-receptor antagonists and PPIs are well-tolerated and recent changes to the Approved Aircrew Medication list have removed the necessity of a waiver if certain medications are well tolerated and control symptoms. At this time, the current approved GERD and EE medications are esomeprazole (Nexium®), omeprazole (Prilosec®), rabeprazole (Aciphex®), lansoprazole (Prevacid®), ranitidine (Zantac®), pantoprazole (Protonix®), and sucralfate (Carafate®). Each can be used to treat GERD or EE after a three day grounding period to rule out idiosyncratic reaction and to assure symptoms are controlled (See Official Air Force Approved Aircrew Medication list). Finally, for those aviators with Barrett's esophagus, there is concern regarding the future risk of esophageal cancer. The incidence of Barrett's esophagus progressing to adenocarcinoma is estimated to be 0.5 per 100 patient-years (i.e., one in 200 patients developing carcinoma per year).[12] As adenocarcinoma of the esophagus is a devastating disease, BE patients need to be followed closely.

III. Waiver Consideration.

Chronic or recurrent esophagitis including reflux esophagitis is disqualifying for all flying classes within the US Air Force and becomes a retention issue if persistent and severe (requiring repetitive dilatation or dysphagia refractive to treatment). Similarly, symptomatic esophageal motility disorders (including Gastroesophageal Reflux Disease) not controlled by medications listed in the Official Air Force Approved Aircrew Medications list are disqualifying.

Table 1: Waiver potential for Esophagitis

Flying Class (FC)	**Disease Status**	**Waiver Potential** **Waiver Authority**
I/IA	Chronic or recurrent esophagitis History of esophagitis, resolved	No AETC Maybe AETC
II*	Chronic or recurrent esophagitis History of esophagitis, resolved	Maybe MAJCOM Yes MAJCOM
III*	Chronic or recurrent esophagitis History of esophagitis, resolved	Maybe MAJCOM Yes MAJCOM
GBC/ATC	Chronic or recurrent esophagitis or history of esophagitis, resolved	Yes AETC for untrained MAJCOM for trained
MOD	Chronic or recurrent esophagitis or history of esophagitis, resolved	Yes AFGSC

*Initial FC II and FC III certification cases should be viewed similar to FC I/IA cases.

AIMWTS review in Oct 2013 revealed a total of 936 cases with the diagnosis of esophagitis or an esophagitis-related disorder. There were 11 FC I/IA cases, 443 FC II cases, 0 FC IIU cases, and 417 FC III cases, and 65 ATC/GBC/SMOD cases. Of the total, 16 resulted in a disqualification specifically for esophagitis; 0 cases were FC I/IA, 3 were FC II, 0 were FC IIU, 10 were FC III, and 3 were ATC/GBC/MOD.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for chronic or recurrent esophagitis should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Thorough discussion of the history and etiology of the condition; detail any prior history of GERD; and list all treatments utilized to include results and side effects.
C. Consultation report by a gastroenterologist or internist.
D. Procedure reports: discussion of all endoscopic testing results.
E. Pathology reports if clinically indicated.

The AMS for waiver renewal for esophagitis should include the following:
A. Interim history and treatment protocol.
B. Consultation report by a gastroenterologist or internist.
C. Procedure reports: discussion of all endoscopic testing results, if applicable.

ICD-9 codes for esophagitis	
530.10	Esophagitis, unspecified
530.11	Reflux esophagitis
530.12	Acute esophagitis
530.19	Other esophagitis
530.2	Ulcerative esophagitis
530.3	Esophageal stricture
530.82	Esophageal hemorrhage
530.85	Barrett's esophagitis
530.89	Other esophageal disorders

ICD-10 codes for esophagitis	
K20.9	Esophagitis, unspecified
K21.0	Gastro-esophageal reflux with esophagitis
K20.8	Other esophagitis

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WAIVER GUIDE
Updated: Aug 2013
Supersedes Waiver Guide of Jun 2009
By: Dr Dan Van Syoc
Reviewed by LtCol LaKeisha Henry, AF/SG Otolaryngology Consultant and LtCol Mark Packer from the Hearing Center of Excellence

CONDITION:
Eustachian Tube Dysfunction (Aug 13)

I. Overview.

Eustachian tube dysfunction (ETD), which is most easily recognized as difficulty clearing one's ears, is often the cause for grounding of airmen. While most occupations require only normal hearing, a normal otoscopic exam, and absence of an ear disease history, the requirements for flight duty are far more rigorous.[1] Sudden changes in atmospheric pressure, as are often experienced by aviators, demand tubal equilibrating capacity to be in optimal working order. Failure to equilibrate to rapid changes in atmospheric pressure can lead to the sudden onset of "ear block" – (barotrauma resulting in severe ear pain due to the inability to equilibrate pressures in the middle ear).[2] This sudden onset of severe pain may be incapacitating and pose great risk to safety of flight.

Our knowledge and understanding of the functions and diseases of the eustachian tubes (ET) are due to the pioneering works of men such as Bartolomeus Eustachius (16th century anatomist), Antonio Valsalva (18th century anatomist), and Adam Politzer (19th century otologist). As an outgrowth of their endeavors, we now realize that the ET serves three physiologic functions: 1) pressure regulation, 2) protection of the middle ear from pathogens/foreign material in the nasopharynx, and 3) clearance of the middle ear space.[3] Failure of the tubal mechanism can disrupt any and/or all of these functions. This altered tubal function may then lead to a multitude of complications which vary from mild and transient (i.e. causing temporary DNIF) to severe and debilitating (i.e. permanently disqualifying). For example, the transient difficulty clearing ears caused by viral upper respiratory tract infections (URIs) and/or seasonal allergic rhinitis (SAR) may only cause mild and/or fleeting symptoms. However, ETD has also been linked to the development of chronic otitis media and secondary cholesteatoma (trapping of squamous debris in the middle ear and mastoid).

In its resting state, the ET remains closed and only opens when necessary to equalize pressure. In flight, ascent usually causes little trouble even in the absence of any active ear clearing maneuvers. This is due to the passive escape from the middle ear of expanding air as it exceeds the opening pressure of the ET. However, 10-17% of airmen have reported vertigo during ascent which is believed to be secondary to asymmetry between the right and left side (i.e. alternobaric vertigo-causing a differential input to the vestibular system).[1, 2] This is more frequently seen on descent which requires the active passage of air into the middle ear space. This is normally accomplished by the tubal musculature associated with deglutition and/or jaw movements.[1] The most well known example of this is the *Toynbee's maneuver*: displacement of air by the movement of the eardrum when swallowing with the nose closed.[1] Should such maneuvers fail, air can be forced into the middle ear by increasing nasopharyngeal pressures via the *Valsalva maneuver*: displacement of air by the movement of the eardrum caused by forceful expiration against a closed nose.[4] Many authorities suggest as safer alternatives the Toynbee or *Frenzel maneuvers*: open the jaw, fill mouth

with air, pinch the nose, purse the lips, and then close the jaw while displacing air posteriorly by pushing the tongue up and back.[4] In a minority of cases, anatomic, hormonal, and disease factors cause the ET to be remain open continuously (i.e. a patulous ET). This often leads to auditory complaints including autophony (hearing one's own breathing).

There are myriad etiologies of ETD and not all are understood in their entirety. Many mechanisms are easily understood. For example, the initiation of swelling, inflammation and/or drainage within the ET caused by entities such as viral URI, chronic sinusitis, and/or allergic rhinitis is a rather straightforward cause. Further, obstructive mechanisms such as adenoid hypertrophy, deviated nasal septum, or nasal polyposis are also well known. Less well appreciated, however, are other causes of ETD such as the decreased tubal function associated with tobacco smoke (decreased ciliary function), reflux disease (nasopharyngeal exposure to gastric contents), and congenital abnormalities (location/angle of tube, cleft palate, reduced mastoid air cell system).[3]

Any history of fullness or clogging of the ears, otalgia, hearing loss, tinnitus or dizziness should prompt an evaluation for ETD. A common complaint is that no amount of yawning, swallowing, chewing or attempted Valsalva maneuver alleviates the symptoms. Several methods are available to assess the function of the ET in the office. Otoscopic observation of tympanic membrane (TM) mobility caused by the Toynbee, Frenzel, Valsalva maneuvers and/or pneumatic otoscopy is good evidence of a functional/patent ET. Likewise, a normal tympanogram attests to the normal transmission of energy through the middle ear space.[3] However, studies have not shown good correlation between a normal tympanogram and any predictive value for barotrauma.[2] The limiting factor for all of these assessment tools; however, is that none of them assess ET function during the dynamic changes in atmospheric pressure experienced by aviators. Such complex function should be tested during simulated flights in a pressure chamber.[1] Even this assessment, however, short of expensive and invasive pressure manometer placement, is dependent upon the subjective report of the aviator. Seeking the best combination of cost, non-invasiveness and accurate surrogacy for the dynamic flight environment has led the USAF to select demonstration of a normal Valsalva maneuver and successful completion of a pressure chamber flight as criteria for pilot selection and training.[1] The main predictors of barotrauma continue to be a previous history of nasal or otologic disease and/or abnormal otoscopy.[2]

Treatment of ETD should be directed at the underlying etiology, if known, as well as any resultant complications.[5] Review of the medical literature reveals no clear consensus on the efficacy of common treatment modalities for ETD.[6] While there are studies showing promising results from treating inflammatory, congestive and allergic causes for ETD with the appropriate oral/topical decongestant, antihistamine or nasal steroid, there are also studies which do not duplicate such promising outcomes.[7-9] Likewise, success rates following surgical correction for ETD have varied. Insertion of pressure equalization tubes (PET) has long been the mainstay of surgical treatment for ETD. However, several investigators have found that while the pressure differential between the middle ear and the external auditory canal may be immediately resolved, the function of the ET itself does not change following PET insertion. Other procedures such as adenoid resection and laser eustachian tuboplasty have also shown a mix of success and failure in treating ETD.[3] Thus, regardless of whether medically or surgically treated, and regardless of specific etiology, the outcome of any treatment for ETD needs to be evaluated on a case by case basis to determine the presence of acceptable ET function. This is especially true in the aviator population.

ETD and otitis media (OM), another common disorder of the middle ear, are closely related. Historically, the pathophysiology of OM has always been linked with abnormalities of ET function. As previously reviewed, the ET performs the three classic functions of aeration, clearance, and protection of the middle ear. Traditional teaching has held that the ET function of aeration was limited and that this was the underlying cause of most acute otitis media (AOM). More recent investigation, however, has suggested that AOM is the result of bacterial entry into the middle ear (i.e., failure of protection). In either case, that there is a relationship between ETD and the development of OM is clear. Whether or not ETD precedes AOM, the finding of ETD in patients with AOM is nearly universal.[10] While space here does not permit a separate treatise on OM and its many variants, the following five principles derived cooperatively by the Centers for Disease Control and the American Academy of Pediatrics should help to guide OM-related diagnosis and treatment decisions: 1) the diagnosis of OM should not be made unless fluid is present in the middle ear, 2) OM should be classified as AOM or otitis media with effusion (OME) on the basis of the presence or absence of signs and symptoms of acute illness, 3) in contrast to AOM, OME should not be treated with an antibiotic, 4) effusion is likely to persist after the treatment of AOM and does not require repeated treatment, and 5) antibiotic prophylaxis for AOM should be used only in accordance with strict criteria.[11]

For questions regarding the complication of cholesteatoma, please refer to the waiver guide on that topic.

II. Aeromedical Concerns.

ETD may result in the failure to equilibrate middle ear pressures and lead to pain, impairment of hearing, and vertigo, with or without rupture of the tympanic membrane, resulting in compromised aircraft safety if a member of the crew is incapacitated in this way.[1] ETD may only be minimally symptomatic at ground level. However, such tubal dysfunction can block the flow of air in and out of the middle ear space. In the presence of ETD, dynamic perturbations of atmospheric pressure may result in acute barotrauma, resulting in sudden, incapacitating pain. Should such an event occur immediately prior to or during landing procedures, it could lead to sudden incapacitation and an aircraft mishap. Treatment should consist of returning to altitude to allow slower equilibration of the middle ear, the use of Afrin®, and if the block persists on landing, the use of a Politzer bag to assist in ventilating the middle ear. Aviators need to take caution with the use of such nasal sprays. Overuse can lead to inhibition of normal smooth muscular tonality of the vascular nasal mucosa, leading to rhinitis medicamentosa, which results in mucosal swelling and secretions; the exact opposite of the desired outcome.[12]

There is no quick test to ensure the ET is patent prior to flight; but, being free of sinonasal and URI symptoms and being able to Valsalva and prior successful completion of altitude chamber training are a close approximation. Further, any middle ear disturbance (e.g. ETD or OM) raises concern for decreased and/or loss of hearing, disequilibrium, and the development of more extensive disease.

There are some concerns about the chronic use of PE tubes in aviators. Most patients requiring prolonged PE tubes will end up with a large central perforation which tends to remain as long as the ear is not being ventilated. Also, the PE tubes can fail. They get plugged, extrude, cause granulation tissue which then causes bleeding and infection, and can cause perforations of the TM. They can also act as a conduit for fluids getting in the middle ear especially soapy fluids with low surface tensions that then can cause a chemical irritation of the middle ear and subsequent

otorrhea/infection. The other challenge is that it sometimes takes a microscope and other specialized otologic instrumentation to accurately evaluate and mediate PE tube problems, so a deployed FS looking at with an otoscope may not be able to discern what is happening with the tube or TM.

III. Waiver Consideration.

Acute ETD secondary to a transient illness (e.g. viral URI or SAR) requires no waiver but is grounding for flyers until resolution. However, chronic ETD is disqualifying and requires a waiver for all flying classes. Also any surgical procedure for correction of ETD is disqualifying for all flying classes. It needs to be emphasized that resolution of ETD and adequacy of ET function are to be assessed on a case by case basis and that no one treatment or procedure, per se, will lead to waiver approval. Regardless of cause or treatment modality, ET functionality must be demonstrable for a waiver authority to be granted. In general, the permanent use of PE tubes in flyers is not advisable, but it is a fact that adults tend to tolerate chronic use of PE tubes better than children. What is important is the operational necessity of using the tubes and the clinical judgment of the flight surgeon and treating otolaryngologist.

For ATC/GBC and MOD personnel, ETD is not listed specifically as disqualifying. However, per retention standards, when satisfactory performance of duty is prevented or there is a requirement for extensive and prolonged treatment, the member will need a waiver if returned to duty.

Table 1: Waiver potential for ETD

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	ETD/OM, regardless of cause, controlled with nasal steroids and/or approved oral antihistamines. ETD/OM, regardless of cause, controlled via surgical correction.	Maybe* AETC Maybe*#+ AETC
II/III	ETD/OM, regardless of cause, controlled with nasal steroids and/or approved oral antihistamines. ETD/OM, regardless of cause, controlled via surgical correction.	Yes* MAJCOM Yes*#+ MAJCOM
ATC/GBC MOD@	ETD/OM, regardless of cause, controlled with nasal steroids and/or approved oral antihistamines or surgery.	Yes MAJCOM

* Waiver in FC I/IA and untrained FC II/III requires at least 12 months of symptoms controlled on medication before waiver.
# Waiver may be considered if at least 6 months after surgery, symptoms entirely resolved, clearance granted by ENT physician. ENT clearance is mandatory as different surgical procedures (e.g. PET vs. cholesteatoma resection) have dramatically different recovery periods and associated complications. Further, any surgical complications (e.g. hearing loss) require evaluation and waiver of their own accord.
+ Altitude chamber ride up to 8-10,000ft with rapid decompression is required. If treated with surgery, altitude chamber ride no earlier than 6 weeks after surgery or when cleared by ENT physician (whichever is later).
@ Waiver authority for MOD personnel is APGSC.

A review of AIMWTS through Aug 2013 revealed 154 cases with the diagnosis of ETD with 94 cases disqualified. Breakdown of the cases was as follows: 7 FC I/IA cases (5 disqualified), 38 FC II cases (15 disqualified), 103 FC III cases (73 disqualified), 5 ATC/GBC cases (1 disqualified), and 1 MOD case (0 disqualified). In every case, except one (optic drusen), the disqualifying diagnosis was the ETD/inadequate or absent Valsalva. In almost every case where the ETD was treated with aeromedically waiverable medications and/or surgical correction (e.g. PET, adenoidectomy, cholesteatoma resection, nasal polypectomy, etc.), the waiver was granted in the presence of subsequently demonstrated pressure equalization (e.g. altitude chamber). In only one case was a granted waiver subsequently denied due to recurrent ETD.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for ETD should include the following:
A. History – symptoms (flying and on ground), duration, and treatment.
B. Physical – HEENT including Valsalva.
C. ENT consultation report to include any surgical reports if applicable.
D. Audiology with Impedance test consultation report.
E. Altitude chamber flight results.

The AMS for waiver renewal for ETD and/or surgery should include the following:
A. History – interim summary of any symptoms (flying and on ground), treatments, or recurrences/exacerbations since last waiver.
B. Physical – HEENT including Valsalva.
C. ENT consultation if symptoms recurrent.
D. Audiology consult if symptoms recurrent.
E. Status report of ET functional capacity in flight (i.e. any in-flight symptoms?).

ICD-9 codes for Eustachian Tube Dysfunction and Otitis Media	
381.5	Eustachian salpingitis
381.6	Obstruction of the Eustachian tube
381.7	Patulous Eustachian tube
381.8	Other disorders of the Eustachian tube
381.9	Unspecified Eustachian tube disorder

ICD-10 codes for Eustachian Tube Dysfunction and Otitis Media	
H68.00 1, 2, 3, 9	Unspecified eustachian salpingitis, right ear, left, bilateral, unspecified ear
H68.10 1, 2, 3, 9	Unspecified obstruction of the Eustachian tube, right ear, left, bilateral, unspecified ear
H69.0 0, 1, 2, 3	Patulous Eustachian tube, unspecified ear, right, left, bilateral
H69.8 0, 1, 2, 3	Other specified disorders of the Eustachian tube, unspecified ear, right, left, bilateral
H69.9 0, 1, 2, 3	Unspecified Eustachian tube disorder, unspecified ear, right, left, bilateral

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WAIVER GUIDE
Updated: Jul 2013
Supersedes Waiver Guide of Nov 2009
By: Capt Peter Baldwin (RAM 13) and Dr. Dan Van Syoc
Reviewed by Col Pat Storms (RAM 05) and gastroenterologist

CONDITION:
Gastroesophageal Reflux Disease (Jul 13)

I. Overview.

The Montreal Classification defines Gastroesophageal Reflux Disease (GERD) as "a condition that develops when the reflux of stomach contents causes troublesome symptoms and/or complications".[1] About 40% of US adults complain of monthly heartburn, about 20% complain of weekly heartburn, and about 7% complain of daily heartburn.[2] The most common symptoms of GERD are pyrosis, regurgitation, and dysphagia. Other symptoms may include odynophagia, water brash, chest pain, globus sensation, nausea, and hemorrhage. Pulmonary symptoms may be the only clinical manifestations of GER and include chronic cough, wheezing, asthma, hemoptysis, hoarseness and recurrent aspiration pneumonia.[3] The pathophysiology of gastroesophageal reflux (GER) reflects a multifactorial process, though inappropriate transient lower esophageal sphincter (LES) relaxation is felt to be the key motility disorder in mild to moderate disease. The diagnosis of GERD can be made by history indicating any of the symptoms previously mentioned. When indicated based on risk factors, co-existent symptoms, or prior history of esophagitis, severity of mucosal damage and complications of reflux esophagitis can be assessed through endoscopy. Endoscopy may be normal in many patients with GER (up to 40%) or may reveal erosions, ulceration, peptic stricture, mucosal changes suggesting a columnar cell-lined lower esophagus (Barrett's esophagus), or adenocarcinoma. In addition, eosinophilic esophagitis commonly presents with dyspeptic symptoms or dysphagia, and may demonstrate endoscopic evidence of "trachealization" of the esophageal mucosa.[4] The presence of alarm symptoms, such as dysphagia, weight loss, and bleeding, suggest more complicated disease and warrant endoscopic investigation.[5] The differential diagnosis of GERD includes peptic ulcer disease, gastritis, symptomatic gallstones, and non-steroidal anti-inflammatory (NSAID)-induced GERD, and eosinophilic esophagitis, all of which should be at least briefly considered in the dyspeptic patient. Mildly symptomatic cases could benefit from lifestyle changes prior to pharmacologic interventions. Additional conservative treatment measures include the avoidance of fatty foods, chocolate, and carminatives (spearmint, peppermint). Patients should also be taught to avoid wearing tight clothing, eating large meals, and reclining soon after eating. Obesity is strongly correlated to GER through a variety of mechanisms, and should be a focus of non-pharmacologic intervention. Alcohol and smoking can decrease LES pressure and/or delay gastric emptying which can cause/worsen symptoms of GER.

Most individuals with either heartburn or regurgitation, will self-medicate with OTC H_2-receptor antagonist regimens (ranitidine or famotidine), or even proton pump inhibitors (PPIs) such as Prilosec OTC. Indeed, the current consensus is that empiric therapy is appropriate initial management for patients with uncomplicated heartburn. Patients whose heartburn has not adequately responded to twice daily PPI therapy should be considered treatment failures, making that a reasonable upper limit for empiric therapy.[6] Note that empiric therapy is appropriate only for "uncomplicated" dyspeptic symptoms. Patients with alarm symptoms such as GI bleeding, unexplained weight loss, or dysphagia should be considered for endoscopic assessment rather than

empiric therapy. It is also very important to be aware that atypical chest pain could be a manifestation of symptomatic coronary artery disease or other significant extra-esophageal pathology, and consideration should always be given to atypical presentations of significant non-gastrointestinal disease before embarking on a regimen of empiric therapy. Endoscopy is indicated for those patients whose symptoms fail to respond to twice daily PPIs. Assessment of patients with persistent dyspeptic symptoms, no response to empiric PPIs, and a normal endoscopy is beyond the scope of this waiver guide and referral of these patients to a gastroenterologist is recommended.

PPIs remain the pharmacologic mainstay for treatment of GERD, but other treatments may be considered in patients with demonstrated esophagitis and an inadequate response to PPIs.[7] Prokinetic agents such as metoclopramide may enhance gastric emptying and reduce reflux eposides, but are not waiverable secondary to their side effect profile. In refractory cases of GERD, antireflux surgery may be considered. Nissen fundoplication, the preferred antireflux procedure, reinforces the lower esophageal sphincter with a 360-degree gastric wrap around the lower esophagus. Nissen procedures are routinely performed through laparoscopy or thoracoscopy. Complications of GERD include esophageal strictures, ulceration with or without hemorrhage, and the development of Barrett's esophagus. Any of these complications should prompt referral to a gastroenterologist for further evaluation and treatment.

II. Aeromedical Concerns.

Increases in intra-abdominal pressure, changes in gravitational position, and abdominal muscle contraction all increase the pressure gradient between the abdomen and the thorax, potentially worsening GERD and its attendant symptoms. This is of major concern in the high-performance cockpit. Reflux symptoms are of aeromedical concern because they can distract the aircrew member even though they are usually not disabling. The availability of OTC medications can mask symptoms of severe disease until the flyer presents significant medical complications like hemorrhage or stricture. Inadequately treated GERD has a high rate of recurrence and this can be very troubling for the aviator.[8] Acute hemorrhage secondary to mucosal ulcers can occur in aircrew with chronic GERD and severe esophagitis, and can be disabling. Acute esophageal obstruction, caused by food impaction in the face of a peptic stricture, can also be disabling. A more subtle impact of GERD on flying performance is reflected in a recent review, suggesting that GERD could disturb sleep by causing difficulty in falling asleep, sleep fragmentation caused by short amnestic arousals, and/or conscious awakenings and awakenings in the early morning.[9]

As already noted, medications used to control GERD may cause disqualifying side effects. Metoclopramide, a dopamine antagonist, crosses the blood-brain barrier. Up to 20% of patients experience psychotropic side effects which include somnolence, lassitude, restlessness, anxiety, insomnia, and rarely extrapyradimal reactions. Sucralfate, an aluminum sucrose polysulfate, potentiates cytoprotection and mucosal resistance. It is safe to use in initial and maintenance therapy, though its efficacy is limited in symptomatic GERD. Antacids are also safe to use in an aeromedical environment, but can cause diarrhea if used in sufficient doses to positively impact chronic GERD symptoms.

III. Waiver Considerations.

AFI 48-123 states that chronic or recurrent esophagitis is disqualifying for flying classes I/IA, II, and III as well as GBC. It also states that a waiver is necessary for "symptomatic esophageal

motility disorders (including Gastroesophageal Reflux Disease) not controlled by medications listed in Official Air Force Approved Aircrew Medications". Thus, if the symptoms of the reflux are controlled by approved medications, a waiver is not required. The current approved GERD medications are esomeprazole (Nexium®), omeprazole (Prilosec®), rabeprazole (Aciphex®), lansoprazole (Prevacid®), ranitidine (Zantac®), or pantoprazole (Protonix®). Each can be used to treat GERD after a three day grounding period to rule out idiosyncratic reaction and to assure symptoms are controlled. Eosinophilic esophagitis is an entity outside of GERD, and should be separately considered (If applicable, see waiver guide for eosinophilic esophagitis). Consultation with a gastroenterologist is recommended in patients with eosinophilic esophagitis.

Table 1: Waiver Potential for GERD

Flying Class (FC)	**GERD Status**	**Waiver Potential Waiver Authority**
I/IA	GERD controlled by approved medications	Waiver not required AETC
	GERD controlled by Surgery*	Yes AETC
	GERD not controlled by approved medications or surgery	No AETC
II/III	GERD controlled by approved medications	Waiver not required MAJCOM
	GERD controlled by Surgery*	Yes MAJCOM
	GERD not controlled by approved medications or surgery#	Maybe MAJCOM
ATC/GBC MOD**	GERD controlled by approved medications	Waiver not required MAJCOM
	GERD controlled by Surgery*	Yes MAJCOM
	GERD not controlled by approved medications or surgery#	Maybe MAJCOM

*If surgery is successful and patient does not require maintenance medications, no waiver is necessary. A waiver will be required if medication usage is still required, even for medications on the approved list.

** Waiver authority for MOD personnel is AFGSC.

#Routinely unapproved medications may be considered on a case-by-case basis after discussion with waiver authority and the ACS. This is typically done only after all approved medications have had an adequate trial (and failed) and even then approval is not guaranteed.

AIMWTS review in May 2013 revealed 2248 aircrew with an AMS for GERD, 154 were disqualified. Breakdown of by flying class is as follows FC I/IA – 31 cases (12 DQ), FC II – 1102 cases (44 DQ), FC III – 971 cases (79 DQ), ATC/GBC – 113 cases (17 DQ), MOD – 31 cases (1 DQ). As evidenced, over 90% of these cases received a waiver and almost every disqualification was due to a diagnosis other than GERD.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for GERD should include the following:
A. History of symptoms and all treatments attempted with response.
B. Diagnostic test results and findings.
C. Consultation from treating physician.
D. Documentation of resolution of symptoms and observation for adverse reaction.

The AMS for waiver renewal for GERD should include the following:
A. Interval history since last waiver submission.
B. All applicable labs and imaging tests as in the initial aeromedical summary.
C. Consultation from treating physician.

ICD-9 code for GERD	
530.81	Esophageal reflux

ICD-10 code for GERD	
K21.9	Gastro-esophageal reflux disease without esophagitis

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WAIVER GUIDE
Updated: Jul 2014
Supersedes Waiver Guide of Jan 2011
By: Capt Marion Powell (FS), Maj Tighe Richardson, Dr Steve Hadley (ACS Staff Ophthalmologists), and Dr Dan Van Syoc

CONDITION:
Glaucoma, Ocular Hypertension, and Enlarged Optic Nerve Cupping (Jul 14)

I. Overview.

Intraocular pressure (IOP) and nerve appearance are key factors when evaluating patients for the potential of having ocular hypertension or glaucoma. However, IOP does not necessarily define glaucoma and must be used in the context of a full ophthalmic exam. Though previous teaching stressed the importance of pressure on defining glaucoma, current studies dictate a more comprehensive approach to arriving at the diagnosis, with the use of several modalities to aid in evaluation. Along with glaucoma, ocular hypertension is a potential disease state that must be discussed when addressing aeromedical concerns related to vision loss and eye pressure pathology. However, due to the sometimes ambiguous nature of glaucoma, specific definitions must be created for application of aeromedical standards.

Aeromedically, glaucoma is defined as IOP of 30 mmHg or greater by applanation, or any evidence of the changes associated with optic nerve damage. Pressure-related optic nerve damage can occur at any level as seen with low (normal) tension glaucoma. However, glaucoma usually occurs among individuals with IOP spikes of 22 mmHg or greater. Statistically, the higher the pressure spike, the greater the risk for optic nerve damage. Medical treatment to lower IOP is almost always indicated in individuals with IOP measured at 30 mmHg or greater by applanation, even in the absence of glaucomatous damage. Two major forms of glaucoma exist: open-angle glaucoma and angle-closure glaucoma. Both forms demonstrate a progressive optic neuropathy with eventual visual field loss as well as characteristic nerve and retina changes.[1] Both forms can also occur secondary to other ocular conditions. Recent studies have shown an estimated prevalence of glaucoma to be approximately 2% in mainly white populations over age 40.[2] This contrasts to studies published demonstrating approximately four times the prevalence of open angle glaucoma in some black communities.[1] This data provides evidence for the increased risk seen in certain ethnicities which must be considered as risk factors when evaluating patients. Compare this data to angle-closure glaucoma wherein East Asian and Inuit populations tend to have the highest prevalence of glaucoma (typically secondary to narrow anatomic angles). Risk factors for primary open angle glaucoma include age, positive family history (in a first degree relative), race, history of ocular hypertension, and relatively thin central corneal thickness as measured by ultrasound pachymetry.[3] Additionally, obstructive sleep apnea may be a risk factor for developing open-angle glaucoma. According to one study, researchers found that patients with OSA had a 1.67 times increased risk for developing open-angle glaucoma within five years of diagnosis.[4] Primary open angle glaucoma is the most common primary glaucoma and has a strong inheritance pattern. Pigmentary glaucoma is the most common form of secondary open-angle glaucoma and is caused by elevated IOP resulting from pigment dispersion syndrome. In pigment dispersion syndrome, pigment granules are liberated from the posterior iris surface which then transiently block aqueous humor outflow from the anterior chamber through the trabecular meshwork, resulting in elevated IOP. Pigment dispersion syndrome alone is <u>not</u> disqualifying. However, if either ocular

hypertension or glaucomatous optic nerve damage are present along with pigment dispersion syndrome, the condition is disqualifying. Angle closure glaucoma is uncommon in the aircrew population because this condition typically affects individuals with a combination of cataracts and advanced age. However, narrow angle configuration of the anterior chamber may be diagnosed among aircrew, especially those with higher levels of hyperopia, which may place the aircrew member at risk for pupillary block and resultant angle closure. A thorough history and ophthalmologic exam are essential in determining the etiology and risk for progression.

Examination for potential glaucomatous optic neuropathy should include several key pieces of the ocular exam. Specifically, evaluation should establish any history of ocular hypertension, ocular trauma, uveitis, family history of glaucoma, as well as use of medications. In addition, the exam should include IOP measurements by Goldmann applanation tonometry, visual field evaluation (Humphrey 30-2), direct stereoscopic evaluation of the optic nerve anatomy for any indications of changes (excessive cupping or change in cup size, notching, rim thinning),and optical coherence tomography (OCT) of the retinal nerve fiber layer (RNFL). The OCT is a valuable tool in evaluating the retinal nerve fiber layer (RNFL) which is most commonly affected in early glaucoma. It has been proposed as a means to quantify the likelihood of patients with RNFL defects actually having glaucoma.[6] Studies evaluating OCT as a diagnostic tool in the assessment of early glaucoma have produced promising results. OCT has shown a range of diagnostic abilities with sensitivities/specificities from 70-92% based on specific parameters.[7]

Aeromedically, ocular hypertension (OHT) is defined as: (1) intraocular pressure (IOP), by applanation, greater than 21 mmHg (but less than 30 mmHg) on two or more occasions, or (2) a 4 mmHg or greater difference in intraocular pressure between the eyes performed by applanation tonometry. Adjustment of an applanation IOP, either up or down, based on cornea thickness; is currently not aeromedically approved. In addition, the eye examination should assess for the following indicators of optic nerve damage: optic nerve cup enlargement greater than 0.4, cup-to-disc asymmetry greater than 0.2, progressive changes in optic nerve cupping, focal retinal nerve fiber layer loss, optic nerve hemorrhage (Drance Hemorrhage), disc-based visual field defects, acquired color vision defects, and the presence of a relative afferent pupillary defect. In the general population, 1 of every 10 untreated individuals will develop glaucomatous damage within 5 years of being diagnosed with ocular hypertension (OHT).[1] These numbers appear to coincide with aircrew population data. A study published in 1974 demonstrated 28% of aircrew labeled as preglaucoma went on to develop glaucoma within five years.[8] Of note, this seemingly higher rate of progression was likely related to the definitions used for glaucoma (as defined as starting of medication or visual field loss). Ocular hypertension treatment decisions should be based on the constellation of risk factors present, including central corneal thickness measurement (pachymetry). However, the relationship between corneal thickness, ocular hypertension and glaucomatous vision loss is currently undefined in the age group of our aircrew population. In addition, no single standardized nomogram currently exists to adjust for elevated IOP (adjustment factors currently being used vary widely). Therefore, applanation IOP adjustment based on corneal thickness is currently prohibited in determining whether an individual meets aircrew standards.

Therapy for glaucoma and ocular hypertension depends upon the specific cause. In general, the initial management is pharmacologic (topical IOP lowering therapy). Other therapeutic modalities include laser therapy (argon laser trabeculoplasty or selective laser trabeculoplasty) and surgical therapy, e.g. filtration surgery, placement of setons, goniotomy, trabeculotomy, trabeculectomy, iSTENT and cycloablative procedures.

II. Aeromedical Concerns.

Enlarged optic nerve cupping and OHT may be indicators of early glaucoma. Elevated IOP may result in difficulty with night vision secondary to the appearance of halos and flares around lights, and decreased contrast sensitivity. Left undiagnosed or inadequately treated, glaucoma can cause acquired changes in color vision, loss of central or peripheral visual fields, loss of visual acuity, and blindness. All of these visual disturbances have the potential to impair the aviator's visual performance and may present a significant safety hazard or adversely impact mission effectiveness. Glaucoma associated visual degradation occurs insidiously without subjective complaints which makes the screening program even more vital.

III. Waiver Consideration.

Glaucoma and OHT are disqualifying conditions for FC I/IA, II, III, ATC/GBC, and MOD duties (OHT is only disqualifying for initial MOD). Neither are waiverable for FC I/IA, initial II, and initial III. OHT waiver criteria for trained aircrew include: acceptable visual performance on ophthalmologic examination, stabilized intraocular pressures and absence of optic nerve damage (as defined above). Glaucoma waiver criteria for FC II or III include: stable glaucoma controlled by waiverable medications or laser treatment modalities, without aeromedically significant visual field defect within the central 30 degrees of either eye, a full binocular visual field, and no evidence of visual or systemic medication side effects.

When pharmacological intervention is required to control IOP, the current waiverable topical medications include beta blockers (Timoptic®, Timpotic XE®, and Betaxolol) and latanoprost (Xalatan®). The degree of systemic beta-blockade resulting from ophthalmic timolol is proportionately much less than oral, with perhaps a 20-30% reduction in reflex cardiovascular responses at the plasma levels achieved with such therapy. This degree of blockade is unlikely to result in any real impairment. On the other hand, latanoprost appears to be more effective at reducing intraocular pressure, and has no known effect on cardiovascular hemodynamics. Thus, Xalatan® appears to be the first-line choice for high-performance aviators requiring treatment. Should the local effects of latanoprost prove to be a problem, or should it prove necessary to add a beta blocker to control intraocular pressure, Timoptic-XE® (once daily depot) is associated with lower systemic levels and improved patient compliance, and would be the preferred preparation.[9] Furthermore, punctual occlusion during administration of eye drops will decrease the systemic absorption of medication and should be encouraged during the use of β-blockers. Pilocarpine and related medications, alpha agonists (alphagan), and carbonic anhydrase inhibitors (dorzolamide) are not waiverable.

Laser surgical procedures such as argon laser trabeculoplasty (ALT), selective laser trabeculoplasty (SLT), peripheral iridotomy (PI), or iridoplasty may be performed on aviators with demonstrated uncontrolled OHT or progressive glaucoma. Waiver request for these procedures should be submitted following successful laser treatment once the treated eye/s have stabilized (usually at least one month), IOP is controlled and topical post-op steroids have been discontinued.

Waiver request and Aeromedical Consultation Service (ACS) case review is not required for symmetric or asymmetric **physiologic** (normal variant) enlargement of the optic nerve cup. However, when enlarged or asymmetric optic nerve cupping is detected on examination, local

evaluation to rule-out ocular hypertension and visual field loss is required. Evaluation must include diurnal intraocular pressures by applanation (at least three readings performed two hour apart), Humphrey visual field testing (30-2), evaluation of the retinal nerve fiber layer by OCT, and stereoscopic disc examination. Only when normal findings and no evidence of secondary causes for glaucoma are documented can the cupping be considered physiologic. If any of these modalities results in abnormal findings, the member would be labeled accordingly (ocular hypertension or glaucoma). In cases of suspicious optic nerve appearance or suspicious visual field abnormalities, waiver request and ACS review should be initiated. Even in the case of physiologic cupping, further monitoring at least every two years is recommended to include stereoscopic disc examination, intraocular pressure by applanation, and visual field testing to monitor stability.

Table 1 summarizes waiverability of ocular hypertension and glaucoma, as well as when ACS review or evaluation is required. Physiologic enlargement or asymmetry of the optic nerve cup is no longer disqualifying once ocular hypertension and glaucomatous visual field defects have been ruled out.

Table 1: Waiver criteria for ocular hypertension and glaucoma.

Flying Class	Ocular Hypertension	Glaucoma	Waiver Authority	Required ACS evaluation/review
I/IA, initial FC II*/ III/GBC	No	No	AETC	No
II/III	Yes	Yes	MAJCOM	Yes
ATC/ GBC	Yes	Yes	MAJCOM	Yes
MOD	Yes#	Yes	AFGSC	Yes

* AFMSA is the waiver authority for initial FC IIU
# Ocular hypertension is only disqualifying for initial MOD

AIMWITS search in Jun 2014 revealed a total of 891 members with an aeromedical summary with the diagnoses of glaucoma or intraocular hypertension. There were a total of 143 disqualifications. Breakdown of the cases revealed: 82 FC I/IA cases (36 disqualified), 373 FC II cases (21 disqualified), 355 FC III cases (71 disqualified), 62 ATC/GBC cases (14 disqualified), and 19 MOD cases (1 disqualified).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. **All glaucoma waivers (initial and renewal) require evaluation by a local optometrist or ophthalmologist prior to ACS review.**

The AMS for initial waiver request for OHT and glaucoma should include:
A. Aeromedical summary with a thorough review of past medical history and family history. Past ocular history should include a review of eye injuries, surgery, previous infectious or inflammatory eye disease, intraocular pressure history, previous visual field findings and presence or absence of associated risk factors including family history of glaucoma.

B. Complete eye examination to include: refraction to best visual acuity, Humphrey visual field testing (30-2), applanation tonometry with diurnal measurements (at least three measurements, performed two hours apart), dilated funduscopic exam, and retinal nerve fiber layer analysis by optical coherence tomography (OCT) results. For OHT and glaucoma, examination should also include central corneal thickness and optic disc photographs if available.
C. Results of ophthalmology consultation (if required)

ACS review is required for all flying classes, for waiver recommendation of OHT and glaucoma as part of the Ocular Hypertension/Glaucoma Management Group. An evaluation may be required following ACS case review. A Medical Evaluation Board (MEB) is required for glaucoma if there are changes in the optic disc, visual field defects, or the condition is not amenable to treatment. An MEB is not required for ocular hypertension.

The AMS for a waiver renewal of OHT and glaucoma should include:
A. Summary of any changes with a review of history and a list of quarterly measurements of intraocular pressure by applanation tonometry, unless the treating specialist specifies less frequent assessment
B A complete eye examination to include: bilateral Humphrey visual field exam (30-2), retinal nerve fiber layer analysis by optical coherence tomography (OCT), and dilated funduscopic exam with optic disc photographs.
C. Results of ophthalmology consultation (if required).

ICD-9 codes for optic nerve cupping, intraocular hypertension, and glaucoma	
743.57	Specified anomalies of optic disc (increased cup-to-disc ratio)
365.04	Ocular Hypertension
365	Glaucoma

ICD-10 codes for optic nerve cupping, intraocular hypertension, and glaucoma	
Q14.2	Congenital Malformation of optic disc
H40.05 1, 2, 3, 9	Ocular Hypertension, right eye, left, bilateral, unspecified
H40.9	Unspecified glaucoma
H40.10X0	Unspecified open-angle glaucoma, stage unspecified

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WAIVER GUIDE
Updated: Jul 2013
Supersedes Waiver Guide of Feb 2010
By: Capt Peter Baldwin (RAM 13) and Dr Dan Van Syoc
Reviewed by LtCol Matthew Carroll, AF/SG Consultant for Rheumatology

CONDITION:
Gout (Jul 13)

I. Overview.

Gout is a recurrent, often monoarticular, acute arthritis resulting from the deposition of urate crystals within joint spaces and in adjacent cartilage and tendons. Fundamental to the development of gout is a substantial increase in total body uric acid stores, as reflected in the metabolic disorder hyperuricemia. It is important to realized that all patients with gout have hyperuricemia (serum uric acid level exceeding 6.8 mg/dL), but that the vast majority of hyperuricemic individuals never experience a clinical event resulting from urate crystal deposition.[1] Gout is a very common disease accounting for an estimated 4 million outpatient visits annually in the United States.[2] Estimates of the prevalence of gout in the United States may range from less than 3 million to more than 8 million.[4, 5] Both the incidence and prevalence of the gout appear to be increasing in both the United States and worldwide.[5-9] It is estimated to affect at least 1 percent of men with a male:female ratio ranging from 7:1 to 9:1.[10] Gout is predominantly an idiopathic or multifactorial disease of adult men, with a peak incidence in the fifth decade and it rarely occurs in men before adolescence or in women before menopause.[11]

The term *gout* is used to represent a heterogeneous group of diseases found exclusively in humans that include the following characteristics: 1) elevated serum urate concentration (hyperuricemia), 2) recurrent attacks of acute arthritis in which monosodium urate (MSU) crystals are demonstrable in synovial fluid leukocytes, 3) aggregates of MSU crystals (tophi) deposited chiefly in and around joints, which sometimes lead to deformity and crippling, 4) renal disease involving glomerular, tubular, interstitial tissues and blood vessels, and 5) uric acid nephrolithiasis.[12] A minority of gout cases are due to heritable defects (about 10%), while the majority are due to increased cell turnover due to tumors, disease states and declining renal function, or the influence of other medications on renal function. Gout is classified by either overproduction of uric acid (10%) or underexcretion of uric acid (90%). The most common initial presentation is an acute episode of pain in first metatarsophalangeal joint (also called podagra) which reaches its maximum intensity within 6-12 hours, often with overlying erythema. Such a presentation is highly suggestive of the diagnosis of gout, but the demonstration of MSU crystals in the synovial fluid permits a definitive diagnosis.[13]

Hyperuricemia is common in our US population and is often caused by a combination of high purine diet, alcohol use, diuretic therapy, and reduced renal clearance. Uric acid is a metabolic by-product of purine metabolism which explains the issue with purine-rich foods.[2] The symptoms of gout and gouty arthritis are due to the unique characteristics of MSU which can cause crystals to precipitate in body fluids if the concentration surpasses its solubility. These crystals are capable of directly triggering and sustaining an intense inflammatory response, the so-called “acute attack”, because of their ability to activate humoral and cellular inflammatory components.[14] Early attacks of gout, if untreated, usually resolve spontaneously in three to ten days, but tend to recur with

increasing frequency. Intercritical gout is the interval between acute synovitis attacks. Chronic arthritis may develop, with deposition of crystal aggregates (tophi) in cartilage, synovial membranes, tendons, and soft tissues, and nephrolithiasis with obstructive uropathy which may occur from precipitation of crystals in the renal collecting system.

Since the 1960s, there has been a reported relation between serum uric acid levels and numerous cardiovascular conditions including hypertension, metabolic syndrome, coronary artery disease, cerebrovascular disease, vascular dementia, preeclampsia, and kidney disease. It is unclear how important these associations are and there is not yet adequate data to support the general treatment of asymptomatic hyperuricemia to reduce cardiovascular risk. The major point of emphasis is for the provider to be looking for such conditions in patients with known gouty disease or significantly elevated uric acid levels.[15] Gout is also associated with obesity and metabolic syndrome. Lifestyle modifications aimed at these highly morbid conditions can also reduce the likelihood of gout recurrence. Diet, exercise, and alcohol moderation can reduce body mass index (BMI), blood pressure, triglycerides, and waist-to-hip ratio and the associated likelihood of gout recurrence.

Nephrolithiasis occurs in 10 to 25 percent of patients with primary gout. The likelihood of stones in a given patient with gout increases with serum urate concentrations and with amounts of urinary uric acid excretion. It exceeds 50 percent with a serum urate level above 13 mg/dl or with urinary uric acid excretion rates in excess of 1100 mg every 24-hours.[11]

In the acute setting, standard therapy consists of prompt treatment of the pain and disability with nonsteroidal anti-inflammatory drugs (NSAIDs) (indomethacin has been the traditional choice by clinicians but is not currently waiverable) or colchicine. Narcotics can be considered for acute pain control. Intrarticular injection of glucocorticoids represents the most efficacious and expedient care if available. Parenteral steroids can also be considered. NSAIDs given in full anti-inflammatory doses are effective in approximately 90% of patients, and the resolution of signs and symptoms usually occurs in 5-8 days. Oral glucocorticoids should be reserved for polyarticular disease.[16] Oral colchicine can be effective for the treatment of acute gouty arthritis, particularly when administered early after the onset of symptoms. It is a plant derivative and inhibits leukocyte activation and migration, and is most effective if given during the first 24 to 48 hours of the attack. However, its use is limited by adverse effects. In one study, approximately two-thirds of colchicine-treated patients improved after 48 hours compared with one-third of the placebo group. However, all patients taking colchicine developed diarrhea and/or vomiting after a median time of 24 hours (mean colchicine dose 6.7 mg), which was before the relief of pain in the majority of patients. As a result of these adverse effects, the use of oral colchicine should be limited to patients intolerant of NSAIDs or for those who have used colchicine with success in the past.[17, 18]

After the acute attack has subsided a decision needs to be made regarding long-term management of the condition. This will normally consist of one of the urate-lowering agents. Indications for such therapy include two or more gout attacks per year, tophaceous gout, erosive arthritis on radiographs, and uric acid kidney disease (urate nephropathy, uric acid nephropathy, and uric acid nephrolithiasis). The goal for therapy is to lower the serum uric acid level to less than 6.0 mg/dL, as serum uric acid levels below this level have been associated with a reduced frequency of acute attacks.[10] Uricosuric drugs increase the urinary excretion of urate, thereby lowering the serum urate concentration. Approximately 75% of patients with primary gout have substantially decreased renal urate excretion. However, uricosuric medications including probenecid require an adequate glomerulo-filtration rate (>60 mg/min) to be effective. Furthermore, patients prescribed probenecid

should be counseled to avoid salicylate use at doses greater than 81 mg per day. Xanthine oxidase inhibitors block the final step in urate synthesis. Allopurinol is effective in lowering serum urate concentrations in both urate over production and renal urate under excretion and is once-a-day dosing. Gouty individuals who excrete larger quantities of uric acid (>800mg/24-hours) in their urine, who have a history of renal calculi of any type, or have renal insufficiency should be treated with allopurinol. Antihyperuricemic agents should not be initiated, adjusted, or stopped during the acute attack without the specific guidance of a rheumatologist as fluctuations in the serum urate concentration may exacerbate an acute attack. Colchicine (not on waiverable medication list) or NSAIDs can be used prophylactically against recurrent attacks, especially during the initiation of urate lowering treatment. However, although colchicine and NSAIDs may block the acute inflammatory response they do not alter the deposition of crystals in tissue. Therefore, colchicine and NSAIDs should not be used solely for prophylaxis but in conjunction with urate-lowering drugs. Additionally, patients with gout should be advised to lose weight if their BMI is above 25 and change their dietary habits.[19] These changes should include reduction in calories and extremely limited alcohol intake.[20, 21] It should be noted that beer consumption is associated with a 2.5 fold increase in gout flares.[21]

II. Aeromedical Concerns.

Acute episodes of gout may cause significant physical incapacitation due to painful joints and cognitive impairment due to distraction of pain. In addition, the risk of nephrolithiasis increases modestly with the serum urate level and with the magnitude of daily urinary uric acid excretion. Chronically, gout may cause significant physical incapacitation due to erosive joint deformities, urate nephropathy, and/or obstructive uropathy (e.g. nephrolithiasis).

NSAIDs can cause gastritis acutely; chronic use can result in peptic ulcer disease and both chronic and acute renal insufficiency. Colchicine may cause diarrhea in the typical prophylactic dose and it usually causes moderate to severe intestinal cramping and vomiting if given intravenous or in high dose orally to abort acute gout. All antihyperuricemic drugs can precipitate an attack of acute gouty arthritis as serum uric acid levels are lowered. Up to 5% of patients are unable to tolerate allopurinol because of adverse events including headache and gastrointestinal irritation, and less commonly, but far more serious, is the occurrence of severe hypersensitivity reactions and bone marrow suppression.

The major questions to be answered prior to requesting a waiver include: Are the gouty attacks frequent and severe? Is the patient free of renal involvement? Does the patient have hypertension, diabetes, atherosclerosis, or other disease associated with gout? Is the serum uric acid kept at normal levels with medication and is the patient free of untoward side effects of the medication prescribed? All of these are important considerations for an airman with gout.[22]

III. Waiver Consideration.

Gout is disqualifying for Flying Classes I, II, III, GBC, and MOD (if frequent exacerbations or if organ damage exists) per AFI 48-123.

Table 1: Waiver potential for gout

Flying Class (FC)	Gout Treatment Status	Waiver Potential Waiver Authority
I/IA	No meds, allopurinol, probenecid, NSAIDs* or colchicine	No AETC
II/III	No meds, allopurinol. probenecid, NSAIDs*	Yes MAJCOM
	Colchicine	No MAJCOM
ATC/GBC	No meds, allopurinol. probenecid, NSAIDs*	Yes MAJCOM
	Colchicine	No MAJCOM
MOD	No meds, allopurinol. probenecid, NSAIDs*	Yes AFGSC
	Colchicine	No AFGSC

* NSAIDs currently on waiverable medication list are ibuprofen and naproxen.

Review of AIMWTS data in May 2013 revealed a total of 552 cases related to hyperuricemia. There were 7 FC I/IA case, 284 FC II cases, 235 FC III, 22 ATC/GBC cases, and 7 MOD cases. Of the total, there were 54 disqualifications; 3 were FC I/IA, 24 were IFC II, 23 were FC III, 3 ATC/GBC, and 1 MOD; although gout should not be waived in FC I/IA applicants, the one FC I case was waived. All but three cases were disqualified for a diagnosis other than gout.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for gout should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history to include description of acute gouty arthritis (duration, location, response to medical treatment), risk factors (aberrant diet, alcohol intake, elevated BMI) and associated conditions (HTN, kidney stones). Negatives for risk factors and associated conditions should be included.
C. Physical exam with special attention to joints and presence of tophi. Screening radiographs of the hands and feet as hands and feet hold wealth of information about joint health.

D. Labs: Results of joint aspiration; Serum BUN, creatinine, and uric acid. (Uric acid levels are frequently normal during attacks).
E. If prophylaxis begun, then current medication, dose, any side effects, and uric acid level (goal < 6.0 mg/dL). A 24-hour urine for uric acid is required to show that the individual is not a urate over producer if started on probenecid.
F. Consultation report from a rheumatologist or internist.

The AMS for waiver renewal for gout should include the following:
A. Interim history to include any interval attacks to along with frequency, specific joint involvement, and treatment.
B. Physical exam with special attention to joints and presence of tophi. If abnormality of joints or tophi, then x-rays of involved area.
C. If on prophylactic treatment then annual uric acid level (goal <6.0 mg/dL) on medications and current medication, dose and side effects experienced.
D. Consultation report from a rheumatologist or internist.

ICD-9 codes for gout	
274	Gout
274.0	Gouty arthropathy
274.1	Gouty nephropathy
274.82	Tophaceous gout
274.9	Gout, unspecified

ICD-10 codes for gout	
M10.00	Idiopathic gout, unspecified site
M1A.9XX0	Chronic gout, unspecified without tophus (tophi)
M10.30	Gouty due to renal impairment, unspecified site
M1A.9XX1	Chronic gout, unspecified, with tophus (tophi)
M10.9	Gout, unspecified

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WAIVER GUIDE
Updated: Jul 2014
Supersedes Waiver Guide of Dec 2010
By: Dr Joe Connolly (RAM XV) and Dr. Dan Van Syoc
Reviewed by Col Roger Hesselbrock, ACS Neurologist

CONDITION:
Guillain-Barré Syndrome (Acute Inflammatory Demyelinating Polyradiculoneuropathy) (Jul 14)

I. Overview.

Guillain-Barré syndrome (GBS) consists of a heterogeneous group of acute, progressive, immune-mediated, polyradiculoneuropathies. These variants include acute inflammatory demyelinating polyradiculoneuropathy (AIDP, in 85% to 90% of U.S. and European cases), the Miller Fisher syndrome (MFS, in 5% of U.S. and 25% of Japanese cases) characterized by ophthalmopelgia, ataxia and areflexia, acute motor axonal neuropathy (AMAN, in 5% to 10% of U.S. cases), acute motor and sensory axonal neuropathy (AMSAN), and acute panautonomic neuropathy.[1–3] In 70% of cases, GBS is typically preceded (days to weeks) by trigger events, most commonly viral or bacterial infectious illnesses often relating to campylobacteriosis, respiratory infections, or gastrointestinal infections.[1, 3, 4] AMAN and AMSAN occur more frequently in *Campylobacter jejuni* infected patients and *C. jejuni* infection is associated with slower recovery, axonal degeneration and severe residual disability. GBS can also be seen after immunizations, surgery, trauma, bone-marrow transplantation, and systemic diseases such as Hodgkin's disease, systemic lupus erythematosus, and sarcoidosis, and it is more common in males than females. Worldwide it occurs in 1 to 3 out of 100,000 people annually, affecting all age groups and races, but peaks in late adolescence and early adulthood, as well as in the elderly and pregnant or postpartum women.[1 ,3 ,5]

GBS generally presents acutely with symmetric proximal muscle weakness, usually lower extremity (90% of the time), more so than facial or upper extremities. Tingling in the extremities, paresthesias, disappearance of deep tendon reflexes, and paralysis (typically ascending) also progress. Pain occurs in about half of GBS patients and can be extremely severe. Cranial nerve involvement can affect airway maintenance, eye movement, facial muscles, and swallowing. Autonomic dysfunction (dysautonomia) including urinary retention, alternating hypotension and hypertension, orthostatic hypotension, bradycardia, other arrhythmias, ileus, and loss of sweating, occurs in 70% of GBS patients, and if severe, can even be associated with sudden death. Other atypical features such as, papilledema, hearing loss, vocal cord paralysis, and mental status changes are associated with severe disease and autonomic dysfunction. Individuals should be hospitalized for observation and care, as 30% will require mechanical ventilation. Complications of thromboembolism, skin breakdown due to immobility, and psychological trauma are among some of the other clinical concerns. This progressive phase lasts from a few days to four weeks, with 73% of symptoms peaking at one week and 90% to 98% at four weeks.[1, 3] It is followed by a plateau phase with persistent, unchanging symptoms. Disease improvement can start within days of the plateau and varies in symptom duration.

The diagnosis of GBS can be difficult initially due to the large variety of symptoms incurred. The substantial differential diagnosis includes disorders of the spinal cord, muscles, neuromuscular junction, brainstem, and other acute polyneuropathies. In addition, electrolyte imbalances, viruses,

bacteria or other organisms, chemicals, toxins and venoms, and even psychosomatic disorders and malingering must be ruled out. Initial diagnosis is made based on clinical features and testing, most reliably five to seven days after symptoms start. Testing in all suspected cases of GBS should include a lumbar puncture to look for elevated protein levels and clinical neurophysiologic studies (electromyography and nerve conduction studies [EMG/NCS]) to support the diagnosis and to assess neurophysiological impairment. Treatment entails supportive care and frequently includes respiratory assistance, cardiac monitoring, and pain control. Specific therapy with high-dose intravenous immune globulin (IVIG) or plasmapheresis have been successful in shortening the severity and duration of the illness in up to 40% to 50% of patients.[1, 3, 6, 7] A history of completing plasmapheresis or IVIG treatments is not in itself a contraindication to later return to flying duties. However, flying during these therapies is disqualifying due to their adverse effect profile and the fact that the disease is still active.

Within six to twelve months 85% of GBS patients have fully recovered, with maximal recovery of residual deficits usually seen 18 months after symptom onset. However, persistent minor weakness, areflexia, and paresthesias remain, with approximately 7% to 15% of patients left with permanent neurological sequelae (e.g. foot drop, intrinsic hand muscle wasting, sensory ataxia, painful dysesthesia). On average, 5% to 10% of GBS patients have an extended disease course with several months of ventilator dependency and very delayed and incomplete recovery while 4% of patients become restricted to bed.[3, 7] With sound intensive care and respiratory support availability, the overall mortality rate for GBS is less than 5%. Approximately 20% of ventilator dependant patients die. Early diagnosis, close monitoring, and appropriate treatment of this disease are essential to prevent mortality. Rehabilitation will be needed in most patients with GBS. In addition severe fatigue persists in 80% of patients and is unrelated to age, duration or severity of the initial illness.[3, 8] The cause and contributing factors are not fully known, but fatigue appears in part to be a sequela of forced inactivity and general muscle deconditioning. The relapse rate for GBS is rare and if this occurs, raises the possibility of the diagnosis of chronic inflammatory demyelinating polyradiculoneuropathy (CIDP). Most GBS recurrences or transformation to CIDP will occur within one year of the initial presentation.

II. Aeromedical Concerns.

Acutely, GBS can cause sudden, acute onset of weakness, paresthesias, pain, dysphagia, and a variety of other symptoms, sometimes developing within a few hours, which can affect flying ability. Ataxia is also a concern in the MFS variant of GBS. Sensory touch and proprioception may be affected, while respiratory distress, cardiac and autonomic dysfunctions, and easy fatigability pose a serious risk for incapacitation. The major aeromedical concern after recovery is the possible long term residual neurological deficits which could affect performance of aircrew duties.

Recurrence of GBS after immunization is rare.[8] Immunizations are not recommended during the acute and recovery phase of GBS. While there is no overall absolute contraindication to immunizations following an episode of GBS, if GBS occurred within 6 weeks after a particular immunization, consideration of avoiding that particular immunization in that individual should be weighed against the overall risk of the disease for which the patient is being immunized.

III. Waiver Consideration.

GBS is disqualifying for all flying classes and for ATC/GBC and MOD personnel. Per Medical Standards Directory (MSD, 14 Feb 2014, L26)"Polyneuritis, whatever the etiology, unless: Limited to a single episode, the acute state subsided at least 1 year before examination, there are no residual effects which could be expected to interfere with normal function in any practical manner." The one-year observation period is specified to allow for maximal functional recovery and because most GBS recurrences or transformation to CIDP will occur within this time frame.

For flying personnel with GBS, a waiver is very likely if there is full recovery. An ACS review/evaluation is required to determine eligibility for a return to flying status if residual deficits remain after recovery and are minor and not felt to interfere with aircrew duties.

Table 1: Waiver potential for GBS

Flying Class (FC)	**Condition**	**Waiver Potential** **Waiver Authority**
I/IA	GBS with full recovery	Yes* AETC
	GBS with some residual deficits	No AETC
II III ATC/GBC	GBS with full recovery	Yes* MAJCOM
	GBS with some residual deficits**	Maybe* MAJCOM
MOD	GBS with full recovery	Yes* AFSPC or GSC
	GBS with some residual deficits**	Maybe* AFSPC or GSC

* ACS review prior to waiver consideration.
**Candidates for FC II, III, IIU, ATC/GBC, or MOD may need to be assessed more critically, as are FC I/IA prior to waiver consideration.

AIMWITS search in Jul 2014 revealed a total of 8 cases of GBS. There was 1 FC I case, 5 FC II cases, 1 FC III case, and 1 MOD case. The only disqualified case was the MOD individual who was disqualified for GBS and concomitant myasthenia gravis.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for GBS should include the following:
A. Summary of presentation, course, and treatment of disease.
B. Results of lumbar puncture, EMG, and neurophysiologic studies.
C. Neurology consult that includes complete exam once disease has resolved.
D. Pulmonary function test upon resolution of disease.
E. Optometry/ophthalmology consult to include all test listed in MSD (stereopsis, ocular motility and alignment testing), if vision involved.
F. Physical and occupational rehabilitation consults if obtained; at the least, documentation of return to full physical activity (including specific comments regarding any limitation of activities requiring prolonged physical exertion).

The AMS for waiver renewal, if indicated, for GBS should include the following:
A. Interval history since last waiver submission with particular emphasis on neurological exam and specific testing as annotated in the initial waiver section.
B. Neurology consult.
C. Evidence that the aviator is fully capable of resuming/continuing normal duties.

ICD-9 codes for Guillain-Barré syndrome	
357.0	Acute infective polyneuritis
357.4	Polyneuropathy in other diseases classified elsewhere
357.8	Other inflammatory and toxic neuropathies

ICD-10 codes for Guillain-Barré syndrome	
G61.0	Acute infective polyneuritis
G63	Polyneuropathy in diseases classified elsewhere
G61.89	Other inflammatory polyneuropathies

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WAIVER GUIDE
Updated: Jan 2014
Supersedes Waiver Guide of Nov 2010
By: Maj Russell Tontz (RAM XV), Col Roger Hesselbrock (ACS Neurology), and Dr Dan Van Syoc

CONDITION:
Headache (Jan 14)

I. Overview.

Headaches are a near-universal experience, with a 1-year prevalence of 90% and a lifetime prevalence of 99%. Each year in the United States, 9% of adults see physicians for headaches and 83% self-medicate. Headaches are one of the most common complaints of patients seen by primary care physicians and account for 20% of outpatient visits to neurologists.[1] Most headaches are not serious, but they can affect the afflicted patient's home life, work environment, and social interactions.

The International Headache Society (IHS) classification of headache has become the basis for headache classification in the International Classification of Headache Disorders (ICHD-III/Beta, 2013).[2] Headaches are classified into three categories:

1. Primary headaches (to include migraine, tension-type headache, trigeminal autonomic cephalalgias including cluster headache and other primary headache disorders.
2. Secondary headaches (to include headache attributed to trauma/injury, cranial/cervical vascular disorder, non-vascular disorder, substance use/withdraw, infection, homeostatic disorder including include high-altitude and headache attributed to airplane travel, ENT disorder, or psychiatric disorder.
3. Painful cranial neuropathies, other facial pains and other headaches.

For clinical classification into one of the categories above, a meticulous, detailed history is essential to arriving at a correct diagnosis, and therefore to directing appropriate treatment. Thus, some discussion of primary headache types likely to affect aviators is warranted. Specific features of the headache should be elicited to include: age of onset, associated symptoms, precipitating triggers/alleviating factors, location, quality, severity, frequency, duration, periodicity, medication history as well as family history.[3]

Although the physical examination in headache patients is generally normal, a good general and neurologic examination is indicated. Thorough head and neck examination should be done to check for possible secondary causes such as cervical spine disease, trigger points, occipital neuralgia and sinusitis. The neurologic examination should look for any asymmetries. Funduscopic examination is important to assess any signs of possible elevated intracranial pressure.

Tension-Type Headaches

Tension-type headache is very common, with a lifetime prevalence in the general population ranging between 30% and 78% in different studies, and it has a very high socio-economic impact.[4]

Although this type of headache was previously considered to be primarily psychogenic, a number of studies have appeared after publication of ICHDI that strongly suggest a neurobiological basis, at least for the more severe subtypes of tension-type headache.

Tension headaches occur as frequent episodes of headache, typically bilateral, pressing or tightening, non-pulsating in quality. They are usually of mild to moderate intensity, divided into episodic tension headaches lasting 30 minutes to days, or unremitting in the case of chronic tension headache. The pain does not worsen with routine physical activity and are not usually associated with nausea, photophobia or phonophobia, however degrees of these may present with either episodic or chronic tension headache. Increased pericranial tenderness recorded by manual palpation is the most significant abnormal finding in patients with tension-type headache. The tenderness is typically present interictally, is further increased during actual headache and increases with the intensity and frequency of headaches.

Treatment plan for tension-type headache should begin with non-pharmacological measures such as physiotherapy (daily exercise programs and posture correction), biofeedback, and stress and pain management. It is important to exclude the overuse of analgesics as a cause or other underlying disease, such as depression or oromandibular dysfunction.

Pharmacologic management for episodic tension headache usually begins with over-the-counter (OTC) analgesics such as acetaminophen, aspirin and other non-steroidal anti-inflammatory agents (NSAIDs). Historically, the treatment for more severe headaches has included muscle relaxers or benzodiazepines, yet this has not been recommended based on evidence based research.[5] Chronic tension-type headaches may be treated with preventive treatment when non-pharmacological treatment has insufficient effect and medication overuse has been excluded.[6]

Migraine

In the Global Burden of Disease Survey 2010, migraine headache was ranked as the third most prevalent disorder and the seventh-highest specific cause of disability worldwide. Although migraines can be seen at any age, they are most common in the young and middle-aged adult, beginning most frequently in adolescence, and with the highest prevalence between 30 to 39 years of age.[7, 8] Migraine affects approximately 6% of men and 15-18% of women.[9] Many migraine sufferers have a family history of migraine.

The genesis of a migraine attack is associated with neuronal activation and the site of this initiation of activation remains debatable.[5] The current concepts of migraine genesis are via cortical spreading depression (CSD) or a brainstem generator. The aura that precedes some migraines is a slow march of visual or other neurologic symptoms associated with changes in neuronal activity that result in spreading neural depression from the occipital cortex. Excitatory changes produce increased blood flow, followed by reduced blood flow caused by neuronal inhibition.[1]

Migraine attacks may vary in intensity, duration, frequency of occurrence, and in associated features from one migraine sufferer to another or from one headache to the next. The most recent 2013 3rd edition of the IHS guidelines defines migraine based on the following diagnostic criteria.

There must be five attacks of 4-72 hour duration, with or without treatment, that have at least 2 of the following 4 characteristics:
1. Unilateral location
2. Pulsating quality
3. Moderate or severe pain intensity
4. Aggravation by or causing avoidance of routine physical activity such as walking or climbing stairs

The final diagnostic migraine criteria is one of the following:
1. Nausea and/or vomiting
2. Photophobia and phonophobia.

Migraines are classified according to their complex of symptoms. The two major subtypes are: migraine with aura ("classical migraine") and migraine without aura ("common migraine" in the old terminology). The difference between migraine with aura and migraine without aura is the aura itself. The diagnostic criteria for migraine with aura is that the individual experiences 2 attacks that include BOTH: 1 or more of the following 6 fully reversible aura symptoms of visual, sensory, speech/language, motor, brainstem or retinal AND at least 2 of the following 4 aura characteristics:
1. At least one aura symptom spreads gradually over 5 minutes, and/or two or more symptoms occur in succession,
2. Each individual aura symptom lasts 5-60 minutes,
3. At least one aura symptom is unilateral,
4. The aura is accompanied, or followed within 60 minutes, by headache.

The aura is the presence of neurological symptoms from a few minutes up to an hour before the migraine attack. The most common form of aura is visual, such as flashing lights, blurriness, or even temporary vision loss. The second most common manifestation is paresthesias, which often occur in association with visual symptoms. Less common forms of aura include global confusion, speech difficulty, or extremity weakness.[10] ICHD-III defines "migraine with aura without headache" as a migraine that meets the criteria for a migraine with typical aura, yet no accompanying headache within 60 minutes. This has commonly been referred to as an "acephalgic migraine". Migraine without aura often has a menstrual relationship. More than 1 of 5 female migraineurs aged 30-34 years have migraine in ≥50% of menstruations.[4]

Migraine sufferers may also describe headache patterns consistent with more than one headache type (e.g. tension-type headaches and migraine headaches). To diagnose migraine, it is necessary to exclude secondary headache causes and then determine whether the patient has another coexisting primary headache. Note that some experts view migraine and tension-type headaches as distinct diseases while others view them merely as ends of a continuum of severity. In the end, the diagnosis in both clinical practice and epidemiological research is almost entirely dependent on the patient's description of prior attacks (i.e. symptom profile). In occupations where a diagnosis of migraine could be potentially career threatening (such as military aviation), there may well be attempts to avoid reporting of such headache conditions.

Unlike cluster headaches, migraines frequently are set off by "triggers." Precipitating factors can include stress (often during post-stress "let down"), fatigue, physical exertion, glare, hunger, certain foods and/or medications, atmospheric changes (e.g., weather, altitude, and ambient temperature), fluorescent lighting and chronobiologic challenges (e.g., alterations in sleep/wake cycles, jet lag, changing seasons, etc.).[11] Migraine may also be precipitated by menstruation, as previously

mentioned. Although there is little scientific basis to show an association between certain dietary factors such as chocolate, cheese and certain fruits and the triggering of migraines has been hypothesized, fasting or skipping meals can be a trigger and may be equivalent to that of stress.[12]

Medical treatment is divided into acute and prophylactic step-wise treatment. The first step in acute treatment consists of simple analgesics and antiemetics for nausea symptoms. Patients should be warned not to exceed 14 days/month of simple analgesics so as to avoid medication overuse headache. The next step up in treatment consists of triptans. Treatment should be initiated as early as possible during the attack however, should not be taken during the aura phase, as they are ineffective in this phase. Ergot alkaloids (ergotamine derivatives) are nearly obsolete due to the risk of serious side effects. These should only be used by specialists for refractory patients.[6]

Approximately, 20–50% of patients experience migraine relapse within 48 hours. An additional dose of triptan is normally effective in these cases. Migraine relapse may also be managed with NSAID. In case of lack of effect from triptans, repetition of the triptan treatment during the same attack is usually ineffective. Use of triptans should not exceed 9 days/month to avoid medication overuse headache. Common side effects include a sensation of pressure on the chest, nausea, distal paresthesia and fatigue. Triptans are, among others, contraindicated in cases with uncontrolled hypertension, ischemic heart conditions, previous cerebral infarctions and peripheral vascular diseases. Caution should be exercised when treating patients less than 18 and over 65 years. However, sumatriptan nasal spray 10 mg is approved for use in adolescents aged 12–17 years.

Roughly 3-13% of identified migraine patients are on preventive therapy, an estimated 38% actually need a preventive agent.[4] The American Migraine Prevalence and Prevention Study outlined recommendations for considering prophylactic treatment for those having 4 to 5 migraine days per month with normal functioning; 2 to 3 migraine days per month with some impairment; 2 migraine days with severe impairment.

Beta-blockers should normally be selected as the first among first-line drugs. Evidence is strongest for propranolol and metoprolol although there is some evidence to support an effect of bisoprolol, timolol and atenolol. Beta-blocker dose should be titrated up based on patient side effects which commonly include fatigue, dizziness, reduced physical capacity and cool extremities. The anti-epileptic drugs topiramate and valproate have well-documented effects comparable to that of beta-blockers, but are generally associated with more side effects.[10]

It should be noted that none of the abortive or prophylactic pharmacologic therapies are waiverable for flying and the medications may limit fitness performance.

Cluster Headaches

Cluster headaches are markedly less common within the general population, affecting less than one percent of the population. Onset of cluster headache typically occurs at 20–40 years of age and the condition has a prevalence of 80–100 per 100,000 persons. Permanent remission is seen, but after 15 years with the disease, 80% of patients still have attacks.[6] Men are at least 4 times more likely than women to be afflicted. Age at onset is usually 20–40 years. For unknown reasons, men are afflicted three times more often than women. Acute attacks involve activation in the region of the posterior hypothalamic grey matter. Cluster headache may be autosomal dominant in about 5% of cases. Alcohol consumption may aggravate cluster headache and should then be avoided in cluster periods. No other trigger factors are known. Many cluster headache patients are heavy smokers.[6]

As trigeminal autonomic cephalalgias (TACs) share the clinical features of headache, which is usually lateralized, and often prominent cranial parasympathetic autonomic features (ipsilateral conjunctival injection, lacrimation, eyelid edema, nasal congestion, Horner's syndrome), which are again lateralized and ipsilateral to the headache. Experimental and human functional imaging suggests that these syndromes activate a normal human trigeminal parasympathetic reflex, with clinical signs of cranial sympathetic dysfunction being secondary. Typical migraine aura can be seen, rarely, in association with TACs.

Attacks occur in series lasting for weeks or months (so-called cluster periods) separated by remission periods usually lasting months or years. Diagnostic criteria usually involve a severe or very severe unilateral orbital, supraorbital and/or temporal pain lasting 15–180 minutes. Ipsilateral symptoms such as conjunctival injection/lacrimation, nasal congestion/rhinorrhea, forehead flushing, miosis or ptosis are usually present with associated restlessness or agitation. These symptoms are usually cluster in frequency to be every other day with 8 episodes per day when active.

Management of cluster headaches typically requires both abortive and preventive medication during the headache cluster period. 100% oxygen at headache onset, as well as ergotamines and triptans have been used effectively as abortive treatments. Intranasal lidocaine has also been used but is reported to have only transient effect. Calcium channel blockers, prednisone, lithium and valproic acid are frequently used for prophylaxis. Management of cluster headaches can be classified as abortive versus preventive treatment.

The first-line treatment for attacks if oxygen is ineffective or unavailable is subcutaneous sumatriptan. It leads to complete pain relief in approximately 75% of patients within 15 min. Sumatriptan nasal spray is also effective, but the effect is achieved more slowly. Oral triptan formulations generally take too long to gain effect. Patients with cluster headache are at risk of developing medication overuse headache from frequent use of triptans. Common side effects include chest pain, nausea, distal paresthesia and fatigue. Triptans are contraindicated in cases with uncontrolled hypertension, ischemic heart conditions, cerebrovascular conditions and peripheral vascular diseases.

Verapamil is the first-line preventive treatment of cluster headache. Treatment should be titrated up to a therapeutic dose. ECG should be checked before treatment initiation and repeated for every dosage increase. Typical side effects are constipation, dizziness, ankle edema, tiredness, exanthema, hypotension and bradycardia. Caution is advised in case of heart failure, AV block and when combined with beta-blockers. Other preventive treatments include prednisolone, DHE and ergotamines.[1] Due to their universally severe nature, cluster headaches historically have not been considered aeromedically waiverable.

General Management Considerations

Therapy for headache, no matter the classification, is dependent on a correct and complete diagnosis. The clinician needs to be cognizant of secondary disorders, medication misuse, as well as concurrent events in the life of the sufferer.[13] It is well recognized that migraine sufferers have less tolerance for significant life changes, sleep disturbances, and stresses in daily than do those without migraines. These life changes can easily trigger a migraine headache.[14] Maintaining a

headache diary/calendar is useful for identifying possible triggering factors and assessing treatment response.

Physicians should be familiar with headache conditions that may warrant imaging and what the preferred imaging technique or type would be most useful. Characteristics such as sudden onset of severe symptoms, severe unilateral headache, new headache with history suspicious for meningitis or concerning laboratory findings, or worsened degree of a chronic headache may necessitate imaging or at least further monitoring or urgent specialty consultation. The type of study in this situation would also warrant discussion with the radiologist to consider options of MRI vs. MRA vs. CT and contrast options depending on the clinical presentation and suspicion.[9]

II. Aeromedical Concerns.

Aeromedical concerns relate to effects of any neurologic or cognitive deficits on flight safety and mission effectiveness, and future risk of headache occurrence with potential for incapacitation or distraction. Any kind of headache may become disabling to the individual. Some people are prone to just one type of headache, while others may get a combination of headache types. It is not the type of headache that is the primary concern in aeromedical disposition of a given aviator; rather, what matters is the degree of incapacitation a headache is likely to cause in that individual.[15, 16] Of interest to our discussion of headaches in aviation is the fact that headache is the most common nervous system complication at altitude. This can be very important with aviators flying in aircraft that are not pressurized to 8,000 ft or less.[12] With an increasing number of female Air Force aviators, the flight surgeon needs to be aware that there is a significant association between headache and the reported use of estrogen-containing oral contraceptives, both for migraine and for non-migrainous headaches.[11] The IHS-III classification does have a classification for headache attributed to airplane travel that has been supported in the literature as existing and deserves further investigation for the aerospace medicine specialist.[9]

The aeromedical decision should be based on the severity and incapacitating nature of the headache, rather than the headache type. The effects of a headache may disrupt concentration at best and be totally incapacitating at worst. Associated features such as visual disturbance, vomiting, or vertigo could themselves lead to incapacitation during flight. Concern would be greatest for those flying single seat aircraft or in aircraft where complete crew participation and coordination is essential for mission completion. However, significant concern exists for any aircrew member in any type of aircraft. Additional concern exists because of the potential duration of the headaches and the consequent fact that the flyer would need to be grounded until complete resolution occurs (potentially days). Lastly, concern exists for the patient's personal well-being because inadequately-managed migraine can result in complications such as persistent aura, ischemic stroke, or migraine-induced seizures, and is a major risk factor for development of affective disorders.

The treatment of headache disorders is complex and unfortunately most of the commonly used medications are not waiverable. Occasional, but not regular use of over-the-counter (OTC) analgesics such as acetaminophen, ibuprofen and caffeine is acceptable for headaches that are not otherwise disqualifying. Non-pharmacologic strategies such as lifestyle modification and behavioral techniques can be useful management adjuncts. Selected patients may benefit from measures such as dietary supplements, osteopathic manipulation, trigger point injections or acupuncture. A new, but poorly understood entity is headache associated with airplane travel; this

will need to be explored in greater detail in the future and could have an impact on military aviation as well.[17, 18]

III. Waiver Consideration.

According to the Air Force Medical Standards Directory, all headaches, except for the occasional tension headaches, are disqualifying for flying duties in the US Air Force, including ATC/GBC and MOD duties. There is no longer any minimum observation period before waiver application. A headache will be considered disqualifying if any of the following characteristics are present:
A. Impairment in social, vocational or academic activities caused by the headache and/or its associated symptoms.
B. Medication other than OTCs is required for abortive control of the headache.
C. A prescription for prophylactic medication is required for the headache.
D. There is associated neurologic dysfunction or deficit including aura, with or without (i.e., acephalgic migraine) associated headache.

The waiver authority may consider a waiver if there are:
A. Three or fewer disqualifying headaches per year, and,
B. There are no associated neurologic dysfunction, deficit or aura, and,
C. There exists negligible or mild functional impairment (i.e., did not cause significant social or occupational impairment), nausea, photophobia, or phonophobia, and,
D. No prescription prophylactic or abortive medication is required.
E. All other cases require ACS review.

Table 1: Waiver potential for Headaches

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	History of headaches resolved or headaches controlled on OTCs	Yes AETC
	History of migraine or cluster headaches	No AETC
II/III*	History of headaches resolved or headaches controlled on OTCs	Yes MAJCOM
	History of migraine headaches	Maybe MAJCOM
	History of cluster headaches	No MAJCOM
ATC/GBC*	History of headaches resolved or headaches controlled on OTCs	Yes MAJCOM
	History of migraine headaches	Maybe MAJCOM
	History of cluster headaches	No MAJCOM
MOD	History of headaches resolved or headaches controlled on OTCs	Yes AFGSC
	History of migraine headaches	Maybe AFGSC
	History of cluster headaches	No AFGSC

* For initial flying class II, III, and ATC/GBC cases, certification authority is AETC.

AIMWITS search in Nov 2013 revealed a total of 1643 members with an AMS submitted with the diagnosis of headache; there were a total of 855 disqualifications. Breakdown of the cases was as follows: 111 FC I/IA (53 DQ), 350 FC II (138 DQ), 723 FC III (426 DQ), 272 ATC/GBC (170 DQ), and 187 MOD (71 DQ). The vast majority of DQ cases were primarily for the headache diagnosis.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for headache should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A detailed history of the headaches; age at onset; presence or absence of aura and prodrome; frequency, intensity and duration of attacks; number of headaches per month; time and mode of onset; quality, site, and radiation of pain; associated symptoms and abnormalities; family history of headaches; precipitating and relieving factors; effect of activity on pain; relationship with food/alcohol; response to any previous therapies; any recent change in vision; any recent trauma; recent changes in weight, exercise, sleep, or diet; state of general health; change in work or lifestyle; change in birth control methods (women): effects of menstrual cycle and exogenous hormones (women); and possible association with environmental factors.
C. Current physical exam – based on history, but focused on a good neurological exam
D. Imaging study reports and copies of the actual images.
E. All specialist consultation reports should be included in the waiver package.

The AMS for waiver renewal for headache should include the following:
A. Interval history and timeline of disease.
B. All applicable physical exam, labs, and imaging tests as in the initial aeromedical summary.
C. Consultation from treating physician team.

ICD-9 codes Headache	
784.0	Headache
346.0	Classical migraine
346.1	Common migraine
346.2	Variants of migraine
346.8	Other forms of migraine
346.9	Migraine, unspecified

ICD-10 codes Headache	
R51	Headache
G43.109	Migraine with aura, not intractable, without status migrainosus
G43.009	Migraine without aura, not intractable, without status migrainosus
G43.809	Other migraine, not intractable, without status migrainosus
G44	Vascular headache, not elsewhere classified

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WAIVER GUIDE
Updated: Jun 2015
Supersedes Waiver Guide of Jun 2011
By: LtCol Hui Ling Li (RAM 16) and Dr Dan Van Syoc
Reviewed by LtCol Lakeisha Henry, AF/SG Otolaryngology consultant, Dr. Carlos Esquivel and Col Mark Packer (Nero-otologists), and LtCol Alicia Nelson, AF/SG Audiology consultant

CONDITION:
Hearing Loss/Asymmetric Hearing Loss/Use Of Hearing Aid(s) (Jun 15)

I. Overview.

USAF aircraft are frequently noisy, so hearing protection is necessary to prevent long-term hearing loss.[1] USAF flight surgeons routinely encounter questions about hearing loss related to either changes in annual audiograms among individuals in the Hearing Conservation Program (HCP) and/or changes in the hearing profile category of aircrew. Aircrew must meet hearing standards as outlined in AFI 48-123 and are considered to be exposed to hazardous noise and enrolled in a HCP. This waiver guide addresses questions related to changes in hearing profile category and asymmetry. Specific questions concerning identification and administrative management of Significant Threshold Shift (STS) are best referred to AFOSH standard 48-20.[2]

A. Epidemiology and Classification: Hearing loss (HL) is common in the general population with nearly 30 million Americans affected.[3] It is estimated that 4% of people under age 45 and as many as 29% of people over age 64 suffering from handicapping loss of hearing defined as "severe enough to interfere with effective conversation in an adult – approximately 25 to 30 decibels (dB)."[4-5] Occupational hearing loss is one of the most common US work-related injury (4). Approximately 22 million US workers are exposed to hazardous noise level while at work, and 9 million are exposed to ototoxic chemicals.[6] An accelerating incidence of hearing loss is seen in adolescents and young adults, affecting 8 to 19 percent of this population.[3] A possible cause for these younger individuals is early, chronic noise exposure, possibly from personal entertainment devices.[3, 7] Most audiologists use the following guideline when describing the severity of hearing loss.

- Normal hearing (0 to 25 dB HL)
- Mild hearing loss (26 to 40 dB HL)
- Moderate hearing loss (41 to 70 dB HL)
- Severe hearing loss (71 to 90 dB HL)
- Profound hearing loss (greater than 91 dB HL)

Through World War II, hearing loss among aviators was so common that acquired hearing loss was referred to as "aviator's ears" or "aviator's deafness"; implying that hearing loss among aviators was expected or routine.[8] A 1985 study of 777 aviators in the Israeli Air Force found that 13.5% of the examined population suffered from hearing loss, that was at least mild to moderate as described above.[9]

HL is commonly classified by type:[10, 11]

- Sensorineural HL (problems converting mechanical vibrations to electrical potential in the cochlea and/or in auditory nerve transmission to the auditory cortex – examples include

noise exposure, presbycusis [HL associated with ageing], Meniere's disease, acoustic neuroma, infection [viral cochleitis in adults], autoimmune disease, inner ear barotrauma, ototoxic drugs [permanent - aminoglycosidic antibiotics and platinum derivative anti-tumor agents; reversible - "loop" diuretics and salicylates]).
- Conductive HL (decreased sound reaching the inner ear due to sound not conducted efficiently through the ear canals, eardrum or bones of the middle ear – examples include impacted cerumen, foreign bodies, otitis media, tympanic membrane perforation, cholesteatoma, otosclerosis, pathology of the ossicles in the middle ear or middle ear space, middle ear barotraumas, or superior semicircular canal dehiscence).
- Mixed HL – a combination of sensorineural and conductive hearing loss.

Sensorineural hearing loss (SNHL) is the most common type of HL in the general population and is usually related to long-term exposure to noise. However, a short blast of loud noise (generally greater than 120 – 155 dB) can also cause severe to profound sensorineural hearing loss, pain, or hyperacusis (pain associated with loud noise).[10] In either case, the HL is related to direct mechanical damage of the hair cells lining the cochlea resulting in permanent loss of a number of these cells specialized to sense sound at a given frequency. All auditory information is transduced by only 15,000 hair cells, of which the so-called inner hair cells, numbering 3500, are critically important, since they form synapses with approximately 90 percent of the 30,000 primary auditory neurons. Thus, damage to a relatively few cells in the auditory periphery can lead to substantial hearing loss.[4]

Therefore, HL related to noise exposure (short or long term) is generally permanent and irreversible. Think about the effect of losing a number of adjacent rods and cones in the retina and the resulting visual field defect. Losing adjacent hair cells in the cochlea is similar in that it results in loss of hearing in specific frequencies that can grow larger as more nearby hair cells are lost with continued noise exposure. Just as glasses cannot reverse a visual field defect, modern hearing aids are not capable of restoring the function of lost hair cells. Therefore, in a patient with sustained sensorineural hearing loss, the care plan is usually more in the direction of palliation than toward a cure.[12]

Clinically, an individual's hearing limitation is described in terms of decibels (dB) of HL. The threshold of hearing at a given frequency by a "normal" person is 0 dB HL, and numbers higher than zero on an audiogram indicate how much louder a sound at a given frequency must be in order for that individual to perceive it fifty percent of the time. Normal conversation levels are 45 to 60 dB, while a jet engine at 100 ft is 140 to 150 dB.[4]

HL as the only symptom of a systemic illness is unlikely except in the case of latent syphilis or immune-mediated SNHL.[4] However, numerous other systemic illnesses (e.g. diabetes, blood cell dyscrasias, thyroid diseases such as hyper or hypothyroidism) can result in hearing loss.

B. Office evaluation of hearing loss: Whether the aviator presents with acute hearing loss (deployed or garrison) or an audiogram that demonstrates worsening HL, in order to direct further evaluation/treatment, classifying the hearing loss (conductive, SNHL, mixed) is started with the history and physical exam. Some pertinent questions are:[13]
- What was the onset and has there been progression of the hearing loss?
- Does your hearing loss involve one or both ears?[14]

- Is there pain or drainage out of the ear associated with the hearing loss?
- Is there a history of significant trauma, including noise and barotrauma?

What exposures to sudden loud noise or repetitive noise (work/hobby)?
Do you hear ringing roaring or buzzing sounds in one or both ears?
If you have hearing loss or tinnitus, does it fluctuate? Is it progressive?

- Is there a history of previous ear surgery?
- What medicine are you currently taking?[14]
- Is there associated tinnitus, vertigo, or disequilibrium?
- Is there a family history of hearing loss? There are a number of congenital and hereditary causes of hearing loss; presbycusis also can run in families.

Many of these questions are covered on the AF IMT 1753, *Hearing Conservation Examination.*

Physical examination portion of an office hearing evaluation includes:

- Whispered voice test – whisper a short sequence of letters and numbers while standing behind the patient and occluding the other ear (rub the tragus in a circular motion to mask hearing)
- Tuning fork assessment
    - Cannot hear 512 Hz tuning fork – approximate loss of 20-30 dB
    - Can hear 512 Hz tuning fork but not 256 Hz tuning fork – approximate loss of 10-15 dB
- Weber and Rinne tests – to distinguish conductive from sensorineural hearing loss
- Visual exam of the ears – evaluate for other causes of hearing loss such as a mass, otitis externa, cerumen impaction, otitis media, squamous cell carcinoma, perforation and effusion
- Pneumoscopy – the operational version of this is the Valsalva with observed movement of the TM.

These tests are not intended to replace a thorough audiology evaluation (see below) but do provide some objective findings to document the status of the individual's hearing at the time of the visit. (A recent meta-analysis listed the sensitivity of the whispered voice test as 90-100 % while the specificity was 70-87 % as a screening tool.[15]) They also provide more effective communication with specialists at a (potentially) distant site (e.g., when trying to make decisions concerning air evacuation for further evaluation).

C. Formal audiologic assessment: The following tests are part of a complete audiologic evaluation. The audiologic evaluation should follow the testing parameters as outlined in AFOSH 48-20.

Pure tone air and bone conduction thresholds – This is the audiogram. Hearing is tested with both air and bone conduction. Air conduction measures thresholds of sensitivity to sounds that travel to the inner ear through the external auditory canal and middle ear. These values are compared to the thresholds of sensitivity to sounds that travel to the inner ear directly through the bone of the skull. Any differences between the two thresholds may be consistent with conductive hearing loss or mixed hearing loss; masking dilemma should be excluded.

Speech reception thresholds (SRT) – This is the softest level at which a person can correctly repeat 50 percent of presented spondee words (words should be presented by professional recorded test). Spondee words are two-syllable words where each syllable is stressed, such as airplane, armchair,

or pancake. SRT results are recorded in dB HL and should correlate with the audiogram: equal to the pure tone air conduction average (average dB score at 500, 1000, and 2000 Hz) to within 10 dB as long as the scores from the three frequencies are similar.

Speech discrimination testing, to include high intensity discrimination (aka word recognition score) - percentage of phonetically balanced words correctly repeated at a given dB level, the most comfortable level (MCL) for speech. Generally classified as normal (>90%); slight difficulty; comparable to listening over a telephone (75-90%); moderate difficulty (60-75%); poor discrimination, difficulty in following conversation (50-60%); and very poor discrimination, difficulty in following running speech (<50%).[16] This is a significant test for an aviator with bilateral hearing loss as it directly relates to comprehension of what is being said (on a radio, for example). All speech testing should use professionally recorded materials, not live voice (e.g., NU-6 by difficulty, W-22, Harvard-50).

Immittance audiometry **–** generally consists of three separate tests:

- *Tympanograms* **–** objective measure of TM compliance.
- *Ipsilateral and contralateral acoustic reflexes* (tested at or below 110 dB HL) – a measure of the softest level at which the stapedius and tensor tympani muscles contract; helping differentiate between conductive and sensorineural hearing loss (ipsilateral: the sound stimulus is presented to the ear being measured, and contralateral: the sound stimulus is presented to the ear opposite the ear being measured).
- *Acoustic reflex decay* (500 and 1000 Hz, tested at or below 110 dB HL) – measures the response of the stapedius to a loud stimulus lasting 10 seconds which may help indicate whether the source of the hearing loss is in the cochlea or in the acoustic nerve. MRI has made this test less valuable.

Otoacoustic emissions (transient evoked or distortion product) – this is a test of cochlear function and requires no input from the patient. Simply stated, a normal cochlea produces sound that can be measured by ultra-sensitive microphones placed in the outer ear (requires normal middle and outer ear function). This test can help specify whether sensorineural hearing loss is related to the sensation of sound (cochlear function) or neural transmission of the sound (acoustic nerve).

- Transient evoked ototacoustic emissions are measured in response to a brief sound stimulus.
- Distortion product ototacoustic emissions are measured in response to two simultaneous tones of different frequencies.

If the audiology testing listed above excludes conductive and retrocochlear disease, the audiologist may defer ENT evaluation. If the results are equivocal, additional testing and ENT evaluation is recommended. Some additional tests to consider include:

- Auditory brainstem response – a screening tool for suspected retrocochlear pathology, an abnormal response indicates the need for an MRI of the cerebellopontine angle.
- MRI (cerebellopontine angle) **–** particularly with gadolinium enhancement.

D. Treatment: Good treatment (often surgical) exists for many forms of conductive hearing loss, and cochlear implants are a surgical treatment of sensorineural deafness when proper indications are met.[12] There are 3 FDA approved Middle ear implants that are indicated for moderately severe to sever hearing loss if hearing aid trial is unsuccessful It is important for flight surgeons to realize that hearing aid technology is advancing at a rapid rate. It is equally important to realize that

indications for successful hearing aid use relate more to a patient's communication needs and challenges than to the specifics of the hearing loss.[17] In addition, there are continued challenges to using hearing aids in the cockpit setting. The normal sense of hearing allows us to filter out unwanted noise during conversation, which is why speech is understandable to us even in a noisy room, but traditional hearing aids cannot do this. Instead, all sound in the environment of the listener is amplified and distorted, causing great difficulty in understanding the speaker.[18] Newer hearing aid technology is available, however hearing aids can never replace a normally functioning auditory system.

II. Aeromedical Concerns.

Clearly it is essential that aviators have hearing adequate to recognize and understand verbal communications and warning tones. This includes adequate binaural hearing in aircraft with warning tones presented specifically to the left or right sides. Significant tinnitus may also interfere with communications as well as sleep. Hearing loss can be an early symptom of other medical problems, for example, an acoustic neuroma (see Acoustic Neuroma waiver guide) which could directly impact vestibular function and flight safety. Lastly, aviators with noise induced hearing loss will likely experience some degree of worsening hearing loss secondary to continued noise exposure.

Normally hearing aids are not worn in hazardous noise (flight environment), but the new design of hearing aids allow the use of the ear muff. Hearing aids are not a substitute for hearing protection. Lack of proper hearing protection in hazardous noise places an individual at risk for increased hearing loss. However, if necessary, current hearing aid technology provides significant acoustic benefit through complex digital processing. Feedback management is a standard in the industry, however, feedback may still occur even with proper programming. If deemed appropriate to wear in flight, hearing aids may not interfere with proper fit of hearing protection devices or if feedback occurs. If double protection is required, hearing aids are not allowed. Cochlear implants or implantable amplification devices are not allowed in any hazardous noise environment and thus not allowed in aviators. Battery life varies with the shortest being about 4 days; changing a battery can be disruptive to aircrew duties, thus batteries should be changed prior to flying if hearing aids are worn while performing aircrew duties.

Individuals with otosclerosis or other causes of conductive hearing loss may actually hear better in noise/flight. This is due to a phenomenon called the Paracusis of Willis; the otosclerosis filters out the background noise and allows the individual to hear communications better. In this unique situation hearing aids may be used on the ground but not recommended/needed in flight. It needs to be noted that there are options for surgical treatment of otosclerosis such as stapedectomy/stapedotomy. Ossicular chain reconstructions, bone anchored hearing aids and middle ear implants are also surgical options for specific patients.

The Attenuating Custom Communication Earpiece System (ACCES) earphone is a custom-made for the shape of the aviator's external auditory canals and blocks out much of the ambient noise; 35 to 50 dB attenuation occurs with the combination of ACCES and a David Clark headset. ACCES may improve communication capability in individuals that otherwise may have failed the hearing proficiency validation tests.

III. Waiver Consideration.

The following table outlines the definition for H-1, H-2, H-3 and H-4 hearing profiles. The hearing profile is based on an unaided audiogram (no hearing aids) and removal from hazardous noise for at least 14 hours.

Table 1: Hearing profile standards and asymmetry definition.

	500 Hz	**1000 Hz**	**2000 Hz**	**3000 Hz**	**4000 Hz**	**6000 Hz**
H-1 Profile If no single value exceeds (dB):	25	25	25	35	45	45
H-2 Profile If no single value exceeds (dB):	35	35	35	45	55	--
H-3 Profile	Any hearing loss exceeding at least one value for H-2 profile					
H-4 Profile	Hearing loss sufficient to preclude safe and effective performance of duty, regardless of level of pure tone hearing loss, and despite use of hearing aids.*					
***Hearing Proficiency Validation**	Written validation of ability to safely perform all assigned aircrew duties in flying environment signed by flying SQ/CC or Operations Officer, ***supplemented by*** the flight surgeon's written MFR stating that Speech Discrimination Levels (from the audiology report) are adequate to perform flying duties (>70%).					
Asymmetry	≥25 dB difference comparing left and right ear, at any two consecutive frequencies*.					

*Asymmetry at 3000 Hz is considered by recent studies to be an important predictor of retrocochlear pathology.

For flying class physicals for I/IA, II, III, and ATC/GBC applicants (initial), a hearing profile that exceeds H-1 is disqualifying. For MOD, applicants must be at least H2. Trained aviators (FC II and III, as well as ATC/GBC) with H-2 profiles should have a full audiology evaluation sufficient to exclude conductive or retrocochlear pathology, but do not require waivers. Trained aviators (all classes) with H-3 profiles or asymmetric HL are disqualified. Waivers are valid for no greater than three years (indefinites will <u>not</u> be granted) or until a shift of 10 dB or greater on the average of 2,000, 3,000 and 4,000 Hz in either ear from the previous waiver's audiogram, whichever occurs first. If the cause of the hearing loss is acoustic neuroma, cholesteatoma, eustachian tube dysfunction, otosclerosis, or a peripheral vertiginous disorder, refer to the Waiver Guides for those conditions as well before preparation of the aeromedical summary.

Table 2: Degree of hearing loss and waiver potential.

Flying Class	Hearing Loss	Waiver Potential Waiver Authority
I/IA	H-1 with asymmetry	Yes AETC
	H-2 with or without asymmetry	Maybe[+] AETC
	H-3/H-4 with or without asymmetry	No AETC
	Hearing aids	No AETC
II/III ATC/GBC MOD**	H-2	Initial/untrained – Maybe[*] Trained – N/A[†] MAJCOM
	H-3	Initial/untrained – No Trained - Maybe[#] MAJCOM
	H-4	No MAJCOM
	Asymmetry	Initial/untrained – Maybe[&] Trained – Maybe MAJCOM
	Hearing aids	Initial/untrained – No Trained - Maybe[$] MAJCOM

+ Waiver for FC I/IA may be considered if H-2 due to one frequency in one ear.
* Waiver for initial/untrained FC II and III may be considered if H-2 due to one frequency in one ear. H-2 is qualifying for MOD applicants.
† For trained FC II and III no waiver required (need not be DNIFed) but must have full audiology work-up.
# If individual inactive flyer, then hearing proficiency validation is delayed; FC IIC or modified FC III waiver granted by MAJCOM (must have hearing proficiency validation [inflight test or letter from SQ/CC or DO] before flying).
& Waiver for initial/untrained FC II and III with H-1 likely; waiver for initial/untrained FC II and III with H-2 may be considered if H-2 due to one frequency in one ear; no waiver for initial/untrained FC II and III with H-3.
$ If H-3 and hearing aids not worn while flying, must pass hearing proficiency validation without hearing aids.
** Waiver authority for MOD personnel is AFGSC.

Note: NO indefinite waivers will be granted for asymmetric hearing loss or H-3; maximum length of waiver is 3 years.

Review of AIMWTS through Jun 2015 showed 35 cases of hearing aid usage; 1 FC I/IA cases (1 disqualified), 17 FC II cases (1 disqualified), 10 FC III cases (0 disqualified), 6 ATC/GBC cases (1 disqualified), and 1 MOD case (0 disqualified).

Review of AIMWTS through Jun 2015 demonstrated 3,114 waivers for some degree of hearing loss. There were 161 FC I/IA cases (51 disqualifications), 1,429 FC II cases (67 disqualifications), 1,298 FC III cases (228 disqualifications), 176 ATC/GBC cases (35 disqualifications), and 50 MOD cases (18 disqualifications).

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Initial waivers and waiver renewals should include the following elements in the aeromedical summary (AMS):
A. History related to hearing loss (including noise exposure history). If hearing aids used include if worn while flying and address the ability to wear hearing protection.
B. Baseline and latest audiograms.
C. Documentation of complete (and current – within 12 months of waiver submission) audiology evaluation.
D. ENT evaluation, if audiologist does not state conductive or retrocochlear disease is ruled out.
E. Validation of hearing proficiency for H-3 waivers (initial waivers and waiver renewals with a shift of 10 dB or greater on the average for 2,000, 3,000 and 4,000 Hz from the previous waiver's audiogram).
1. In-flight hearing test or
2. Written validation of ability to safely perform all assigned aircrew duties in flying environment signed by flying SQ/CC or Operations Officer, ***supplemented by*** the flight surgeon's written MFR stating that Speech Discrimination Levels (from the audiology report) are adequate to perform flying duties (≥70%).

ICD-9 Codes for Hearing Loss	
389.0	Conductive hearing loss
389.1	Sensorineural hearing loss
389.16	Sensorineural hearing loss, asymmetrical
389.2	Mixed conductive and sensorineural hearing loss
V53.2	Hearing aid

ICD-10 Codes for Hearing Loss	
H90 0, 2	Conductive hearing loss, bilateral, unspecified
H90 3, 5	Sensorineural hearing loss, bilateral, unspecified
H90.5	Unspecified sensorineural hearing loss
H90.8	Mixed conductive and sensorineural hearing loss, unspecified

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WAIVER GUIDE
Updated: Jul 2014
Supersedes Waiver Guide of Mar 2011
By: Dr Dan Van Syoc
Reviewed by LtCol Timothy Phillips, AF/SG consultant for Urology and LtCol Eric Barnes, AF/SG consultant for Nephrology

CONDITION:
Hematuria (Jul 14)

I. Overview.

Gross hematuria is relatively common - one out of every 1000 visits to the emergency room is prompted by a patient's discovery of gross hematuria. Asymptomatic microscopic hematuria (AMH) is even more common, with a prevalence of 1.2% to 5.2% in young adult males, and as high as 16% to 21% in community population-based studies.[1, 2, 3] Discovering the underlying process, if any, causing the hematuria is the key to a proper aeromedical disposition. Some emergency department estimates are that the underlying cause of hematuria is elusive in as many as 61% of cases.[4] The risk factors for significant underlying disease include: cigarette smoking, occupational exposure (benzene, aromatic amines), history of gross hematuria, age greater than 35 years, history of urologic disorder or disease, urinary tract infection, analgesic abuse, irritative voiding symptoms, pelvic radiation, and cyclophosphamide use.[5] Screening for hematuria in patients with no symptoms suggestive of urinary tract disease is not recommended by any medical body.[6]

Hematuria may be transient and common causes of such cases are vigorous physical exercise, sexual intercourse, trauma, digital rectal examination, or menstrual contamination. If a transient etiology is suspected, the clinician should order a follow-up urinalysis 48 hours after the positive test and a negative result will probably confirm the diagnosis of transient hematuria.[7, 8] The most common non-transient causes of hematuria in adults include urinary tract infections, stone disease, benign prostatic enlargement and a urologic malignancy.[9]

A positive dipstick for blood in urine indicates hematuria, hemoglobinuria or myoglobinuria. Hematuria can be distinguished from hemoglobinuria and myoglobinuria by microscopic examination of the centrifuged urine; the presence of a large number of erythrocytes establishes the diagnosis of hematuria. If erythrocytes are absent, examination of the serum will distinguish hemoglobinuria and myoglobinuria. In hemoglobinuria, the supernatant will be pink and in myoglobinuria, the serum remains clear. Dipsticks for heme detect 1 to 2 RBCs per high powered field (HPF) which is equivalent to the sensitivity of urine sediment examination, but will result in more false positive tests. The American Urologic Association has stated that the most accepted upper limit of normal for urinary RBCs, based on an exam of the urinary sediment, is <3 per HPF.[10] Asymptomatic microscopic hematuria is defined as 3 or greater RBCs per HPF on a single properly collected urinary specimen in the absence of obvious benign cause.[10]

Hematuria of nephrologic origin is frequently associated with casts in the urine and almost always associated with significant proteinuria. Protein in the urine greater than 200mg/24 hours is of nephrologic origin; significant hematuria from a urologic origin will not elevate protein that high. Erythrocytes arising from glomerular disease are typically dysmorphic and show a wide range of

morphologic alteration. Conversely, erythrocytes arising from tubulointerstitial renal disease and of urologic origin have a uniformly round shape.[11]

Hematuria may be essentially a normal variant, or it may be a sign of underlying disease, which may possibly even be life-threatening. For the purposes of evaluation and diagnosis, hematuria is divided into two general categories: glomerular and non-glomerular.

Glomerular hematuria (loss of blood into urinary tract from glomeruli) is frequently associated with proteinuria, protein or RBC casts, and dysmorphic RBCs on phase-contrast microscopy. The differential diagnosis of hematuria with proteinuria or casts is extensive, and includes nephron damage and many forms of glomerulonephritis. The most common glomerular sources have been found to be IgA nephropathy (Berger's disease) and thin glomerular basement membrane disease.[7]

Non-glomerular hematuria is blood that enters the urinary tract distal to glomeruli, so that RBCs have normal morphology on phase-contrast microscopy. Proteinuria and casts are not normally associated with non-glomerular hematuria. The most common non-glomerular sources are stones, infection and malignancy. In six major studies of microscopic hematuria, between 1% and 12.5% had a neoplastic etiology and between 3.5% and 16.5% had calculi as the etiology. In one study of 161 aviators with asymptomatic microscopic hematuria, no evident pathology developed over a mean follow-up period of 7.6 years.[11, 12]

The differential diagnosis of asymptomatic hematuria without proteinuria or casts (e.g. non-glomerular hematuria) includes neoplasm, calculi, infection, trauma (including exercise), analgesic use/abuse and sickle cell nephropathies. Bleeding into the urinary tract from a source between the urethra and the renal pelvis will result in no protein, cells or casts. Hematuria at the beginning or end of the stream usually indicates a urethral or prostatic source.

Once infectious and glomerular etiologies of hematuria have been ruled out, other etiologies will need to be considered. The consensus among urologists is that patients presenting with hematuria less than 35 years of age and no risk factors should at a minimum have upper tract imaging with CT urography or other modalities as directed below. Cystoscopy need only be performed in this group of patients at the discretion of a urologist. For the remainder of cases (≥35 years old or risk factors), a complete urologic evaluation to include imaging and cystoscopy is indicated.[10] Cystoscopy is utilized to directly visualize the lining of the bladder to detect evidence of bladder cancer. The goal of imaging is to detect neoplasms, urinary tract calculi, renal cystic disease, and obstructive lesions that could be responsible for the hematuria.[12] Most clinicians consider multidetector CT urography to be the preferred initial imaging modality in most patients presenting with unexplained hematuria. Other modalities used include intravenous pyelography (IVP), ultrasonography, MR urography, retrograde pyelography with plain films.[6, 10]

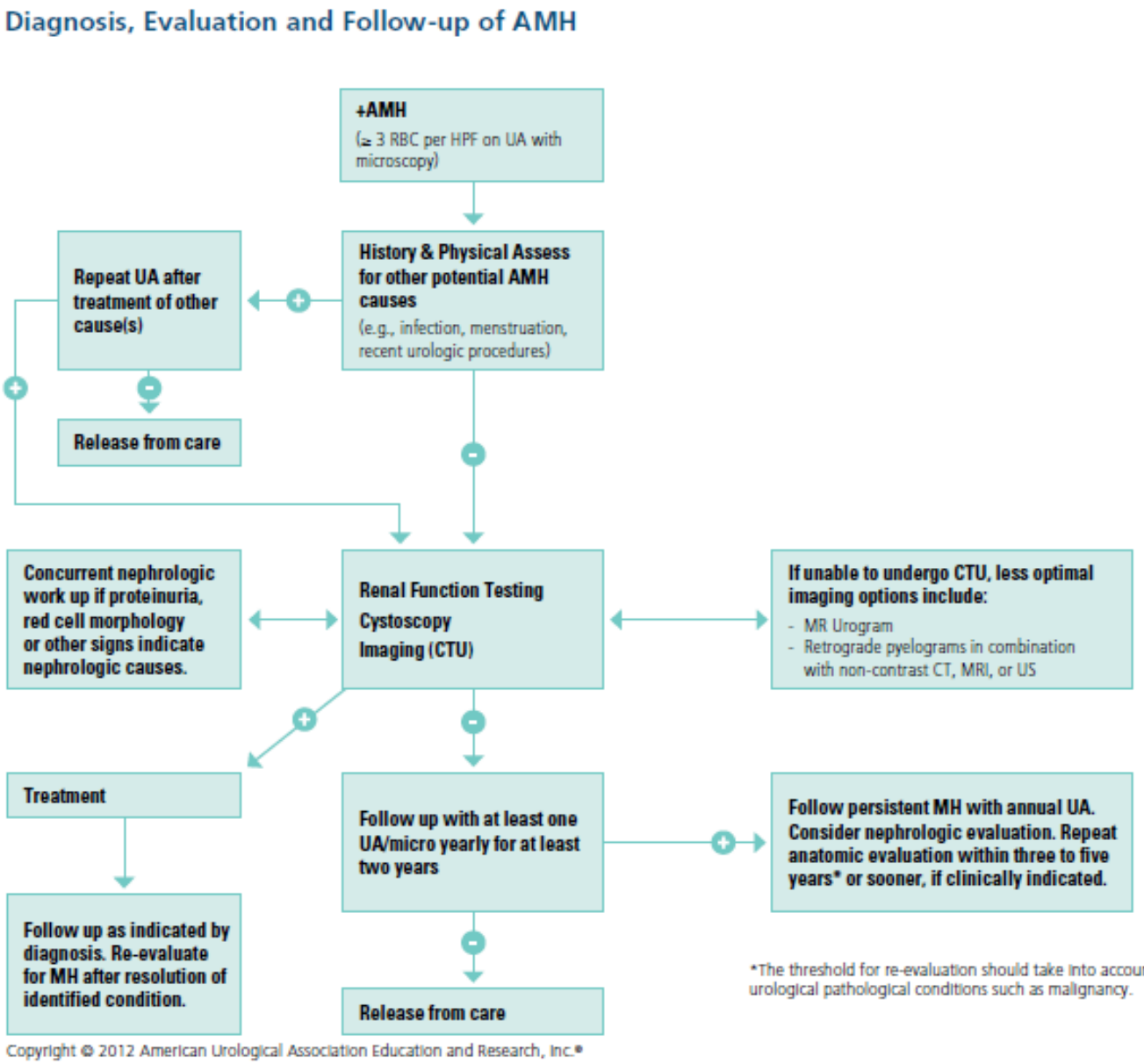
A negative evaluation for a patient with asymptomatic microscopic hematuria is good news for the patient. But each of these folks deserves some sort of follow-up as reports have shown that 1% to 3% of these patients may progress to a urologic malignancy within three years and another small proportion can also develop renal insufficiency.[13]

The American Urological Association (AUA) Guideline: Diagnosis, Evaluation and Follow-up of Asymptomatic Microhematuria (AMH) in Adults (Table 1 and Figure 1 below):

Table 1. Common Risk Factors for Urinary Tract Malignancy in Patients with Microhematuria[10]

Table 1: Common Risk Factors for Urinary Tract Malignancy in Patients with Microhematuria
Male gender
Age (> 35 years)
Past or current smoking
Occupational or other exposure to chemicals or dyes (benzenes or aromatic amines)
Analgesic abuse
History of gross hematuria
History of urologic disorder or disease
History of irritative voiding symptoms
History of pelvic irradiation
History of chronic urinary tract infection
History of exposure to known carcinogenic agents or chemotherapy such as alkylating agents
History of chronic indwelling foreign body

FIGURE 1. Algorithm for Evaluation and Follow-up of Asymptomatic Microhematuria



II. Aeromedical Concerns.

Persistent or recurrent hematuria is not disqualifying, unless an underlying etiology is identified. Because hematuria can be a sign of significant underlying disease, it must be evaluated fully. Calculi can cause extreme pain, lead to urinary tract infection and obstruction and/or result in sudden incapacitation while in flight. Urinary neoplasms are often slow growing but must be diagnosed and treated early to optimize survival and function. Glomerular disease must be evaluated and renal function assessed to determine proper treatment and to address worldwide deployability (e.g. renal reserve, ability to tolerate dehydration, etc.).

III. Waiver Consideration.

As of Nov 2013, hematuria by itself is not disqualifying for flying classes I/IA, II, and III. It is also not disqualifying for retention purposes, for ATC/GBC duties, or for MOD duties. While hematuria itself is not disqualifying for GBC or MOD duties, the underlying cause (such as calculi) may be disqualifying or require waiver. No waiver required if fully evaluated and final diagnosis is benign or idiopathic with appropriate follow-up.

Table 2: Waiver potential for hematuria

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority**
I/IA	"Benign" or idiopathic	N/A
	Calculi†	Maybe AETC
	Other causes*	Maybe AETC
II/III	"Benign" or idiopathic	N/A
	Calculi†	Maybe MAJCOM
	Other causes*[&]	Maybe AETC**
ATC/GBC MOD	N/A	N/A – not disqualifying

†See Renal Stones waiver guide for details
*IgA nephropathy, glomerulonephritis, cancer, etc.
[&] Initial Flying Classes II, IIU, and III applicants will need to be evaluated similarly as for FC I/IA
** AFMSA is waiver authority if retention standards are applicable

AIMWITS search in Jul 2014 revealed a total of 514 members with an AMS for the diagnosis of hematuria. Breakdown of the cases revealed: 47 FC I/IA cases (11 disqualified), 198 FC II cases (8 disqualified), 248 FC III cases (30 disqualified), 13 ATC/GBC cases (1 disqualified), and 8 MOD cases (1 disqualified). Almost all of the disqualifications were due to other medical problems, or if it was due to hematuria, there were other renal issues as well. In the ATC/GBC and MOD cases, the underlying reason for the waiver submission was not hematuria. For future waiver guide updates, the total number of cases will be much less as only a small percentage of cases with hematuria will require a waiver to be submitted.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

For flying classes I/IA, II, IIU, and III, a waiver for the finding of microscopic hematuria only (if proteinuria also seen in urinalysis then initiate steps J through L listed below concurrently) is not necessary. An initial work-up of hematuria, though, should include the following:
A. Thorough history to identify possible sources for hematuria, upper versus lower tract, and identification of risk factors for malignancy.
B. Examination of external urethra and prostate (male) or pelvis (female).
C. Urinalysis and urine culture.
D. Serum BUN and creatinine.
E. Repeat urinalysis 48 hours after cessation of menstruation, analgesic medications, vigorous exercise, or sexual activity. Repeat urinalysis 6 weeks after treatment of a urinary tract infection.

In individuals where the above information supports a "benign" cause (menstruation, analgesic medications, vigorous exercise, sexual activity, and/or the resolution of a urinary tract infection) and the repeat urinalysis is normal, no further workup is required.

If A – F above does not point to a "benign" cause of the hematuria (menstruation, analgesic medications, vigorous exercise, sexual activity, and/or the resolution of a urinary tract infection), the aeromedical summary is required to contain the following additional elements:
G. Radiographic evaluation of upper tract CT, IVP and/or ultrasound (helical CT with and without contrast is now upper tract imaging procedure of choice, if available).
H. Urology consult (to include cystoscopy if indicated) should follow upper tract imaging, particularly if risk factors for malignancy are identified.
I. If no urological etiology is found, consultation with a nephrologist for possible renal biopsy should be obtained.

If proteinuria, dysmorphic red blood cells, red cell casts, or elevated serum creatinine level is present, the following additional work-up is required:
J. Complete blood count (CBC).
K. 24-hour urine for creatinine and protein, if urinalysis positive for protein.
L. Nephrology consultation to include consideration of a renal biopsy.

If a cause for the hematuria is determined such as calculi, IgA nephropathy, glomerulonephritis or cancer, then waivers will be also be needed for those diagnoses. Current waiver guides exist for renal stones, IgA nephropathy, and bladder cancer which need to be adhered to if that diagnosis is applicable.

ICD-9 code for hematuria	
599.7	Hematuria

ICD-10 codes for hematuria	
R31.9	Hematuria, unspecified
R31.2	Other microscopic hematuria

V. References.

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WAIVER GUIDE
Updated: Oct 2014
Supersedes Waiver Guide of Mar 2010
By: Capt Karen A Rupp (RAM XV) and Dr Dan Van Syoc
Reviewed by LtCol Roger Wood, AF/SG consultant for Hematology/Oncology and Col Pat Storms, RAM and gastroenterologist

CONDITION:
Hemochromatosis (Oct 14)

I. Overview.

Hemochromatosis is an iron overload syndrome first described by Trousseau in the French pathology literature in 1865. In 1889, von Recklinghausen gave the condition the name hemochromatosis because he thought that the disease was a blood disorder that caused increased skin pigmentation. In 1935, Sheldon published a description of all 311 cases of the disease that had been reported in the world's literature to that point, including several from his own records. He realized that hemochromatosis was an inborn error of iron metabolism and that all the pathologic manifestations of the disease were caused by increased iron deposition in the affected organs. In 1976, Simon and coworkers demonstrated that the gene for hereditary hemochromatosis (HH) was linked to the HLA region on the short arm of chromosome 6. The hemochromatosis gene was identified on chromosome 6 in 1996 and named HFE. C282Y is the major mutation of the HFE gene that is responsible for HFE related hereditary hemochromatosis. The second most common mutation in HFE is H63D.[1, 2] Other gene mutations have been described that lead to hemochromatosis, but these are much rarer than the C282Y mutation.[2, 3] Studies by numerous investigators have shown that 80% to 90% of patients with typical features of HH are homozygous for the C282Y mutation.[4, 5, 6] Some people who are compound heterozygotes (C282Y/H63D) may also present with iron overload.[1]

Hemochromatosis is now known to be a genetic disease of autosomal recessive inheritance with a prevalence of approximately 1:250 in the US Caucasian population and is the most common genetic disease in populations of European ancestry.[1, 5, 7] Population screening has demonstrated that the frequency of heterozygotes is 10 to 15% in the US Caucasian population and that the frequency is 0.5% (5 per 1000) for the homozygous state.[6, 8] The C282Y mutation is much less common in Hispanic, Asian American, Pacific Islander, and black persons.[9] Due to incomplete penetrance of the C232Y mutation, a large number of individuals that are homozygotes for the mutation never develop clinically significant disease.[6] Having the mutation only increases the risk for developing HH.[9]

Adult men normally have 35 to 45 mg/kg of total body iron. Premenopausal women typically have lower iron stores, about 35 mg/kg due to the recurrent monthly blood loss that occurs with menstruation. More than two thirds of the body's iron content is incorporated into hemoglobin, and lesser amounts are found in muscle myoglobin (10-15%), enzymes and cytochromes (10%), with less than 1% circulating in plasma bound to transferrin. Under homeostatic conditions, the 1 to 2 mg of iron lost daily through sweat and sloughed cells of the skin and intestine is balanced by dietary iron absorption. There is no physiologic mechanism for the excretion of excess iron in humans, so the body stores are regulated by intestinal iron absorption in the duodenum. Improper regulation of this absorption can lead to iron overload, which is what occurs with HH.[10, 11]

Hepcidin is a peptide hormone that has an important role in iron homeostasis. It is secreted into circulation primarily by hepatocytes and helps to meet iron requirements by regulating iron absorption, mobilization, and storage. Hepcidin expression is up regulated by excess total body iron and inflammation which results in a decrease in iron absorption and lower amounts of iron released from macrophages. Hepcidin expression is down regulated by low total body iron, erythropoiesis, and hypoxia with a net result of more iron absorption and more iron released from macrophages.[1, 9, 12] Hepcidin deficiency is the key mechanism of iron overload in the most commonly encountered forms of HH, in which gene mutations lead to defective or low hepatic synthesis of hepcidin for the degree of iron burden.[13]

Most patients with HH become symptomatic at 40 to 50 years of age since most patients absorb only a few milligrams of excess iron daily. The clinical manifestations of disease often occur only after age 40 when body stores of iron have reached 15 to 40 grams (normal body iron stores are approximately 4 grams). Women can present later than men due to natural blood losses due to menstruation and child birth. When diagnosed at an advance stage, patients with HH often have the classic triad of cutaneous hyperpigmentation, diabetes, and cirrhosis. Currently, most patients are diagnosed prior to becoming symptomatic due to screening the family members of homozygous patients and the inclusion of iron studies on routine chemistry panels. Patients that do present with symptoms most often present with arthralgias, weakness, fatigue, hepatomegaly, and impotence.[1, 2, 9] In patients with these types of presenting symptoms, serum iron studies to include serum iron, total iron-binding capacity (TIBC), serum transferrin, and transferrin saturation should be measured. HH should be suspected when the transferrin saturation is above 45%. The serum ferritin is usually elevated in a person with HH but can be normal in young persons. In this setting, genetic testing should be strongly considered, looking for the HFE genotype. Similar genetic testing should be considered in first degree relatives of those known to have the disorder.[1, 9]

In the past, HH could have devastating effects on those afflicted with the disorder. Excess iron leads to problems with the liver, heart, pancreas, gonads, thyroid gland, joints, and skin. Untreated disease can lead to hepatic cirrhosis, which accounts for about 85% to 90% of all HH-related deaths. Individuals with HH and cirrhosis can have up to a 5% annual risk for developing hepatocellular carcinoma, a 200 fold increase.[11] Hemochromatosis patients who drink in excess of 60 grams of alcohol daily are approximately nine times more likely to develop cirrhosis than are those who drink less than this amount. Therefore, it is strongly recommended that HH patients decrease or eliminate alcohol consumption.[14] Hemochromatosis can also result in a mixed dilated-restrictive or dilated cardiomyopathy and conduction disturbances. Cardiac dysrhythmias and cardiomyopathies are the most common cause of sudden death in iron overload states. Iron excess can lead to diabetes by either iron accumulation in the pancreatic beta cells or by impairing insulin sensitivity. Hypogonadism is the most common nondiabetic endocrinopathy and can present as impotence, amenorrhea, decreased libido, or osteoporosis. Thyroid dysfunction in HH occurs at a rate approximately 80 times over the rate in unaffected men. Classic HH arthropathy occurs in up to 50% of patients and resembles noninflammatory osteoarthritis. Skin pigment changes often present as a “bronzing”, but can be brown or slate-gray as well.[11]

Phlebotomy has long been the standard treatment for HH. Each unit (400-500 mL) of whole blood removed contains 200 to 250 mg of iron. In providing replacement for the hemoglobin lost during the phlebotomy, the body mobilizes an equal amount of iron from tissue stores, which reduces the degree of iron overload. For a patient diagnosed with HH who has an excess of 10 grams in iron

stores, one phlebotomy per week for 50 weeks should fully deplete the accumulated iron stores. An endpoint for weekly phlebotomies is normalized iron stores, defined as a serum ferritin <50 ng/mL and transferrin saturation <50%. A maintenance phlebotomy schedule should then be continued following the primary iron depletion to prevent reaccumulation. Most clinicians agree that the goal is to keep the ferritin concentration between 50 and 100 ng/mL or less. For maintenance, most patients require a 500 mL phlebotomy every two to four months.[1, 9, 15] It is now widely recognized that the prognosis of HH depends on the amount and duration of excess iron. Early diagnosis and prompt therapy largely prevent the adverse consequences of the disease and essentially normalize life expectancy.[16]

As with all diseases with a known genetic cause, there are questions regarding mass screening in order to diagnose early and treat prior to the patient becoming symptomatic. At this time, large-scale screening is not recommended as there are unanswered questions regarding cost-effectiveness.[2, 17] On the other hand, all first-degree relatives should be offered testing once an HH proband is diagnosed. If an adult relative of a C282Y homozygote is identified, and is either a C282Y homozygote or a compound heterozygote (C282Y/H63D) and if blood iron studies are abnormal then a presumptive diagnosis can be made and therapeutic phlebotomy can be initiated. Early treatment can prevent complications.

Dietary supplements containing iron should be avoided. It may be reasonable to recommend avoidance of vitamin C supplements due to their possible enhancement of free iron and the generation of reactive oxygen species.

II. Aeromedical Concerns.

Hemochromatosis has the potential to affect numerous organ systems of the body through the deposit of iron in the tissue. Some of the major aeromedical concerns include: 1) cardiac arrhythmias or cardiomyopathy, 2) manifestations of cirrhosis of the liver and hepatocellular carcinoma, such as altered mental status and hemorrhage, and 3) diabetes mellitus. Arthropathy could become severe enough to interfere with controlling the aircraft. Symptoms of hypogonadism and hypothyroidism would be of gradual onset and not likely to be suddenly incapacitating. Treatment compatible with flying (phlebotomy) is available, as long as the appropriate post-phlebotomy period of 72 hours is observed.

III. Waiver Consideration.

Hemochromatosis is disqualifying for all flying classes, as well as for ATC/GBC and MOD duties. It is not waiverable for initial flying training. It is potentially waiverable in FC II and III if the aviator has no aeromedically significant complications from the HH and is on maintenance phlebotomy. Maintenance phlebotomy to maintain control of iron stores will require a 72-hour DNIF after each phlebotomy. Per AFI, HH renders a member unfit for continued service, so does require an MEB.

Table 1: Waiver potential for Hemochromatosis

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	No AETC	No
II/III	Yes#* AFMSA/SG3PF	At the discretion of AFMSA/SG3PF
ATC/GBC	Yes*# AFMSA/SG3PF	At the discretion of AFMSA/SG3PF
MOD	Yes*# AFMSA/SG3PF	At the discretion of AFMSA/SG3PF

*Initial FC II/III, ATC/GBC, and MOD requests for untrained individuals should be treated like FC I/IA and waiver should not normally be granted for a history of hemochromatosis.
#No indefinite waivers

AIMWITS search in Aug 2014 revealed a total of 27 submitted cases for the diagnosis of hemochromatosis. There were a total of 0 FC I/IA cases, 11 FC II cases, 13 FC III cases, 2 ATC/GBC cases, and 1 MOD case. There were 4 cases resulting in a disqualification and all 4 were FC III. One was an initial FC III which was disqualified for a history of PRK with an excessive preoperative refractive error, one was disqualified with new diagnoses of DM type I and hemochromatosis, another was disqualified for a history of a myocardial infarction, and the final one was disqualified for multiple medical issues.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for hemochromatosis should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of hemochromatosis including symptoms, pertinent negatives, complete physical and treatment plan.
C. Consultation from a Gastroenterologist regarding need for liver biopsy if liver function tests abnormal or ferritin levels greater than 1000 ng/mL.
D. Labs: Serum iron, serum ferritin, serum transferrin, and transferrin saturation; CBC; liver function tests to include ALT, AST, bilirubin, and alkaline phosphatase; fasting electrolytes and glucose levels; and thyroid function tests.
E. Copy of all consults, imaging, and procedure reports.
F. Genetic testing results (if done).
G. ECG, echocardiogram, and Holter (reports, representative tracings, and echo tape should be sent to the ACS ECG library for FC II)
H. MEB results

The AMS for waiver renewal for hemochromatosis should include the following:
A. Interval history to include change in symptoms, medication usage, and side effects.

B. All applicable labs and imaging tests as in the initial aeromedical summary. Individuals on maintenance phlebotomy should be followed with yearly serum transferrin saturation and ferritin. Further studies are dependent on symptoms.
C. All consults since last AMS.
D. All additional tests completed since last AMS.
E. Results from most recent RILO, if an interval evaluation was performed.

ICD-9 code for Hemochromatosis	
275.0	Disorders of iron metabolism

ICD-10 code for Hemochromatosis	
E83.10	Disorders of iron metabolism, unspecified

V. References.

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WAIVER GUIDE
Updated: Jun 2016
Supersedes Waiver Guide of Apr 2013
By: Maj Andrew Timboe (RAM 17) and Dr Dan Van Syoc
Reviewed by Col Pat Storms, RAM 05 and AF/SG consultant for Gastroenterology

CONDITION:
Hepatic Cirrhosis (Jun 16)

I. Overview.

According to the National Center of Health Statistics, chronic liver disease and liver cirrhosis account for 11.5 deaths per 100,000 people in the United States making it the 12th most common cause of death.[1] *Cirrhosis* in Greek means orange or tawny, and was definitively described by Laennec over a century and a half ago. Hepatic cirrhosis is defined as a chronic disease of the liver in which diffuse destruction and regeneration of the hepatic parenchymal cells have occurred, and in which a diffuse increase in connective tissue has resulted in disorganization of the lobular and vascular architecture.[2] The most common etiologies for cirrhosis in the United States are from chronic Hepatitis C virus and alcohol-related liver disease; however the incidence of non-alcoholic fatty liver disease (NAFLD) is on the rise due to increased rates of obesity.[3] Other causes include primary biliary cirrhosis (PBC), autoimmune hepatitis, drug-induced liver injury, hemochromatosis, celiac disease, alpha-1-antitrypsin deficiency, Wilson's disease, sarcoidosis, protozoan infection, small bowel bypass, a variety of lesser miscellaneous causes, and cryptogenic cirrhosis. The distribution of causes of cirrhosis in a military population is not well-described, nor is the distribution of causes in a population of military aviators. Worldwide, the prevalence of chronic liver disease or cirrhosis is estimated to be 100 per 100,000, but it varies widely by country and by region.[4]

Two conditions warrant particular consideration in a population of generally young healthy aviators: NAFLD and autoimmune hepatitis. NAFLD is increasingly common, and reflects a spectrum that ranges from simple fatty liver without inflammation, to non-alcoholic steatohepatitis (NASH) that can result in cirrhosis and liver failure. The apparent correlation between weight gain, metabolic syndrome and NAFLD increases concern about this condition in the face of our obesity "epidemic".[5, 6] Autoimmune hepatitis is a progressive chronic hepatitis that can impact both adults and children. It can share features with other immune-based inflammatory liver conditions, including primary biliary cirrhosis and sclerosing cholangitis. Potential triggers include drugs and viral infections, and it is felt that "aberrant autoreactivity" plays a role.[7] Both NAFLD and autoimmune hepatitis can strike an otherwise healthy military aviator, and are thus important to understand in detail.

Liver dysfunction in the face of cirrhosis is manifest as both synthetic dysfunction and vascular pressure concerns. Signs and symptoms are myriad, depending on the severity and underlying cause of the cirrhosis. Constitutional symptoms often include "failure to thrive", with wasting, anorexia, weakness and fatigue.[2] Jaundice may be noted in the face of end-stage synthetic dysfunction or biliary obstruction, and physical exam findings aside from jaundice may include palmar erythema, thenar wasting, Caput Medusae, and ascites. A patient with advanced cirrhosis and hepatic encephalopathy may demonstrate decreased mental status to the point of coma, and reveal asterixis on physical exam. And of course a dramatic presentation with aggressive

gastrointestinal hemorrhage from variceal rupture may drive a physician's initial encounter with a cirrhotic patient. The two main consequences of hepatic cirrhosis are portal hypertension and liver insufficiency.[4]

Laboratory assessment of the cirrhotic patient often reflects the severity of their hepatic dysfunction. Elevated transaminases suggest ongoing hepatocyte destruction. Anemia can reflect either active or recent bleeding, or can be a result of the "anemia of chronic disease". Thrombocytopenia is common in the advanced cirrhotic, due to both sequestration and decreased production. Hyperbilirubinemia can be the result of drastically reduced hepatic reserve, or can be a marker of biliary obstruction at the intra or extra-hepatic level. Radiologic assessment may include sonographic evidence of a small echogenic liver, enlarged spleen, and, in the case of biliary obstruction, dilated biliary radicals. A radioisotope liver scan will often reveal decreased uptake in the hepatic bed with shunting of the radionuclide into an enlarged, bright spleen. CT scan is of considerable value in assessing the patient for one of the very serious complications of cirrhosis: hepatocellular carcinoma. Of course, liver biopsy is the definitive method to assess for the presence of cirrhosis and to gain valuable information about the potential underlying cause of the cirrhosis. Unfortunately, the risks of liver biopsy in the cirrhotic patient with ascites and coagulopathy can be considerable. Recently, the "Fibroscan", a non-invasive method of determining liver stiffness, has gained attention as a tool to assess for cirrhosis without the need to resort to liver biopsy.[8, 9] Interest in developing serologic panels or algorithms to assess for the presence of hepatic fibrosis/cirrhosis is considerable, but such panels and algorithms are not yet been established as standards of care.[10]

Treatment

Treatment of hepatic cirrhosis is less about reversing established hepatic fibrosis than it is about reducing or eliminating ongoing hepatocyte destruction, preserving residual functional capacity, and treating the complications of established cirrhosis.[11] Therapy to reduce hepatocyte destruction depends on the primary disease process. In patients with chronic Hepatitis C virus (HCV), antiviral therapy is complex and quickly changing and now even boasts treatments with interferon-free regimens. All cirrhotic patients with HCV should undergo quantitative HCV RNA and genotype before initiating antiviral therapy.[12] For patients with alcoholic cirrhosis, abstinence remains the cornerstone of therapy. Those with NAFLD should pursue vigorous controlled weight loss. For patients with primary biliary cirrhosis and primary sclerosing cholangitis, ursodeoxycholic acid (UDCA) has demonstrated an ability to slow down disease progression and reduce the severity of cholestatic symptoms. In hemochromatosis, regular therapeutic phlebotomy remains the treatment mainstay, whereas patients with Wilson's disease should be treated with chelation therapy.[13, 14] Treatment of the underlying liver disease, before the development of cirrhosis, is a primary prevention strategy. As the major causes of cirrhosis are related to lifestyle choices, primary prevention programs that focus on encouraging alcohol abstinence, reducing high-risk behavior for hepatitis virus infection, and vaccinating for hepatitis B are proven prevention strategies.[4]

Beyond the disease-specific considerations discussed above, there is some evidence that established drugs, such as non-selective beta blockers (NSBBs), statins, antibiotics, and anticoagulants might have expanded application in patients with cirrhosis regardless of etiology, and that these agents could prevent or delay the advent of complications. NSBBs are effective in both primary and secondary prevention of variceal bleeding, regardless of the etiology of cirrhosis. Broad spectrum antibiotics such as quinolones and, recently, rifaximin, have been shown to have value in primary and secondary prevention of spontaneous bacterial peritonitis in cirrhotic patients. Statins have been shown to reduce portal hypertension, and in a large population of cirrhotics with diabetes were

found to reduce the risk of hepatocellular carcinoma. Finally, while anticoagulation is currently used only for limited indications such as portal vein thrombosis, its use pre-emptively may reduce the development of portal vein thrombosis and potentially even impact the progression of fibrosis.[15]

II. Aeromedical Concerns.

Aeromedical concerns include: torrential gastrointestinal hemorrhage, hepatic encephalopathy, generalized malaise and lethargy, metabolic bone disease, ascites, renal dysfunction and pulmonary decompensation. Each of the underlying medical conditions may have additional aeromedical concerns, such as itching related to PBC. As many of the cirrhotics in our aviation population will have problems with alcohol, there are also concerns related to alcohol use/abuse and the behavior associated with this condition.

In the face of portal hypertension, gastric or esophageal varices could result in spontaneous massive upper GI hemorrhage, and while a literature search failed to reveal studies evaluating the risk of the anti-G straining maneuver in patients with portal hypertension, it would seem unwise for patients with varices to engage in this vigorous activity. Aggressive gastrointestinal hemorrhage could certainly lead to sudden incapacitation and unconsciousness.

Hepatic encephalopathy would be hazardous for aircrew duties due to compromised cognition, impaired higher executive decision making and decreased dexterity. Ascites could interfere with proper fit and function of the anti-G suit, and the anorexia and inanition that are often found in cirrhotic patients undermine proper conditioning necessary for top physical performance while flying. Finally, hepatopulmonary syndrome and portopulmonary hypertension could potentially lead to hypoxemia.

III. Waiver Consideration.

The diagnosis of hepatic cirrhosis is disqualifying for all flying classes. ATC/GBC and MOD personnel will also require a waiver as the diagnosis of cirrhosis is disqualifying for retention purposes.

Table 1: Waiver potential for hepatic cirrhosis

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	No AETC	No
II/RPA Pilot/III	Initial - No Maybe*+! MAJCOM	No Yes
ATC/GBC MOD	Initial - No Maybe*+! MAJCOM**	No At the discretion of the waiver authority

* Waiver possible with documentation of treatment and resolution of symptoms or documentation of adequate control measures.
** Waiver authority for MOD personnel is AFGSC.
+ MEB required first if subspecialty follow-up is required or if there are complications, to include abnormal liver function; waiver authority then becomes AFMSA.
! No indefinite waiver.

AIMWTS search in Jun 2016 revealed a total of 48 cases with a diagnosis of cirrhosis. Breakdown of cases was as follows: 1 FC I/IA case (not disqualified), 24 FC II cases (5 disqualified), 19 FC III cases (3 disqualified), 4 ATC/GBC cases (0 disqualified), and 0 MOD cases. All 8 disqualified cases were either due to severe disease or for multiple medical problems.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for hepatic cirrhosis should include the following:
A. Complete history with clear delineation of the underlying disease process that led to the development of cirrhosis, and notation of the presence or absence of major complications of hepatic cirrhosis to include ascites, any episodes of spontaneous bacterial peritonitis, varices with or without bleeding, hepatic encephalopathy, and any other medical complications attributed to the diagnosis of cirrhosis. Document any alcohol use: years, amount, and if still drinking.
B. Exam: Vital signs, weight (as many as possible to assess fluid gains from ascites if present), thorough abdominal and neuromuscular exams.
C. Labs: CBC with platelet count, metabolic panel with liver function tests, lipid panel, PT/PTT, iron panel, ceruloplasmin with serum copper level and urine copper levels, serum protein electrophoresis, 24 hour urine protein, alpha 1-antitrypsin level, antinuclear antibody, complete viral hepatitis panel, anti-mitochondrial antibody, and anti-smooth muscle antibody.
D. Imaging studies: CT-scan of the liver, ultrasound of the abdomen, radionuclide liver/spleen scan or as clinically recommended by consultant.
E. Reports of any endoscopic examinations.
F. Pathology reports from any biopsies.

G. Consultation reports from a gastroenterologist or hepatologist.
H. If alcohol dependent, report from ADAPT and documentation that aviator will remain abstinent. Refer to Alcohol Abuse and Dependence waiver guide for assistance.
I. Medical treatments: all drugs used to include dosages and any side effects.
J. Medical evaluation board results (if required).

The AMS for waiver renewal for hepatic cirrhosis should include the following:
A. Interval history and focused exam.
B. All applicable labs, pathology reports, and imaging tests noted above.
C. Consultation report from a gastroenterologist or hepatologist.

ICD-9 codes for hepatic cirrhosis	
571	Chronic liver disease and cirrhosis
571.0	Alcoholic fatty liver
571.2	Alcoholic cirrhosis of liver, including Laennec's cirrhosis
571.5	Cirrhosis of liver without mention of alcohol (portal cirrhosis, cryptogenic, postnecrotic, post hepatic, NOS
571.6	Biliary cirrhosis
571.8	Other chronic nonalcoholic liver disease (NAFLD)

ICD-10 codes for hepatic cirrhosis	
K70.0	Alcoholic fatty liver
K70.30	Alcoholic cirrhosis of liver without ascites
K70.31	Alcoholic cirrhosis of liver with ascites
K74.60	Unspecified cirrhosis of liver
K74.69	Other cirrhosis of liver
K74.5	Biliary cirrhosis, unspecified
K75.81	Nonalcoholic steatohepatitis (NASH)

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WAIVER GUIDE
Updated: Jul 2013
Supersedes Waiver Guide of Aug 2009
By: Lt Col Talib Y. Ali (RAM 13) and Dr. Dan Van Syoc
Reviewed by Col Pat Storms, RAM 05 and gastroenterologist

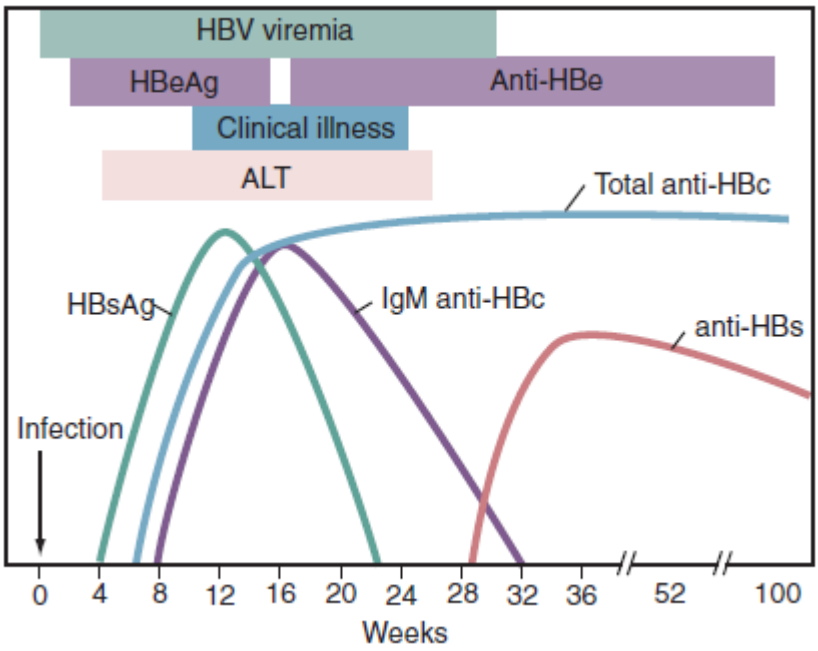
CONDITION:
Hepatitis, Viral (Jul 13)

I. Overview.

Hepatitis (hepatocellular inflammation) can result from many types of infectious agents (including bacterial, protozoan, and viral organisms), alcohol, drugs, dietary supplements, chemicals, and metabolic or autoimmune processes. The most common infectious agents of the liver that the flight surgeon likely will encounter are viral. Hepatitis A, B, C, D, E and G have been described. These viral hepatitides are divided based upon their mode of transmission – enteral (Hepatitis A and E) or parenteral (Hepatitis B, C, D, and G). Other viruses such as herpes simplex, Epstein-Barr virus (EBV), mumps, rubella, rubeola, adenovirus, coxsackie virus, and yellow fever virus can cause inflammation of the liver but are not a primary causes of hepatitis. Acute viral hepatitis is a spectrum of clinical disease ranging from asymptomatic infections, marked only by a rise in aminotransaminase levels, to fulminant hepatic necrosis and failure. Symptoms during the acute phase of a viral hepatitis episode may include anorexia, nausea, vomiting, fatigue, malaise, arthralgias, myalgias, headache, jaundice, abdominal discomfort, and constitutional symptoms often described as a "flu-like illness." Symptom expression is variable and asymptomatic infections are 10 to 30 times more common than symptomatic viral hepatitis infections.[1] Accurate diagnosis is important for future waiver actions, and patients should have clinically appropriate medical care and evaluation through the acute phase of any hepatitis regardless of etiology. The focus of the remainder of this waiver guide will be on Hepatitis B (HBV) and Hepatitis C (HCV) viruses. However with the advent of a universal vaccination program, the prevalence of Hepatitis B in the United States Armed Forces has decreased.

Generally, patients will achieve full functional recovery from an acute viral hepatitis with minimal clinical sequelae, with only a few patients progressing to acute hepatic failure. Recovery from the acute phase of viral hepatitis can be assumed when symptoms have resolved, liver enzymes have normalized, and viral markers demonstrate a pattern of resolution or of persistent chronic infection—usually within six months of the initial infection. With immunologic clearance of a HBV infection, surface antigenemia will usually resolve after three months. Chronic infection is likely if the viral surface antigen is still detectable after six months. Approximately 5% of immunocompetent adults will become chronically infected following an acute case of HBV. Figure 1 demonstrates the typical time course of viral serologies following an HBV infection.[1]

Figure 1: Time course of Hep B serologies



In cases of chronic HCV infection, the acute phase often is subclinical and not identified. A persistent, detectable viral load indicates chronic infection and 85% of HCV infections will become chronic. Up to 15% of patients with chronic hepatitis C also have extrahepatic manifestations often associated with autoimmune or lymphoproliferative states like lichen planus, idiopathic thrombocytopenic purpura, thyroid abnormalities and diabetes.[2]

Chronic infections with either of these viruses may be static or indolent with minimal demonstrable sequelae. Conversely, chronic viral hepatitis can result in hepatocellular carcinoma, cirrhosis, or end-stage hepatic failure requiring liver transplantation.[3] In chronic HBV infection antigen-antibody immune complexes may persist and cause arthralgias, arthritis, glomerulonephritis and polyarteritis.[1] In HCV, chronic hepatitis may not progress, or may progress in a slow and insidious fashion. Progression to cirrhosis may develop in up to 15-30% of chronically infected HCV patients. Progression tends to be slower (over 30 years) for females who were younger at age of first infection, and is accelerated in all patients in the presence of alcohol use or infection with other hepatopathic agents. Once cirrhosis is present, hepatocellular carcinoma may occur at a rate of 1-3% per year.[3] A liver biopsy is a useful tool to stage the current status of hepatic inflammatory activity and fibrosis, and may help direct appropriate therapy, but should not be considered necessary in every case of chronic HCV infection.[2] Please note that the historical distinction between “chronic active” and “chronic persistent” hepatitis C has fallen out of favor, consistent with the observation that chronic viral hepatitis presents with a spectrum of histologic and clinical manifestations, and treatment decisions hinge on serologic, histologic, and functional findings.

Pharmaceutical therapy is available for chronic B and C virus hepatitis but these drugs have significant side effects. Specific treatment regimens are beyond the scope of this document, but it is important to note that recent advances in the development of direct-acting antiviral agents have dramatically increased the viral clearance rate in chronic hepatitis C, from less than 10% with the initial regimen of interferon monotherapy to more than 70% with current therapy[4]. It is also worth

noting that, in the case of chronic hepatitis C, the genotype (1-6) of the strain of the virus can impact response to therapy and should be taken into consideration when considering treatment regimens.[4]

Table 1: Treatment regimens for Hepatitis B and Hepatitis C

	Treatment Agent	Potential side effects[1, 5]
Hepatitis B	Interferon-α-2a Peginterferon-α-2a	Headache, fever, fatigue, thrombocytopenia, anorexia, insomnia, demotivation, depression, paranoia, diabetes mellitus, optic neuritis, seizures, cardiotoxicity
	Lamivudine	Headaches, nausea, vomiting, dizziness, insomnia, lactic acidosis, exacerbation of viral hepatitis, pancreatitis, cough, rashes, arthralgias
	Adefovir	
	Entecavir	
	Telbivudine	
	Tenofovir	
Hepatitis C	Peginterferon-α-2a	Headache, fever, fatigue, thrombocytopenia, anorexia, insomnia, demotivation, depression, paranoia, diabetes mellitus, optic neuritis, seizures, cardiotoxicity
	Ribavirin	Hemolysis, nausea, anemia, pruritus, gout
	Telaprevir	Anemia, rash, anorectal discomfort
	Boceprevir	Anemia, neutropenia, dysgeusia

For both infections, the risks and benefits of treatment with antivirals must be weighed against the current clinical state and likelihood of disease progression. Treatment is typically reserved until there is evidence of chronic liver disease (as demonstrated by unequivocal serological and laboratory results, or biopsy results showing moderate necrosis and inflammation, or definite fibrosis) rather than empirically treating virological carrier status.[2, 4, 5] With the advent of more effective antiviral therapy for chronic hepatitis C, however, the future may hold a reality in which chronic hepatitis C is treated more like an infection to be addressed with specific antiviral therapy than as a chronic liver disease.

II. Aeromedical Concerns.

Aviators with acute hepatitis are unfit to fly due to the likelihood of unacceptable symptoms, as are those with chronic hepatitis who are either undergoing drug treatment or who have demonstrated functional impairment due to their chronic liver disease. However, aviators who have fully recovered from an episode of acute viral hepatitis, as demonstrated by being asymptomatic with liver function tests (LFTs) within the standard reference range and negative viral markers, may be returned to flying status without requiring a waiver. Careful consideration must be given to the time course of viral markers, as their evolution may occur over weeks to months.

Aviators with chronic viral hepatitis may experience many years without functional impairment before the onset, if at all, of aeromedically significant complications. Therefore, individuals may be considered for a waiver if they are off disqualifying medications, demonstrate normal hepatic functional capacity and have no significant symptoms of hepatic decompensation or extrahepatic manifestations of chronic hepatitis. Aviators suspected to be chronic carriers should be evaluated

similarly to those with chronic viral hepatitis, though additional consideration should be given to any particular occupational hazards associated with blood and body fluid exposure from the chronic carrier. Due to the high risk of chronicity, HCV-infected aviators should be under the clinical care of a gastroenterologist.

III. Waiver Considerations.

Chronic viral hepatitis is disqualifying for all flying classes in the US Air Force. Specifically, for FC I/IA/II/III "History of viral hepatitis, with carrier status, persistent transaminase elevation, or evidence of chronic active or persistent hepatitis is disqualifying." For retention: "chronic, when symptoms persist after a reasonable time following the acute stage and there is objective evidence of impairment of liver function or if member requires follow up/treatment beyond six months and any other chronic liver disease whether congenital or acquired." Waiver consideration will hinge upon the severity of hepatic inflammation, functional hepatic capacity, and absence of significant neuropsychiatric symptoms.

AFMSA/SG3PF granted a waiver for the use of Entecavir for chronic active hepatitis in an exchange pilot. A waiver was recommended and requested by the AF/SG of his country. AFMSA honored this waiver IAW a long standing STANAG (Standardization Agreement) policy. Both the condition and treatment remain disqualifying in the USAF.

Table 2: Waiver Potential for Hepatitis B or C for FC I/IA, FC II and FC III

Flying Class (FC)	**Waiver Potential Waiver Authority**	**ACS Review/Evaluation**
I/IA	No AETC/SGPS	Only if requested by AETC/SGPS
II/III	Maybe*+# MAJCOM	Yes
ATC/GBC	Maybe*+# MAJCOM	No
MOD	Maybe*+# AFGSC	No

* Waiver possible with resolution acute phase and no sequelae from chronic state.
+ MEB required first for evidence of persistent liver impairment.
# No indefinite waiver.

Review of AIMWTS waiver submissions for viral hepatitis in Jul of 2013 showed 67 waivers submitted for Hep B and Hep C. Breakdown of the cases was as follows: 4 FC I/IA (2 disqualified), 23 FC II (0 disqualified), 36 FC III (10 disqualified), and 4 ATC/GBC (2 disqualified). There were a total of 14 submissions that resulted in a disqualification.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for hepatitis should include:
A. History, including diagnosis, comprehensive serology results related to the specific viral infection being considered (if any), all available chronological LFT results, treatments, if any, and current performance at work (particularly with regard to possible fatigue or neuropsychiatric symptoms).
B. List and fully discuss all clinical diagnoses requiring a waiver.
C. Results of physical examination, focusing on signs of acute and chronic liver disease.
D. Gastroenterology/hepatology evaluation.
E. Current LFTs, serum albumin, prothrombin and CBC with platelet count.
F. MEB report (if required under 5B 5.3.9.6.).
G. A liver biopsy need not be routinely performed prior to waiver request, although the waiver authority may ask for this in specific cases.

The AMS for waiver renewal for hepatitis should include the following:
A. Interim history to include documentation recent serology and LFTs, and work performance. Other labs should include serum albumin, prothrombin time, and CBC.
B. Current treatment if applicable.
C. Results of each annual examination, focusing on signs of acute and chronic liver disease.
D. Gastroenterology evaluation (internal medicine evaluation will suffice if patient has been stable for over twelve months).

At this time, each of the medications listed in Table 1 for hepatitis immunotherapy/ chemotherapy is disqualifying. Waivers may be considered on a case-by-case basis for patients with viral hepatitis before or after treatment, and will depend on the status of the underlying disease and must meet the waiver criteria outlined in AFI 48-123.

ICD-9 Codes for Viral Hepatitis	
070	Viral Hepatitis NOS
070.1	Viral hepatitis A without mention of hepatic coma
070.3	Viral hepatitis B without mention of hepatic coma
070.5	Other specified viral hepatitis without mention of hepatic coma
070.52	Hepatitis delta without mention of hepatitis B w/ hepatic coma
070.6	Unspecified viral hepatitis with hepatic coma
070.70	Viral Hepatitis C without mention of hepatic coma
070.9	Unspecified viral hepatitis without hepatic coma

ICD-10 Codes for Viral Hepatitis	
B17.9	Acute viral hepatitis, unspecified
B18.9	Chronic viral hepatitis, unspecified
B15.9	Hepatitis A without hepatic coma
B19.10	Unspecified viral hepatitis B without hepatic coma
B19.0	Unspecified viral hepatitis with hepatic coma
B17.10	Acute hepatitis C without hepatic coma
B19.20	Unspecified viral hepatitis C without hepatic coma
B19.9	Unspecified viral hepatitis without hepatic coma

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WAIVER GUIDE
Updated: Mar 2016
Supersedes Waiver Guide of Jun 2012
By: Dr Dan Van Syoc
Reviewed by LtCol Joseph Gower, AF/SG consultant for Orthopedic Surgery

CONDITION:
Herniated Nucleus Pulposus (HNP) and Spinal Fusion (Mar 16)

I. Overview.

Herniated Nucleus Pulposus:

Herniated nucleus pulposus (HNP) is the herniation of the nucleus pulposus (NP), a mucoprotein gel located in the posterocentral portion of the disc, through the annulus fibrosis (AF), the concentric bands of fibrous tissue surrounding the NP. It usually occurs in a posterior or posterolateral fashion, compressing the spinal cord and/or nerve roots, potentially causing pain and neurologic symptoms.[1] It can be caused by violent trauma, recurrent microtrauma, or from degenerative changes of the disc. Risk factors include increased age and heavy lifting. It has been postulated that the hydraulic pressure on the disc rather than the excessive motion produces the traumatic disc herniation. Mechanical studies have shown that injury from a single event is rare and that most injuries are a wear and tear phenomenon. Genetic predispositions to disc disease are controversial and studies are underway to assess the validity of genetic claims.[2]

The majority of HNPs occur in the lumbar region, followed by the cervical region, and the thoracic region. The age-incidence curve peaks in the second through fourth decades of life and the incidence is higher in males than females. It is most common between C5-6, C6-7, and L5-S1.[1, 3] Symptoms from HNP vary from asymptomatic to paraplegia depending on the degree of compression of nerve roots, vascular structures, and the spinal cord. Neuropathic symptoms such as radicular pain, numbness, paresthesias, weakness, and myelopathic symptoms such as weakness and muscle wasting can be the presenting symptoms. However, progression of myelopathic disease may lead to quadriparesis, paraplegia, and emergent conditions such as cauda equina syndrome and conus syndrome.

Cervical disc disease is of concern in our aircrew, particularly those flying high performance aircraft. The mean age in the general population of cervical disc disease is 47 years and the most commonly affected nerve root is C7. Onset of symptoms is most frequently acute and paresthesias or numbness occur in 80% of affected patients. Associated neurological symptoms are a major concern in this population.[4]

Diagnosis of HNP is based on characteristic symptomatology, confirmed by radiologic studies. The predominant studies used to document HNP are MRI and CT myelogram. However, studies have failed to delineate a direct relationship between the degree of herniation and the amount of symptoms. In one study, MRI scans revealed herniated discs in approximately 25 percent of asymptomatic persons age 45-54 and in 57 percent of those more than 64 years of age.[5]

Standard treatment for HNP consists of conservative therapy and/or surgery. Conservative therapy (i.e., bedrest, pain medications, physical therapy, and steroid injection) has resulted in symptomatic

improvement in 20-95% of HNPs. The is no evidence that early referral for surgery, in the absence of severe or progressive neurologic deficits, improves outcomes for patients with HNP.[6] For those that do eventually require surgery, resection of HNP, with or without fusion, and microdiscectomy are effective for pain relief in 90% of cases with some complications. There have been regional differences in the rates of surgery that may be due, in part, to the lack of a well-established standard of care for lumbar disease.[7] Chymopapain nucleolysis of HNP has a lower success rate and its use has fallen out of favor. A more accepted form of treatment is transforaminal epidural steroid injection (TFESI). This modality has demonstrated good results in patients with acute to subacute unilateral radicular pain caused by HNP or spinal stenosis.[8] An ideal surgical solution to low back pain and HNP has yet to be found.[9] Newer methods such as minimally invasive microdiscectomy have much promise. Ultimately, the treatment selected for any patient with disease at any level needs to customized to their particular clinical situation and the desired outcome.[10]

Spinal Fusion

Spinal fusion can be traced back to 1911 when initially used to treat Pott's disease. Since then it has been used to treat scoliosis, kyphosis, fractures, dislocations, spondylolisthesis, and intervertebral disc disease. The decision to fuse can still be controversial, as in cases of disc disease or spondylosis, but is easily justified for severe instability, spondylolisthesis, or trauma with ligamentous rupture. Generally, conditions such as wedge, burst, and extension fractures are considered stable, and shear or rotational fracture-dislocations and dislocations are considered unstable injuries, however, this classification may vary with the extent of damage. Features predictive of the best surgical outcome include a definable neurological deficit, imaging pathology that correlates with the deficit, and positive physical signs of nerve root impingement. When all three exist 90 to 95% improvement is usual.

Current evidence indicates that fusion and remodeling may be prolonged but bony incorporation will likely adequately occur by 6 months sufficient enough to proceed with waiver. Factors that tend to prolong healing time in spinal arthrodesis include wound infections, loosening hardware, previous surgery in the same area, aged patients, clinically unstable spine, and large bone grafts. There is a concern that multiple level fusions cause increased stress concentration at the adjacent non-fused vertebral joints during flexion, extension, and rotational movements. It is thought that adequate healing will compensate for and accommodate a single level fusion.

Artificial Disc Replacement

Artificial disc replacement has a theoretical advantage over fusion in that the prosthetic disc could help preserve normal range of motion and mechanics of the spine, thus reducing the long-term degenerative changes in adjacent vertebral segments that have been observed in individuals after fusion. There are two studies comparing disc replacement with the more traditional fusion. One of the studies demonstrated no significant differences in pain or functional status, and the second indicated a superior score for disc replacement based on a composite measure of disability, functional status, radiographic success, neurological improvement and the rate of reoperation.[6] One large multicenter study showed the CHARITÉ™ artificial disc to be clinically equivalent to lumbar fusion for treatment of lumbar disc disease (L4 to S1).[11] Another study showed conclusive evidence of the safety and efficacy of the ProDisc®-L total disc replacement for lumbar disc disease.[12] In addition, a large multicenter study of the PRESTIGE ST Cervical Disc System actually showed improved neurological success, improved clinical outcomes, and a reduced rate of

secondary surgeries compared to the more traditional discectomy and fusion.[13] The above studies were designed only to test for equivalency with fusion and both were successful. Still other authors feel that the jury is still out for lumbar artificial disc replacement and that there is limited evidence for use of arthroplasty over fusion.[14] The FDA approved the Mobi-C® cervical disc prosthesis in 2013. At this time disc replacement is approved by the US FDA for patients who are in good health, less than or equal to age 60, and who have disease limited to one disc.

Spine surgeons are anxious to look at alternatives to more conventional treatment modalities. The preservation of motion is hypothesized to lower the risk of adjacent segment disease and, thereby, improve long-term outcomes. However, the current devices are expensive and their use is associated with the potential for significant complications (often above and beyond those seen with lumbar fusion). At the present time, there is a lack of evidence to suggest that the use of disc arthroplasty results in better short- or long-term functional outcomes than fusion in properly selected patients. At this time, Air Force spine specialists feel that lumbar artificial disc replacement has fallen out of favor due to costs and other factors, but that such treatment for cervical disease holds more promise. For lumbar total disc replacement there is also the concern involving revision and the increased potential for great vessel injury.

II. Aeromedical Concerns.

Our current high-performance aircraft can take a toll on the necks of our pilots.[15] Inability to perform flying duties may be a result of baseline symptoms such as pain and/or weakness. Sudden incapacitation and permanent disability are significant concerns, particularly in a high-G environment or during ejection.[3] The forces applied to the intervertebral disc under high-G stress may lead to accelerated progression of disease. Following surgical treatment of HNP, concerns are raised regarding vertebral joint stability and subsequent catastrophic failure of the vertebral column. There are documented cases of herniated discs, vertebral fractures, and neck injuries with high G maneuvers and ejections.

After spinal fusion, there is concern over the possibility of repeat injury to a fused spine as a result of ejection and rapid onset Gz-forces. The normal acceleration magnitude during ejection from the ACES II seat, used in all USAF high performance aircraft, is 12-14 +Gz, but may vary with flight parameters and weight of occupant (F-35 currently uses the Martin-Baker US16E seat). Parachute opening shock can range from 10 to 20 +Gz, especially if outside the ejection envelope. Vertebral fracture occurs frequently with forces of greater than 20 Gz. Sixty-six percent of subjects sustain vertebral fracture at G levels greater than 26 +Gz but with poor positioning forces as low as 10 +Gz have caused fractures. In all ejection seats, an inertial reel system is designed to pull the shoulders back into proper alignment, but nothing is in place to protect the cervical spine. There is no standard human spine tolerance limit to mechanical loads, but tolerances vary with the position of the vertebral body, angle of load and spine vectors, strain rate, and age. To date, there are no studies elucidating the G capability of the postoperative arthrodesis. Non-waiverability for high-performance and ejection seat aircraft of multiple level cervical fusions is based on the concern that fusions cause increased stress concentration at the adjacent non-fused vertebral joints during flexion, extension, and rotation of the joints. Significant cervical level motion is common in these airframes, i.e. checking six, air-combat training, or basic fighter maneuvers. Furthermore, cervical joint motions are often extreme during ejection, especially when ejecting outside the envelope. In the case of 2 or more levels of fusion, considerable increased stress concentrations may occur at adjacent levels causing fractures with potentially catastrophic results. Multiple levels of cervical

fusion may also indicate progressive cervical spinal degeneration, which may worsen with further G-exposure.

Multiple level lumbar or thoracic fusions may be considered for waiver in ejection seat aircraft because i) the thoracolumbar joints are not generally as mobile as the cervical joints resulting in less severe focal stress concentrations at adjacent non-fused levels. During high-performance flight, most of the loading is theoretically along the vertical axis and ii) the consequence of a lumbar fracture or other injury is far less likely to result in permanent neurological impairment than cervical injury.

In a minority of cases, bone fusion is not complete despite the patient being asymptomatic and having a normal neurological exam, thus requiring more time for healing or possibly additional surgery. It is essential to establish successful complete fusion by a surgeon prior to returning to fly, particularly in high-performance aircraft given the mechanical stresses occurring during G-exposure and ejection.

As a general rule, in most cases of HNP, regardless of the amount of disabling pain and neurologic deficit, there is a good chance for returning to aviation duties.[16] Some high performance flyers may have restrictions placed upon them, but they will more than likely be returned to flying duties.

As data with artificial disc replacement is not yet conclusive, it would be best to take a conservative approach, particularly with lumbar disease. What is currently needed is a superiority study (disc replacement vs. fusion) for both cervical and lumbar regions and studies demonstrating that adjacent segment disease is prevented with disc replacement.

III. Waiver Consideration.

HNP is disqualifying for all flying classes and will require a waiver. ATC/GBC and MOD personnel require a waiver when they fall into the following category: "Herniation of nucleus pulposus, when symptoms and associated objective findings are of such a degree as to require repeated hospitalization, significant duty limitations, or frequent absences from duty." This criteria is disqualifying for retention standards, so also requires and MEB.

Aviation personnel must fulfill all of the following applicable qualifying criteria for initial waiver request:

- Need to be asymptomatic
- Need to have adequate waiting period after treatment - see Note bottom of page 5
- Note difference in waiting times for aviators on Jump status.

Table 1 - Requirement Criteria for Initial HNP Waiver Request (Conservative [non-surgical] Treatment, Discectomy with/without Laminectomy [no spinal fusion] and Microdiscectomy)

Level of Disc Herniation	Flying Class	Waiver Potential Waiver Authority†	Waiting Period Post Treatment	Required Studies
Cervical/thoracic/lumbar	FC I/IA	No	N/A	N/A
Cervical	FC II	Yes AFMSA (ACS review)	3 months	Cervical MRI* Flexion/extension radiographs
Cervical	FC IIB	Yes AFMSA (ACS review)	3 months	None required Flexion/extension radiographs
Thoracic/lumbar	FC II	Yes MAJCOM (ACS review)	3 months	None required
Cervical/thoracic/lumbar	RPA Pilot FC III** MOD GBC	Yes MAJCOM@	3 months	None required
Cervical/thoracic/lumbar	Flyers on Jump status	Yes MAJCOM	6 months	None required#

* MRI must demonstrate the following: The cervical disc herniation does not contact or displace the spinal cord. The cervical disc herniation does not produce any signal change in the spinal cord or cord deformity. Cerebrospinal fluid remains visible anterior and posterior to the spinal cord. (MRI should be obtained on a 1.5 tesla (or greater) field strength magnet and include T2 weighted images).

** Members requesting FC III waivers for HNP whose duties require flight in ejection seat aircraft follow FC II waiver requirements. Waiver authority remains MAJCOM.

If the involved area is the cervical spine, the jumper will need a cervical MRI and flexion/extension radiographs as part of their evaluation.

@ Waiver authority for MOD is AFGSC.

†If symptoms and associated objective findings are of such a degree as to require repeated hospitalization, significant duty limitations, or frequent absences from duty, then Waiver Authority is AFMSA for all classes.

Table 2 - Requirement Criteria for Initial Waiver Request (Spinal Fusion - with or without hardware)

Level of Disc Herniation	Flying Class	Waiver Potential Waiver Authority†	Waiting Period Post Treatment	Required Studies
Cervical/thoracic/lumbar	FC I/IA	No	N/A	N/A
Cervical#	FC II (single level fusion only, multiple level fusion not waiverable)	Yes AFMSA (ACS review)	6 months	Tests may be requested by ACS**
Thoracic	FC II (single or multiple level fusion)	Yes AFMSA (ACS review)	6 months	Tests may be requested by ACS**
Lumbar	FC II (single or multiple level fusion)	Yes MAJCOM (ACS review)	6 months	None
Cervical/lumbar#	FC IIB (single or multiple level fusion)	Yes AFMSA (ACS review)	4 months	None
Thoracic	FC IIB (single or multiple level fusion)	Yes AFMSA (ACS review)	4 months	None Tests may be requested by ACS**
Cervical/thoracic/lumbar#	RPA Pilot FC III* MOD@ GBC	Yes MAJCOM	4 months	None

* Members requesting FC III waivers for spinal fusion whose duties require flight in ejection seat aircraft follow FC II waiver requirements. Waiver authority remains MAJCOM.
** This applies if the ACS agrees to see or review the case for the waiver authority.
# All initial FC II/III waivers require copies or reports of MRI of C-Spine.
@ Waiver authority for MOD is AFGSC.
†If symptoms and associated objective findings are of such a degree as to require repeated hospitalization, significant duty limitations, or frequent absences from duty, then Waiver Authority is AFMSA for all classes.

Note: A six month wait status post cervical, thoracic or lumbar fusion prior to waiver consideration for high performance aircraft is based on current evidence which indicates complete fusion of bone mass may require six months post-operatively. Multiple level cervical fusions is not waiverable for high-performance and ejection seat aircraft based on the concern that multiple level fusions cause a

much greater increase in stress concentration leading to fractures at the adjacent non-fused vertebral joints during flexion, extension and rotation of the joints versus a single joint fusion. Multiple level thoracic and lumbar fusions may be considered for waiver for high-performance flying because the thoracic and lumbar joints are not generally as mobile as the cervical joints resulting in less severe focal stress concentrations at adjacent non-fused levels. Thoracic HNP is much less common than cervical and lumbar HNP and thoracic HNP requiring surgical intervention is even rarer. Because of the location within the body, microdiscectomy is not possible and the surgical approach for laminectomy and fusion is more difficult. There is an increased risk of surgical complications including stenosis and myelopathy as well as the possibility of some underlying spinal pathology, which led to the thoracic HNP in the first place. Because of this, all aviators requesting a waiver for surgical fusion of the thoracic spine with or without hardware are required to be evaluated by the ACS.

Table 3 - Requirement Criteria for Initial HNP Waiver Request for Artificial Disc Replacement (Prosthesis) [prosthesis must be fully FDA approved for that particular site and not investigational]+

Level of Disc Herniation	**Flying Class**	**Waiver Potential Waiver Authority**	**Waiting Period Post Treatment**	**Required Studies**
Cervical/thoracic/lumbar	I/IA	No AETC	N/A	N/A
Cervical#	FC II	Yes AFMSA (ACS review)	6 months	None
Thoracic (Not technically feasible)	FC II/III		N/A	N/A
Lumbar#	FC II	Yes AFMSA (ACS review)	6 months	None
Cervical*#/lumbar#	RPA Pilot FC III MOD@ GBC	Yes AFMSA	6 months	None

Single implant only, multiple not waiverable at any level.
* FC III waiver restricted to nonejection seat aircraft.
+ Disc replacement requires MEB.
@ Waiver authority for MOD is AFGSC.

Table 4 - Waiver requirement criteria for Initial HNP Waiver Request (Treatment other than Conservative, Discectomy, Microdiscectomy, Spinal Fusion or Prosthetic Disc Replacement)*†

Level of Disc Herniation	Flying Class	Waiver Potential Waiver Authority	Waiting Period Post Treatment	Required Studies
Cervical/thoracic/lumbar	FC I/IA	No	N/A	N/A
Cervical/thoracic/lumbar	FC II/IIA/B/C	Maybe* AFMSA ACS review	As requested by ACS	As requested by ACS
Cervical/thoracic/lumbar	RPA Pilot FC III MOD@ GBC	Maybe* MAJCOM ACS review	As requested by ACS	As requested by ACS
Cervical/thoracic/lumbar	Flyers on Jump status	Maybe* MAJCOM ACS review	As requested by ACS	As requested by ACS

* Waiver requests for HNP treated with surgical procedures other than spinal fusion, prosthetic disc replacement, discectomy (with/without laminectomy) or microdiscectomy will be considered on a case-by-case basis and will require ACS review. Recommend discussing with ACS prior to surgery.
# Any jumper with treatment more advanced that a microdiscectomy needs to be treated on a case-by-case basis as these aviators are potentially at high risk of re-injury.
@ Waiver authority for MOD is AFGSC.
†If symptoms and associated objective findings are of such a degree as to require repeated hospitalization, significant duty limitations, or frequent absences from duty, then Waiver Authority is AFMSA for all classes.

AIMWTS search in Jan 2016 revealed a total of 3005 members with a diagnosis of HNP and/or spinal fusion; there were 484 cases resulting in disqualification. Breakdown of the cases demonstrated: 45 FC I/IA cases (27 disqualified), 1577 FC II cases (123 disqualified), 1296 FC III cases (288 disqualified), 66 ATC/GBC cases (30 disqualified), and 21 MOD cases (16 disqualified).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for <u>initial waiver</u> for HNP and spinal surgery should include the following:

A. Detailed history of back/neck pain and previous treatments; surgical history; any specialty consultative reports and follow-up notes.
B. Physical – musculoskeletal and neurological exam. A normal examination by a flight surgeon, and in addition, for surgical procedures (spinal fusion, discectomy with or without laminectomy, microdiscectomy, prosthetic nucleus implant), have a normal neurologic exam and be cleared for all activities by a neurologist, neurosurgeon or orthopedic surgeon.

C. Operative report from surgeon regarding patient's current postoperative status and prognosis (should be some statement regarding flying duties and/or clearing for unrestricted activities).
D. Studies – copies of reports and images from all imaging studies performed (MRI of C-Spine for initial FC II/III waivers).
E. In cases of spinal fusion, instrumentation, hardware or disc replacement, follow-up dynamic (flexion-extension) radiographs to confirm stability. Send copies of report and images to ACS.
F. MEB results and summary if applicable.

The AMS for <u>waiver renewal</u> for HNP and spinal surgery should include the following:
A. Interval history of initial signs and symptoms, treatment and residual signs and symptoms, if any, current symptoms, medication, treatment, and activity level. Provide copies of any interim specialty consultations or follow-up notes.
B. Physical – musculoskeletal and neurological exam by local flight surgeon.
C. Results of any studies obtained in the interval period. Provide copies of any images from interim imaging studies.

* Waivers requesting a change from a FC IIB to an unrestricted FC II waiver should follow the initial waiver request criteria in Tables 1 or 2.

ICD-9 Codes for HNP and Spinal Fusion	
722	Intervertebral Disc Disorders
81.0	Spinal Fusion
81.3	Refusion of Spine
84.60	Insertion of Spinal Disc Prosthesis, NOS

ICD-10 Codes for HNP	
M50.9	Cervical disc disorder, unspecified, unspecified cervical region
M51.9	Unspecified thoracic, thoracolumbar and lumbosacral intervertebral disc disorder

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WAIVER GUIDE
Updated: May 2015
Supersedes Waiver Guide of Apr 2012
By: Maj Jennifer Wolf (RAM 16) and Dr. Dan Van Syoc
Reviewed by LtCol Roger Wood, AF/SG consultant for Hematology/Oncology

CONDITION:
Hodgkin Lymphoma (May 15)

I. Overview.

Hodgkin lymphoma (HL) (formerly Hodgkin's disease) is a neoplasm of lymphoid tissue that accounts for 12-30% of all malignant lymphomas.[1] It has a bimodal distribution with a peak incidence between 15 and 30 years of age followed by another peak among adults over 55 years old and is more common among males.[1] HL will be diagnosed in approximately 9,000 people in 2014 of which 1,180 will die.[2] HL is divided into two main types by the World Health Organization classification: nodular lymphocyte-predominant Hodgkin lymphoma (NLPHL) and classical Hodgkin lymphoma (CHL). CHL is further divided into four subtypes: nodular sclerosis, mixed cellularity, lymphocyte-depleted, and lymphocyte-rich. CHL predominates in Western countries (95% of cases).[2] The nodular sclerosis subtype of CHL is more common among young adults (15-35 years old) whereas NLPHL is more common during the fourth decade of life.[1]

CHL is defined histopathologically by the presence of the malignant Reed-Sternberg cell in an inflammatory background of lymphocytes and fibrosis whereas NLPHL is characterized by the presence of lymphocyte-predominant cells (popcorn cells) distinguished by giant cells, which express typical B cell lineage.[2] Among CHL, nodular sclerosis accounts for 50-80% of cases followed by mixed cellularity (20-30%), lymphocyte-rich (5%) and lymphocyte-depleted (<1%).[1-5]

Common presenting features of CHL include painless lymphadenopathy (usually above the diaphragm), cough, fever, night sweats, and weight loss.[6] The mediastinum is often involoved.[1] NLPHL most often presents with cervical or axillary lymphadenopathy and is distinguished from CHL in that mediastinal lymph nodes and extranodal organs are rarely involved.[1]

Several large studies have demonstrated that a prior history of serologically confirmed infectious mononucleosis (in particular elevated titers of Epstein-Barr virus) confers about a three-fold increased risk for HL in young adults.[7] Of note, EBV is implicated in 40% of CHL cases, most commonly the mixed cellularity subtype.[1] An increased risk for HL among siblings and close relatives supports a genetic basis for increased susceptibility.[8]

The extent of HL is classified using the four-stage modified Ann Arbor classification. Stage I is involvement of a single lymph node region (I) or extralymphatic site (I_E). Stage II is involvement of two or more lymph node regions (II) or extralymphatic sites (II_E) on the same side of the diaphragm. Stage III is involvement of lymph node regions on both sides of the diaphragm (III) or extralymphatic sites (III_E) [Waldeyer's ring of lymphoid tissue in the oropharynx and the spleen both count as nodal sites]. Stage IV is diffuse or disseminated involvement of one or more extralymphatic organs or tissues. Extranodal/lymphatic sites primarily include bone marrow, liver, lungs and bones. The absence or presence of unfavorable factors such as fever, night sweats, and/or unexplained loss of 10% of more of body weight in the 6 months preceding diagnosis are denoted

by the suffix letters A or B, respectively. The classic B symptoms are seen in ~25% and denote widespread or locally extensive disease. Fatigue and pruritus can also be seen in HL.[2]

The workup of HL should include a thorough history focusing on the presence or absence of B symptoms, alcohol intolerance, pruritus, and fatigue; a focused physical exam of the lymph nodes, spleen and liver; laboratory tests including a CBC with differential, platelets, ESR, LDH, albumin, LFT, renal function, chest x-ray, PET/CT and contrast-enhanced CT. The preferred method for diagnosis is by excisional lymph node biopsy although core needle biopsy may be used. The role of fine-needle aspiration (FNA) is controversial and a negative FNA biopsy does not rule out lymphoma. The use of immunohistochemistry is also recommended.[2]

Prognosis varies depending primarily on stage of disease and histologic subtype, but Hodgkin lymphoma is now curable in 80% of cases as a result of improved management and treatment.[2] Nodular lymphocyte-predominate HL has the best prognosis, usually (80%) present as asymptomatic, limited stage disease. Nodular sclerosis usually carries a better prognosis than mixed cellularity, which in turn has a better prognosis than lymphocyte depletion.[5] With regards to prognosis and treatment, patients are classified into three groups: early-stage favorable (stage I-II with no unfavorable factors); early-stage unfavorable (stage I-II with any unfavorable factors); and advanced-stage disease (stage III-IV).[2] The International Prognostic Factors Project Score (IPS) is used for risk stratification among patients with advanced-stage HL. This score was based on studies that found that patients with advanced-stage CHL (stage III-IV) experienced reduced survival rates 7-8% per year for each of the following factors: age greater than 45 years, male gender, stage IV disease, albumin <4 g/dL, Hgb < 10.5 g/dL, leukocytosis (>15,000/mm^3), lymphocytopenia (<8% of WBC and/or count < 600/mm^3).[1, 2] Currently, the overall 5-year survival for HL is 81%.[1] B systemic symptoms, mediastinal mass to largest transthoracic diameter ratio >0.33 and extensive tumor burden (≥10 cm largest diameter of any single mass) are other factors that have been repeatedly documented as poor prognostic factors.[2]

Treatment for HL may involve radiotherapy, chemotherapy, or both, depending on the subtype (CHL vs. NLPHL), stage of disease, and the IPS score.[1] For CHL, the ABVD (doxorubicin [Adriamycin®], bleomycin, vinblastine, and dacarbazine) and Stanford V (doxorubicin, vinblastine, mechlorethamine, etoposide, vincristine, bleomycin and prednisone) protocols are most commonly used with involved field radiation therapy (RT). Escalated BEACOPP (bleomycin, etoposide, doxorubicin, cyclophosphamide, vincristine, procarbazine, and prednisone) can also be used.[2] PET/CT imaging is used for monitoring therapy and disease response.[1, 2] For NLPHL, a combination of rituximab, multiagent chemotherapy, such as ABVD, CHOP (cyclophosphamide, doxorubicin, vincristine, prednisone), or CVP (cyclophosphamide, vincristine, prednisone) plus involved field radiotherapy are used.[1] Stem cell transplantation and immunotherapy has been used in refractory HL with limited success. Monoclonal antibodies are currently in Phase II trials and FDA approved as second-line agents.[1] Generally, individuals with limited-stage disease and nonbulky disease are treated with two cycles of ABVD followed by RT or four cycles of ABVD without RT.[9] Individuals with advanced-stage disease (III-IV) or with B symptoms in any stage receive ABVD until two cycles beyond achieving complete remission. Individuals with bulky disease and in any stage receive ABVD plus RT. More recent studies have indicated that two cycles of ABVD followed by involved-field, moderate-dose radiation can cure most patients.[10]

For early stage favorable HL (stage I-II), the 5 year failure rate for treatment (recurrent disease) is 9%.[5] For early stage unfavorable disease (stage I-II), the failure rate (relapse) is around 15%.[5]

Relapse after successful treatment in advanced-stage occurs in 30% to 47% and most relapses occur within 4 years; about 10% of all relapses occur beyond 5 years.[5]

Although the likelihood of being "cured" of HL is high, overall expectation of survival is not normal.[1] Long-term follow-up studies show that the cumulative treatment-related mortality rate exceeds that of HL itself in 15 years.[9] The challenge is holding the potential for long-term toxicity to a minimum while successfully treating the disease initially. MOPP (mustargen, oncovin, procarbazine, and prednisone) is associated with infertility, premature menopause and/or leukemia/myelodysplasia. ABVD has less long-term toxicities and has proven therapeutic efficacy. Anthracyclines (e.g., doxorubicin) are associated with cardiomyopathy, bleomycin with pulmonary fibrosis, and alkylating agents with bone marrow failure. RT-induced second malignancies include non-HL, breast, lung or gastrointestinal cancers. RT treatment to the neck area is associated with hypothyroidism and to the chest with cardiac disease. The practice of RT has improved; smaller fields, PET/CT imaging enhanced RT planning and intensity-modulated radiotherapy (IMRT) allows for better targeting and reduced radiation of uninvolved tissues.[9] Fatigue is commonly reported in HL survivors.[3, 11]

Pregnancy, older age (>50 years old), and HIV infection can complicate care and treatment of HL. Among pregnant women, abdominal ultrasound can be used instead of CT/PET and treatment can sometimes be delayed until after delivery. Older patients with HL experience poorer treatment outcomes due to the toxic effects of treatment. They do, however, benefit from the use of doxorubicin. According to the literature, HIV patients should receive the same treatment as non-infected patients.[12]

II. Aeromedical Concerns.

As with most malignancies, aeromedical health concerns of HL are based on the disease and the treatment. With HL, the risk for sudden incapacitation is minimal as disease involvement of the CNS or heart is rare. Although the most common presentation of HL is a superficial nontender mass, initial manifestations rarely may include hemoptysis (intrathoracic involvement) or neurologic symptoms from spinal cord compression. However, the greatest concern arises from the potentially rapid (weeks to months) degradation in mental and physical status when the HL and/or treatment protocol is aggressive. Damage to the cardiopulmonary, neurologic, endocrine, and reticuloendothelial systems may occur as a result of disease progression and/or radiotherapy/chemotherapy. In general, flyers can be returned to flight status once all therapy has been discontinued, adverse effects from therapy have resolved, and any hematologic deficits have normalized.[13]

In the past, the use of bleomycin in aviators would have been permanently disqualifying. This was based on the risk of pulmonary fibrosis with exposure to oxygen. The value of bleomycin in the treatment of malignancies is in part a function of its specific toxicity, since it does not induce bone marrow aplasia, and thus does not add to the toxicity that limits most oncologic drugs. Instead, the principal target organ of bleomycin-induced injury is the lung, with acute pulmonary damage occurring in 6-18% of treated patients. The pathophysiology of delayed toxicity of bleomycin is complex. In the medical literature of the last thirty years, a number of patients have been described who, having previously received bleomycin therapy; have developed pulmonary toxicity when undergoing subsequent surgery. Typically, these have been young individuals receiving modest levels of oxygen (33-42%) during long operations (4-8 hours). The true incidence of such delayed

toxicity is unknown, since the subsequent literature has largely consisted of isolated case reports or small series.[14] A more cogent argument can be made that the period of risk is primarily in the first year after therapy, since most cases occurred within that time frame. However, it is equally possible that this observation represents a bias related to the timing of operative intervention.

Applicable data had been non-existent, a state of affairs that has been somewhat altered by unpublished data recently supplied by the Duke Hyperbaric Unit.[14] Although it had been the practice in hyperbaric medicine to avoid hyperoxia in bleomycin-treated individuals, the undoubted benefit from hyperbaric oxygen (HBO) in wound healing and osteonecrosis posed against the uncertain risk of delayed bleomycin toxicity led several years ago to a change in policy. Since then, the Duke unit has treated 11 individuals previously exposed to bleomycin with HBO. There was a wide range of time between the last dose of bleomycin and the institution of HBO, ranging from 1 month to 22 years. The range of cumulative bleomycin doses was not noted. Anywhere from 8 to 44 treatments with 100% oxygen at 2 ATA (PiO2 ~ 1475 mmHg) were administered for two hours per treatment, once or twice daily. One individual experienced significant chest discomfort and a decline in diffusion capacity of 50%; both resolved following a break in treatment, and she successfully completed HBO treatment with a reduction in frequency of her sessions. While the Duke experience does not represent occupational exposure per se, and the number of individuals treated is small, the amount of oxygen exposure from HBO therapy is far in excess of what would be expected in aviation, and suggests that the risk of delayed toxicity outside the operating room may be minimal.

Based on this data, policy was changed for aviators treated with bleomycin. Those aviators returning to non-high performance aircraft would be evaluated as usual, addressing risks of tumor recurrence and potential toxicity from chemotherapy. Assuming they had not developed bleomycin pneumonitis during therapy, then no restrictions from altitude chamber or other sporadic oxygen exposure is warranted. Because it is possible, and biologically plausible, that the common perception of an increased period of risk within the first year is correct, a grounding period of one year from the end of treatment is required before waiver consideration in high performance aircrew. In most cases, this will coincide with the grounding period already recommended as a result of the disease/chemotherapeutic regimen.

There have been case reports of life-threatening pneumonitis developing in patients with a history of bleomycin-induced lung injury, who were later given supplemental oxygen for surgical procedures. Therefore, aviators who have a history of bleomycin-induced lung injury should not be allowed to return to airframes that require routine use of 100% oxygen. Also, they should be exempted from the portions of the altitude chamber qualification that require 100% oxygen use. Use of 100% oxygen during emergencies such as fire or rapid decompression is acceptable and should not be discouraged.

Aviators treated with anthracyclines (e.g. doxorubicin) are at risk of treatment-induced cardiomyopathy. The aeromedical risk due to poor left ventricular function as a result of anthracycline containing treatment regimens requires demonstration of adequate cardiac function. An echocardiogram or Multi-Gated Acquisition (MUGA) scan may be required to demonstrate adequate cardiac function for consideration of returning an aviator to flying following treatment with anthracyclines.

III. Waiver Considerations.

History of Hodgkin lymphoma is disqualifying for all flying classes. In addition, all malignancies require an I-RILO no more than 90 days after the start of treatment, which necessitates a waiver for all ATC/GBC and MOD personnel with HL who are returned to duty.

Table 1: Waiver potential for various stages of Hodgkin lymphoma and flying class.

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority**	**ACS review/evaluation**
I/IA	All stages	Maybe*+ AETC	Maybe†
II	All stages	Yes*#+ AFMSA	Yes†
III	All stages	Yes*#+ AFMSA	Yes†
ATC/GBC MOD	All stages	Yes+ AFMSA	At the discretion of the waiver authority

* FC I/IA candidates, as well as untrained FC II, FC III, GBC, MOD; waiver may be considered five years after completion of treatment if asymptomatic and in full remission with a favorable prognosis.
# For trained FC II, FC III, ATC/GBC, MOD individuals only, waiver may be considered six months after completion of treatment if asymptomatic and in full remission; the exception is for fighter aircrew who need to wait 12 months prior to waiver consideration if they received bleomycin, otherwise 6 months.
+ No indefinite waivers will be granted.
† For high performance (routine use of aviator mask while flying) individuals treated with bleomycin, will no longer require an ACS evaluation unless problems arise and the evaluation is requested by the waiver authority.

Review of AIMWTS in Apr 2015 revealed a total of 31 members with a waiver request for the diagnosis of HL. There were two cases resulting in a disposition of disqualified. Breakdown of the cases was as follows: 13 FC II cases (0 disqualifications), 11 FC III cases (2 disqualifications), 5 ATC/GBC cases (0 disqualifications), and 2 MOD cases (0 disqualifications). One of the DQs was for recurrent disease and the other was due to side effects from treatment.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for Hodgkin lymphoma should include the following:
A. History – initial symptoms and signs, staging, treatment (amount and location of radiation and/or amount and type of chemotherapy), current symptoms/signs and activity level.
B. Physical – lymphoid regions, spleen and liver.
C. Hematology/oncology reports to include all follow-up studies consistent with current guidelines in National Cancer Comprehensive Network (NCCN).
D. CT scan results after treatment.
E. Labs – complete blood count (CBC), erythrocyte sedimentation rate (ESR), LDH, liver function tests, albumin, blood urea nitrogen (BUN), and creatinine.
F. Submit ECG and echocardiogram (or MUGA scan) studies if the individual is treated with anthracycline containing regimens.
G. Pulmonary function testing, with spirometry pre and post bronchodilator, lung volumes and DLCO. If there is any DLCO abnormality, exercise oximetry and/or metabolic exercise testing, and follow up DLCO in 3-6 months would be advisable to determine functional status and clinical course.
H. Pathology report.
I. Tumor board results (military or civilian).
J. Medical evaluation board results.

The AMS for waiver renewal for Hodgkin lymphoma should include the following:
A. History – brief summary of stage with risk factors, treatment, review of symptoms for signs of recurrence or complications from treatment (include negatives), activity level.
B. Physical – thyroid, lung, cardiovascular, lymphoid regions, spleen and liver.
C. Hematology/oncology consult.
D. TSH if RT to mantle region.
E. Labs – CBC, platelets, ESR, and chemistry profile.

ICD-9 Codes for Hodgkin's lymphoma	
201.4	Hodgkin's disease, lymphocytic-histiocytic predominance
201.5	Hodgkin's disease, nodular sclerosis
201.6	Hodgkin's disease, mixed cellularity
201.7	Hodgkin's disease, lymphocytic-depletion
201.9	Hodgkin's disease (lymphoma), unspecified

ICD-10 Codes for Hodgkin's lymphoma	
C81.00	Nodular lymphocyte predominant Hodgkin lymphoma, unspecified site
C81.10	Nodular sclerosis classical Hodgkin lymphoma, unspecified site
C81.20	Mixed cellularity classical Hodgkin lymphoma, unspecified site
C81.30	Lymphocytic-depleted classical Hodgkin lymphoma, unspecified site
C81.90	Hodgkin's lymphoma, unspecified, unspecified site

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WAIVER GUIDE
Updated: May 2015
Supersedes Waiver Guide of Jan 2013
By: Maj Amy Gammill (Chief ACS Internal Medicine branch) and Dr Dan Van Syoc

CONDITION:
Human Immunodeficiency Virus (HIV) Infection (May 15)

I. Overview.

Human immunodeficiency virus (HIV) is a retrovirus that likely evolved from simian immunodeficiency virus in chimpanzees, perhaps as early as 1968. The syndrome of acquired immunodeficiency syndrome (AIDS) was first described in 1981 as a severe form of immune deficiency in homosexual men. At that time, the disease appears to have been confined for the most part to Africa, the Caribbean, and North America, but over the next two decades the disease reached epidemic proportions throughout the world. The disease is predominantly transmitted via sexual contact, intravenous access (illicit drug use and transfusions), and transplacental in the perinatal period; currently, about 80% of transmission worldwide is believed to occur via heterosexual intercourse. With the introduction of combination antiretroviral therapy (cART), the natural history of the disease has changed, with long-term survival proving to be relatively common; cART is not curative, however, and therapy is lifelong.[1]

Infection with HIV is commonly asymptomatic in its early stages, with the presence of early symptoms correlating with more rapid progression to AIDS.[2] The infection at this point is diagnosable by measuring viral RNA copies. Seroconversion, with the development of specific antibodies detectable on standard ELISA testing, occurs within weeks to months, with over 95% converting within six months.[3] A small percentage (7% in one study) of individuals are able to spontaneously control their viremia.[4] For the first six months after transmission, the disease is usually latent, with no findings except occasional lymphadenopathy. Lymphoid tissue is the primary reservoir of infection. Helper T lymphocytes (cluster determinant 4, or CD4) are predominantly affected, with remarkable turnover of both virus and CD4 cells in the early stages of disease. In the great majority of patients, CD4 levels eventually decline from their pre-morbid value of ~1,000/mm^3, with the CD4 count correlating well with risk of infection. After the first year, CD4 counts drop an average of 50/mm^3 annually. Staging is largely by CD4 counts, and is depicted in Table I. AIDS is defined by a CD4 count of 200/mm^3 or by an AIDS-defining complication; about 10% of patients develop the latter while their CD4 count is still above 200/mm^3.[5] HAART is now recommended for all HIV-positive patients according to Department of Health and Human Services HIV treatment guidelines and the 2014 International Antiviral Society-USA Panel.[6, 7]

Table 1 – AIDS Surveillance Case Definitions[26]

CD4 cell categories	A – Asymptomatic, PGL[#] or acute HIV infection	B – Symptomatic (not A or C)[*]	C – AIDS indicator condition
>500/mm^3 (≥ 29 percent)	A1	B1	C1
200-499/mm^3 (14-28 percent)	A2	B2	C2
<200/mm^3 (<14 percent)	A3	B3	C3

1993 AIDS surveillance case definition for adolescents and adults. All patients in categories A3, B3, C1-C3 are reported as AIDS based upon prior AIDS-indicator conditions and/or a CD4 cell count <200/mm^3. AIDS-indicator conditions include three new entities added to the 1987 case definition: recurrent bacterial pneumonia, invasive cervical cancer, and pulmonary tuberculosis.
Persistent Generalized Lymphadenopathy
*Symptomatic conditions not included in category C that (a) are attributable to HIV infection or indicate a defect in cell-mediated immunity or (b) are conditions considered to have a clinical course or to require management that is complicated by HIV infection. Examples of B conditions include but are not limited to bacillary angiomatoses; thrush; vulvovaginal candidiasis that is persistent, frequent or poorly responsive to therapy; cervical dysplasia (moderate or severe); cervical carcinoma in situ; constitutional symptoms such as fever (38.5^{0}C) or diarrhea for more than one month; oral hairy leukoplakia; and herpes zoster involving two episodes or more than one dermatome.

CD4 count correlates less well with other complications, including neurologic involvement. Encephalitis from AIDS was initially thought to be due to opportunistic organisms such as cytomegalovirus.[8] It soon became clear, however, that HIV itself was responsible.[9] Invasion of the central nervous system commonly occurs early in the course of disease, as soon as 16 days after transmission.[10] The virus probably gains access to the central nervous system (CNS) through infected macrophages, a route known as the Trojan Horse mechanism.[11] Once in the brain, the virus targets the glia, the supporting cells that represent 90% of brain cells. There is little evidence that neurons themselves are infected, though the involvement of surrounding cells eventually leads to neuronal death. From post-mortem studies, the virus appears to have a predilection for subcortical white matter and the basal ganglia. About half to two-thirds of patients with HIV develop clinical neurologic disorders.[12] Though the introduction of HAART has been associated with a decrease in the incidence of frank dementia, the prevalence of HIV encephalopathy has actually risen over the same period.[13] This suggests that while antiretroviral therapy reduces some of the severe neural manifestations, such therapy has had little effect on the virus's involvement of the CNS. Therefore, HIV infection of the CNS presents a serious barrier to the management and eradication of the virus.[14]

New onset seizures occur in 2-8% of HIV patients; about half of these are due to infectious complications or comorbid conditions, while the remaining half appear to be directly due to HIV itself.[15] Psychiatric manifestations are common, likely due to a combination of demoralization, social isolation, and chronic stress, as well as direct CNS involvement. Major depression affects 15-40% of patients with HIV, a rate that is far in excess of the general population.[16] Although some

of the populations most affected by HIV may be at increased risk of depression, meta-analysis of ten published studies comparing HIV-positive individuals to at-risk HIV-negative controls found a two-fold increase in prevalence of major depression with the former group.[17] Unlike depression, AIDS mania is a complication of late-stage disease, and has diminished in frequency with the introduction of HAART.

Although the conditions described in the previous paragraph have the potential for severe morbidity, the most common neurologic complications are neurocognitive disorders. Major or mild neurocognitive disorder due to HIV infection occurs in up to 25% of individuals with HIV infection. The earliest reports of CNS disease described cases of frank dementia. HIV-associated dementia (HAD) is a subcortical process, characterized in its early stages by impaired attention-concentration, abnormal memory, mental and motor slowing, and incoordination. As is typical for a subcortical dementia, language is generally spared. By definition, HAD entails moderate-to-severe cognitive impairment, and marked difficulty in carrying out activities of daily living (ADL). A milder form of the same disorder was also identified and labeled as minor cognitive-motor disorder (MCMD); characteristics were similar to HAD, but with mild-to-moderate cognitive impairment, and mild interference with ADL (e.g., difficulty managing finances, problems with medication schedules). The criteria for these two disorders were described by an American Academy of Neurology Task Force in 1991.[18] However, a number of reports began appearing over the ensuing decade which described subclinical neurocognitive abnormalities in association with HIV infection; these abnormalities involved similar cognitive functions, and were apparent on testing but were not grossly evident to the patient or to companions.[19-21] Some studies, in contrast, were unable to document similar abnormalities.[22, 23] A review of available research found that identification of such abnormalities was largely determined by the nature of the cognitive test battery, with abbreviated exams usually failing to demonstrate the deficiencies.[24]

In 2007, the National Institute of Mental Health and the National Institute of Neurologic Diseases and Stroke convened a working group to evaluate the validity of these findings, and to refine the definitional criteria.[25] The group adopted the collective term HIV-associated neurocognitive disorders (HAND), and recognized three subcategories, consisting of HAD, mild neurocognitive disorder (MND, similar to MCMD), and asymptomatic neurocognitive impairment (ANI). Neurocognitive impairment of any of these three categories was noted to be prevalent throughout all HIV stages, with 27% of CDC stage A, 44% of stage B, and 52% of stage C affected (see Table 1). Epidemiologic data from the post-HAART era showed that, as the disease progressed through the stages, the prevalence of ANI slowly decreased, the prevalence of MND markedly rose, and HAD prevalence remained under 5%. One issue noted from multiple studies was the instability of HAND, with about 20% of individuals showing fluctuating mental status from one examination to another. (Such fluctuation is not unique to HIV; it is particularly characteristic, for instance, of the dementia that may complicate multiple sclerosis).

II. Aeromedical Concerns.

Aviation is a demanding discipline, requiring a high degree of cognitive capability in an occupation with significant inherent risk. Clearly any mental disorder that impairs ADL is incompatible with aviation. In addition, measurable neurocognitive abnormalities, even if not severe enough to impair routine activities, are considered to be potentially significant for aviation. Furthermore, certain conditions encountered in flying, particularly reduced ambient oxygen pressure, would be expected to unmask an underlying cognitive deficiency. It is notable that in one of the early reviews of HIV

encephalopathy, the authors noted that of those patients whose dementia appeared suddenly, approximately half did so under the stress of hypoxia.[27] Thus cognitive function would be at greatest risk under actual aviation conditions. There is also a risk of depression and suicide (relative rate 20 as compared to USAF controls) during the adjustment reaction phase. Other potential aeromedical concerns include the aviator's emotional reaction to the diagnosis of HIV, side effects of treatment regimens, and the need for close observation of the patient.[28] While most first-line agents for HIV management are relatively well-tolerated in comparison to older regimens, the range of therapeutic options is broad, with six classes of medications and over 20 drugs currently available.[7] Therefore risk of toxicity and intensity of monitoring for medication side effects must be considered on a case-by-case basis.

Qualification for worldwide military duty must be considered for any HIV-seropositive individuals. In fact, issues of worldwide deployment to areas of limited medical resources, use of attenuated live virus vaccines, and the use of the military as its own walking blood bank were all reasons cited for mandatory HIV testing of military personnel beginning in 1985.

III. Waiver Consideration.

HIV infection is disqualifying for all flying class personnel per Air Force policy. Primarily because of the risk neurocognitive impairment even in the early stages of disease, aeromedical waiver is not recommended for this condition. ATC/GBC and MOD personnel are also disqualified for retention duties so will require an AMS for disposition from their special duty assignments.

Table 2: Waiver potential for HIV infections

Flying Class	Condition	Waiver Authority	ACS Review/Evaluation
I/IA	HIV positivity	AETC	No
II/III	HIV positivity	AFMSA	If requested by waiver authority
ATC/GBC	HIV positivity	AFMSA	If requested by waiver authority
MOD	HIV positivity	AFMSA	If requested by waiver authority

AIMWTS search in Mar 2015 produced 41 cases with the diagnosis of HIV infection. All were disqualified. There were no FC I/IA cases, 14 FC II cases, 20 FC III cases, 6 ATC/GBC cases, and 1 MOD case. One of the earlier FC III cases was originally given a waiver and then disqualified less than one year later due to a decreased CD4 count.

IV. Information Required for Waiver Submission.

Active duty Air Force members and Air Reserve Component (ARC) members on extended duty are referred to San Antonio Military Medical Center (SAMMC) for initial medical evaluation and medical evaluation board (MEB) to determine fitness for duty. ARC members not on extended active duty must obtain a medical evaluation that meets the requirements of Attachment 8 in AFI 44-178, *Human Immunodeficiency Virus Program,* from their civilian healthcare provider (in the case of the Air National Guard (ANG), only if the state identifies a nonmobility, nondeployable

position in which the member can be retained). The immediate commander of ARC members not on extended active duty will determine if the member can be utilized in the Selected Reserve.

Information required for a waiver for HIV should include:

A. All pertinent medical history and laboratory data.
B. Reports from all treating physicians, particularly infectious disease providers.
C. If not already accomplished, an MEB is mandatory for continued military service.

If there is a request for the ACS to review the case, the following are required:
A. All Infectious Disease Consultant notes.
B. CD 4 counts at diagnosis and on therapy.
C. Viral loads (viral RNA levels) at diagnosis and on therapy.
D. Complete metabolic panel and CBC at baseline and on therapy.
E. Description of drug regimen (including duration, compliance and side effects).
F. Lipid panel and fasting glucose or HbA1C on therapy.
G. Continued surveillance plan.

ICD-9 code for HIV	
042	Human Immunodeficiency Virus Disease

ICD-10 code for HIV	
B20	Human Immunodeficiency Virus (HIV) Disease

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WAIVER GUIDE
Updated: Mar 2014
Supersedes Waiver Guide of Mar 2010
By: Capt Laura Bridge (ACS Internal Medicine) and Dr Dan Van Syoc
Reviewed by LtCol Mark True, AF/SG Consultant for Endocrinology

CONDITION:
Hyperlipidemia, Therapy of (Mar 14)

I. Overview.

An estimated 1 in 3 Americans die as a result of atherosclerotic cardiovascular disease (ASCVD), which is the pathophysiologic process underlying heart attacks and strokes. As such, the primary and secondary treatment of ASCVD to reduce the risk of morbidity and mortality must be a major focus of every medical provider.[1] Epidemiologic studies demonstrate a graded relationship between higher serum cholesterol and increasing risk for ASCVD. A continuous relationship exists between elevations in LDL cholesterol and the risk of ASCVD. The fact that therapy to reduce LDL results in improvements in atherosclerotic disease led to the development of the Adult Treatment Panel III (ATP III) guidelines by the National Cholesterol Education Program (NCEP) in 2001, which were updated in 2004. ATP III emphasized treatment of hyperlipidemia to a goal LDL level based largely on expert consensus.[2-6] For more than a decade, this guideline steered the treatment of hyperlipidemia for millions of Americans.

The scope of the problem of hyperlipidemia was brought to the forefront of both the medical community and the American public at large in late 2013 with the release of an updated lipid treatment guideline by the American College of Cardiology/American Heart Association (ACC/AHA). This new guideline replaces the previous ATP III guideline, and is the culmination of five years of careful and systematic review of over thirty years of data on ASCVD and lipid treatment by the committee behind the publication.[2, 3] The benefits of the new guideline include a shift away from the expert opinion expressed in ATP III and toward the strongest, most robust evidence, extrapolated from randomized controlled trials (RCTs) and meta-analyses. Additionally, the definition of ASCVD was broadened to include stroke, an acknowledgement that coronary artery and cerebrovascular disease share some similar, though not identical, pathophysiology.[4] Though the publication of the ACC/AHA guideline, particularly the new risk calculator for determining 10-year and lifetime risk of developing primary ASCVD in persons without a history of coronary artery disease or one of its equivalents, was met with some criticism and stirred controversy when it was first released, this guideline and risk prediction tool are an improvement on previous models and represent the best available synthesis of the currently available evidence, culled over several decades.[2, 5]

Standard measurement of serum lipids requires a blood sample drawn after an 8-12 hour fast. Previous definitions of dyslipidemia were a total cholesterol greater than 200mg/dL, a triglyceride level greater than 200mg/dL, an HDL below 40mg/dL for men or 50mg/dL for women, or an LDL above 160mg/dL.[6] The new ACC/AHA guideline de-emphasizes these definitions and instead focuses on identifying patient populations for whom there is evidence that treatment of cholesterol will result in reduced ASCVD risk.[7]

As previously alluded to, ATP III outlined a treatment approach based on an assessment of cardiovascular risk factors and a determination of a goal LDL level, with treatment directed to achieving that target. However, a thorough and systematic review of available data, emphasizing the highest quality and strongest evidence collected through RCTs and analyzed by meta-analyses, failed to demonstrate that this approach resulted in measurable reductions in disease-related and patient-centric outcomes of improved morbidity or mortality. As a result of the dearth of evidence to correlate LDL targets with clinical outcomes, the new ACC/AHA guideline abandons this paradigm. Rather, the guideline identifies specific populations of patients shown through RCT and meta-analysis evidence to benefit from lipid-lowering therapy.[7]

Therapeutic lifestyle changes (TLC) remain the first line of lipid-lowering interventions. TLC entails a low fat diet and regular physical activity. For more information on TLC, please refer to the 2013 ACC/AHA Guideline on Lifestyle Management to Reduce Cardiovascular Risk.[10] For more information on exercise recommendations for adults, please refer to the 2008 Physical Activity Guidelines for Americans from the US Department of Health and Human Services or the American Heart Association Recommendations for Physical Activity in Adults.[11,12] When TLC alone is insufficient, or in those populations identified by the ACC/AHA guideline as being at increased risk, the addition of lipid-lowering therapy is recommended. Whereas the previous ATP III guideline suggested a variety of drug classes for achieving a target LDL, based on a systematic review of evidence, the only medication class endorsed by the ACC/AHA guideline as proven to reduce ASCVD and improve disease-related outcomes are the HMG-CoA reductase inhibitors, or statins.[4] Choice of specific statin and starting dose are dependent on risk and the ability of the individual patient to tolerate statin therapy, with higher potency recommended in the highest risk patients. **For additional information about lipid-lowering therapy for primary and secondary ASCVD risk reduction and to calculate an individual's 10-year and lifetime ASCVD risk using the new Pooled Risk Equations, please refer to the 2013 ACC/AHA lipid guideline. The 2013 ACC/AHA treatment recommendations can be accessed as follows, under "Recommendations for Initiation of Statin Therapy":** http://tools.cardiosource.org/ASCVD-Risk-Estimator/#page_reference. **The 2013 ACC/AHA risk calculator is available at** http://tools.cardiosource.org/ASCVD-Risk-Estimator/. The full-text of the article is available for free online.[7,8] This waiver guide is a summary of the ACC/AHA guideline and does not supersede the recommendations of the ACC/AHA.

There are a variety of statins within the class of medications of varying potencies. Overall, these medications are generally well-tolerated, with the most common side effects consisting of myalgias and muscle symptoms of weakness or fatigue, tenderness, pain, cramps, or stiffness. Though this is a class-effect, it is more common at higher doses or higher potencies. However, individual patients may respond differently to different drugs within the class, and intolerance to one statin does not always correlate to intolerance to others. Hepatotoxicity can also occur, though the FDA does not recommend routine hepatic monitoring if baseline transaminases are normal. Statins may increase the risk of developing type 2 diabetes mellitus, but based on all available data, the risk of untreated hyperlipidemia in patients with known ASCVD or at high risk for primary ASCVD outweighs the risk of diabetes in most individuals.[7] Several statins are approved for use in U.S. Air Force aircrew: lovastatin (Mevacor®), pravastatin (Pravachol®), atorvastatin (Lipitor®) and simvastatin (Zocor®) to treat hyperlipidemia. All of these statins are available in generic formulations.

Though there is no convincing evidence that other lipid-lowering agents, such as fibrates, niacin, bile acid sequestrants, or ezetimibe, result in improvements in disease-related outcomes or ASCVD

risk reduction, add-on therapy with one of these classes of medications may be appropriate in some individuals. For a complete and updated list of approved aircrew medications, please refer to the Official Air Force Aerospace Medicine Approved Medications list, available on the Air Force Knowledge Exchange. While the 2013 ACC/AHA lipid guideline emphasizes a risk-stratification approach and shared decision-making based on discussions between patient and provider regarding the risks and benefits of lipid-lowering therapy given an individual's unique clinical context, the appropriate management of hyperlipidemia is paramount before any consideration of aeromedical implication, and waiverability of certain medications is NOT an appropriate reason to withhold therapy that is otherwise indicated due to existing disease or ASCVD risk.

II. Aeromedical Concerns.

Hyperlipidemia is a common and treatable risk factor in the development of ASCVD. Given the fact that US Air Force air crew are often under high physiologic stress and are expected to operate in a worldwide theater, during which the course of their duties may put them in situations wherein an acute or severe cardiovascular or cerebrovascular event would be potentially catastrophic for both the member's health and mission success, any possible intervention to lessen risk becomes of critical importance for all aircrew members. With the exception of aeromedically approved statins and bile acid sequestrants, any other lipid-lowering therapy requires a waiver.

III. Waiver Consideration.

Hyperlipidemia requiring use of any medication other than a single approved statin or resin binder for control, or requiring multiple medications for control is disqualifying for Flying Classes I/IA, II, and III, as well as for ATC/GBC personnel. It is not disqualifying for MOD personnel. If hyperlipidemia is controlled in accordance with the 2013 ACC/AHA guideline, then AETC may consider a waiver. In accordance with the guideline, fasting lipids should be assessed at baseline, at 1-3 months after initiating statin therapy, and then every 3-12 months to assess for expected LDL-response and adherence. Baseline measurements of serum transaminases should be performed prior to initiating statin therapy. If baseline transaminases are normal, then routine monitoring of hepatic function is not necessary, although any signs or symptoms or hepatic toxicity should prompt a clinical and laboratory evaluation. It is reasonable to obtain a baseline serum creatinine kinase (CK) in individuals who will receive statin therapy. However, routine measurements of CK are not recommended in the absence of symptomatic myopathy. Patients should be assessed for muscle symptoms, including weakness or fatigue, aching, pain, tenderness, cramps, or stiffness, prior to beginning therapy and at each follow-up visit. For further recommendations on the management of suspected statin-related myopathy, please refer to the complete ACC/AHA lipid guideline.[7]

Table 1: Waiver potential for hyperlipidemia

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA/II/III*	Hyperlipidemia requiring use of a medication other than a single approved statin or bile acid sequestrant for control to ACC/AHA 2013 standards*	Yes MAJCOM
ATC/GBC	Hyperlipidemia requiring use of a medication other than a single approved statin or bile acid sequestrant for control to ACC/AHA 2013 standards*	Yes MAJCOM
MOD	Not disqualifying	N/A

*The 2013 ACC/AHA treatment recommendations can be accessed as follows, under "Recommendations for Initiation of Statin Therapy": http://tools.cardiosource.org/ASCVD-Risk-Estimator/#page_reference. The 2013 +ACC/AHA risk calculator is available at http://tools.cardiosource.org/ASCVD-Risk-Estimator/

A review of AIMWTS data in Feb 2014 revealed a total of 595 aircrew with the diagnosis of hyperlipidemia. Of that total, 2 were FC I/IA, 334 were FC II (28 disqualified), 214 were FC III (25 disqualified), 36 were ATC/GBC (2 disqualified), and 8 were MOD (2 disqualified). There were a total of 57 aircrew with a disqualification disposition. A representative sample of the DQ cases revealed that none of them were primarily the result of the hyperlipidemia diagnosis.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver request should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations as described above and further detailed in the 2013 ACC/AHA lipid guideline. The goal of treating hyperlipidemia is reducing the risk of an adverse cardiovascular event. Serum lipid levels and pertinent risk factors must be addressed as part of this goal. If a member suffered an adverse cardiovascular event, this diagnosis must be addressed before a waiver for return to flying status will be favorably considered.

A complete and thorough aeromedical summary (AMS) is required for initial waiver consideration to include:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete history to include risk factors for ASCVD (age, gender, race, tobacco use, blood pressure measurement and whether there is a history of treatment for hypertension, family history, and diabetes), diet and exercise patterns, and response to lifestyle changes and all treatments attempted with results to include all adverse effects.
C. Labs: All serial serum lipid levels. It is important to see the medication effect on the lab results. Also, submit baseline serum transaminases and creatinine kinase (routine monitoring of normal transaminases and CK is NOT necessary).

D. Physical: evidence of arcus senilis, target organ damage from atherosclerosis, xanthomas or xanthelasmas.
E. Consultation report from the treating physician, if applicable.

Waiver Renewal: For a time-limited waiver, a renewal AMS is needed. It should include all interim history and medical information necessary to update the case.

ICD-9 codes for hyperlipidemia	
272.0	Pure hypercholesterolemia
272.1	Pure hyperglyceridemia
272.2	Mixed hyperlipidemia

ICD-10 codes for hyperlipidemia	
E78.0	Pure hypercholesterolemia
E78.1	Pure hyperglyceridemia
E78.2	Mixed hyperlipidemia

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WAIVER GUIDE
Updated: Jan 2014
Supersedes Waiver Guide of Jul 2010
By: Capt Dan Pizzino (RAM XV), Maj Chris Keirns (ACS Internal Medicine), and Dr Dan Van Syoc

CONDITION:
Hypertension (Jan 14)

I. Overview.

Hypertension (HTN) affects more than 70 million Americans. The complications caused by HTN, are the leading cause of death worldwide, and HTN remains the most frequent cause of outpatient clinic visits. Hypertension is also the easiest to treat risk factor of stroke, MI and heart failure, kidney disease, and peripheral vascular disease. The relationship between blood pressure (BP) and risk of cardiovascular disease (CVD) events is continuous, consistent, and independent of other risk factors. The higher the BP, the greater is the chance of myocardial infarctions, heart failure, stroke, and kidney disease. For individuals 40–70 years of age, each increment of 20 mmHg in systolic BP (SBP) or 10 mmHg in diastolic BP (DBP) doubles the risk of CVD across the entire BP range from 115/75 to 185/115 mmHg.

The 7th Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) classification of hypertension, based on two or more properly measured readings, with confirmation of an elevated reading in the contralateral arm, at each of two or more visits after an initial screen, is listed in Table 1. These definitions did not change with JNC 8, published ahead of print in December 2013.

Table 1. Blood Pressure Classification.[1]

Condition	SBP (mmHg)	DBP (mmHg)
Normal BP	<120	and <80
Pre-hypertension (Pre-HTN)	120-139	or 80-89
HTN • Stage 1 • Stage 2	 140-159 ≥ 160	 or 90-99 or ≥ 100

[1]These definitions apply to adults on no antihypertensive medications and who are not acutely ill. If disparity exists in categories between SBP and DBP, the higher value defines the severity of the HTN.

For aeromedical purposes, the USAF defines hypertension for flying personnel as a 3-day average systolic blood pressure greater than 140mm Hg or a 3-day average diastolic blood pressure greater than 90mm Hg. Asymptomatic trained flying personnel with average systolic blood pressure ranging between 140 mmHg and 160 mmHg, or average diastolic blood pressure ranging between 91 mmHg and 100 mmHg, may remain on flying status for up to 6 months (from the date the elevated blood pressure was first identified) while undergoing non-pharmacological intervention to achieve acceptable values.

While HTN is the dominant risk factor for stroke, coronary disease is associated with a number of other risk factors that are often co-morbid with HTN, and should be addressed at the same time.

These include obesity, dyslipidemia, diabetes, cigarette smoking, and physical inactivity. Additional but non-modifiable risk factors for CVD include a family history of premature CVD and the patient's age.

Identifiable causes of HTN should be considered in all patients, especially when HTN is initially diagnosed under the age of 30 in a non-obsese individual with no family history, when the onset of HTN is rapid or severe, or when a patient's HTN does not respond to treatment. Although most HTN is idiopathic, relatively common causes of secondary hypertension include alcohol use, obesity, sleep apnea, and renal disease. These are readily addressed by history, physical exam, or initial lab studies. Pursuing a work-up for rarer causes of secondary HTN (e.g., renal vascular disease) should be guided by consultation with an internist or nephrologist.

Lifestyle modifications, which are listed in Table 2, are often effective at treating HTN and are associated with improvement in a patient's other major CVD risk factors and should always be considered as first-line treatment. If lifestyle modifications alone are inadequate, medical therapy is indicated. JNC 8 broadened the recommendations regarding initial choice of antihypertensive but still recommends thiazide-type diuretics for most patients without compelling indication for another antihypertensive medication class.

Modification	**Recommendation**	**Approximate SBP Reduction (Range)**
Weight reduction (10kg/22lbs)	Maintain normal body weight (body mass index 18.5–24.9 kg/m2)	5–20 mmHg
Adopt Dietary Approaches to Stop Hypertension (DASH) eating plan	Consume a diet rich in fruits, vegetables, and low fat dairy products with a reduced saturated fat and total fat content.	8–14 mmHg
Dietary sodium reduction	Reduce dietary sodium intake to no more than 100 mmol/day (2.4g sodium or 6g sodium chloride)	2–8 mmHg
Physical activity	Engage in regular aerobic physical activity (at least 30 min per day, most days of the week)	4–9 mmHg
Moderation of alcohol consumption	Limit consumption to no more than 2 drinks (1 oz or 30 mL ethanol; e.g., 24 oz beer, 10 oz wine, or 3 oz 80-proof whiskey) per day in most men and to no more than 1 drink per day in women and lighter weight persons.	2–4 mmHg

In clinical trials, antihypertensive therapy has been associated with reductions in stroke incidence of approximately 35–40%; myocardial infarction, 20–25%; and heart failure, more than 50%. The

Framingham Heart Study confirmed the benefit of long-term antihypertensive therapy on CVD disease incidence and mortality with a 40% reduction of a 10-year risk of CVD death for treated versus untreated HTN. For aeromedical purposes the goal of antihypertensive therapy in patients under age 60 with uncomplicated HTN is to reach a BP below 140/90 mmHg. In accordance with JNC 8, the goal BP in patients 60 years of age or older with uncomplicated HTN is now less than 150/90 mmHg.

II. Aeromedical Concerns.

It should be noted that hypertension is almost never a risk factor for sudden incapacitation, particularly if it is controlled. However, the secondary complications of hypertension are of aeromedical significance. The long term vascular complications of HTN are an increased risk of cardiovascular events such as myocardial infarction and stroke, potentially resulting in sudden incapacitation, or death. Because lifestyle modifications are considered to be first line interventions and are associated with negligible aeromedical side effects, each aviator should be individually evaluated for potential benefit from lifestyle modifications, used alone or in combination with medication(s). While numerous medications are effective in lowering BP, some drugs have modes of action that may adversely affect the flyer. Medications that act via direct vasodilatation or autonomic vasoregulation are avoided in favor of those that work via volume reduction, such as diuretics, or via the renin-angiotensin axis, such as angiotensin converting enzyme inhibitors (ACEi), or angiotensin receptor blockers (ARB). Medications that affect cognitive capacity (e.g., central α-adrenergic agonists) should also be avoided.

The classes of antihypertensive agents available to USAF aviators include diuretics (thiazide, with or without triamterene), ACEi (lisinopril or ramipril) and ARB (losartan or telmisartan). These drugs are effective as monotherapy and when used as such do not require a waiver as long as the blood pressure is controlled and there are no adverse affects from the medication. All other medications will require a waiver. If those aviators on diuretics require potassium supplementation, they will require a waiver or they should be switched to a medication that does not require potassium replacement. The combination of diuretic with ACEi or ARB is synergistic and usually very effective at lowering BP; it is restricted to non-high performance aircraft. Calcium channel antagonists (specifically coat-core and GITS [Adalat CC® and Procardia XL®, respectively] and amlodipine [Norvasc®]) are also approved in aviators; whether used alone or in combination they are restricted to non-high performance aviators. Beta-blockers (specifically atenolol) may be used in the setting of a specific indication. (Beta-blockers are often poorly tolerated in aviators due to fatigue, reduced exercise capacity, and impotence; whether used alone or in combination they are restricted to non-high performance aviators.) Medical therapy for hypertension other than that noted at the beginning of this paragraph does require a waiver for continued flying or special duty activities.

III. Waiver Consideration.

Hypertension that is not controlled with a single approved agent or with lifestyle changes is disqualifying for FC I/IA, FC II, FC III, and ATC/GBC personnel. Hypertension is not disqualifying for MOD personnel, and treatment with approved antihypertensive medications does not require MOD waiver. Aviators with hypertension responsive to lifestyle modifications should have serial BP rechecks quarterly to semi-annually during the first year to assure success of the lifestyle modifications. Failure to achieve blood pressure control with lifestyle modifications, or an

initial blood pressure average exceeding 160 mmHg systolic or 100 mmHg diastolic, requires initiation of pharmacotherapy. The rated or non-rated aviator (to include ATC/GBC personnel) with a history of isolated HTN who remains normotensive using lifestyle modifications or one of the following approved medications as monotherapy (thiazide, with or without triamterene, ACEi [lisinopril or ramipril], or ARB [losartan or telmisartan]) does not require a waiver. The aviator requires a minimum of seven days grounding after initiation of pharmacotherapy. Their BP should be controlled below 140/90 mmHg (or below 150/90 mm Hg if 60 years of age or older), and they should be free of medication side effects prior to return to full duty; this includes all subsequent dose adjustments. For retention purposes, hypertensive cardiovascular disease is disqualifying for all classes to include ATC/GB and MOD personnel.

Table 3. Anti-hypertensive medications and the waiver authority for specific flying classes.

Flying Class	Medications	Waiver Potential Waiver Authority	Duration
I, IA	HTN, if controlled with a thiazide[1] (HCTZ or chlorothiazide), lisinopril, ramipril[2], losartan or telmisartan	Waiver not required	N/A
	HTN, if controlled on other medication than listed above and/or in combination.	No AETC	
II	HTN, if controlled with a thiazide[1] (HCTZ or chlorothiazide), lisinopril, ramipril[2], losartan or telmisartan	Waiver not required	N/A
	HTN, if controlled on HCTZ combined with lisinopril, ramipril[2], losartan or telmisartan; atenolol[3] alone or in combination; nifedipine (coat-core or GITS) alone or in combination; or amlodipine alone or in combination	Yes[4, 5] AFMSA	Up to 3 years
III	HTN, if controlled with a thiazide[1] (HCTZ or chlorothiazide), lisinopril, ramipril[2], losartan or telmisartan	Waiver not required	N/A
	HTN, if controlled on HCTZ combined with lisinopril, ramipril[2], losartan or telmisartan; atenolol[3] alone or in combination; nifedipine (coat-core or GITS) alone or in combination; or amlodipine alone or in combination	Yes[5] MAJCOM	Up to 3 years
ATC/GBC	HTN, if controlled with a thiazide[1] (HCTZ or chlorothiazide), lisinopril, ramipril[2], losartan or telmisartan	Waiver not required	N/A
	HTN, if controlled on HCTZ combined with lisinopril, ramipril[2], losartan or telmisartan; atenolol[3] alone or in combination; nifedipine (coat-core or GITS) alone or in combination; or amlodipine alone or in combination	Yes MAJCOM	Up to 3 years
MOD	Any antihypertensive medication	N/A-not disqualifying except for Nifedipine AFGSC	Up to 3 years for those requiring a waiver

1 With or without triamterene. If potassium is added, a waiver will be required.
2 Ramipril restricted to dosages of 5 mg to 20 mg.
3 Third line drug, used after all others failed or were not tolerable. For aviators not required to fly in high-G aircraft.
4. FC II aviators on these medications can be waived, but only for FC IIA.
5. Waiver authority for initial FC II and FC III is AETC

An AIMWTS search in Nov 2013 produced a total of 877 current waiver submissions for the diagnosis of hypertension. Breakdown of these waivers revealed 9 FC I/IA cases (2 disqualifications), 387 FC II cases (28 disqualifications), 398 FC III cases (41 disqualifications), 74 ATC/GBC cases (9 disqualifications), and 9 MOD cases (2 disqualifications).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. Waiver is required for hypertension only if pharmacotherapy involves more than one medication (with the exception of HCTZ and triamterene) or the use of one of the following (alone or in combination with another approved medication): atenolol, amlodipine, and nifedipine.

The AMS for the initial waiver for essential hypertension should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History - summary of blood pressures, risk factors/co-morbidities including negatives [diet (especially, alcohol and sodium intake), botanicals/supplements, cigarette smoking/tobacco use, physical activity level, family history of premature cardiovascular disease, dyslipidemia, diabetes mellitus, sleep apnea (snoring, observed apneas)], symptoms including negatives (flushing, headaches, nocturia, chest pain, and claudication), previous treatments, medications and side effects.
C. Physical - weight (BMI), fundus for hypertensive retinal changes, thyroid, heart, lungs, auscultation for carotid, abdominal, and femoral bruits, abdominal exam for enlarged kidneys, masses, and abnormal aortic pulsation, lower extremity exam for edema and pulses and neurological assessment.
D. Labs - hematocrit/hemoglobin, fasting glucose, serum electrolytes, serum calcium, blood urea nitrogen (BUN), serum creatinine (Cr), lipid profile, thyroid stimulating hormone (TSH), and urinalysis.
E. Resting electrocardiogram (ECG).
F. 3-day blood pressure check demonstrating BP stable at goal at least one week after medication initiated.

The AMS for waiver renewal for essential hypertension should include the following:
A. Interval history - summary of the intervening blood pressure control, symptoms related to coronary artery disease or medications, diet (e.g., alcohol and sodium intake) and supplements, cigarette smoking/tobacco use, physical activity level, other co-morbid medical conditions since last waiver granted.
B. Physical - blood pressure readings over the course of the previous waiver, weight changes, hypertensive retinal changes, auscultation for carotid, abdominal, and femoral bruits, heart and lungs, abdominal exam for enlarged kidneys, masses, and abnormal aortic pulsation, lower extremity exam for edema and pulses, and neurological assessment.
C. Labs - for all medications a renal panel (to include Cr and potassium) annually.
D. 3-day blood pressure check.

ICD-9 codes for hypertension	
401.0	Malignant essential hypertension
401.1	Benign essential hypertension
401.9	Unspecified essential hypertension
405.0	Malignant secondary hypertension
405.1	Benign secondary hypertension
405.9	Unspecified secondary hypertension

ICD-10 codes for hypertension	
I10	Essential (primary) hypertension
I15.8	Other secondary hypertension
I15.9	Secondary hypertension, unspecified

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WAIVER GUIDE
Updated: Apr 2014
Supersedes Waiver Guide of Oct 2010
By: Capt Dan Pizzino (RAM XV) and Dr. Dan Van Syoc
Reviewed by: LtCol Mark True, AF/SG consultant for endocrinology

CONDITION:
Hyperthyroidism (Apr 14)

I. Overview.

Hyperthyroidism is defined as the overproduction of thyroid hormone by the thyroid gland. It represents a subset of disorders that cause *thyrotoxicosis*, or clinical manifestations of thyroid hormone excess. Hyperthyroidism is present in 1.2% of the general U.S. population.[1] Etiology of hyperthyroidism includes primarily Graves' Disease, toxic multinodular goiter, and toxic adenoma.

The most common cause is Graves' disease (or von Basedow's disease in Europe), an autoimmune disorder that typically occurs in women (F:M 8:1) and in patients between the ages of 20 and 40.[2, 3] Graves' disease has a familial tendency and may be associated with other autoimmune conditions like pernicious anemia, myasthenia gravis, and Type 1 diabetes mellitus. Presenting symptoms classically include diaphoresis, heat intolerance, hyperdefication, weakness, fatigue, tremor, and tachycardia. Other tachyarrhythmias may be present, with atrial fibrillation being the most common (found in approximately 8% of patients).[3] Psychiatric symptoms can include anxiety, dysphoria, irritability, agitation, insomnia, and psychosis. Other common findings are goiter, dry skin or myxedema, weight loss, ophthalmopathy, or menstrual irregularities (oligomenorrhea or amenorrhea in women). Asian or Native American men may also present with sudden flaccid paralysis, hypokalemia, and hypophosphatemia, symptoms suggestive of the endocrinological emergency known as thyrotoxic periodic paralysis.

Another cause of hyperthyroidism is toxic multinodular goiter (TMNG). This is a condition that arises over a long period of time from nontoxic multinodular goiter. Patients are usually over 50 years of age and have had nontoxic multinodular goiter for years. Thyroid hormone overproduction is usually less severe than in Graves' disease. A uninodular toxic adenoma (Plummer's disease) is a lesser common form of hyperthyroidism, caused by a single autonomous thyroid hormone-secreting adenoma in the thyroid gland. Adenomas usually do not cause thyrotoxicosis until they reach 2.5-3 cm in size. These patients are typically in their 40s or 50s and present with a slowly-growing lump in their neck.

Subacute thyroiditis may induce a transient thyrotoxicosis. The etiology is believed to be a viral infection of the thyroid, often preceded by an upper respiratory infection. Patients are also usually in their 40s and 50s and present with a painful thyroid gland, although this is variable.[4] Thyrotoxic effects are generally mild and spontaneous resolution is typically seen in 1-2 months after onset. Patients may experience a hypothyroid state for 2-9 months, during which levothyroxine may need to be administered. Patients usually return to a euthyroid state, however there is a tendency for recurrence. Treatment is aimed at pain control using non-steroidal anti-inflammatory drugs (NSAIDs) and at control of thyrotoxic symptoms with β-blockers or sedatives. Less common causes of thyrotoxicosis include: Jod-Basedow reaction (iodine-induced hyperthyroidism), thyrotoxicosis factitia (excessive exogenous thyroid hormone intake),

Hashitoxicosis (early in Hashimoto's disease with hypothyroidism occurring later), and medication-induced (e.g. amiodarone, which can also cause hypothyroidism). Other rare causes include struma ovarii (associated with dermoid tumors and teratomas), TSH-secreting pituitary tumors (rare), pregnancy and trophoblastic tumors.

Graves' exophthalmos: Graves' disease is the most common cause of exophthalmos, accounting for more than 50% of cases. The prevalence is estimated to be about 0.4% in the US and 1.1% to 1.6% in the UK, with a female predominance (female to male ratio is between 3:1 and 10:1). Although more common in women, Graves' disease is typically more severe in men and in those older than 50, and the onset of orbitopathy occurs on average 2.5 years later (and will usually stabilize 8-36 months after onset). The course of the ophthalmopathy in Graves' disease may be independent of the hyperthyroidism, sometimes occurring in euthyroid patients or not occurring at all in clinically hyperthyroid individuals. Environmental factors such as stress, smoking, and some infections (particularly with Gram-negative organisms, such as *Yersinia enterocolitica*) may increase the risk of developing Graves' ophthalmopathy. The odds ratio for ophthalmopathy in Graves' disease is increased almost sevenfold in smokers compared to non-smokers, and smoking exhibits a dose-response relationship (e.g. the more you smoke, the greater the risk of ophthalmopathy).[5]

The initial symptoms of Graves' ophthalmopathy may be complaints of foreign-body sensation, tearing, photophobia, lid retraction, lid lag, lagophthalmos, decreased vision in one or both eyes, lid edema, and diplopia (which may be noticed only on awakening). Lid retraction is common, often leading to a more pronounced appearance of the eyes as opposed to actual proptosis. Dry eye is common secondary to disturbances of tear quantity and tear film constitution, as well as inability to fully close the lids. The optic nerve may be compressed in the orbital apex by enlarging extraocular muscles. Evaluation by an ophthalmologist/optometrist should be accomplished to screen for exposure keratopathy, optic nerve compression, presence or absence of diplopia, intraocular pressure, and proptosis (measured with a Hertel exophthalmometer). Because complaints or evidence of decreased visual acuity, color loss, afferent pupillary defect, or visual field loss may be due to optic neuropathy, they require urgent evaluation and possible emergent management by an ophthalmologist. The optic nerve can appear normal, swollen, or atrophic. If optic nerve compression is suspected orbital imaging is indicated. If optic nerve compression is confirmed then treatment consists of steroids, radiation and/or surgery.

Diagnosis: A TSH assay is the best reliable and sensitive screening test for thyrotoxicosis; it is suppressed except in very rare cases of inappropriate secretion of thyrotropin by the pituitary gland. If the serum TSH is below normal, then free T_4 and T_3 should be obtained. The diagnosis of hyperthyroidism is confirmed if either is elevated. Low TSH with normal T_4, but elevated T_3 has high likelihood of a Graves' diagnosis.[6] Other laboratory abnormalities may include hypercalcemia, increased alkaline phosphatase, anemia, and decreased granulocytes. Prior to sensitive TSH, the free thyroxine index (FTI) was frequently used, but it is rarely utilized today. Thyroid stimulating immunoglobulin (TSI) is elevated in approximately 80% of Graves' cases and can be helpful in diagnosis.[3] Antithyroglobulin or antithyroperoxidase antibodies are usually elevated in Graves' disease but are nonspecific. To determine the etiology, all patients with suppressed TSH values should have an I^{123} thyroid uptake and scan. A high radioactive iodine uptake is seen in Graves' disease (diffuse uptake), toxic multinodular goiter (focal or patchy uptake), and a few other conditions. A low radioactive iodine uptake is most commonly seen in thyroiditis or thyrotoxicosis factitia. The thyroglobulin concentration may help differentiate between these two conditions.

The improved sensitivity of TSH assays has enabled the identification of patients with low TSH concentrations (<0.5 μU/mL) but normal free T_4 and T_3, a constellation of findings defined as subclinical hyperthyroidism.[7] These patients have few or no symptoms of hyperthyroidism. However, they do have an increased risk for atrial fibrillation and low bone density. If the diagnosis of subclinical hyperthyroidism is uncertain, a 24-hour radioactive iodine uptake (RAIU) and scan of the thyroid may be helpful. Central hypothyroidism, nonthyroidal illness, and recovery from hyperthyroidism can also have low TSH with normal free T_4 and T_3.

Evaluation of hyperthyroidism also includes imaging studies. Currently radioactive iodine or Technetium 99m pertechnetate scans and ultrasound are used to examine for presence of pathology.[1]

Treatment: Initial treatment is often aimed at symptom control. Beta blockers are generally used for symptomatic relief until the underlying cause of hyperthyroidism is resolved. Propranolol alleviates symptoms by blocking the β-adrenergic receptors and by impeding the conversion of T_4 to T_3. Beta blocker therapy leads to an improvement of cardiovascular function by causing a decrease in heart rate and systolic blood pressure, and other effect include reduction of muscle weakness and tremor, and improvement in the psychological symptoms.[1] It is the initial treatment of choice for thyroid storm.

Thioamides (methimazole or propylthiouracil [PTU]) are used in primarily two ways: as the primary treatment for hyperthyroidism and as a preparative therapy before radiotherapy or surgery.[8] Thioamides are frequently used in Europe for the treatment of Graves' disease. At one time, the thioamides were thought to preserve the thyroid so that hypothyroidism did not ensue, but it now appears eventual hypothyroidism is the typical outcome of Graves' disease. Additionally, treatment of Graves' disease with the thioamides has up to a 60 to 80% recurrence of the disease when the medication is discontinued, and those patients will typically then undergo radiotherapy.[9] The drug PTU is the preferred primary treatment for pregnant patients in the first trimester as there are some risks to the fetus associated with radioactive iodine and the thioamide drug methimazole. A new practice for pregnancy is use of PTU during first trimester and conversion to methimazole after first trimester.[10]

The usual treatment of choice in the United States for Graves' disease is radioactive iodine (RAI), ^{131}Iodine. RAI is also the usual treatment for adenomas and toxic multi-nodular goiter because spontaneous remission rarely occurs with thioamides. The administration of RAI is an excellent method of destroying overactive thyroid tissue, and in a 36-year retrospective study patients treated with RAI as adults or teenagers have not been shown to have any increased risk of malignancy.[2] Likewise, children born to parents previously treated with RAI do not have an increased rate of congenital abnormalities.[9] Most individuals will eventually become hypothyroid, which is easily treated with synthetic T_4. RAI has been shown in controlled trials to accentuate ophthalmic Graves' disease. However, this worsening is typically mild, transient and can be ameliorated with corticosteroid treatment.

A less common treatment option for hyperthyroidism is surgical resection of the gland. For thyroiditis, which is usually self-limiting and transient in nature, preferred treatment is supportive with beta-blockade and anti-inflammatory medications, +/- thioamides.

II. Aeromedical Concerns.

The focus of aeromedical concerns are on the disease's effects on the cardiopulmonary system, potential changes in neurological and behavioral status, and on treatment side effects.[9] Symptoms of untreated hyperthyroidism in flyers include heat intolerance, anxiety, fatigue, weakness, tremor, irritability, tachycardia, psychiatric disorders, and ophthalmopathy. All of these could be safety hazards as well as detract from aircrew performance. Subacute or subclinical hyperthyroidism also presents an aeromedical problems, as there is increased risk of atrial fibrillation in subclinical hyperthyroidism.[11] Post-treatment, the major concerns are recurrence of hyperthyroidism (mainly after thioamide therapy) and the insidious onset of hypothyroidism, which can lead to apathy, slowed mentation, hypersomnolence, and performance degradation.

The thioamides are aeromedically cumbersome, since they are utilized for 6-18 months, discontinued and then occasionally restarted (and it takes a few months for the patient to stabilize on a particular dosage). There is also a high treatment failure rate so that RAI is often eventually used in these patients. Moreover, thioamides are not on the approved aircrew medication list, and waiver for hyperthyroidism temporarily controlled with these medications is unlikely. There are no aeromedical concerns with RAI treatment and waiver is likely once stable on thyroid replacement therapy.

III. Waiver Considerations.

Hyperthyroidism is disqualifying for FC I/IA, II, IIU, III, MOD, and ATC/GBC duties when medication maintenance therapy or surgery are needed to control hormone levels or symptoms.

Table 1: Waiver potential for hyperthyroidism

Flying Class	Treatment	Waiver Potential/ Waiver Authority[&]
I/IA[*]	RAI, thyroidectomy, thioamide treatment completed[**]	Yes AETC
II[*]	RAI, thyroidectomy, thioamide treatment completed[+]	Yes MAJCOM[@]
III[*]	RAI, thyroidectomy, thioamide treatment completed[+]	Yes MAJCOM
ATC/GBC[*]	RAI, thyroidectomy, thioamide treatment completed[+]	Yes MAJCOM
MOD	RAI, thyroidectomy, thioamide treatment completed[+]	Yes AFGSC

* Waiver Authority for initial certification is AETC.
** Thioamide treatment completed over 3 years prior.
+ Thioamide treatment completed and individual euthyroid for 6 months.
& Waiver Authority for continued flying in these classes.
@ Waiver authority for trained RPA operators is AFMSA.

A review of the AIMWTS database through Mar 2014 revealed 79 cases identified as hyperthyroidism, of which 7 were disqualifications (FC I – 2, FC II – 3, FC III – 1, ATC/GBC -1). Of the 7 disqualified, 3 were for poor control of symptoms/hormone levels, 3 due to thioamide usage, and 1 was due to history of treated thyroid cancer with persistent insomnia post treatment with no etiology. Breakdown of the cases were: FC I/IA – 3; FC II – 34; FC III – 32; ATC/GBC – 10 and there were 0 MOD cases.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for hyperthyroidism should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history of symptoms, pertinent negative symptoms (eye, heart, psychiatric) lab and radiographic studies, treatment, and current symptoms.
C. Endocrinology evaluation and confirmation of euthyroid status (TSH and free T_4) off any medication other than thyroid hormone replacement (e.g. Synthroid®) for initial waiver.
D. Ophthalmology consult with orbital imaging if any symptoms or signs of optic neuropathy or orbitopathy are present.

E. If atrial fibrillation occurred, an echocardiogram, Holter and treadmill should be accomplished. If FC II, then all tests and tapes must be sent to the ACS ECG Library prior to waiver (see atrial fibrillation waiver guide).
F. If smoker, documentation of steps taken to assist flyer to stop smoking due to the increased risk and exacerbation of orbitopathy with smoking.

The AMS for waiver renewal for hyperthyroidism should include the following:
A. Updated history of hyperthyroidism episode, treatment and current symptoms.
B. Annual TSH values if now hypothyroid on T_4 replacement (see hypothyroidism waiver guide.)
C. Annual TSH, free T_4, CBC, and ALT if on chronic thioamides.
D. Individuals with Graves' disease treated with thioamides and are euthyroid need annual TSH values for the rest of their life (still at risk for hyperthyroidism recurrence).
E. Annual optometry evaluations for individuals with continuing eye symptoms.

ICD-9 code for Hyperthyroidism	
242	Thyrotoxicosis with or without goiter

ICD-10 code for Hyperthyroidism	
E05.00	Thyrotoxicosis with diffuse goiter without thyrotoxic crisis or storm

V. References

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WAIVER GUIDE
Updated: May 2015
Supersedes Waiver Guide of Dec 2012
By: Dr Dan Van Syoc
Reviewed by LtCol Mark True, AF/SG Endocrinology Consultant

CONDITION:
Hypogonadism and Testosterone Replacement (May 15)

I. Overview.

Male hypogonadism is an increasingly recognized phenomenon. Male androgen levels are known to fall over a man's lifetime.[1] The presentation normally may include fatigue, depression, decreased libido, impotence, decreased strength, depressed mood and infertility.[2] The most common reason for seeking consultation though is erectile dysfunction.[3] Due to the ease of application of new testosterone replacement formulations, there has been increased interest in diagnosis and treatment; the US has seen an increase of more than 500 percent in prescription sales of testosterone products since 1993.[4] The diagnosis is based on the above symptoms and a documented low morning serum testosterone level on two or more occasions.

Testosterone levels can vary widely over the course of the day in normal individuals, and it is not uncommon to see an isolated low testosterone in healthy males; however, it is not normal for the levels to remain <400 ng/dL on repeated testing. Testosterone levels are highest in the early morning, therefore the diagnosis of androgen deficiency should be based on multiple early morning measurements; 0800 is the recommendation of most experts.[5] If the levels are below or at the lower limit of the laboratory normal, an assessment of gonadotropins and prolactin is recommended.[3, 6] Because testosterone is highly bound to sex hormone binding globulin (SHBG), at least one measurement of free and bioavailable testosterone should be performed if there is a reasonable concern about protein binding abnormalities (SHBG is commonly decreased in obesity and increases with normal aging after the fourth decade).[7]

The testis is responsible for two major functions in the adult male: sperm production and testosterone production. Sperm is produced in the seminiferous tubules and testosterone in the Leydig cells. Follicle stimulating hormone (FSH), produced in the pituitary under hypothalamic control, has control over activity of the seminiferous tubules, while luteinizing hormone (LH), also produced in the pituitary, controls Leydig cell functions.[8]

Primary hypogonadism is caused by testicular failure. Lab testing would reveal low sperm counts and possibly low testosterone levels along with elevated gonadotropin levels, FSH and LH. Causes include cryptorchidism, infections (e.g., mumps), radiation, chemotherapeutic agents, trauma, environmental causes, testicular torsion, medications such as ketoconazole or steroids, autoimmune damage, genetic causes such as Klinefelter's syndrome or may be idiopathic. Primary hypogonadism is more likely to be associated with gynecomastia than is secondary hypogonadism.[8, 9] Secondary (central) hypogonadism is evidenced by low testosterone levels in the face of low or inappropriately normal FSH and LH levels.[9, 10] Causes of secondary hypogonadism include hypothalamic or pituitary masses, infiltrative diseases, hemochromatosis, infection or trauma. In adult males with new-onset hypogonadism, however, the most common etiology is idiopathic central (hypogonadotropic) hypogonadism. This is not well defined in the literature and is a

diagnosis of exclusion. Obesity can also lead to low testosterone, reducing both total and free testosterone levels. Greater decreases are seen in the total testosterone level, as obesity not only decreases testosterone secretion but also lowers sex hormone binding globulin (SHBG) levels.[5] A loss in weight can produce an increase in the testosterone level and an increase in the SHBG level, which may obviate the need for testosterone replacement therapy in some of these individuals.[11]

Testosterone is a controlled substance mainly due to abuse by athletes. Careful attention should be made to avoid inappropriate refill requests or overuse of the medication. **Testosterone should be administered only to a man who is hypogonadal, as evidenced by clinical signs and symptoms of androgen deficiency and clearly subnormal fasting serum testosterone concentrations on two or more occasions.**[12,13]

Testosterone can be replaced satisfactorily whether the acquired testosterone deficiency is due to primary or secondary hypogonadism, although treatment of some causes of secondary hypogonadism should target the underlying disorder to normalize serum testosterone. The principal goal of testosterone therapy is to restore the serum testosterone concentration to the normal range. Symptomatic improvement is seen with replacement given to those whose serum testosterone is consistently less than 200 ng/dL. In general, the testosterone patch or gel formulations are more physiologic and better tolerated. The injections are associated with large hormone peaks that can be above the normal range, as well as troughs below the normal range. The injections are dosed based on the interval given, for example, 100 mg weekly, 200 mg every 2 weeks, or 400 mg every 4 weeks. The higher doses last longer but almost always have periods above and below normal levels. In contrast, the *transdermal* testosterone preparations result in relatively stable serum testosterone concentrations, with less potential for fluctuation in energy, mood and libido. Oral preparations are infrequently prescribed because it is virtually impossible to maintain a normal serum level and due to their association with substantial hepatotoxicity, to include development of benign and malignant neoplasms.[12] A nasal testosterone preparation (Natesto®) received FDA approval in May 2014.[14] The obvious advantage to this form of therapy is that the potential for transfer of testosterone to a partner is eliminated. However, this benefit is offset by the requirement for dosing three times daily.[15] Nasal testosterone is not approved for use in USAF aviators at this time. Testosterone pellets (for subcutaneous implantation) are also unapproved for use in aircrew.[16]

Patients who are treated with testosterone should be monitored to determine that normal serum testosterone concentrations are being achieved and that symptoms have substantially improved or resolved. The serum total testosterone should be measured two to three months after any dose or preparation change and at least annually once established on a preparation.[13] Blood draws should be performed at 0800 for standardization, and the target serum testosterone concentration is a value within the normal range (400 to 700 ng/dL [13.9 to 27.7 nmol/L]). Serum testosterone levels can be measured at any time of the day in men who are using any of the transdermal preparations, with the recognition that for the patch, testosterone levels peak six to eight hours after application. Testosterone concentrations fluctuate when the gel is used, but not in a predictable way, so at least two measurements should be made at any dose of gel; the time of measurement does not appear to matter. However, as noted above, testosterone levels on therapy should ideally be performed at 0800 for standardization. If injectable testosterone is used, then serum testosterone levels should be assessed midway between injections.[12]

Patients on testosterone replacement therapy should also be monitored for undesirable effects and adverse reactions. Prostate volumes and serum prostate specific antigen (PSA) may increase in

response to testosterone treatment, although the values increase, on average, merely to those of age-matched eugonadal men. Some men, particularly those over 50 years of age, are at an increased risk for benign prostatic hyperplasia (BPH) and possibly prostate cancer, because both are testosterone-dependent diseases. Existing sleep apnea and erythrocytosis may also be worsened. Most experts encourage monitoring for prostate disease and erythrocytosis to reduce the risks of adverse effect with testosterone replacement therapy.[12, 13] Studies have not shown an increase in rates of prostate cancer, sleep apnea or death in hypogonadal men using testosterone therapy versus those using placebo.[17-19] Whether increased cardiovascular risk accompanies testosterone treatment is unclear. A number of studies show no increase in risk,[18,19] while some studies have demonstrated a statistically significant increase in cardiovascular events, particularly in older men (> 65 years of age) and in men with known coronary artery disease.[20] The FDA is reviewing current data and to date, has not concluded that testosterone therapy increases the risk of heart attack, stroke or death.[21]

Increased risk of venous thrombolic events (VTE) in men with erythrocytosis due to testosterone replacement is a known effect; more recently, 40 post-marketing cases of thrombosis *unrelated* to polycythemia in men on testosterone were reported. Thirty-nine of the 40 patients were found to have an inherited thrombophilia. There are no long-term, prospective, randomized trials investigating this potential complication of testosterone therapy, and currently, routine screening for hereditary thrombophilia prior to starting testosterone replacement is not recommended.[22] The FDA has required an update in testosterone drug labeling that includes a broader warning about the risk of VTE, with notice of the possibility of VTE in the absence of erythrocytosis.[12, 23]

II. Aeromedical Concerns.

Hypogonadism from any cause is associated with decreased strength, decreased muscle mass, anemia, and possible depression, in addition to infertility and decreased libido. Further, some of the etiologies of hypogonadism are disqualifying in and of themselves. Complications of testosterone replacement therapy that would be of concern include the increased risk of prostate cancer, erythrocytosis and VTE, and the potential to worsen OSA. As noted above, whether CV risk is increased on therapy is unclear. Another aeromedical concern is the increased variability in testosterone levels with injections -- supraphysiologic levels with injection followed by sub-therapeutic levels prior to the next dose. If injections are used, one method to decrease this variability is to shorten the time between injections, two weeks at the most. There is a risk of local skin reactions with topical formulations, particularly the patch, which would need to be addressed before return to flying duties if severe or distracting.

III. Waiver Consideration.

Hypogonadism is not specifically identified as a disqualifying diagnosis for any flying or special duty operations. As symptomatic disease can easily lead to fatigue and weakness, the generalized statement in AFI 48-123 (MSD, 06 OCT 2014, M26) stating, “other endocrine or metabolic disorders which obviously preclude satisfactory performance of military service, or which require frequent or prolonged treatment” does apply to hypogonadism. Testosterone replacement therapy is an approved aircrew medication and will require a waiver.

Table 1: Waiver potential for hypogonadism and testosterone replacement

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Maybe*# AETC	Maybe**
II/III	Yes*# MAJCOM	Maybe**
ATC	Yes*# MAJCOM	No
MOD	Yes*# AFGSC	No

*No indefinite waivers
Minimum of 7-days ground trial, control of manifested symptoms before waiver submission. A change of dosage and/or preparation requires an additional 7-day observation period.
** At the discretion of the waiver authority if there are clinical concerns.

AIMWTS search in May 2015 revealed a total of 172 cases. Breakdown of the cases was as follows: 1 FC I/IA cases; 94 FC II cases (4 disqualified); 67 FC III cases (13 disqualified); 7 MOD cases and 3 ATC/GBC cases. Of the total of 17 disqualified cases, only two were primarily disqualified for the hypogonadism – a FC III case with hypogonadotropic hypogonadism secondary to prolactininoma and another FC III case on a non-approved medication.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for hypogonadism should include the following:
A. Complete history to include all symptoms of the condition (fatigue, decreased libido, mood changes, etc.). **Include discussion on whether the case is the result of primary or secondary hypogonadism**, and give specifics to support assertion. Assess history of **OSA, cardiovascular disease, and VTE (PE or DVT)**. OSA must be treated, and CV disease or VTE history may be contraindications to therapy.
B. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
C. Exam: testicular exam, muscle strength determinations, hair distribution pattern, **prostate exam and PSA if over age 50 (also consider in African-Americans and men over age 40 with a family history of prostate cancer)**.
D. Laboratory: **Two or more pre-treatment testosterone levels less than 300 ng/dL (drawn at 0800)**, **FSH and LH levels (with normal ranges specified) in order to distinguish primary and secondary hypogonadism (particularly LH)**, and baseline CBC. For secondary hypogonadism, pituitary function testing (such as thyroxine or free thyroxine, 0800 cortisol), prolactin, iron saturation if indicated, and an MRI of the sella turcica if pituitary or hypothalamic disease is suspected.
E. Consult: Endocrinology, Internal Medicine or Urology report.
F. All medications: Current treatment doses, formulations, and **documentation of therapeutic testosterone levels once the dose strength is stabilized**; discuss any noted side effects of therapy.

The AMS for waiver renewal for hypogonadism should include the following:
A. Interim history to include documentation of symptoms of BPH or sleep apnea since beginning testosterone therapy.
B. Current treatment doses, formulations and documentation of therapeutic testosterone levels (at least annually once established).
C. Documentation that current dosage leads to serum testosterone levels within normal range. Lab tests recommended every three months after any dosage change and annually thereafter.
D. Documentation of a normal digital rectal examination and serum PSA annually in those over age 50. The patient should be referred for prostate biopsy if a prostate nodule is palpated at any time, if the PSA velocity is greater than 0.4 ng/mL per year over at least two years starting 6 months after initiation of therapy or if greater than 1.4 ng/mL across one year.
E. CBC performed 3 to 6 months after the start of therapy and annually thereafter. A hematocrit ≥ 54% should prompt discontinuation of therapy, with possible treatment at a lower dose if the hematocrit normalizes off therapy.

ICD-9 codes for hypogonadism	
257	Testicular dysfunction
257.2	Other testicular hypofunction/hypogonadism
253.4	Gonadotropic hypogonadism

ICD-10 codes for hypogonadism	
E29.9	Testicular dysfunction, unspecified
E29.1	Testicular hypofunction
E23.6	Other disorders of the pituitary gland

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WAIVER GUIDE
Updated: Jan 2014
Supersedes Waiver Guide of Oct 2010
By: Maj Angela Albrecht (RAM 15) and Dr Dan Van Syoc
Reviewed by LtCol Mark True, AF/SG consultant for Endocrinology

CONDITION:
Hypothyroidism (Jan 14)

I. Overview.

Hypothyroidism is a relatively common condition, and is due to a deficiency of thyroid hormone. The incidence of primary hypothyroidism is approximately 5% of the population, with secondary hypothyroidism occurring in less than 1% of all cases.[1] The prevalence of subclinical hypothyroidism is higher (4-10%) compared to the prevalence of overt hypothyroidism (0.1-2%). There is an age-related shift towards higher TSH values in older patients. Therefore, with age-adjusted normal ranges for TSH concentrations, the prevalence of hypothyroidism may not necessarily increase with old age, as previously predicted.[2] Hypothyroidism is much more commonly seen in women than men and is more common in women with a history of a small body size at birth and during childhood.[3]

The symptoms of hypothyroidism are highly variable, depending upon the age at onset and the duration and severity of the disease. They include fatigue, lethargy, physical and mental slowness, depression, apathy, headache, cold-intolerance, arthralgias, myalgias, dyspnea on exertion, thick-dry skin, hoarseness, constipation, menstrual irregularities, and weight gain.[1, 4, 5, 6] The diagnosis is often delayed due to the insidious onset of symptoms. Hypothyroidism is generally progressive and irreversible with the exception of drug-induced disease.

Laboratory evaluation includes TSH and free T_4 levels. An elevated TSH indicates the presence of primary hypothyroidism while a low T_4 confirms overt hypothyroidism. A normal T_4, with a high TSH, is indicative of subclinical hypothyroidism. Central hypothyroidism is characterized by a low serum T_4 concentration and a TSH concentration that is not appropriately elevated.[1, 2, 7]

Primary thyroid disease accounts for over 99% of cases of hypothyroidism.[1, 4, 8] While dietary iodine deficiency is the most common cause worldwide, in the US and most developed countries, the most common cause is autoimmune (Hashimoto's) thyroiditis, resulting from progressive destruction of the gland by antibodies directed against thyroperoxidase (anti-TPO), thyroglobulin, or the thyroid-stimulating hormone (TSH) receptor.[1, 9] Ten percent of patients with histologic autoimmune thyroiditis will not have any circulating antithyroid antibodies.[1] Thyroid ablation therapy is another common cause of primary hypothyroidism, with neck irradiation, medications (amiodarone, interferon alpha, lithium, and stavudine), I^{131} therapy for Graves' disease, and post-partum thyroiditis also contributing to disease occurrence.[4, 8]

Subclinical hypothyroidism is more common than overt disease.[10] It is defined as asymptomatic mild elevations in TSH with a normal serum free thyroxine (T_4). The implications of mildly elevated TSH levels seen in subclinical hypothyroidism are not entirely clear, but in some cases this may represent the development of early primary hypothyroidism.

Central hypothyroidism is due to thyrotropin (TSH) deficiency caused by either acquired or congenital hypothalamic or pituitary gland disorders. Congenital severe hypothyroidism (cretinism) occurs in 1 in 2000-4000 births.[11] The US Preventive Services Task Force (USPSTF) recommends that all newborns be screened for this disorder. Treated congenital hypothyroidism is occasionally encountered in the USAF population.[12]

The USPSTF has concluded that there is insufficient evidence to support screening for hypothyroidism in asymptomatic adults, as there is no evidence to support that early detection and treatment with T4 improves the clinical outcome in individuals detected to have hypothyroidism by screening techniques only.[7, 13] The American Thyroid Association recommends measurement of TSH in any individual who is at risk for developing hypothyroidism. This includes those who complain of any symptoms typical of hypothyroidism or develop a goiter. Clinical testing for hypothyroidism should also be considered in patients with hyperlipidemia, or unexplained hyponatremia, high serum muscle enzyme concentrations (hypothyroid myopathy), macrocytic anemia, pericardial or pleural effusions. Other candidates for testing include persons with previous thyroid injury (e.g., radioiodine therapy, thyroid or neck surgery, and external radiation therapy), pituitary or hypothalamic disorders, or persons with a personal history or family history of thyroid or autoimmune diseases.[7, 14]

Ultrasonography is reserved for evaluations of goiter and nodules. Ultrasonography can distinguish solid from cystic lesions and determine changes in the size of the nodules over time. If fine needle aspiration (based on the size) is needed, ultrasonography can be used to assist with aspiration of those nodules that are not easily palpable. Measurement of radioactive iodine uptake (RAIU) is rarely required in the evaluation of hypothyroidism.

The mainstay of primary hypothyroidism treatment is replacement therapy using levothyroxine (Synthroid®). Patients begin to improve within 2 weeks of initiating levothyroxine therapy, but complete recovery may take up to several months depending upon the severity of the disease. Because the steady state TSH concentration is not achieved for at least 6 weeks, a euthyroid state is determined by monitoring the serum TSH concentration 6 weeks after initiation of the medication and after each dosing change, and as needed to ensure appropriate treatment. The goal of levothyroxine therapy is to keep the serum TSH concentration within the normal range (0.5 to 5.0 mU/L). Once the maintenance dose has been determined, patients should be examined and the serum TSH measured once yearly. Long-term treatment of hypothyroidism does not correlate with impaired cognitive function, depressed mood, or an increase in all-cause mortality.[1, 4, 15] Over replacement with levothyroxine must be discouraged and avoided, as it can cause subclinical hyperthyroidism or even overt hyperthyroidism. The main risks associated with subclinical hyperthyroidism are the onset of atrial fibrillation and accelerated bone loss.[16]

II. Aeromedical Concerns.

The major aeromedical concern is the insidious nature of the disease which may delay diagnosis until symptoms become significant and pose a potential threat to flying safety. The symptoms of hypothyroidism may present dramatically and include lethargy, mental status changes and multiple physiologic problems. For this reason, close monitoring of patients with hypothyroidism and subclinical hypothyroidism is essential. Waiver is required whenever there is a validated elevation in TSH or treatment with thyroid replacement occurs. For a flyer with overt hypothyroidism,

waiver should be submitted when the patient is clinically euthyroid and treatment has been stabilized.

III. Waiver Considerations.

Hypothyroidism is disqualifying for all flying classes as well as for ATC/GBC and MOD duties.

Table 1: Waiver potential for hypothyroidism

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	History of hypothyroidism, controlled on thyroid replacement therapy	Yes AETC
II/III*	History of hypothyroidism, controlled on thyroid replacement therapy	Yes MAJCOM**
ATC/GBC	History of hypothyroidism, controlled on thyroid replacement therapy	Yes MAJCOM
MOD	History of hypothyroidism, controlled on thyroid replacement therapy	Yes AFGSC

*Certification authority for untrained FC II and FC III applicants is AETC.
**Waiver authority for trained RPA operators is AFMSA.

A review of the AIMWTS database through Jan 2014 revealed a total of 1075 individuals with an aeromedical summary with the diagnosis of hypothyroidism. The breakout was as follows: FC I/IA – 29 (6 disqualified); FC II – 448 (28 disqualified): FC III – 492 (53 disqualified); ATC/GBC – 79 (12 disqualified); and MOD –27 (1 disqualified). Almost all of the disqualifications (total of 100) were for problems not related to thyroid disease.

IV. Information Required for Waiver Submission.

Initial waiver requires consultation by an endocrinologist or internist. Information sought from the consultant includes the cause of the hypothyroidism and treatment recommendations. For previously diagnosed hypothyroidism on stable therapy, specialty care is not typically required except for women who are pregnant or considering pregnancy. When thyroid replacement is started, very close monitoring is required to assure the patient attains and sustains their euthyroid state. The TSH should normalize in primary hypothyroidism. Minimal elevations of TSH may be acceptable (still requires a waiver) provided there is documentation of a normal T_4 and no symptoms. With minimal elevations of TSH, a rough cutoff of 10 mU/L can be used as a guide for initiation of thyroid replacement if the diagnosis is primary hypothyroidism. Treatment for elevations of TSH below 10 mU/L is appropriate for symptomatic patients, but controversy exists regarding treatment of asymptomatic individuals with TSH values between 4.5 – 10 mU/L. Waiver renewal requires confirmation that the patient remains euthyroid and asymptomatic (i.e. recent TSH, +/-free T_4, history). If the cause of the hypothyroidism is other than primary hypothyroidism, the

primary disease process should be addressed appropriately and waiver should also be requested for any such disease(s) in accordance with the applicable section of the waiver guide.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for hypothyroidism should include the following:
A. History of all symptoms and treatments.
B. Physical exam to include thyroid gland and lateral and submandibular lymph nodes.
C. TSH, free T_4 (before and with treatment).
D. Ultrasonography, radioactive iodine scan, and/or fine-needle aspiration, if performed.
E. Report from the treating physician or consultant.

The AMS for waiver renewal for hypothyroidism should include the following:
A. Interim history since last waiver.
B. Physical exam to include thyroid gland and lateral and submandibular lymph nodes.
C. TSH, free T_4 (before and with treatment); confirmation that the aviator remains euthyroid.
D. Reports of any imaging studies if performed.
E. Report from treating physician.

ICD-9 codes for Hypothyroidism	
243	Congenital hypothyroidism
244	Acquired hypothyroidism
245	Thyroiditis
246	Other disorders of the thyroid

ICD-10 codes for Hypothyroidism	
E03.1	Congenital hypothyroidism without goiter
E03.9	Hypothyroidism, unspecified
E03.6	Thyroiditis, unspecified
E07.89	Other specified disorders of the thyroid

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WAIVER GUIDE
Updated: Mar 2016
Supersedes Waiver Guide of Jan 2013
By: Dr Dan Van Syoc
Reviewed by: Col Pat Storms, AF/SG consultant for gastroenterology

CONDITION:
Irritable Bowel Syndrome (Mar 16)

I. Overview.

Irritable bowel syndrome (IBS) is a common malady that is characterized by the presence of abdominal discomfort or pain associated with disturbed defecation. It is important to note that IBS is not a single disease but rather a symptom cluster resulting from diverse pathologies.[1] IBS patients may experience constipation, diarrhea, or a combination of these symptoms. The prevalence of IBS depends on the case definition used and the setting (specialist vs. primary care) from which the subjects are chosen. When employing the Rome criteria, IBS is thought to have a prevalence of up to 12 % in the US population.[2] IBS patients often utilize health services more than those without IBS for gastrointestinal (GI) symptoms as well as for non-GI concerns. It has been estimated that 25-50% of all referrals to gastroenterologists and an estimated health care expenditure of $30 billion dollars a year can be attributed to IBS (2012 data).[3]

The pathophysiology of IBS is a subject of ongoing debate, but abnormal colonic and small bowel motility and visceral hypersensitivity are commonly cited as having pathophysiologic significance.[2] Additional considerations include alterations in central autonomic regulation, subclinical mucosal inflammation, and even a potential role for intestinal microbiota. In fact, a significant proportion of subjects (7-31%) recovering from infectious gastroenteritis develop post-infectious IBS, dyspepsia, or both.[4] While the mechanisms of post-infectious IBS are unclear, persistent mucosal inflammation in these IBS patients could be the result of inefficient down-regulation of the inflammatory response to infection. Intestinal dysmotility can also lead to altered clearance of small bowel microbial flora, and studies have attempted to link small bowel bacterial overgrowth to IBS. Though convincing evidence is still lacking, the potential connection has prompted treatment regimens that include neomycin and rifamixin, both non-absorbable antibiotics that target gut flora.[2, 5]

Patients with IBS can present with a wide array of symptoms which include both gastrointestinal and extra intestinal complaints. However, the symptom complex of chronic abdominal pain and altered bowel habits remains the nonspecific yet primary characteristics of IBS. The Rome III criteria, updated in 2005, are widely used as diagnostic criteria for IBS (Table 1). Coexisting psychological symptoms are common, primarily anxiety, somatization, and symptom-related fears, but it's not clear if these symptoms lead to IBS, or are a psychological response to the discomfort associated with IBS. The constellation of gut-focused symptomatology and co-morbid psychological issues can contribute to impairment in quality of life and overutilization of health care resources.[6] While not specifically cited as criteria within the Rome III classification scheme, the following are commonly reported by patients considered to have IBS: abnormal stool frequency (<3 bowel movements per week or >3 bowel movements per day); abnormal stool form (lumpy-hard stool or loose-watery stool); defecation straining; defecation urgency; a feeling of incomplete evacuation; passing mucus, and bloating. These symptoms, depending on their predominance,

delineate subtypes of IBS, and are described as: IBS with diarrhea, IBS with constipation, mixed IBS and unsubtyped IBS. IBS also can be associated with non-GI complaints to include impaired sexual function, dysmenorrhea, dyspareunia, increased urinary frequency and urgency, and fibromyalgia.[7]

IBS is a diagnosis that can often be suggested by history alone. Empiric therapy is often initiated with a minimum of initial testing, reserving a more aggressive workup to those who present alarm features or fail to respond to conservative therapy. The most recent guidelines on the evaluation of IBS, published by the American College of Gastroenterology (ACG) IBS Task Force, encourage clinicians to make a positive diagnosis of IBS based on a thorough history, using symptom-based criteria. Testing should be held in reserve and used in conjunction with the presence or absence of specific alarm features such as rectal bleeding, unintended weight loss, iron deficiency anemia, family history of inflammatory bowel disease or colorectal cancer, family history of celiac disease, or nocturnal diarrhea.[5] Such testing might involve endoscopy to exclude visible mucosal pathology, testing for celiac disease, and breath tests to assess for the presence of small bowel bacterial overgrowth.[5]

The assessment and treatment of a patient with IBS can stress patients and physicians alike. The lack of a single definitive diagnostic test can lead to a patient undergoing a number of evaluations, only to be told that "all of your tests or normal, so this must all be in your head". The management of these patients is optimized by an individualized approach utilizing dietary, lifestyle, medical, and behavioral modalities.[1] Likewise, the lack of effective pharmacologic therapy that is universally helpful and free of bothersome side effects is a source of additional stress. The most important component in the treatment of IBS is the establishment of a therapeutic physician-patient relationship. The provider should be non-judgmental, establish realistic expectations with consistent limits, and involve the patient in all treatment decisions. Proper education of the patient is vital – patients need to be well informed of the chronic and benign nature of the disease, without trivializing their symptoms or the lifestyle impact of their IBS. The major goal of therapy is a reduction in the severity and frequency of symptoms and an overall improvement in their quality of life.[8] Treatment is divided into pharmacologic and non- pharmacologic methods with the latter favored by most practitioners as a starting point. Dietary therapy is frequently a first step, and while increasing dietary fiber has long been recommended as a treatment for IBS, there is little evidence to support the efficacy of fiber supplementation in IBS patients. In fact, Wilkins in a 2012 review of the management of IBS in adults cites a Cochrane review of 12 randomized controlled trials involving 621 IBS patients. The Cochrane review could find no evidence that fiber is effective for treating IBS.[9, 10] Fiber may have some utility in constipation-predominant IBS, but its benefits must be weighed against its potential to increase bloating and abdominal discomfort. Polyethylene glycol (PEG) laxative was shown to improve stool frequency but not abdominal pain.[11] In addition, foods that appear to routinely stimulate symptoms may need to be eliminated from the diet – some patients are greatly benefited by eliminating different sugars from their diet. Some physicians recommend the reduction or exclusion of food that increase flatulence – the explanation is that the underlying visceral hypersensitivity may explain the discomfort experienced by some patients after these foods.[8] Care should be taken to avoid an overly restrictive diet, since many IBS symptoms are random in their presentation and are unrelated to specific foods. Some patients, in their zeal to eliminate dietary triggers, may put themselves on nutritionally inadequate diets.

For some patients who associate their symptoms with stressors, behavioral treatment can be helpful. Therapies that are utilized include hypnosis, biofeedback, and psychotherapy. Advantages to these

types of therapy are that they all involve the patient and give them an opportunity to take responsibility for their treatment plan. These types of therapy are most helpful in those patients who are very motivated and have symptoms that are more severe.[12]

For patients with moderate or severe symptoms, the provider needs to consider the use of medications. Antispasmodics such as hyoscyamine and dicyclomine are used frequently but efficacy for IBS has yet to be well established. Troubling side effects from these anticholinergic antispasmodics include visual disturbances, dry mouth, urinary retention and constipation, so they need to be used with caution (these side-effects prohibit their use in aviators).[13] Laxatives are sometimes utilized in those patients with constipation-predominant IBS. These agents can include stool softeners such as docusate, colonic stimulants such as bisacodyl and senna and osmotic agents such as polyethylene glycol, magnesium-containing compounds, and lactulose. Care should be taken to avoid the routine use of cathartic laxatives, such as senna or bisacodyl, given the habit-forming nature of these laxatives. A newer medication, linaclotide has been given a good recommendation by the American Gastroenterology Association (AGA) for use in constipation-predominant IBS.[14, 15] For diarrhea-predominant IBS, loperamide has demonstrated good efficacy in reducing stool frequency, but is not generally helpful for pain symptoms.[13] Particular care should be taken in patients with a mixed pattern of IBS, as their swings from constipation to diarrhea could be aggravated by therapeutic efforts to modify their bowel movement frequency.

Antidepressants have been shown to relieve pain at low doses. They work by modulating the perception of visceral pain. Tricyclic antidepressants have been studied most extensively, but large meta-analyses of their efficacy have shown variable results.[11, 13] A newer approach to the treatment of IBS involves the use of 5-HT modulators. These medications, which include tegaserod, a partial agonist of the 5-HT_4 receptor, and alosetron, a 5-HT_3 receptor antagonist, need to be used only by gastroenterologists who are very familiar with the proper indications for their use and with the problems associated with these medications.[13]

Several newer approaches have been assessed for efficacy in the treatment of IBS. Antibiotics and peppermint oil have shown promise in randomized control trials, while mast cell stabilizers have been slightly disappointing. One antibiotic of note, Rifaximin (Xifaxan®), is an oral rifamycin with no systemic bioavailability after oral ingestion. While used clinically for the treatment of travelers' diarrhea and hepatic encephalopathy, it has been studied in IBS patients without constipation. When used at a dose of 550 mg three times daily for two weeks, patients in the treatment group experienced significant relief of global IBS symptoms.[16] The AGA suggests using rifaximin over no drugs in patients with diarrhea-predominant disease.[14, 15] Complimentary approaches such as use of herbs, probiotics, acupuncture and enzyme supplementation all remain uncertain in their role for treating IBS.[11]

Table 1: Rome III diagnostic criteria* for irritable bowel syndrome

Recurrent abdominal pain or discomfort at least 3 days per month in the last 3 months associated with 2 or more of the following:
(1) Improvement with defecation
(2) Onset associated with a change in frequency of stool
(3) Onset associated with a change in form (appearance) of stool

* Criteria fulfilled for the last 3 months with symptom onset at least 6 months prior to diagnosis. Discomfort means an uncomfortable sensation not described as pain.

II. Aeromedical Concerns.

Urgency and frequency of defecation, as well as abdominal pain or discomfort, can be very distracting during flight. These can be further aggravated by the effects of rapid altitude changes in patients with abdominal distension, gas, and bloating. IBS symptoms can present inconveniences during long flights, extended trips, or austere living conditions and symptoms may likely worsen as a result of these types of stressors. There is also great concern with aviators afflicted with IBS due to its chronicity. If dietary therapy is deemed necessary, the nature of the flying mission may make it extremely inconvenient if not impossible to comply.[17] Many medications used for treatment of IBS symptoms cause cognitive impairment, anticholinergic effects, hypotension, or disorientation, and are thus not on the approved list of medications for flyers.

III. Waiver Consideration.

IBS is disqualifying for all classes of Air Force flying to include ATC/GBC and MOD personnel, as well as for retention. Due to the chronic and unpredictable nature of the disease, it is not wise to consider aviation applicants with the history of IBS for any flying class or position. These folks do not fare well with many stressful positions and run the risk of not being available, on short notice, for many sorties. For trained aviators with mild symptoms easily treatable with diet or other non-pharmacologic therapies, waiver can be considered. There are some cases that can be controlled on approved medications; these aviators can also be considered for a waiver.

Table 2: Waiver potential for Irritable Bowel Syndrome

Flying Class (FC)	Waiver Potential# Waiver Authority	ACS Evaluation or Review*
I/IA	No AETC	No
II/RPA Pilot/III - trained	Yes MAJCOM	Yes
II – untrained (initial Flight Surgeon and RPA applicants) and III - untrained	No AETC	Maybe
ATC/GBC MOD**	Yes MAJCOM	No

*ACS review is at the discretion of the waiver authority in cases where the diagnosis is uncertain.
** AFGSC is the waiver authority for all MOD personnel.
# No indefinite waivers.

AIMWTS review in Oct 2015 resulted in 283 cases with the diagnosis code of IBS. There were a total of 136 disqualifications which is 48% of all submitted cases. Breakdown of the cases revealed: 11 FC I/IA cases (9 disqualified), 80 FC II cases (27 disqualified), 150 FC III cases (82 disqualified), 18 ATC/GBC cases (11 disqualified), and 24 MOD cases (7 disqualified). With IBS there are significant comorbidities that are associated with the disease. In many cases it is difficult to determine if the comorbidities contribute to the IBS or are the comorbidities a result of having IBS.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

AMS for <u>initial waiver</u> for irritable bowel syndrome must include the following:
A. History specifically discussing the disease entity, frequency of events, specific symptoms, what relieves symptoms, pattern of recurrence, duration of attacks, and treatments (both pharmacologic and non-pharmacologic) used with their effectiveness.
B. Results of all labs and imaging tests, if performed.
C. Clinical consultation report from a gastroenterologist or internist.
D. Documentation that the aviator is asymptomatic off all daily medications, or is stable on medications currently on the approved medication list.
E. Results of MEB if applicable.

AMS for <u>waiver renewal</u> for irritable bowel syndrome must include the following:
A. Interim history specifically discussing any recurrences or any changes in the disease pattern and all treatments used.
B. Testing: new labs and imaging results, if ordered, since last waiver.

C. Clinical consultation report from a gastroenterologist or internist unless aviator has been totally asymptomatic since last waiver.
D. Documentation that the aviator's condition is stable and that he or she is not on unapproved medication.

ICD-9 code for Irritable Bowel Syndrome	
564.1	Irritable Bowel Syndrome

ICD-10 code for Irritable Bowel Syndrome	
K58.9	Irritable Bowel Syndrome without diarrhea

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Waiver Guide
Updated Aug 2016
Supersedes waiver guide of Jul 2014
By Dr. Steve Wright (ACS Optometrist), Dr. Darrell Rousse (ACS Optometrist), Lt Col Dan LaMothe (ACS Ophthalmology Branch Chief), and Dr. Dan Van Syoc

CONDITION:
Keratoconus (Aug 16)

I. Overview.

Keratoconus (KCN) and Pellucid Marginal Degeneration (PMD) are forms of corneal ectasia in which the cornea undergoes progressive thinning and bulging, resulting in an inferior conical shape.[1] Strictly for the purpose of this waiver guide, PMD will be considered a form of keratoconus. Historical estimates on the prevalence of KCN typically reported a rate of 50 per 100,000.[2] Current studies, using corneal topography (CT), suggest this may be an underestimation.[3] KCN is usually bilateral; however, asymmetric presentation is not uncommon. This dystrophic process appears to be familial in nature, but no specific pattern of inheritance has been identified. Those with a first degree relative with KCN are more likely to show subclinical topographic patterns consistent with keratoconus when compared to the general population. Additionally, a relationship to environmental factors has been postulated. Multiple studies indicate a higher risk of developing KCN in individuals with atopy, specifically those with asthma and hay fever. Eye rubbing has also been indicated as a possible predisposing factor.[4] KCN has also been associated with several systemic conditions, including Trisomy 13, Ehlers-Danlos, and Marfan's.[3]

The age of onset of KCN is variable, ranging from the second to fourth decade of life. Progression is unpredictable, although earlier presentations are typically associated with more aggressive forms of the condition. In some instances, progression may be naturally halted and remain sub-clinical, referred to as forme-fruste keratoconus. Early stages of KCN are associated with blurred vision and frequent refractive changes, particularly in the magnitude and direction of astigmatism. As the condition progresses, spectacles may not provide adequate vision correction and specialty contact lenses, specifically rigid gas permeable or hybrid lenses, may be required to optimize quality of vision. Eventually, Penetrating Keratoplasty (PK, or corneal transplant) may become necessary to recover useful vision. Other indications for PK include excessive corneal scarring, contact lens intolerance, and corneal hydrops (corneal edema and clouding). Although progression to PK rates vary in different reports, a large multicenter study reported a 12% rate of keratoplasty over an 8-year follow-up.[5] Recently, the US Food and Drug Administration (FDA) has approved a procedure known as corneal crosslinking for the treatment of progressive keratoconus, discussed below. However, at the time of the drafting of this Waiver Guide, the USAF has not granted aeromedical approval for this procedure in aircrew (see more discussion on this topic below).

Historically, KCN was diagnosed based on clinical findings including a scissoring reflex (action of two retinal light reflex bands moving toward and away from each other like scissor blades) on retinoscopy and distortion of the mires reflex with manual keratometry. Slit lamp findings of KCN, such as Rizzuti's sign (conical reflection on the nasal cornea when a penlight is shone from the temporal side), Fleisher's ring (pigmented ring in the mid-peripheral cornea resulting from iron deposition due to tear pooling at the base of the corneal deformity), Vogt's striae (fine stress lines in the posterior cornea caused by stretching and thinning), clinically apparent corneal thinning, and

Munson's sign (a V-shaped indentation in the lower eyelid when the patient's gaze is directed downwards), were also used to confirm the diagnosis, although these are relatively late findings that are only evident with advanced progression. In recent decades, CT has been particularly useful in identifying eyes with early KCN or eyes that show changes that may ultimately lead to KCN.[6]

KCN should be suspected in cases with distorted mires on keratometry, CT that demonstrates a pattern consistent with inferior corneal steepening and irregularity, excessive and/or progressive corneal astigmatism, or when an aircrew member cannot be adequately corrected to at least 20/20 in the absence of any other ophthalmic pathology. KCN of any degree, including forme-fruste KCN, is disqualifying for accession from any source and for all flying classes. Unfortunately, identifying early forms of KCN prior to clearly evident disease can be difficult. There is a risk that early KCN may manifest as abnormal corneal topography but not meet the diagnostic criteria for disease and may or may not progress to true clinical KCN. Historically, the Aeromedical Consult Service (ACS) had coined the term Topographic Pattern Suggestive of Keratoconus (TPSK) for these corneal topographic findings and had recommended they be disqualifying for entry into an aviation career. The diagnosis of TPSK was based on corneal topography alone which evaluates only the anterior surface of the cornea. Prior studies upon which the TPSK aeromedical recommendation had been developed demonstrated that abnormal topographies progress to keratoconus (KCN) at a rate of 28% over ten years when associated with skew.[7] However, based on these same studies, the rate of progression in the absence of skew is much less (~1% to 2%). Additionally, newer technology has developed and allowed for the evaluation of the posterior aspect of the cornea which aids in a more accurate determination of risk of progression to KCN. Topographic patterns that demonstrate inferior steepening, exaggerated posterior float, and more importantly radial skew can be suggestive of early keratoconus. In response to these refinements in corneal architectural evaluation and diagnosis, the ACS has developed a new study group, Re-Evaluation of Abnormal Corneal Topography (REACT). The REACT study aims to maximize the pilot applicant pool by recommending waivers for individuals with abnormal topographies wherein the likelihood of progression is considered to be low. This study will utilize the latest corneal imaging technologies to longitudinally track these individuals with the goal of refining selection criteria when abnormal topographies are observed.

TPSK is a term coined by the ACS and is not routinely used in literature. Because it is not recognized outside the USAF, it will be replaced with the more descriptive term of "abnormal corneal topography". Subjects identified as having abnormal corneal topography may be enrolled in the REACT study group, and be recommended to enter aviation training, if inclusion and exclusion criterian for the study are met.

As discussed above, treatment of KCN typically consists of correction of refractive error with spectacle or contacts (soft, rigid, or hybrid) until the patient no longer can be corrected with these modalities; that member may then require PK. A more recent treatment procedure was developed which utilizes Riboflavin or Vitamin B2 and ultraviolet light to polymerize stromal collagen and induce corneal stiffening, with the goal to halt progression of KCN. This method is known as collagen cross-linking and has widespread use in Europe. Several studies have shown very promising results with reduction in corneal steepness, improved corrected visual acuity, and halting of progression of KCN.[8, 9] The Air Force is currently investigating the approval of cross-linking in its members, however, at this time cross-linking is not approved for any aircrew member or applicant. Any member/applicant who has undergone collagen cross-linking will require ACS

review/evaluation, but will likely not receive a waiver. Treatment with collagen cross-linking may also trigger a medical evaluation board.

II. Aeromedical Concerns.

Keratoconics frequently have poor quality of vision. Optical correction mitigates those effects somewhat, but many cases eventually require hard contact lenses to optimize correction. These contact lens fittings, however, are complicated and not always successful. Blurred vision, distorted images, decreased contrast sensitivity, degradation in stereopsis, monocular diplopia, and optical side effects caused by KCN are undesirable and detrimental to flight safety. It is imperative that aircrew carry a set of backup spectacles (and backup contacts if used) on all missions in the event problems arise with contacts making removal necessary. In addition, corneal hydrops is a known complication in approximately 2-3% of KCN patients.[10] Corneal hydrops is the development of acute and significant corneal edema following a break in Descemet's membrane and endothelium, producing corneal clouding and vision loss. This complication typically only occurs in severe cases of KCN but would be a significant event if it occurred during operations. However, the risk of simultaneous bilateral corneal hydrops is considered to be low and is aeromedically acceptable. Fortunately, hydrops has rarely been observed within the USAF flying population. This may be due to the fact that hydrops is typically associated with younger patients who develop a severe form of KCN that presents at an early age.[11, 12] These individuals would likely be aware of their impaired visual condition and self-select out of an occupation with strict vision requirements.

III. Waiver Considerations.

KCN (including PMD) is a disqualifying condition for all flying classes in the Air Force, to include RPA Pilot, ATC/GBC, and MOD, and is not waiverable for IFC I/IA/II/III and initial RPA Pilot candidates. An FC I waiver for abnormal corneal topography is possible, provided visual standards and correction are met functionally and clinically, and inclusion and exclusion criteria are met for the REACT study group. Initial FC IA/II(FS)/III and initial RPA Pilot waivers for abnormal corneal topography will be considered by on a case by case basis with ACS review. Contact lenses, if worn, must be fitted appropriately and achieve adequate wearing times prior to use while flying. Aircrew diagnosed with KCN require frequent evaluations and management to ensure that they are adequately corrected to mitigate the optical side effects of the condition. Although contact lenses, particularly rigid lenses, are frequently required to optimize vision performance in these cases, aircrew must also be adequately corrected with spectacle back-ups. A key element in correction of KCN is to ensure adequate stereopsis with both contact lenses and spectacles. Trained aircrew who require specialty contact lenses (e.g. rigid gas permeable, hybrid, scleral lens) to meet stereopsis standards may be granted a IIC waiver (restricted to flying with another qualified pilot) and must carry a back-up pair of both contact lenses and spectacles on person at all times while flying. Specialty contact lenses for KCN are fitted and dispensed by the ACS.

Table 1: Waiver potential for Keratoconus

Flying Class	KCN waiver potential	Waiver Authority**	Required ACS evaluation/review
IFC I/IA/III	No	AETC	N/A
Initial RPA Pilot	No	AETC	N/A
II/III*	Yes	MAJCOM	Yes
ATC/ GBC	Maybe$	MAJCOM	Yes
MOD	Maybe$	AFGSC	Yes

* Includes IFCII Flight Surgeons, but not IFCII for RPA Pilots.
** Cases that are progressive, require long-term treatment, surgical intervention or results in spectacle corrected visual acuity below that specified in the MSD require AFMSA waiver after MEB.
$ Condition only disqualifying if demonstrates progression, requires long term treatment or surgical intervention, or does not meet best spectacled correction standards; requires MEB prior to waiver submission

Table 2: Waiver potential for Abnormal Corneal Topography

Flying Class	Abnormal Corneal Topography Waiver Potential	Waiver Authority	Required ACS evaluation/review
IFC I	Yes, if meets REACT Study Criteria	AETC	Yes
IFC IA/III Initial RPA Pilot	Maybe#	AETC AFMSA	Yes
II/III	Yes#	MAJCOM	Yes

Any corneal findings that exceed the following criteria should be submitted for waiver: I-S > 1.4, corneal pachymetry < 475 microns by any device, steepest K > 48 diopters by any measurement, pachymetry progression > 1.2 on Belin-Ambrósio Enhanced Ectasia. Waivers will be considered on a case by case basis.

AIMWTS review in Aug 2016 revealed 395 aircrew with waiver dispositions for keratoconus or abnormal corneal topography. There were 71 FC I/IA cases, 156 FC II cases, 9 RPA pilot cases, 137 FC III cases, 14 ATC/GBC cases, and 8 MOD cases. There were a total of 133 disqualifications; 62 were FC I/IA, 9 FC II, 2 were RPA pilots, 54 FC III, 3 were ATC/GBC, and 3 were MOD.

IV. Information Required for Waiver Submission:

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical

guidelines/recommendations. Initial waiver for KCN in trained aircrew or for abnormal corneal topography in aircrew or applicants requires an ACS evaluation. Following initial waiver, trained aircrew with KCN will be followed at the ACS every 1-3 years depending on clinical and optical stability. For those enrolled in the REACT study, an annual corneal evaluation including corneal topography and Orbscan or Pentacam (if available), OVT-DP stereopsis, refraction to best visual acuity, and ultrasound central pachymetry (corneal thickness) is required with an ACS review prior to waiver renewal. If KCN or abnormal corneal topography demonstrates progression, requires long term treatment, surgical intervention or results in spectacle corrected visual acuity below the level specified in item MSD C2, MEB results are required for inclusion into AMS submission.

The AMS for an initial waiver for KCN or Abnormal Corneal Topography should include the following:
A. History of previous refractions and progression of astigmatism (if available) and other visual symptoms.
B. Family history of KCN and any impact on job/daily life.
C. Full eye exam to include: 5% Precision Vision chart, manifest refraction to best visual acuity, locally obtained corneal topography, retinoscopy findings (+/- scissoring), and slit lamp exam with comment on positive/negative findings in the cornea. All CT submissions should be formatted in **Axial** view using a standard dioptric scale (39.0 to 50.0 Diopter range, 0.50 Diopter increments) and standard color palette. The **OD/OS Display** with an **Axial Map** and an **Axial Numeric View** is preferred. All ATLAS topographies should display the **Axial I-S** value.
D. Orbscan or Pentacam (Holladay and Belin-Ambrósio) if available.
E. Ophthalmology consultation report in advanced cases.
F. ACS report or review.

The AMS for a waiver renewal for KCN or Abnormal Corneal Topography should include the following:
A. An interval AMS with particular attention to clinical changes.
B. Full eye exam to include: 5% Precision Vision chart, manifest refraction to best visual acuity, locally obtained corneal topography, retinoscopy findings (+/- scissoring), and slit lamp exam with comment on positive/negative findings in the cornea. All CT submissions should be formatted in **Axial** view using a standard dioptric scale (39.0 to 50.0 Diopter range, 0.50 Diopter increments) and standard color palette. The **OD/OS Display** with an **Axial Map** and an **Axial Numeric View** is preferred. All ATLAS topographies should display the **Axial I-S** value.
C. Orbscan or Pentacam (Holladay and Belin-Ambrósio) if available.
D. Ophthalmology consultation report in advanced cases.

For KCN, the AMS should request a repeat ACS evaluation as this is mandatory for continuation of a waiver. The ACS may request specific tests based on the history of the aviator in question.

ICD 9 code for keratoconus	
371.6	Keratoconus
ICD-10 code for keratoconus	
H18.609	Keratoconus, unspecified, unspecified eye
ICD-10 code for abnormal corneal topography	
H18.899	Other specified disorders of cornea, unspecified eye

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WAIVER GUIDE
Updated: Aug 2013
Supersedes Waiver Guide of: Feb 2010
By: Maj Dan LaMar (RAM 13) and Dr Dan Van Syoc
Reviewed by Maj Eric Barnes, AF/SG Consultant for Nephrology

CONDITION:
Kidney Disease, Chronic (Aug 13)

I. Overview.

Chronic kidney disease (CKD) is a worldwide public health problem, and in the US the incidence and prevalence of kidney failure are rising as evidenced by the total prevalence of CKD increasing from 12.3% to 14% between the early 1990s and 2010.[1] This data uses a definition of CKD as glomerular filtration rate (GFR) < 60 mL/min/1.73 m^2 of body surface area or an albumin to creatinine ratio ≥ 30 mg/g. The major outcomes of CKD, regardless of the underlying etiology, include progression to kidney failure, complications associated with decreased kidney function, and cardiovascular disease (CVD).[2] Approximately 19.2% of Americans older than age 20 have CKD, and an additional 630,000 (0.1%) have end-stage renal disease.[1] The financial burden of end-stage renal disease is substantial, with an estimate of nearly $27 billion in Medicare payments in the US in 2010.[1]

CKD is typically defined as the presence of kidney damage or decreased level of kidney function for three months or more, irrespective of diagnosis.[6] The diagnosis of CKD is typically made by using one of the lab criteria shown in the previous paragraph. In the US, the major causes of CKD are diabetes, hypertension, glomerulonephritis, and tubulointerstitial disease. Most patients are totally asymptomatic until later in the disease process. Symptoms and/or signs of renal failure would include weakness, anemia (from chronic disease), easy fatigability (from the anemia), anorexia, vomiting, mental status changes or seizures, and edema.[7] There is also a strong association between frailty and CKD in the general US population, and is particularly strong among persons with a GFR <45 mL/min/1.73 m^2. Frailty is also independently associated with mortality.[8]

Earlier stages of chronic kidney disease can be detected through laboratory testing. Treatment of these early stages of chronic kidney disease is effective in slowing the progression toward kidney failure. Unfortunately, chronic kidney disease is ‘‘under-diagnosed’’ and ‘‘under-treated’’ in the United States, resulting in lost opportunities for prevention. One reason is the lack of agreement on a definition and classification of stages in the progression of chronic kidney disease, as well as the best target group of patients to screen. Measurement of serum creatinine and estimation of GFR can identify patients with reduced kidney function. Measurement of urinary albumin excretion can identify some, but not all, patients with kidney damage. Screening asymptomatic individuals at increased risk could allow earlier detection of chronic kidney disease.[6] High-risk groups that should be screened for CKD include patients who have a family history of the disease and patients with diabetes, hypertension, recurrent urinary tract infections, urinary obstruction or any systemic illness that affects the kidneys. Of those at high risk, diabetes is the most common cause of CKD.[3]

In most cases, the GFR estimate (eGFR) is calculated from the measured serum creatinine level after adjustments for age, sex and race. A GFR of 100 mL/min/1.73 m^2 is considered normal for women and 120 mL/min/1.73 m^2 is normal for men. There are two commonly used formulas for

estimating the GFR; the Modification of Diet in Renal Disease (MDRD) study equation or the Cockroft-Gault equation. The MDRD equation is considered by most to be more accurate, but has been found to underestimate the GFR in healthy patients.[3, 9] Proteinuria, specifically albuminuria, in CKD patients is associated with more rapid progression of disease and an increasing likelihood of developing end-stage renal disease. Early detection of any proteinuria is essential for the treatment of this condition. One major study has shown that screening for proteinuria is not cost-effective unless selectively directed at high risk groups which was defined as patients older than 60, and those with hypertension.[3, 6, 10]

Most CKD patients should be considered for renal imaging studies as part of their initial evaluation. The most common test is renal ultrasonography which is normally utilized to document the size of the kidneys. With ultrasound, CKD usually manifests as small, echogenic kidneys, but occasionally, bilateral echogenic kidneys may be due to bilateral renal artery stenosis, so if that condition is suspected, CT or MR with associated angiography is recommended. Rarely, hydronephrosis can cause renal insufficiency, so ultrasound can identify the rare cases of bilateral hydronephrosis (usually due to a pelvic tumor). Occasionally, infiltrative processes can cause decreased renal function and ultrasound will identify large echogenic kidneys. Lastly, autosomal dominant polycystic kidney disease (ADPCKD) may result in renal dysfunction and ultrasound is good at identifying the enlarged kidneys with multiple cysts.[3, 7, 11]

Proper staging of CKD will facilitate application of clinical practice guidelines, clinical performance measures and quality improvement efforts to the evaluation and management of chronic kidney disease (see Table 1). Management of the disease includes blood pressure control, glycemic control in diabetic patients and reduction of proteinuria with an angiotensin-converting enzyme (ACE) inhibitor or angiotensin II receptor blocker (ARB). Other interventions that may be beneficial include lipid lowering measures, especially with HMG CoA reductase inhibitors (statins), limiting dietary protein intake to 0.60 to 0.75 g/kg body weight in patients with a GFR below 25 mL/min/1.73 m^2, and partial correction of anemia.[3, 6] Regarding the use of ACE inhibitors and ARBs, there is growing evidence that higher doses of these medications are necessary to provide optimal reduction in proteinuria and that both of these agents provide similar renoprotective effects.[12]

Table 1: Stages of Chronic Kidney Disease[6]

Stage	Description	GFR (mL/min/1.73m^2)
1	Kidney Damage with normal or ↑ GFR	≥90
2	Kidney Damage with mild ↓ GFR	60 - 89
3	Moderate ↓ GFR	30 - 59
4	Severe ↓ GFR	15 - 29
5	Kidney Failure	<15 (or dialysis)

Most patients with CKD do not die of kidney failure, but rather of CVD complications, which are often worsened by diabetes mellitus. Studies have indicated that anemia, decreased GFR and microalbuminuria are associated with the CVD prevalence, and when all three are present, approximately 25% of the CKD patients had documented CVD. Regarding the outcome of mortality, neither CKD nor diabetes had a hazard ratio as high as that of CVD in a study sponsored by the National Kidney Foundation.[4, 13] Additionally, CKD is associated with increased morbidity and mortality in heart failure patients.[5] Accordingly, increased lipids need to be managed

aggressively in patients with CKD. The current CKD guidelines recommend an LDL cholesterol goal of less than 100 mg/dL, with a very strong recommendation for use of statins in order to attain these goals.[15]

A frequent question with CKD patients is when to refer to nephrology. In the primary care setting, all patients should undergo evaluation with internal medicine or nephrology regarding the etiology of renal dysfunction. Young patients (e.g., the active duty population) should be followed closely in an internal medicine or nephrology clinic since the preservation of remaining renal function is particularly important. In general, patients with GFR <30 mL/min/1.73 m^2 (CKD Stages 4–5) and those with >500mg/24 hr proteinuria should be referred to a nephrologist.[6]

II. Aeromedical Concerns.

Progressive kidney disease is not compatible with military aviation since the nature of the military mission may keep the aviator away from necessary medical care and speed the decline of the disease. Documented decreased renal function in an applicant for aviation service should not be waiverable as there is a reasonable chance the condition may progress. In a trained aviator, stable decreases in renal function without systemic effect (such as electrolyte disturbances) may be acceptable for waiver. A primary concern with this population is the risk of cardiovascular disease. These members need to be closely monitored on a regular basis with strict cardiac risk factor modification.

III. Waiver Consideration.

All forms of chronic kidney diseases are disqualifying for aviation duty in the Air Force. The only medications considered for waiver are those on the approved medication list at the time of the waiver submission. CKD is not mentioned as disqualifying for ATC/GBC or MOD duties; for these personnel, a waiver would only be indicated if they were being treated with an unapproved medication or their general health had deteriorated significantly to affect duty performance.

Table 2: Waiver potential for Chronic Kidney Disease (CKD)

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Any form of CKD	No AETC	No
II*@	Stages 1-3	Yes MAJCOM	If requested by MAJCOM
	Stage 4	Maybe MAJCOM	Yes
	Stage 5	No MAJCOM	Only if requested by MAJCOM
III*@	Stages 1-3	Yes MAJCOM	No
	Stage 4	Maybe MAJCOM	Yes, if waiver being considered
	Stage 5	No MAJCOM	Only if requested by MAJCOM
GBC/ATC MOD#	Stages 1-3	Yes (if required) MAJCOM	No
	Stage 4	Maybe MAJCOM	Yes, if waiver being considered
	Stage 5	No MAJCOM	Only if requested by waiver authority

* No waivers for untrained assets
@ No indefinite waivers
# Waiver authority for MOD personnel is AFGSC.

AIMWTS review in Jun 13 revealed 12 cases submitted for the diagnosis of chronic kidney disease. There were 0 FCI/IA cases, 5 FC II cases, 5 FC III cases, 1 GBC case, and 1 MOD case. Four of the FCII cases were disqualified; 2 had gone on to kidney transplant, 1 had co-existent left ventricular hypertrophy and diabetes, and the other had several other medical problems. One of the FC III cases was disqualified, and the individual had multiple medical problems in addition to the chronic kidney disease. The GBC case was disqualified because of chronic myopathy and rhabdomyolysis. The MOD case was medically authorized.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for CKD should include the following:
A. Complete history of the problem to include all consultants seen.
B. Physical exam results.
C. Labs – all urinalysis tests to include protein and albumin results, BUN/Cr, eGFR, 24 hour urine (if applicable), renal biopsy results if done, and lipids.
D. Imaging results if accomplished.
E. Nephrologist or internist consultation report.
F. Current treatment to include all medications and dates started.
G. Results of MEB.
H. Detail of all other medical problems, if applicable.

The AMS for waiver renewal for CKD should include the following:
A. Updated history since last waiver.
B. Physical exam results.
C. Labs – all urinalysis tests, other labs and additional imaging and biopsy results (if applicable) since last waiver.
D. Nephrologist or internist consultation report.
E. Current treatment to include all medications and dates started.

ICD-9 code for Chronic Kidney Disease	
585	Chronic Kidney Disease

ICD-10 code for Chronic Kidney Disease	
N18.9	Chronic Kidney Disease, unspecified

V. References.

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WAIVER GUIDE
Updated: Jun 2013
Supersedes Waiver Guide of Aug 2009
By: Lt Col Michael Hodges (RAM13) and Dr Dan Van Syoc
Reviewed by Col John Gooch, chief ACS Ophthalmology

CONDITION:
Lattice Degeneration (Jun 13)

I. Overview.

Lattice degeneration (LD) of the retina is the most common of all the hereditary vitreoretinal degenerations, with an estimated prevalence of 7% to 11% in the general population.[1, 2] Males and females appear to be equally affected with no racial preference. LD is significant because it can lead to retinal breaks and retinal detachment (RD) and is the most clinically recognizable abnormality that is a precursor of rhegmatogenous retinal detachment (RRD), which is a full-thickness retinal break.[3]

LD was first recognized by Jules Gonin in 1930 and the term was first used by Schepens in 1952 because of the ophthalmoscopic similarity of the white lines seen to a lattice or trellis. It was later well described by Straatsma through the examination of eyes from 800 autopsies, as well as by Byer's careful fundoscopic examinations of over 1300 consecutive patients in a large vision clinic.[1, 3, 4, 5]

Although there are many hypotheses for the pathogenesis for lattice degeneration, the actual cause remains unknown. Photoreceptor cell death is found in some forms of lattice degeneration; however, apoptosis (programmed cell death) had not been demonstrated. The current leading hypotheses are vitreous traction, retinal ischemia and a primary defect in the internal limiting membrane of the retina.[6]

Ophthalmoscopically, LD appears as one or more linear bands of retinal thinning located in the equatorial region. Fine white lines, which account for the term lattice degeneration, are present in only about 9% of lesions, but pigmentary disturbances are present in most cases.[7] LD is characterized by multiple pathological features, including sharply demarcated, circumferentially oriented, oval or round areas of retinal thinning with overlying vitreous liquefaction and exaggerated vitreoretinal attachments along its edges. Other features that can be, but are not always, present include fine white lines (lattice-like) in the crossing retinal vessels, alterations of retinal pigment, small white-yellow particles at the margin of the lesion surface, punched out areas of extreme retinal thinning, or excavations and atrophic retinal holes. Retinal tears can occur at the posterior or lateral margin of the lesion from vitreous traction following posterior vitreous detachment. The size and area of lattice degeneration lesions vary tremendously and both eyes are affected in up to half of cases.[3, 4]

Approximately 80% of RDs occur within the age group greater than 40 years old. Patients with lattice degeneration have detachments at younger ages and have more myopia than patients with detachments caused by simple retinal tears and holes. Higher degrees of myopia are associated with detachments at younger ages of onset than with emmetropia or hyperopia. Approximately 20% of

the United States population is myopic to some degree, whereas about 60% of detachments are associated with myopic refractive errors.[8]

Retinal holes are often associated with LD.[9] The incidence of retinal holes in LD ranges from 15-44%.[2] Two types of holes can occur: round atrophic holes, centrally located within the LD area, and retinal holes/breaks on the peripheral edge of the lattice. Central lattice holes are usually not associated with vitreous traction because the overlying vitreous has liquefied as part of the pathogenic changes associated with the process. LD can cause RRD by two mechanisms, including either round holes without posterior vitreous detachment (PVD) or tractional tears associated with PVD.[10] Younger myopic patients who have LD with round holes need regular follow-up visits, because they can develop small, localized retinal detachments, which occasionally slowly enlarge to become clinical retinal detachments. Treatment should be considered if the detachments are documented to increase in size.[11] However, holes or horseshoe breaks at the edge of the LD patch are associated with vitreo-retinal traction and are more serious. Multiple holes of different types may be present in the same area of LD. Both types of holes can lead to RRD, but the peripheral type of hole/break constitutes the more significant risk for progression to RRD. All holes, therefore, need careful examination to identify the type involved and to determine if vitreo-retinal traction, or other signs of impending RD, such as subretinal fluid, are present. This is best accomplished by an ophthalmologist, ideally a retinal specialist.

Although LD remains stable in most cases (97%), it can cause, or be associated with RD, especially in higher degrees of myopia. LD is the direct cause of RD in 21% of cases, and is present in 41% of all RD cases. Seventy percent of RD, associated with LD, occurs in patients younger than 40 years of age. LD is more common in myopia; 70% of RD are seen in myopic eyes, with 75% of those RD in myopes with refractive error of -3.00D or greater. The risk of RD in association with any amount of LD increases with the degree of myopia, especially when the refractive error is greater than -5.00D. In this case, the lifetime risk of RD in the general population increases 10 times to 35.9%, whereas those with lesser myopic refractive errors between -1.00D and -3.00D, incur a 5.3% lifetime RD risk.[8]

There is no specific treatment for lattice degeneration, but high risk atrophic holes or breaks can be treated by cryothermy, laser photocoagulation, or diathermy. In an evidence-based analysis of prophylactic treatment of asymptomatic retinal breaks and LD, a panel of vitreoretinal experts reviewed the ophthalmology literature. They concluded that there was insufficient information to strongly support prophylactic treatment of lesions other than symptomatic flap tears.[7, 12] If the condition leads to a retinal detachment, the vast majority can be repaired permanently, allowing the flyer to return to aviation duty due to a lack of increased further risk of retinal detachment.[13]

A theoretical concern with LD is an increased risk of open angle glaucoma, specifically from pigment dispersion. It is recognized that various types of pigmentary disturbances can be seen in up to 80% if LD cases, particularly in cases with high myopia.[14]

II. Aeromedical Concerns.

Retinal detachment is the primary aeromedical concern. This can result in decreased or loss of vision, visual field changes, abnormal stereopsis, and proliferative vitreoretinopathy. All of these conditions can compromise visual function to such a degree that continued aviation duty is not possible. Detachment is usually sudden and without warning and can be quite incapacitating.

III. Waiver Consideration.

Lattice degeneration is disqualifying for all classes of Air Force aviation. Lattice degeneration is not disqualifying for ATC/GBC and MOD personnel, nor is it listed as disqualifying for retention purposes. The closest diagnostic category for retention purposes is retinal detachment.

Table 1: Waiver potential for Lattice Degeneration

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA*+	LD, ≤-5.50 diopters, no untreated atrophic holes outside areas of lattice	Yes AETC	Yes
	LD, >-5.50 diopters, or untreated high risk retinal holes	No AETC	At discretion of AETC
II*#+	LD without retinal holes	Yes MAJCOM	At the discretion of MAJCOM
	LD with retinal holes	Yes MAJCOM	Yes** MAJCOM
III*#+	LD without retinal holes	Yes MAJCOM	At the discretion of MAJCOM
	LD with retinal holes	Yes MAJCOM	Yes** MAJCOM

* LD may be waived for FC I/IA, as well as initial FC II and FIII, if the member has been evaluated by a retinal specialist who has ruled out the presence of untreated high risk peripheral holes or breaks, retinal traction or sub-retinal fluid, and native refractive error (pre-corneal surgery, if applicable) does not exceed -5.50 diopters.
# Waiver for history of retinal detachment is possible if treatment results in stable vision that is within accepted standards.
+ No indefinite waivers.
** ACS review/evaluation for initial waivers, and at the discretion of MAJCOM for waiver renewals.

Review of AIMWTS data in Feb 2013 revealed a total of 763 cases with a listed diagnosis of lattice degeneration. There were a total of 123 FC I/IA cases with 22 disqualifications, 299 FC II cases with 16 disqualifications, 322 FC III cases with 15 disqualifications, 10 ATC/GBC cases with 1 disqualification, and 9 MOD cases without disqualifications. The one disqualified ATC case was due to migraine headaches. Regarding the disqualifications, FC I/IA, initial FC II and FC III cases were most often disqualified if the lattice was in conjunction with excessive refractive error. The remainder of the disqualified cases were primarily for other diagnoses.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for lattice degeneration should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Symptoms, degree of lattice degeneration, and degree of myopia (pre-refractive surgery, if applicable).
C. If there is a history of retinal detachment; discuss fully to include all treatments and post-treatment results (visual acuity, visual fields, status of other eye).
D. Details of complete ophthalmologic exam, to include presence and location of retinal holes, presence or absence of subretinal fluid, and presence or absence of vitreo-retinal traction.
E. Comprehensive ophthalmologist exam (Retinal specialist exam if there is a history of retinal detachment).
F. Copies of any photos if they exist (photograph or digital).
G. Medical Evaluation Board results, if applicable.

The AMS for the waiver renewal for lattice degeneration should include the following:
A. Interim history specifically discussing any recurrences or any changes in the disease pattern and vision status.
B. Details of complete ophthalmologic exam.
C. Comprehensive ophthalmologist exam to include presence and location of retinal holes, presence or absence of subretinal fluid, and presence or absence of vitreo-retinal traction (Retinal specialist exam if there is a history of retinal detachment).

ICD-9 codes for Lattice Degeneration	
362.6	Peripheral retinal degenerations
362.63	Lattice degeneration

ICD-10 codes for Lattice Degeneration	
H35.40	Unspecified peripheral retinal degenerations
H35.411	Lattice degeneration of retina, right eye, .412 left eye, .413 bilateral, .419 unspecified

V. References.

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WAIVER GUIDE
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Supersedes Waiver Guide of Feb 2009
By: Lt Col Michael Hodges (RAM 13) and Dr. Dan Van Syoc
Reviewed by Col Kent McDonald, ACS chief of Neuropsychiatry

CONDITION:
Learning Disabilities (Jun 13)

I. Overview.

A learning disability is a persistent higher order cognitive deficit that interferes with learning and academic achievement, especially in reading, spelling, writing and/or arithmetic in the context of average or above average intelligence.[1] The term, "learning disability," once associated with reading problems, is often misunderstood, and is a non-specific term for numerous disorders of cognition in various combinations and levels of severity. Such variability leads to a spectrum of aeromedical significance, so that knowledgeable evaluation of the individual and a thorough history on educational achievement, rather than simply identifying the diagnosis, is essential to making a correct aeromedical decision. Previously unrecognized and otherwise irrelevant mild cognitive inefficiencies can prove to be dangerous and result in safety of flight and mission performance issues in military aviation. Due to problems with overall learning, people identified with learning disabilities as children often suffer from low levels of academic achievement.[2] Since speech and language delays can be a contributing factor in younger ages for learning difficulties, early recognition and intervention is a must.[3] Success in later educational endeavors can be potentially compromised unless the parents and/or school recognize the problem early and provide appropriate remediation.

There are multiple variations of learning disabilities, but there are three widely accepted categories that include reading, mathematics, and written expression. A given individual may have more than one form of learning disability. The first category is reading disorder which is defined as a significant impairment in reading that does not have any demonstrable cause in visual, hearing or physical disorders; is not related to mental retardation, emotional disturbance; nor does it have any environmental, cultural or economic disadvantage.[4] It is estimated that up to one in five children have a significant problem learning to read. Reading disorder is seen in up to 80 percent of school children labeled with a learning disability, or about four percent of the school-age population.[4, 8] All children with this disorder share three key symptoms: inaccurate reading, slow reading, and poor reading comprehension. Reading is a totally different skill than oral language. It requires the brain to link written markings to spoken language. To break it down further, the act of reading is actually at least two different processes: basic reading which has to be taught and is letter-sound knowledge along with word recognition, storing and decoding; and reading comprehension, which is the ultimate goal.[4] Dyslexia is the most commonly recognized form of reading disorder. One author defined dyslexia as an unexpected difficulty in reading in children and adults who otherwise possess the intelligence and motivation necessary for accurate and fluent reading.[5] Although the etiology of dyslexia is not known, there are various theories. One is the “Cerebellar Deficit” theory where non-verbal, sensory-motor impairments are felt to have an effect for bringing about dyslexia.[6] Another is the “Phonological Deficit” hypothesis where dyslexia individuals suffer from a deficit in phonological skills where they have a problem reading nonwords.[7] The severity of impairment in individuals with this disorder varies widely. There are numerous models being developed in an

effort to identify children at an early age and to intervene in an effective manner.[7, 9] Patients with reading disabilities require lifelong assistance, and for secondary and college students, the emphasis is on accommodations, to include extra time, and help with different study skills and test taking.[8]

The second category of learning disabilities is mathematics disorder which is an impairment of arithmetic or mathematic skills that is sufficiently serious to interfere with academic achievement or daily living. This may affect up to six percent of school age children. The only proven treatment of mathematics disorder is systematic instruction.[4]

The last major category is the disorder of written expression, which some call dysgraphia. It is a significant impairment in written communication that is not attributable to the same issues outlined under reading disorder. It is commonly expressed with spelling, grammatical/syntax or punctuation errors, poor paragraph organization, and excessively poor handwriting. Most studies to date indicate that individuals with the disorder have persistent problems with written language into late childhood and adolescence.[4]

Until the past couple of decades, little thought was given to adult manifestations of learning disabilities. Clinicians now realize these disorders, once felt to "burn themselves out" in adolescence, can persist into adulthood. Even though it does not disappear, given early intervention and positive educational experiences, many of these people can show a remarkable ability to learn and succeed.[10] Both genetic and environmental factors are undoubtedly important in the etiology of these disorders. Physiological as well as anatomic markers are being sought. Still, current science requires thorough clinical, historical, and, often, psychometric evaluation in order to make these diagnoses. Learning disabilities may be associated with underlying abnormalities in cognitive function, including deficits in attention, memory, or linguistic processes. Impaired vision or hearing may affect learning ability and should be investigated through audiometric or visual screening tests. A learning disability may be diagnosed in the presence of such sensory deficits *only* if the learning difficulties are in excess of those usually associated with these deficits.

II. Aeromedical Concerns.

Typically, significant problems will become manifest in childhood or adolescence and well before an individual is considered as an applicant for aviation service, and the individual will not be selected for flying duties on the basis of low academic performance and/or screening tests (such as the AFOQT). Additionally, it is unlikely that a person with an identified learning disability for which remedial services were provided will be able to successfully complete rigorous military aviation training. As otherwise intelligent officers will have great difficulty keeping up with the rigors of training and operational flying, a confirmed diagnosis of LD is disqualifying for flying class FC I duties, unless the individual can demonstrate passing academic performance off medication and /or solid job performance off medication for a period of no less than 12 months. A history of a learning disorder will not necessarily disqualify a member. Severity and nature of the disorder should be documented. In addition, LD and other psychiatric diagnoses made during childhood are occasionally found to be unsubstantiated in light of a careful, accurate history, and instead can be the result of over-eager achievement-driven parents. This is particularly true if the service member has had no symptoms since early childhood.

III. Waiver Considerations.

A history of a learning disability is disqualifying for appointment, enlistment and induction into the US Air Force. It is also disqualifying for retention in the military. A history of a persistent learning disorder is disqualifying for FC I/IA. Although the AFI does not specifically list learning disabilities as disqualifying for FC II and III, the retention standards apply to these aviators.

Table 1: Waiver potential for Learning Disabilities

Flying Class (FC)	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Maybe AETC	Maybe*
II/III	Maybe MAJCOM+	Yes
ATC/GBC	Maybe MAJCOM+	No
MOD	Maybe AFGSC+	No

+ For untrained FC II, FC IIU and FC III personnel, as well as ATC/GBC, waiver authority is AETC, otherwise it is the MAJCOM of assignment.
*ACS review/evaluation if requested by AETC for initial FC I/IA, FC II, FC IIU and FC III applicants.

For FC I/IA applicants to receive a waiver, their academic record must have been achieved without any accommodations and there must be no evidence of current problems. Waiver may be considered for aircrew with a history of LD, providing they are symptom free and have not manifested a degradation of their performance of aircrew duties.

AIMWTS review in Feb 2013 for all variations of learning disabilities revealed a total of 14 cases with six resulting in a disqualification disposition. There were a total of 7 FC I/IA cases, one was disqualified. There were no FC II cases. There were a total of 5 FC III cases with 2 disqualified. One member was applying for loadmaster duties and could not pass the Reading Aloud Test which was felt to be secondary to English not being his native language (member inappropriately labeled as LD), while the other case was a flight nurse applicant with dyslexia. Of the 3 ATC cases, all 3 where disqualified for learning difficulties during their apprenticeship.

IV. Information Required for Waiver Submission.

Submitting a Mental Health Waiver Guide:

AFI 48-123 –Chapter 6 (pg. 55) and the Aeromedical Consultation Service (ACS) Waiver Guide addresses waiver evaluations

Step 1 - Is the aviator ready for waiver submission?

C. Waiver is submitted when 1) the member is asymptomatic and 2) medications/psychotherapy treatment have been completed, as applicable to diagnostic category, for the specified time-

frame below (Note: psychotherapy "booster sessions", and sometimes SSRIs, are permissible and often advisable after initial symptom resolution):

- ☐ 1 Year—Psychotic Disorders & Somatoform Disorders
- ☐ 6 Months—Mood Disorders, Anxiety Disorders & Suicidal Behavior
- ☐ Discretion of Flight Surgeon—Adjustment Disorders & V-Codes requiring waiver
- ☐ For Traumatic Brain Injury cases, please refer to TBI Waiver Guide
- ☐ For aviators with any other psychiatric disorders, please refer to AFI 48-123 and ACS Waiver Guide

D. To be considered for an aeromedical waiver, any disqualifying condition must meet the following criteria per AFI 48-123 Section 6B, 6.2.1.1 through 6.2.1.6. (pg. 57-58):

- ☐ Not pose a risk of sudden incapacitation
- ☐ Pose minimal potential for subtle performance decrement, particularly with regard to the higher senses
- ☐ Be resolved, or be stable, and be expected to remain so under the stresses of the aviation environment
- ☐ If the possibility of progression or recurrence exists, the first symptoms or signs must be easily detectable and not pose a risk to the individual or the safety of others
- ☐ Cannot require exotic tests, regular invasive procedures, or frequent absences to monitor for stability or progression
- ☐ Must be compatible with the performance of sustained flying operations

Step 2 - Before beginning the Aeromedical Summary (AMS), Flight Surgeon must obtain Mental Health consultation and ensure it contains items specified below:
Instructions for the Mental Health Provider
The mental health evaluation must include a **<u>comprehensive written report</u>** addressing:

- ☐ Consultation must address each criteria in Step 1B
- ☐ Clinical mental health history (description of symptoms, treatment modality, frequency and compliance with treatment, relevant personal and family history, and perceived impact on occupational duties)
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…) ***** for alcohol cases, please comment on Carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, input from line leadership, if possible, and please address current state of any triggers for the mental illness)
- ☐ Current and past aviation related duties and any history of current and past occupational performance difficulties (to include perceived impact of mental health condition on performance of duties)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)

- ☐ Summary and interpretation of psychological/neuropsychological testing results (recommend MMPI-2, NEO PI-R, or similar personality test). For neuropsychological cases, please contact

ACS neuropsychologist (Dr. Gary Ford, DSN: 798-2704) for guidance on recommended neuropsychological tests.

- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly or engage in special duty operations (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)
- ☐ Copies of all records (mental health/ADAPT/inpatient) and raw testing data should be on hand for shipment to ACS Neuropsychiatry Branch

Step 3 - Items for the Flight Surgeon to include in the AMS:

- ☐ AMS must clearly address each criteria in Step 1B and the risk to the member, mission, and safety
- ☐ Summarize Mental Health history and focus on occupational impact
  ***** If 2 or more months have passed since the comprehensive evaluation/report was completed, the flight surgeon should address how the member has done since and consult with the mental health provider if the member has been seen at mental health since the evaluation*****
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…)
  ***** for alcohol cases, please comment on Carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, if possible - please address current state of any triggers for the mental illness)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)

Step 4 - Items to complete the waiver package:

- ☐ Letter of support from command
- ☐ Comprehensive mental health written-report
- ☐ Confirm mental health has made copies of chart(s) and testing. When requested send to:

ACS Aerospace Medicine Branch, USAFSAM/FECA
c/o Neuropsychiatry Branch
2510 Fifth Street Bldg 840
Wright Patterson AFB, OH 45433-7913
Fax: (937) 904-6296 DSN: 674-9296

Please feel free to contact the ACS Neuropsychiatry Branch with questions:
TSgt Tonya Merriweather: DSN 798-2703 or Mr. John Heaton: 798-2766

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for learning disorder should include the following:
A. AMS detailing any social, occupational, administrative or legal problems, including an analysis of the aeromedical implications of this particular case history.
B. Mental health evaluation summary, *specifically including* psychological and neuropsychological evaluation reports (with their raw data), and any pertinent past medical or mental health records.
C. Any pertinent current neurological or other medical consultation reports.
D. For FC I/IA, detailed history of academic achievement and use of any accommodations.
E. For trained FC II or III, a letter from the flyer's aviation supervisor or commander supporting a return to flying status.

The AMS for waiver renewal for learning disorder should include the following:
A. Interval history.
B. All applicable testing results.
C. Consultation from mental health professional.

ICD-9 Codes for Learning Disabilities	
315.0	Specific Reading Disorder
315.02	Developmental Dyslexia
315.1	Mathematics Disorder
315.2	Other Specific Learning Difficulties
315.3	Developmental Speech or Language Disorder
784.61	Alexia and Dyslexia

ICD-10 Codes for Learning Disabilities	
F81.0	Specific Reading Disorder
R48.0	Dyslexia and Alexia
F81.2	Mathematics Disorder
F81.89	Other Development Disorders of Scholastic Skills
F81.9	Development Disorders of Scholastic Skills, Unspecified

V. References.

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WAIVER GUIDE
Updated: Dec 2013
Supersedes Waiver Guide of Apr 2010
By: Dr. Dan Van Syoc
Reviewed by Maj Eddie Davenport, chief ACS cardiologist

CONDITION:
Left Bundle Branch Block (Dec 13)

I. Overview.

Left Bundle Branch Block (LBBB) is a relatively uncommon pattern seen on electrocardiogram (ECG). The normal heart's electrical impulse originates in the sinus node, spreads across the atria, and travels through the atrioventricular node. The impulse penetrates into the ventricles via the His bundle where it then enters the two bundle branches. Soon after, the right and left bundle branches transmit the electrical impulse to the right and left ventricle, respectively. This entire process of ventricular depolarization is completed within about 100 msec, and thus the normal width of the QRS complex is less than 100 msec. In a normally functioning heart, the ventricles contract nearly simultaneously.[1] LBBB usually reflects intrinsic impairment of conduction in the left bundle system, i.e. an intraventricular conduction disturbance. With a LBBB the impulse through the left bundle branch is disrupted. The electrical impulse is transmitted only through the right bundle branch and activation of the left ventricle occurs after the signal spreads across the right ventricle. Thus contraction of the left ventricle is delayed and occurs after the right ventricle. The impairment can be chronic or transient. It may also appear only when the heart rate exceeds some critical value (rate- or acceleration-dependent LBBB). A much less common type is bradycardia-dependent LBBB, in which LBBB occurs only at low heart rates; the responsible mechanism for this seemingly paradoxical situation is not known.[2] Careful examination of the QRS complex and axis should be made as an accessory pathway with aberrant ventricular conduction (not a LBBB) would be a more common reason for a widened QRS complex occurring only at lower heart rates.

The total time for left ventricular depolarization is prolonged with LBBB and leads to prolongation of the QRS interval and sometimes to alterations in the QRS vector. The degree of prolongation depends upon the severity of the impairment.[3] A QRS interval greater than or equal to 120 msec is considered a complete LBBB while incomplete LBBB has a shorter 100 – 120 msec interval. The ECG patterns most commonly seen in LBBB are the characteristic notched or W-shaped QRS complex in lead V_1 and M-shaped complex in lead V_6.[4] It should be noted that LBBB renders the ST segment of chest leads unreliable during stress testing.

Unlike right bundle branch block, LBBB is more often a sign of organic heart disease. LBBB is considered a marker of one of four underlying conditions: advanced coronary heart disease, long-standing hypertension, aortic valve disease, or cardiomyopathy. Often, more than one contributing factor may be identified and most patients with LBBB have underlying left ventricular hypertrophy.[4] Thus LBBB is an important clinical consideration as it may be the first clue to previously undiagnosed, but clinically important abnormalities.

The incidence of LBBB increases with age.[5] It has been reported in 0.01%-0.1% of healthy military aviators versus 0.2%-0.7% of various civilian populations, increasing to over 2% of those over age 75 and over 5% prevalence over age 80 suggestive of a degenerative disease of the conduction

system.[6, 7] Ten percent of the aviators found to have LBBB in the above study were also found to have significant coronary artery disease, twice that of the estimated background prevalence. Rate- or acceleration-dependent LBBB has also been shown to be associated with a greater degree of underlying coronary artery disease.[8]

II. Aeromedical Concerns.

The prognosis of isolated LBBB in young men is generally benign.[9] However, there are two major aeromedical concerns for LBBB. First, does LBBB increase the risk for progressive conduction system disease? And second, is LBBB predictive of current or future underlying cardiac disease? The risk of progressive conduction system disease for newly diagnosed LBBB has not been shown to be increased in otherwise apparently healthy young males.[10] However, acquired LBBB may be the result of advanced and advancing coronary artery disease (CAD).[11] A study in 2012 demonstrated that adjusted mortality rates for patients with new onset LBBB were similar to patients with ST-segment elevation myocardial infarction.[12] In the USAF male aviator population aged 35-55 years, estimated background prevalence of significant CAD is about half that of those with LBBB (5% vs. 10%).[6] Thus LBBB has a two-fold increase in risk of underlying significant CAD. Many studies have shown increased major adverse cardiovascular event and increased mortality when LBBB is accompanied by any structural heart disease, congestive heart failure, or coronary artery disease. Thus echocardiography and an ischemic evaluation is absolutely necessary for all cases of LBBB. . However, considering the possibility of underlying coronary heart disease and the inaccuracy of many noninvasive tests in the presence of LBBB, invasive coronary angiography might be warranted for definitive diagnosis, especially in older or high-risk aviators.[13] Noninvasive coronary angiography (ie CT coronary angiography) is aeromedically acceptable to exclude coronary heart disease for age under 35 as the risk of significant CAD in this population is well less than 5%. In the absence of underlying cardiac disease, return to unrestricted flying is acceptable. Finally, more recent data suggests there may be structural changes in contractility with increased ventricular dysnchrony as seen in LBBB and therefore even without CAD or valvular disease, echocardiography at regular intervals is recommended to ensure absence of cardiomyopathy.

III. Waiver Consideration.

LBBB is disqualifying for all classes of flying duties, to include ATC/GBC and MOD duties. It may be waiver eligible for any class of unrestricted flying duties after evaluation. All flyer cases that are being considered for a waiver MUST be seen at the Aeromedical Consultation Service (ACS). Angiography is preferably done during the ACS evaluation. If coronary angiography is normal, waiver is usually recommended for unrestricted flying duties. If angiography is abnormal, waiver status will be determined primarily by the extent of CAD and the CAD waiver policy. Re-evaluations for LBBB are typically at three-year intervals and are primarily to follow for the possible development of cardiomyopathy.

Table 1: Waiver potential for Left Bundle Branch Block

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Yes AETC	Yes
II/III	Yes MAJCOM	Yes
ATC/GBC	Yes MAJCOM	No
MOD	Yes AFGSC	No

AIMWITS search in Nov 2013 revealed a total of 65 cases carrying the diagnosis of LBBB with 6 total disqualifications. Breakdown of the cases was as follows: 7 FC I/IA cases, 37 FC II cases (4 disqualified), 20 FC III cases (2 disqualified), and 1 ATC/GBC case. Of the disqualified cases, only one was disqualified for a cardiac reason and that was primarily for cardiomyopathy.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. All aircrew with LBBB require ACS evaluation prior to waiver consideration.

The AMS for the initial waiver for LBBB should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History of symptoms along with a good time line of events.
C. List all treatments (medications if any) attempted with response.
D. Original copy of the 12-lead ECG or other ECG tracing documenting LBBB.
E. Reports of any local consultations.
F. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram, treadmill, stress nuclear imaging).

The AMS for waiver renewal for LBBB should include the following:
A. Interim history since last waiver submission to include symptoms.
B. Treatments – current medications for the condition, if any.
C. Recent 12-lead ECG.
D. Reports of any local consultations.

ICD-9 code for Left Bundle Branch Block	
426.3	Left bundle branch block

ICD-10 code for Left Bundle Branch Block	
I44.7	Left bundle branch block, unspecified

V. References.

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WAIVER GUIDE
Updated: Feb 2013
Supersedes Waiver Guide of Jul 2009
By: Col Lynda K. Vu (RAM 13) and Dr Dan Van Syoc
Reviewed by LtCol Roger Wood, AF/SG Consultant for Hematology/Oncology

CONDITION:
Leukemia (Feb 13)

I. Overview.

The leukemias are a diverse group of diseases of the hematopoietic system where malignant proliferation of a single cell line (clone) replaces production of the other bone marrow cells. This can result in secondary anemia, thrombocytopenia or granulocytopenia. Leukemias are divided into myelogenous or lymphocytic based on the origin of the precursor cell. Myelogenous leukemia, also called myelocytic leukemia, arises from granulocytes or monocytes and lymphocytic leukemia arises from lymphocytes. Each type is further divided into acute or chronic forms of disease.

Acute Myelogenous (Myeloid, Myelocytic) Leukemia (AML)

AML is a hematopoietic malignancy leading to the infiltration of blast cells in the marrow and the decreased production of normal blood cells; consequently, anemia, neutropenia and thrombocytopenia develop. AML is the most common acute form of leukemia in adults. It represents 35% of all leukemias in the US and is responsible for about 20% of acute leukemia in children and 80% of adult acute leukemia cases. The median age of adults at diagnosis is 65 and the male:female ratio is nearly 5:3.[1] Increased frequency is seen among Jews of Eastern European origin. There are numerous predisposing factors in the development of AML, including genetic abnormalities, environmental factors, and other hematologic diseases (benign and malignant), but most patients have no significant exposure.[1, 2, 3] Also disturbing is the increasing incidence of treatment-related myelodysplasia and leukemia in survivors of tumors of childhood and young adulthood such as Hodgkin's disease, sarcomas, breast and testicular cancers, and lymphomas. Ionizing radiation and occupational exposure to benzene and petrochemicals are also associated with AML.[4]

Clinical presentation of AML usually relates to complications of pancytopenia. Common symptoms include weakness, fatigue, pallor, infections, bleeding tendency, and bone pain. Definite diagnosis of AML requires bone marrow aspiration and biopsy and possibly peripheral blood smear if significant bone marrow necrosis is present.[1]

Treatment with induction therapy includes agents such as daunorubicin, cytarabine, idarubicin and mitoxantrone.[2, 3] Post-induction treatment utilizes allogeneic bone marrow transplantation, autologous bone marrow transplantation, or use of the chemotherapeutic agent cytarabine.[3] Central nervous system involvement (meningeal) occurs in 2% of cases at the time of presentation. In these cases, CNS treatment is recommended; high-dose or intrathecal therapy is more commonly used than cranial radiation due to less toxicity.[2] Remission is the more accepted term with AML rather than cure and the remission rates have improved dramatically, but remission, 5-year survival, and cure rates are most dependent on the patient's age when AML occurs. Initial remission rates now

approach 90 percent in children, 70 percent in young adults, 50 percent in middle-aged subjects, and 25 percent in the elderly.[2]

Acute lymphoblastic leukemia (ALL)

ALL is a malignant condition that is characterized by blast cell (from either B or T cell lineage) proliferation in the bone marrow and extramedullary sites or "sanctuaries", such as meninges.[2] ALL is the most common cancer in children younger than 15 years of age; it occurs mainly in children but any age can be affected. There are many subtypes of this form of leukemia. It represents 12% of all leukemias and 20% of adult leukemias. Males are more commonly affected than females. In most age groups, the incidence of ALL is higher in those of European descent than in those of African descent. Cure rates are 80% for children and less than 40% for adults. The majority of adults treated for ALL with current regimens will relapse.[5,6] The disease can lead to anemia, thrombocytopenia, and neutropenia.[2] No specific cause can be identified in most cases, but there is increased risk associated with patients who underwent antineoplastic treatment or those exposed to ionizing radiation and toxins.[3]

Treatment consists of induction therapy, central nervous system-directed treatment or prophylaxis, and consolidation or maintenance therapy. Induction chemotherapy may include glucocorticoids, conventional chemotherapy, and/or targeted therapy. The central nervous system (CNS) may be a site for relapse as it commonly serves as a sanctuary for leukemic cells. To prevent relapse from a CNS source, treatment targeting the CNS is indicated with the use of systemic and intra-thecal chemotherapy or cranial irradiation. Consolidation or maintenance therapy may include conventional chemotherapy or high dose chemotherapy followed by bone marrow transplantation of an allograft from a matched sibling.[2,3] In those patients treated with prophylactic CNS radiation as a child, there is concern about the lifetime risk of neurocognitive difficulties, a second cancer and endocrinopathies, as well as problems with bleeding from intracranial vessels. The approach currently has shifted to a more aggressive intrathecal and systemic chemotherapeutic regimen for CNS therapy.

Chronic lymphocytic leukemia (CLL)

CLL is a malignant proliferation of small mature looking B-lymphocytes in the vascular and lymphatic systems, as well as in the bone marrow. CLL is considered to be the same disease as small lymphocytic lymphoma, but at a different stage.[7] CLL is the most common adult leukemia in the western world but is rare in Asia. In the U.S., male incidence is almost twice that of females, and it comprises 30% of all leukemias. The risk increases with age, occurring mostly in the middle-aged and elderly with a median age of onset of 70 years.[8] It is a disease of unknown etiology with a long clinical course.

Patients may present with a wide range of symptoms, signs, and laboratory abnormalities when diagnosed with CLL. Symptoms may range from no symptoms to persistent lymphadenopathy, unintentional weight loss, fevers with or without infection, night sweats, and extreme fatigue. Signs of CLL include lymphadenopathy, splenomegaly, hepatomegaly, and skin lesions (leukemia cutis). Laboratory findings show typical lymphocytosis in the peripheral blood and bone marrow, mild to moderate cytopenia of all cell lines, and less commonly, hypogammaglobulinemia.[8]

Not all patients with CLL require immediate treatment due to the variable survival rates based on the disease subset, lack of scientific evidence of improved survivability with early treatment, and a low cure rate with current treatment regimens (except possibly for allogeneic hematopoietic cell transplantation). The current recommendation during the asymptomatic phase of CLL, based on several prospective randomized trials, is to observe and not treat. Immediate treatment is recommended for patients with advanced disease, high tumor burden, severe symptoms, or repeated infections. There is no standardized treatment for CLL although there are several options. Choice of treatment regimen is determined by patient characteristics and treatment goals. Overall survival rates vary with the treatment regimen.[9]

Chronic myelogenous (myelocytic, myelogenous, granulocytic) leukemia (CML)

CML is an acquired malignant disorder that is associated with the presence of the Philadelphia chromosome. It commonly results in anemia, granulocytosis, immature granulocytosis, basophilia, thrombocytosis and splenomegaly. CML comprises 15-20% of all adult leukemia cases, with a slightly higher incidence in males compared to females. It is a disease of octogenarians but may occur in any age; the risk of developing the disease increases with age and the median age at presentation is 53. Exposure to high doses of ionizing radiation is known to be the major risk factor and genetic mutations may be a predisposing factor.[10]

Clinical manifestations of CML depend on the phase of the disease at the time of diagnosis: chronic phase, accelerated phase, or blast crisis. Approximately 20-50% of patients are asymptomatic at the time of diagnosis and clues to the disease are found in the peripheral blood. Symptoms, when present, include fatigue, malaise, weight loss, excessive sweating, bleeding tendency, and abdominal fullness. Laboratory findings in CML include white blood cell counts in the 100,000 micro/L range with predominance of the neutrophilic cell line. Bone marrow aspiration and biopsy show granulocytic hyperplasia with features consistent with the peripheral blood. Ninety to 95% of CML patients have evidence of the Philadelphia chromosome. The remainder have the BCR-ALB1 fusion gene, or its product, BCR-ALB1 fusion mRNA. Several other medical conditions may mimic CML and must be differentiated to determine the appropriate treatment and prognosis. The differential diagnosis includes leukemoid reactions, juvenile myelomonocytic leukemia, chronic myelomonocytic leukemia, atypical CML, chronic eosinophilic leukemia, chronic neutrophilic leukemia, and other hematologic neoplasms. The strongest predictor of prognosis is the stage at which CML is diagnosed: the chronic phase has a much better prognosis compared to the acute phase or blast crisis.[10]

Treatment options include potential cure with allogeneic bone marrow transplant, disease control with tyrosine kinase inhibitors (TKI), and palliative therapy with cytotoxic agents. The treatment of choice for the majority of patients in the chronic phase of CML is a TKI, such as imatinib mesylate. Approximately 8% of patients in the chronic phase are either resistant or intolerant to treatment with imatinib mesylate. Monitoring of residual disease after treatment is a key component in managing patients with CML.[11] The prognosis for these patients is better than in the 1970s and 1980s, but the median survival still is only 2.5 to 5.0 years after diagnosis.[2]

Hairy cell leukemia

Hairy cell leukemia is an uncommon neoplastic proliferation of B lymphocytic cells that is similar to CLL but the cell has larger cytoplasm with “hairy projections”. It represents 2% of all leukemias.

It is now considered to be an indolent non-Hodgkin lymphoma. Its prevalence is higher in males with a male to female ratio of 4:1 with a median age of 52. It is three times more prevalent in Caucasians than African-Americans. Predisposing factors are not completely understood, but possible causes include exposure to ionizing radiation, Epstein-Barr virus, and organic chemicals.[12]

Patients with hairy cell leukemia may be asymptomatic or present in various ways including splenomegaly, pallor, ecchymosis, weakness, fatigue, or infections. Diagnostic tests may show a characteristic peripheral blood smear with "hairy cells" (usually < 20% of circulating white cells), hyper or hypo cellularity of the bone marrow (the latter causing fibrosis), and pancytopenia.[12] Asymptomatic individuals do not require immediate treatment and can often be observed. Treatment is initiated when they become symptomatic. The first-line treatment option is cytotoxic chemotherapy with purine analogs such as cladribine (2-CdA) and pentostatin. Other treatment options include splenectomy and interferon.[13] Life expectancy has greatly improved with this disease; newer therapies have led to overall survival rates greater than 95% at four years.[2]

Patients with a prior history of ALL or AML will be the most common in our active duty aviation personnel, but any form of leukemia may be encountered.

II. Aeromedical Concerns.

Most of the leukemias present with symptoms of fatigue, lethargy and malaise associated with infections, anemia and/or hemorrhage. Other signs and symptoms may develop as the disease progresses and affect other parts of the body, such as abdominal discomfort due to splenomegaly. Disseminated intravascular coagulation is a common complication of ALL and a sub-set of AML and can cause sudden, fatal hemorrhage or disabling bone pain. Relapse of all leukemias can present with mild to severe CNS symptoms.

Radiation therapy for the treatment of leukemia is not a significant treatment modality except for the prevention of CNS relapse. Prophylactic CNS radiation in cases of ALL can produce leukoencephalopathy with ataxia and confusion. The long-term complications of brain irradiation include seizures, microangiopathy, endocrine abnormalities with growth hormone deficiency and thyroid problems, brain tumors, obesity, osteopenia, cataract, dental problems, and when given to very young patients, cognitive impairment.[5] Spinal cord radiation can result in transient myelopathy, a self-limited condition that is characterized by L'hermitte's sign due to transient demyelination of the spinal cord.[14]

Treatment regimens, both chemotherapeutic and CNS irradiation, for virtually all types of leukemia can have a multitude of side effects and complications that degrade performance and safety. Ongoing therapy is not compatible with a waiver.

III. Waiver Consideration.

A history of leukemia requires a MEB before aeromedical disposition and is disqualifying for all classes of flying. Waiver consideration should be delayed until at least one year following completion of active treatment. The patient must be asymptomatic and in remission. Due to the heterogeneity of disease and the multitude of factors affecting prognosis and risk, waivers are evaluated on a case-by-case basis. Waiver is unlikely to be granted following allogenic bone marrow transplant.

Table 1: Waiver potential for Leukemia for FC I/IA, II and III.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	All forms of Leukemia	Yes#† AETC&$	Yes
II, III, ATC/GBC, SMOD, and UAS Sensor Operator	All forms of Leukemia	Yes+*† MAJCOM&$	Yes

For FC I/IA individual waiver may be considered after 5 years of remission, asymptomatic.
+ For trained FC II, III, ATC/GBC, SMOD, and UAS Sensor Operator individuals, waiver may be considered 12 months after treatment completed, in remission, and asymptomatic.
* For untrained FC II, III, ATC/GBC, SMOD, and UAS Sensor Operator individuals, waiver may be considered after 5 years of remission.
& AFMSA is the ultimate authority for all cancers, but the case is to be submitted initially to the MAJCOM
† No indefinite waivers
$ All initial waivers requests will be routed to AFMSA.

AIMWTS review in October 2012 revealed a total of 26 cases. Six cases were disqualified (1 FC I, 2 FC II, 2 FC III, and 1 SMOD) and 20 were approved for waivers. Five of the six disqualified cases were primarily disqualified due to the leukemia diagnosis or issues related to the diagnosis. The other case was disqualified for anthropometric reasons.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for an initial waiver for leukemia should include the following:
A. History – symptoms, pathology, stage, treatment, including date of last treatment, surveillance plan and activity level.
B. Physical exam – focus on CNS, skin, abdominal and chest exams.
C. Hematology/oncology consults to include the six month and twelve month follow-ups - all consistent with National Comprehensive Cancer Network (NCCN) guidelines for the specific type of leukemia.
D. Labs – all with dates, including bone marrow biopsy.
E. Imaging studies, if obtained.
F. In patients who received prophylactic CNS radiation, a neurology and psychology review is necessary.
G. Tumor board report, military or civilian, if applicable.
H. Medical evaluation board results.

The AMS for a waiver renewal for leukemia should include the following:

A. History – interim history since last waiver request to include any recent or planned therapy.
B. Physical exam – see above physical exam elements.
C. Hematology/oncology consults.
D. Labs – all test results since previous waiver.
E. Imaging studies since last waiver, if done.

ICD-9 codes for leukemia	
204-208 (range) 204 205 206 207 208	All leukemias Lymphoid leukemias Myeloid leukemias Monocytic leukemias Other specified leukemias Leukemia NOS
204.0	Acute lymphoblastic leukemia
205.0	Acute myelogenous leukemia
204.1	Chronic lymphocytic leukemia
201.1	Chronic myelogenous leukemia
202.4	Hairy cell leukemia

ICD-10 codes for leukemia	
C91.91	Lymphoid leukemia, unspecified, in remission
C92.91	Myeloid leukemia, unspecified, in remission
C93.91	Monocytic leukemia, unspecified, in remission
C94.81	Other specific leukemias, in remission
C95.91	Leukemia, unspecified, in remission
C91.11	Chronic lymphocytic leukemia of B-cell type in remission
C92.11	Chronic myeloid leukemia, BCR/ABL-positive, in remission
	Hairy cell leukemia, in remission

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WAIVER GUIDE
Updated: May 2014
Supersedes Waiver Guide of Aug 2010
By: Lt Col Niraj Govil (RAM XV) and Dr. Dan Van Syoc
Reviewed by Col Pat Storms, RAM and gastroenterologist

CONDITION:
Liver Function Testing (Transaminases) and Gilbert's Syndrome (May 14)

I. Overview.

Liver function tests are the markers of diseases that may have aeromedical implications. Abnormal liver function tests alone are not disqualifying, but the diseases that manifest the abnormal tests may well be. The following topics in the AF Medical Standards Directory (MSD) relate specifically to liver disease: history of viral hepatitis, with carrier state, persistent aminotransferase (previously termed "transaminase") elevation or evidence of chronic active or persistent hepatitis, marked enlargement of the liver from any cause including hepatic cysts. Drugs are a relatively common cause of liver insult, which usually is recognized as abnormalities seen with serum liver testing. At least 300 agents have been implicated in drug-induced liver injury.[1] In addition, among tens of thousands of chemical compounds in commercial and industrial use, several hundred are listed as causing liver injury by the National Institute for Occupational Safety and Health (NIOSH), as published in their most recent Pocket Guide to Chemical Hazards.[2]

Aminotransferases (AST/ALT) and gamma glutamyl transpeptidase (GGT) are sensitive indicators of hepatocellular injury due to their abundance in hepatocytes. Normal range is generally 30-40 U per liter, but varies widely among laboratories. They are released into the bloodstream in increasing amounts when the liver cell membrane is damaged. Most common causes of elevated aminotransferase levels are: alcohol, chronic viral hepatitis, autoimmune hepatitis, hepatic steatosis and steatohepatitis, hemochromatosis, toxins, drugs, ischemia, Wilson's disease, alpha-1 antitrypsin deficiency, and (more recently recognized) celiac sprue. An AST to ALT ratio of > 2:1 should raise concern about alcohol injury. With a ratio of 3:1, 96% of patients in one study were confirmed to have alcoholic liver disease.[3] Ratios of AST/ALT of > 5, particularly if the ALT is normal or only slightly elevated, may be seen in rhabdomyolysis or strenuous exercise, a situation that may well be encountered in a military training or deployed environment.[4]

Gamma glutamyl transpeptidase (GGTP) is found in the cell membranes of a wide distribution of tissues including liver (both hepatocytes and cholangiocytes), kidney, pancreas, spleen, heart, brain, and seminal vesicles. It is present in the serum of healthy persons. Serum levels are not different between men and women and do not rise in pregnancy. Although an elevated serum GGTP level has high sensitivity for hepatobiliary disease, its lack of specificity limits its clinical utility. The primary use of serum GGTP levels is to identify the source of an isolated elevation in the serum alkaline phosphatase level, since GGTP is not elevated in bone disease.

Any diagnostic evaluation must begin with repeating the suspect liver function tests to confirm that an abnormality does indeed exist. The history and physical are very important in narrowing the focus of the investigation and preventing a "shotgun" approach that may raise more questions than it answers. Abstinence from alcohol is required in any patient being evaluated for abnormal liver function tests, and this must be specifically addressed with the aviator. Careful attention to

medications and environmental/toxic exposures may prevent the frustration of a long and expensive workup. Almost any medication can cause elevation in liver enzymes, with common offenders including NSAIDs, antibiotics, HMG CoA reductase inhibitors, and anti-tuberculous drugs.[5] Therefore, stop current medications, whenever possible, and remove the individual from known toxic/environmental exposure sources; then assess the impact on the abnormal liver tests. This simple maneuver may answer the diagnostic questions without the need for additional testing. Most liver specialists would agree that persistent elevation of serum ALT for greater than six months is an indication to begin an investigation.[6]

Hepatic steatosis ("fatty liver") is a common cause of aminotransferase elevation, and is unlikely to progress to cirrhosis. Weight loss is the most important aspect of treatment in obese aviators. Such fatty infiltration can often be detected by sonography, and rarely leads to aminotransferase elevations beyond four times the normal value. In steatosis, the AST/ALT ratio is at or less than 1:1. When weight loss does not result in normalization of aminotransferase levels, non-alcoholic steatohepatitis must be considered. This condition is more serious than simple hepatic steatosis, and may progress to cirrhosis. Liver biopsy is indicated for its specific diagnosis.

A 1998 report of sprue as the cause for chronically elevated aminotransferases in 13 of 140 asymptomatic patients suggests that screening for sprue with antigliadin antibodies could be valuable if more common causes of aminotransferase elevations have been excluded.[7] Occasionally, aminotransferases can be of extra-hepatic origin, as may be the case in rhabdomyolysis. Markedly elevated CPK measurements may suggest a muscular origin of elevated aminotransferases. While severe rhabdomyolysis may cause the appearance of an acute elevation of aminotransferases, it is highly unlikely to be a cause of chronic aminotransferase elevation.

The routine measurement of serum iron/iron-binding capacity (Fe/TIBC), ceruloplasmin, and serum protein electrophoresis in patients with demonstrated aminotransferase elevations and no clear history to suggest a specific etiology may seem like a "shotgun" approach, but the conditions in question are often difficult to detect without specific testing, and each has significant long-term implications with respect to the development of cirrhosis. A transferrin saturation of > 45% suggests hemochromatosis; the ceruloplasmin, if low, suggests Wilson's disease; and the lack of a peak alpha-globulin band on SPEP suggests alpha-1 antitrypsin deficiency. Positive antinuclear antibodies (ANA) may indicate a diagnosis of autoimmune hepatitis.

In those individuals with no firm diagnosis in spite of hepatic sonography and the battery of blood tests discussed above, focus must shift to a discussion of the need for liver biopsy and the functional status of the aviator's liver. With aminotransferases less than twice normal and well-preserved hepatic function, liver biopsy is not currently recommended.[5] Where aminotransferases exceed twice normal, liver biopsy may be considered to assess the extent and severity of hepatic inflammation, and of any fibrotic or cirrhotic changes. Liver biopsy should only be performed after consultation with a gastroenterologist/hepatologist. Although a liver biopsy may change the final diagnosis in some patients with nonspecific asymptomatic liver test abnormalities, modifications in management are usually minor.[8] In addition, liver biopsy has several well-documented drawbacks, including sampling error, variability in pathologist interpretation, cost, and morbidity. Serious complications have been noted in 0.3% of cases and mortality in 0.01%.[9] One group in Cleveland has advocated for expectant clinical follow-up as the most cost-effective strategy in the management of asymptomatic patients with negative viral, metabolic and autoimmune markers in patients with chronically elevated aminotransferase levels.[10]

Imaging techniques are being used more frequently in the early assessment of suspected liver disease. Ultrasound is typically the first-line imaging modality used in the assessment of liver function test abnormalities. CT and MRI are now being used more frequently if non-alcoholic steatohepatitis (NASH) is a suspected cause of the liver function abnormalities. A novel variation on traditional ultrasonography is the use of transient or dynamic elastography to detect hepatic fibrosis. This technique analyzes the axial propagation of a transient, mechanically generated shear wave through the liver, a process that is related to tissue elasticity or stiffness. A proprietary device called the FIBROSCAN has been studied as a non-invasive method to determine liver elasticity, and thereby to predict the presence of cirrhosis.[11] Additional studies will be needed to validate the utility of this new technique in the assessment of patients with abnormal liver function tests.

Evaluation of abnormal aminotransferases also requires assessment of hepatic function. Demonstration of well-preserved hepatic function demands no history of encephalopathy, a physical exam free of stigmata of chronic liver disease (angiomata, palmar erythema, ascites, truncal wasting), and blood tests demonstrating preserved hepatic function. Such testing should include a normal prothrombin time, normal CBC with platelet count, and normal serum albumin. A radionuclide liver/spleen scan may add additional information when assessing liver function, since the scan can indicate overall intensity of the liver image and shunting of activity to the spleen.

While the gamma-glutamyltransferase (gamma-GT) level is so nonspecific as to provide little insight when ordered as a stand-alone test, it can be very useful when combined with other blood tests. A gamma-GT greater than two times normal in the face of an elevated AST/ALT ratio strongly suggests alcohol as the etiology of the elevated LFTs. As mentioned previously, it may also be useful in confirming the hepatic origin of an elevated alkaline phosphatase level.

A recommended test battery for patients with abnormal aminotransferases and no specific diagnosis implicated by history or physical examination consists of: AST/ALT (repeat); GGT if AST > 2X ALT; hepatitis C serologies (Hep C antibody with Hep C PCR if antibody positive); hepatitis B serologies (Hep B Surface Antigen, IgM Hep B Core Antibody); hepatitis A serology (Hep A antibody); Fe/TIBC, ferritin; ceruloplasmin; serum protein electrophoresis; hepatic sonogram (to look for ductal abnormalities or fatty infiltration); prothrombin time; CBC with platelet count; and serum albumin.

In 1901, Gilbert and Lereboullet described a syndrome of chronic, benign, intermittent jaundice, characterized by mild hyperbilirubinemia in the absence of bilirubinuria or signs or symptoms of liver disease. Gilbert's syndrome is also known as low-grade chronic hyperbilirubinemia , and is the most common of the hereditary hyperbilirubinemias (Gilbert's syndrome, Type I and Type II Crigler-Najjar syndrome, Dubin-Johnson syndrome, and Rotor's syndrome) with a genotypic prevalence of $\leq$12% and a phenotypic prevalence of $\leq$7%.[12] The fact that Gilbert's syndrome is most often recognized in the second or third decades of life and rarely diagnosed before puberty appears to be attributable to pubertal changes in the plasma bilirubin concentration.[12] In older subjects, the diagnosis is made most often after routine screening blood tests or when fasting associated with surgery or concomitant illness unmasks the hyperbilirubinemia. Gilbert's syndrome results from defective conversion of unconjugated bilirubin to bilirubin mono- and diglucuronides by a specific UDP-glucuronosyltranferase isoform designated UGT1A1 encoded on the UGT1 gene complex. Patients with Gilbert's syndrome have 10-33% of normal UGT1A1 enzymatic

functioning and accounts for the typically low-level hyperbilirubinemia (1.5 to ~4 mg/dl). Despite earlier evidence to the contrary, Gilbert's syndrome is inherited as an autosomal recessive trait.[13]

The hyperbilirubinemia in Gilbert's is mild, with plasma bilirubin levels most often less than 3mg/dl. Considerable daily fluctuation may be seen with stress, fatigue, alcohol ingestion, and concurrent illness. The plasma bilirubin may be normal on occasion in up to one-fourth of patients. Bilirubinuria is absent since the plasma bilirubin is virtually all unconjugated. Most patients with Gilbert's are asymptomatic and are unaware of the abnormality until it is detected by incidental laboratory examination or in the course of family studies. Other patients may have a variety of nonspecific symptoms, including vague abdominal discomfort, fatigue, or malaise. In general, these symptoms do not correlate with the plasma bilirubin level.

The diagnosis of Gilbert's syndrome is a diagnosis of exclusion suggested by the clinical finding of mild, chronic, unconjugated hyperbilirubinemia. Conventional hepatic biochemical tests are normal.[14] A family history should be sought and evidence of other hepatic or hematological disorders, including hemolysis, excluded. Pertinent history of jaundice should include duration and previous attacks of jaundice, pain, fever, chills, or other systemic symptoms, itching, exposure to drugs (prescribed and illegal), biliary surgery, anorexia or significant weight loss, color of urine/stool, contact with other jaundiced patients, history of blood transfusions, and occupation. Caution must be exercised to eliminate the possibility that the chronic unconjugated hyperbilirubinemia is not due to some acquired disease state, such as cardiac disease, fatty liver and alcoholism, cirrhosis, biliary tract disease, viral hepatitis, malignant tumors, infections, portocaval shunts, or thyrotoxicosis. Elevated bilirubin also may be present in people living at high altitudes. Confirmed Gilbert's syndrome is usually benign in nature with an excellent prognosis. Since hyperbilirubinemia in Gilbert's may be exacerbated by fasting, it is common that a fasting chemistry profile may uncover a latent Gilbert's patient. Drawing a repeat bilirubin level on the well-hydrated (non-fasting) patient will often ease concerns caused by identification of an isolated elevation of the serum bilirubin, and avoid costly follow-up testing.

II. Aeromedical Concerns.

As noted above, abnormal LFTs are not of themselves disqualifying. The underlying etiology of the aminotransferase elevations must be diagnosed. Since the MSD lists "impairment of liver for any reason, if chronic and/or requiring ongoing specialty follow-up" as disqualifying, most diagnoses discussed above are disqualifying. Of the diagnoses listed, steatosis, drug-induced hepatitis, and alcohol-related liver injury are all potentially "curable". Chronic hepatitis, hemochromatosis, Wilson's disease, alpha-1 antitrypsin deficiency, autoimmune hepatitis, and sprue are chronic diseases with unique waiver concerns. Waiver consideration requires a firm diagnosis; once a diagnosis is made, the safety issues related to an individual so afflicted in the aerospace environment can be evaluated.

Most patients with Gilbert's syndrome are asymptomatic and should not experience problems with sudden incapacitation or mission completion. A few may experience a variety of nonspecific symptoms, including vague abdominal discomfort, nausea, diarrhea, constipation, fatigue, or malaise and will need to be individually assessed as to whether performance may be affected. If the hyperbilirubinemia is sufficiently elevated, cholelithiasis is possible.

III. Waiver Consideration.

Chronic liver disease is disqualifying for all flying classes including ATC/GBC or MOD personnel. For abnormal liver function tests, waiver consideration will hinge on the specific diagnosis and the functional hepatic capacity, as described above. The specific disqualifying diagnoses should be the focus of waiver package preparation. The initial waiver request should address, in a comprehensive manner, the diagnostic testing resulting either in a specific diagnosis, or the exclusion of other diseases to result in a diagnosis of "abnormal liver function tests of unclear etiology". Re-evaluation requests should focus on any new testing that could reveal a diagnosis not previously made (if appropriate), or that testing which demonstrates stability of hepatic function over time. Congenital hyperbilirubinemia diseases, i.e. Gilbert's, are not disqualifying if the patient is asymptomatic; no waiver is required. If an individual has Gilbert's syndrome with symptoms then a waiver would be required and an internal medicine or gastroenterology consult is recommended.

Table 1: Waiver potential for abnormal liver function tests and Gilbert's Syndrome

Flying Class (FC)	**Condition**	**Waiver Potential** **Waiver Authority**
I/IA	Liver Impairment	Yes AETC
II* III*	Liver Impairment	Yes MAJCOM*
ATC/GBC	Liver Impairment	N/A-not disqualifying
MOD	Liver Impairment	N/A-not disqualifying

* AETC is waiver authority for initial certification for FC II and FC III

AIMWTS review in February 2014 resulted in 34 aviators with a waiver submitted for liver disease that included abnormal liver functions tests; 5 of these cases resulted in a disqualification disposition, none of which were attributable to the abnormal lab tests. There were 12 additional aviators with a waiver submitted for Gilbert's syndrome; 2 were disqualified for diagnoses other than the Gilbert's.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for liver disease with abnormal liver function tests should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of any diagnosed liver disease and abnormal liver function testing to include any family history of liver diseases.
C. Labs: all liver function test results, CBC, hepatitis profile. For Gilbert's, also need a reticulocyte count, as well as unconjugated and conjugated bilirubin levels.
D. Imaging: all results of any performed imaging tests.

E. Consultation from a gastroenterologist or internal medicine specialist.

The AMS for waiver renewal for liver disease with abnormal liver function tests should include the following:
A. Interval history from past waiver request with any pertinent updated information.
B. All applicable labs and imaging tests as in the initial aeromedical summary.
C. Consultation from a gastroenterologist or internal medicine specialist.

ICD-9 codes for abnormal liver function tests	
790.4	Nonspecific elevation of levels of aminotransferase or lactic acid dehydrogenase [LDH]
790.6	Other abnormal blood chemistry
277.4	Disorders of bilirubin excretion

ICD-10 codes for abnormal liver function tests	
R74.0	Nonspecific elevation of levels of aminotransferase or lactic acid dehydrogenase [LDH]
R79.89	Other specified abnormal findings of blood chemistry
E80.7	Disorder of bilirubin metabolism, unspecified

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WAIVER GUIDE
Updated: Mar 2015
Supersedes Waiver Guide of Jan 2011
By: Capt Vanessa Pearson (RAM 16) and Dr Dan Van Syoc
Reviewed by: LtCol Nicholas Conger, AF/SG consultant in Infectious Diseases

CONDITION:
Lyme Disease (Mar 15)

I. Overview.

Lyme disease is the most common tick-borne disease in the United States (U.S.).[1, 2] In North America, it is caused exclusively by the spirochete *Borrelia burgdorferi* whereas in Europe it is caused by *B. afzelii*, *B. garinii*, *B. burgdorferi*, and occasionally by other species of borrelia.[2] It occurs worldwide and has been reported on every continent except Antartica.[1] Lyme disease surveillance in the U.S. began in 1982 at the Centers for Disease Control (CDC) and became a nationally reportable disease in 1991. In the U.S., the number of reported cases has been steadily increasing from over 11,700 cases/year in 1995 to almost 30,000 cases/year in 2009. Since 2009, the number of cases decreased to less than 25,000 in 2010, 2011, and 2012, but there was an increase again in 2013 to more than 27,000 (these numbers only reflect the number of confirmed cases not the number of probable cases).[3] In 2013, the highest number of confirmed Lyme cases were in Pennsylvania (4,981), Massachusetts (3,816), New York (3,512), New Jersey (2,785), and Connecticut (2,111).[4] In the Northeastern and North-central U.S., the black-legged tick (or deer tick, *Ixodes scapularis*) transmits Lyme disease and in the Pacific coastal U.S., the disease is spread by the western black-legged tick (*Ixodes pacificus*). A cluster of cases identified in 1975 had their epidemiological epicenter in Lyme, Connecticut, for which the disease was named.[5] Documentation of this disease dates back to 1883 in Breslau, Germany by a physician named Alfred Buchwald. He described an expanding, ring like lesion now known as erythema migrans (EM), the most common symptom associated with early Lyme disease, and speculated that the rash came from the bite of an *Ixodes* tick.[6]

Three distinct foci occur in the United States: the Northeast (Maine to Maryland), the North Central (Wisconsin and Minnesota) and the West (northern California and Oregon). In Europe, most cases occur in the Scandinavian countries and in central Europe (Germany, Austria, and Switzerland), although cases have been reported in the United Kingdom (South Downs and New Forest areas).[7] Other prevalent worldwide locations include Russia, China and Japan.[8]

The ticks have larval, nymphal and adult stages, each stage requiring a blood meal. In the Northeast and North Central U.S., an efficient cycle of infection of *B. burgdorferi* between nymphal ticks and white footed mice yields a high frequency of infection during the spring and summer months in humans. An abundance of deer, the adult ticks' preferred host, fulfill a similar role in the Northeast. *I. scapularis*, also known as *I. dammini*, serves as the tick vector.[8] The principle vector in the Northwestern U.S. is *I. pacificus*. The frequency of human infection is relatively low in the Northwest, as *I. pacificus* tends to feed on lizards, which are not susceptible to the infection, and only occasionally feed on the dusky-footed woodrat while in the larval stage. In Europe and Asia the principal vectors include *I. ricinus* and *I. persulcatus*, respectively, which also serve as vectors of tick-borne encephalitis virus.[9]

Even though the likelihood of infection is twice as high in adult ticks than in the nymphal stage, most cases of transmission of early Lyme disease occur in the spring and summer months when the nymph is seeking a blood meal. Adult ticks are much larger and easier to identify and remove prior to transmission of infection. Animal studies confirm that approximately 36 - 72 hours are required for transmission of the infection to the animal host once the tick has attached itself to the host. During this time spirochetes in the midgut of the tick multiply and migrate to the tick's salivary glands, in preparation for transmission to the animal host.[5, 10] Only ticks that are partially engorged with blood are associated with the development of EM at the site of the bite.[10]

Active Lyme disease occurs in three broad stages. The clinical symptoms of each stage may overlap. Individuals may also present in a later stage without presenting with symptoms of an earlier stage.[9, 11] In addition, there is a post-Lyme disease syndrome the practitioner should be aware of the includes nonspecific symptoms such as headache, fatigue, and joint pain that may linger for months.[11] The most common clinical manifestation of the first phase is EM.[2] EM occurs between 3 and 30 days, although it most commonly develops between 7 and 14 days. In the U.S., EM (single or multiple) is found in about 90% of patients with objective evidence of infection with *B. burgdorferi*.[12] This lesion is usually greater than or equal to 5 cm in diameter, often with a central clearing, bull's-eye or target like appearance. Approximately 45 percent of patients with EM have spirochetemia which is not related to the size or duration of the presenting skin lesion.[5] Hematogenous dissemination from the primary infection site may yield secondary lesions.

Lyme disease has a myriad of dermatologic, neurologic, cardiac, and musculoskeletal manifestations. The most common symptoms during the primary stage often resemble those of a viral infection, including myalgias, arthralgias, fatigue, headache, neck pain and possible fever. Rarely, respiratory, gastrointestinal or ocular complaints such as conjunctivitis, iritis, and keratitis may be reported.[2, 5, 13] EM spontaneously resolves in approximately four weeks without treatment.[8] Given these vague initial symptoms, this represents a challenge in early detection and initial treatment.

The second stage is manifested by dissemination of the disease within days up to 10 months following the initial tick bite.[9, 11] It is associated with hematogenous spread of the spirochete to extracutaneous sites. Treatment at this stage helps to prevent later problems associated with Lyme disease.[11] Sixty percent of untreated patients with EM will progress to mono or oligoarticular arthritis, usually involving the knee. Ten percent will manifest with neurologic complications, the most common of which is facial-nerve palsy. Neurologic involvement may occur within weeks. Acute neuroborreliosis may develop in up to 15 percent of untreated patients in the U.S. Potential manifestations include lymphocytic meningitis with episodic headache and mild neck stiffness, subtle encephalitis with difficulty with mentation, cranial neuropathy (particularly unilateral or bilateral facial palsy), motor or sensory radiculoneuritis, mononeuritis multiplex, cerebellar ataxia or myelitis.[9] In children blindness may result secondary to increased intracranial pressure on the optic nerve.[9] Acute neurologic abnormalities spontaneously improve or resolve over a period of weeks or months, even in untreated patients. Cardiac involvement may occur several weeks after the initial onset. Approximately five percent of untreated patients experience cardiac involvement, to include atrioventricular block, acute myopericarditis, mild left ventricular dysfunction and rarely cardiomegaly or fatal pancarditis.[9, 11]

The third stage includes late disease which may occur months to years following the initial tick bite.[9, 11] In some individuals, symptoms at this stage may be the first symptoms of the disease.[11]

Individuals experiencing joint involvement may sustain several brief attacks of arthritis with the potential for persistent joint inflammation. In up to 10 percent of cases, the arthritis may persist for months or years despite 30 days of intravenous (IV) or 60 days of treatment with oral antibiotics.[5] Large joints, especially the knee are susceptible, presenting with joint swelling and pain which is thought to be mediated by the immune response by the spirochete in the joint.[13] Up to five percent of untreated patients may experience chronic neuroborreliosis. This may occur after long periods of latent infection. In the U.S. and Europe, a chronic axonal polyneuropathy may develop manifesting as spinal radicular pain or distal paresthesia. In Europe, chronic encephalomyelitis may occur. It is most often characterized by spastic paraparesis, cranial neuropathy or cognitive impairment with marked intrathecal production of antibodies against the spirochete. In the U.S., Lyme encephalopathy, a mild, late neurologic syndrome with subtle cognitive disturbances, has been reported.[8]

Diagnosis in the U.S. is usually based on the recognition of the characteristic clinical findings, a history of exposure in an area where the disease is endemic and except in patients with erythema migrans, an antibody response to *B. burgdorferi* by enzyme-linked immunosorbent assay (ELISA) and Western blotting. IgM antibody titers during the first month of infection are unreliable. IgG antibody responses are prevalent in most patients infected for one month. Even with antibiotic treatment, IgM and IgG titers may persist for many years.[8]

Treatment recommendations during the first stage of Lyme disease include: doxycycline 100 mg twice daily for adults; amoxicillin 500 mg three times daily for adults; or cefuroxime axetil 500 mg twice daily for adults. The duration of therapy has traditionally been three weeks, although some studies suggest that a 10 to 14 day duration of therapy may be as effective.[14] Doxycycline is not recommended for children under 8 years of age or for pregnant or lactating women. Individuals with chronic musculoskeletal pain, neurocognitive symptoms or both that persist after antibiotic treatment for well-documented Lyme disease may have considerable impairment in their health-related quality of life. However further treatment with an extended (90 day) course of antibiotics in a controlled clinical trial in individuals without evidence of persistent infection by *B. burgdorferi* received no added benefit over those who received placebo. A substantial increase in the risk of morbidity and even death in patients secondary to extended antimicrobial therapy was noted in this study.[15]

Second (early disseminated) and third (late) stages of Lyme disease may be treated with intravenous (IV) ceftriaxone, a third generation cephalosporin. Recommended dosages include 2 g once daily in adults. Similarly, cefotaxime 2 g every eight hours is also recommended in adults. Additionally, penicillin G divided into doses given every four hours in patients with normal renal function may be effectively used. Eighteen to 24 million units per day in adults is the recommended dosage. Recommended duration of IV therapy is two to four weeks. Four weeks is the current standard in many communities, although there is no evidence to support greater efficacy of four versus two weeks. There is also no evidence that treating for more than four weeks is beneficial. However, a 28-day course is preferred if the patient suffers from facial nerve palsy that has not resolved within 14 days.[14]

Prevention may be accomplished through avoidance of tick-infested areas, wear of protective clothing, the use of repellents and acaricides, tick checks and modifications of landscapes in or near residential areas.[8] In December 1998, GlaxoSmith- Kline gained U.S. Food and Drug Administration approval for a *B. burgdorferi* outer surface protein A (OspA)-based Lyme disease

vaccine, LYMErix.[16] The efficacy was 49 percent after two injections and 76 percent after three injections.[8] The vaccine, however, was voluntarily withdrawn from the market because of poor sales.[16] Antimicrobial treatment within 72 hours of a tick bite with a single 200 mg dose of doxycycline has been suggested as effective prophylaxis against the development of Lyme disease. Although a study reported an efficacy of 87 percent, it was limited by the number of participants in whom Lyme disease developed, resulting in a wide 95 percent confidence interval. This study is in direct contrast to other studies demonstrating no clear protection attributable to antimicrobial prophylaxis administered after a tick bite.[10] Regardless, it may be prudent in aircrew to consider doxycycline prophylaxis within 72 hours of a tick bite from an endemic area to preclude progression of possible Lyme disease, since doxycycline is an approved aircrew medication after ground testing.

II. Aeromedical Concerns.

The symptoms during primary Lyme disease, including arthralgias, fatigue, headache, neck pain and possible fever are obviously not optimal in the flying environment. As with all infectious diseases, if recognized and treated early with full resolution of symptoms, return to flight status is appropriate. However, if untreated, then aeromedical concerns of this disease are its debilitating effects in regards to the neurologic, cardiovascular, and arthritides that may result. Neurocognitive impairment, cardiac arrhythmias and arthritic pain are all manifestations that could impact the safety of the individual and mission.

III. Waiver Considerations.

Patients should be DNIF while symptomatic and under treatment. Once all symptoms of the disease have resolved, the aviator can be returned to status without a waiver (true for all aviation classes). Lyme disease is not mentioned by name as disqualifying for any aviation class, but the residual symptoms mentioned above may require a waiver. In these cases, waiver for flying classes I/IA, II, and III, as well as for RPA Pilot, ATC/GBC and MOD personnel may be considered, depending on the success of the therapy. An ACS review of cardiologic or neurologic complications is recommended.

Table 1: Waiver potential for Lyme disease

Flying Class	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Stage II and III Lyme disease with complications or residual symptoms	Yes* AETC	Yes
II/III RPA Pilot	Stage II and III Lyme disease with complications or residual symptoms	Yes* MAJCOM	Yes
ATC/GBC	Stage II and III Lyme disease with complications or residual symptoms	Yes* MAJCOM	Yes
MOD	Stage II and III Lyme disease with complications or residual symptoms	Yes* AFGSC	Yes

*FC I/IA candidates and all other initial training candidates need to be totally disease and complication free for at least 12 months prior to waiver consideration. Waiver authority in such cases is AETC for all except MOD personnel which is AFGSC.

Review of the AIMWTS data base through Nov 14 revealed a total of 8 cases submitted for waiver consideration with the diagnosis of Lyme disease. There was 1 FC I case, 4 FC II cases, 2 FC III cases, and 1 MOD case. All were granted waivers except for the MOD case which resulted in a disqualification for persistent neurological symptoms.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for cardiology involvement should include:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level.
B. Copies of reports and tracings/images of any cardiac tests (e.g. electrocardiogram, echocardiogram, treadmill, Holter monitor, cardiac cath, cardiac CT or MRI) performed locally for clinical assessment (i.e., serial ECGs for uncomplicated 2nd degree AV blocks; serial Holters/echos depending on the level of cardiac involvement to begin with; etc.). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)
C. Any procedure-related reports (e.g. pacers, EP studies, etc.), as applicable.
D. Results of serologic studies.

Note 1: Call ACS to get correct mailing address for all required videotapes and CDs.

For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

The aeromedical summary for neurological involvement should include:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level.
B. Neurology consultation report.
C. Neuropsych testing, as appropriate.
D. Results of serologic studies.

The aeromedical summary for arthritic involvement should include:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level.
B. Rheumatology consultation report.
C. Results of serologic studies.

ICD-9 code for Lyme disease	
088.81	Lyme disease

ICD-10 code for Lyme disease	
A69.20	Lyme disease, unspecified

V. References.

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WAIVER GUIDE
Updated: Apr 2014
Supersedes Waiver Guide of Jan 2011
By: Dr Dan Van Syoc
Reviewed by LtCol Nicholas Conger, AF/SG Consultant for Infectious Disease

CONDITION:
Malaria/Antimalarials (Apr 14)

I. Overview.

The use of antimalarials by aircrew with flight surgeon approval is common because deployments to areas endemic for malaria are frequent. In order to prevent malaria and maintain the health of aircrew, a proper understanding of the disease and of prescribed use of antimalarials is a necessity.

Malaria has been described as far back as 2700 BC in both Chinese and Egyptian writings. It arrived in Rome by 200 BC and had spread throughout Europe during the 12th century. Malaria had spread to the US through the importation of African slaves and by the early 1800s it was found worldwide. Malaria has had a greater impact on world history that any other infectious disease, as it has impacted the outcome of wars, population movements, and the development and decline of various nations.[1]

Malaria in humans is caused by one of five protozoan species of the genus *Plasmodium*: *P. falciparum*, *P. vivax*, *P. ovale*, *P. malariae*, or *P. knowlesi*. Infection from each of these species is transmitted by the bite of an infected female *Anopheles* mosquito, which occurs mainly from dawn to dusk. Hence, most of the prevention measures are directed toward night-time hours.[2] Transmission can occasionally occur by blood transfusion, organ transplantation, needle sharing, or congenitally from mother to fetus.[3] The vast majority of all deaths in travelers from the western world to malaria endemic areas are due to infection with *P. falciparum*.[4, 5]

Malaria is a tremendous global public health concern. Worldwide, malaria causes 350-500 million infections and approximately 1 million deaths annually. It is estimated that up to 40% of the world's population is at risk for acquiring malaria.[6] Approximately 1500 cases of imported malaria are reported annually to the Centers for Disease Control (CDC) and one half to two thirds of these are due to *P. falciparum*.[7, 8] Malaria is one of the top three leading causes of death due to an illness contracted while traveling.[9] Transmission of malaria occurs in large areas of Central and South America, parts of the Caribbean, Africa, Asia (including South Asia, Southeast Asia, and the Middle East), Eastern Europe, and the South Pacific. The risk for a traveler acquiring malaria differs substantially from region to region and from traveler to traveler, even within a single country. In the US, more than 95% of malaria infections occur in travelers, often within the first 30 days after return.[10] Many infectious disease experts feel that fever in a traveler returning from an endemic area is malaria until proved otherwise.[11]

The bite of an infected mosquito transmits sporozoites into the host which then invade the host liver and multiply to form tissue schizonts, which contain thousands of merozoites. Approximately 6-16 days (or longer) after infection, the schizonts rupture and the daughter merozoites invade erythrocytes. It is at this point that the first symptoms appear, though the classic fever, caused by the 48- or 72-hour life cycles of the respective organisms with the red cell, is rare this early in the

infection. The merozoites mature to trophozoites within red cells, and then divide into new daughter merozoites, which are released when the red call ruptures. With *P. vivax* and *P. ovale* infections, some organisms may remain dormant within the liver as hypnozoites, and can cause late relapse months or years after the primary infection. (Primaquine is the only approved drug capable of destroying such latent infections). Neither *P. falciparum* nor *P. malariae* develop hepatic hypnozoites, so late relapses do not occur, though the latter organism can result in an indolent infection that may remain subclinical for prolonged periods.[7, 12]

The first line of defense (primary prevention) for malaria prevention is personal protective measures that include multiple strategies to minimize mosquito bites. The first strategy is to minimize the exposure of bare skin by providing a barrier with clothing or protective equipment. Ideally when wearing clothing in an area with known malaria, the pant legs should be tucked into the boot or sock, sleeves rolled down, and top button closed at the neck. At times when one may not be able to take advantage of the proper use of clothing, protective equipment can be used, such as a permethrin treated mosquito netting over a cot or mattress. The second strategy is to use repellents such as 33% time-released DEET on exposed skin and pre-treat clothing with permethrin. The final strategy is avoidance of the known habitat such as areas of standing water and exposure during peak hours of activity for the mosquito. These personal protective measures are not only important in preventing malarial disease, but are also effective to prevent any other arthropod borne disease. A manual is available at http://www.afpmb.org/coweb/ppm.htm for more details.

Medications: Chemoprophylaxis is not 100% effective in preventing malarial infection and is truly the second line of defense (secondary prevention). These medications will help eliminate any early infection before the disease becomes symptomatic.[13]

Chloroquine phosphate 500 mg (300 mg base) weekly starting one to two weeks prior to exposure and terminating four weeks after departing risk area. Adverse side effects may include nausea, abdominal pain, diarrhea, headache, lightheadedness, pruritus, and fatigue. Currently, resistance to chloroquine in malaria caused by *P. falciparum* is widespread in all areas except for Central America and some regions of southwestern Asia.[14]

Doxycycline 100 mg daily starting one to two days prior to exposure and terminating 28 days after departing risk area. The medication should be taken with the evening meal with a lot of fluid to minimize gastrointestinal side effects and reduce photosensitivity risks. Pill esophagitis is a potential complication. Other adverse symptoms may include nausea, abdominal discomfort, fatigue, and vaginal candidiasis in women.

Malarone 1 tab each day (250 mg atovaquone/ 100 mg proguanil) starting one day prior to exposure and continued for seven days after exposure. One of the advantages to this drug combination is that it does not require the advanced loading and prolonged dosing after travel that other drug choices require.[15] Adverse side effects may include abdominal discomfort, nausea, vomiting, and headache. There is minimal risk of photosensitivity to this medication (unlike doxycycline).

Primaquine is typically used for terminal prophylaxis for areas at risk for *P. vivax* and *P. ovale*. The dose for terminal prophylaxis is 30 mg base (52.6 mg salt), which is two standard tablets, each day started after exposure and for a period of two weeks. Terminal prophylaxis is contraindicated in G-6-PD deficiency. Adverse reactions to primaquine include abdominal discomfort, nausea,

headache, pruritus, interference with accommodation, leukopenia, agranulocytosis, anemia, and methemoglobinemia. In special situations, primaquine can be used for primary prophylaxis with 30mg base daily starting 2 days before through 7 days after exposure. However, this is usually not used due to a higher side effect profile than other chemoprophylaxis agents, the desire to reserve it for terminal prophylaxis and therapy, and because it is not FDA approved for this indication and therefore cannot be AF or DoD policy.

Mefloquine can be used for non-flyers deploying to chloroquine-resistant regions. Dosage is 250 mg once a week beginning two weeks prior to departure and continuing for four weeks after returning to home station. The concern about potential neurotoxic side effects of this drug is the reason that it is unapproved for use in aircrew. If an aircrew member takes this by mistake, then they must remain DNIF for 4 wk, being observed for any neurological or psychiatric side effects.[16] Mefloquine in contraindicated for anyone with significant depression or any other psychiatric history.

Determining need for medication and appropriate regimen:

Our aircrew often deploy at the last minute, can traverse multiple countries over a few days, and also deploy to barren areas with little medical infrastructure. These factors make determining the need for malaria prophylaxis and the appropriate regimen more difficult than for the average traveler. There are currently numerous policies on the need and regimen for malaria prophylaxis. A MAJCOM can have a policy for all their personnel due to the unique nature of their mission. Also, theater commands often set policy in their area. Other sources of guidance include your own Public Health Officer (PHO), the National Center for Medical Intelligence (NCMI), formerly the Armed Forces Medical Intelligence Center, (subscribe at http://www.military-medical-technology.com/mmt-archives/24-mmt-2008-volume-12-issue-5/146-national-center-for-medical-intelligence.html), and the CDC traveler's website at http://www.cdc.gov/travel/regionalmalaria/index.htm.[17] These sources will be vital to determining not only the need for malaria chemoprophylaxis, but also will assist with determining the appropriate regimen. A decision tree is included below to aid flight surgeons.

When determining the need for chemoprophylaxis in an aircrew member it is important to not only consider the area where the exposure will occur, but also the length of time in that area. For example, a flyer may be on the ground in a controlled environment for less than a couple of hours for transload of equipment and have minimal chance of exposure. Also, CENTAF's "Policy on Malaria Chemoprophylaxis" dated Jan 2005 stated that unless a person would be exposed for seven days they would not need prophylaxis in Iraq.[18] When lacking a policy, look at AFMIC and the CDC traveler's site and discuss with your PHO and Senior Flight Surgeon. In addition, Infectious Diseases experts may be locally available for individual or group consultation. May non-military travelers have access to a pretravel clinic that can give similar information on prevention strategies.[11]

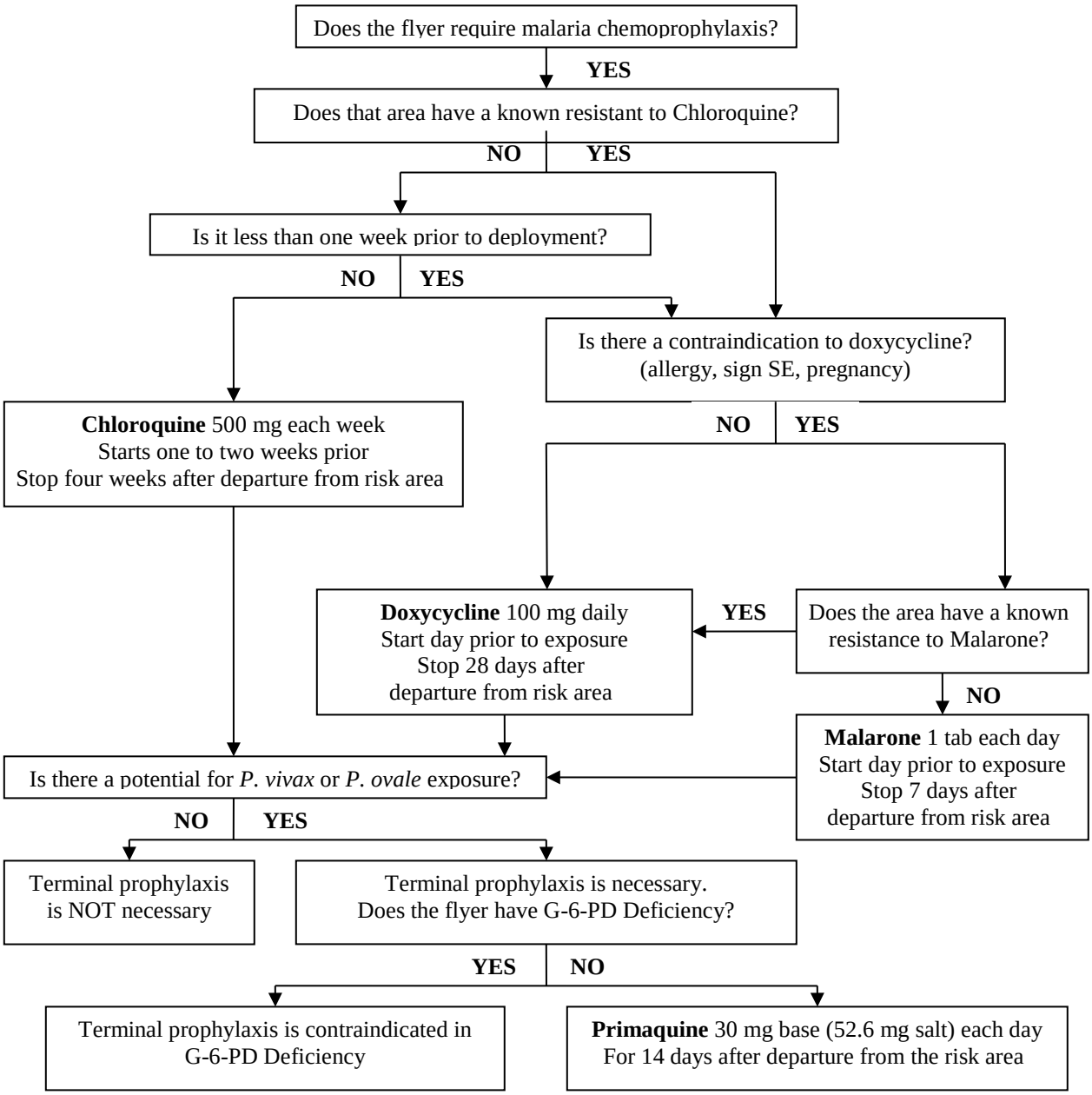
After determining whether a person needs prophylaxis, it is important to determine if the area has chloroquine resistance. Most areas have resistance to chloroquine, but there are still a few that have sensitivity particularly in Latin America and the Middle East. If the area is chloroquine sensitive, chloroquine is the preferred agent of choice. However, it is important to find out if the aircrew member is leaving within the week since it takes at least one week to preload chloroquine for it to be affective for malaria prophylaxis.

If the area is resistant to chloroquine, doxycycline is the first line agent for malaria chemoprophylaxis for aircrew. For individuals with a contraindication to taking doxycycline, such as previous significant allergic reaction, photosensitivity, GI intolerance or pregnancy, Malarone is approved as a second-line agent. Doxycycline and Malarone should be single dose ground tested prior to operational use.

After determining the medication for malaria chemoprophylaxis, it is necessary to determine if terminal prophylaxis is required. Primaquine is affective against the hypnozoite state of *P. vivax* and *P. ovale*. If the area does not have known *P. vivax* or *P. ovale* (such as Haiti and the Dominican Republic), then terminal prophylaxis is not necessary. Another important point is that primaquine is contraindicated in all personnel who are G-6-PD deficient. Thus, G-6-PD status must be documented and reviewed prior to prescribing this medication to any personnel.

One of the major thrusts at this time is development of an effective malaria vaccine. Recent work has been with RTS,S/AS01E in children raised in P. falciparum endemic areas. Efficacy declined with use of this vaccine and with increasing vaccine exposure.[19] More work needs to be done in this area.

Decision Tree for Malarial Prophylaxis in Aircrew



II. Aeromedical Concerns.

There are several medications for malaria prophylaxis per AFI 48-123 available to the flight surgeon, which may be used without removal from flight duty once the potential for idiosyncratic reactions has been excluded. Approved medications include chloroquine phosphate, primaquine phosphate, and doxycycline. Additionally Malarone has recently been approved by AFMSA for use in aircrew as a second-line agent for use when doxycycline is not tolerated. Single dose ground

testing is advised (except doxycycline where a 3-day grounding period is recommended). MEFLOQUINE IS NOT APPROVED FOR AIRCREW. As noted above, if an aircrew takes mefloquine by mistake, the flyer must be placed DNIF for a period of four weeks while being observed for neuropsychological side effects.

III. Waiver Consideration.

Waiver is not required for malaria chemoprophylaxis with approved medications. Aircrew that contract malaria need to be grounded until cured and recovered, without exceptions.

IV. Information Required for Waiver Submission.

N/A

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WAIVER GUIDE
Updated: Apr 2016
Supersedes Waiver Guide of Jul 2015
By: Capt Laura Bridge (ACS Internal Medicine), Dr Christopher Keirns (ACS Internal Medicine), and Dr Dan Van Syoc
Reviewed by: LtCol Jeffrey Bidinger, AF/SG consultant for Dermatology

CONDITION:
Malignant Melanoma (Apr 16)

I. Overview.

Melanoma accounts for just 7% of all dermatological cancers and it is curable in early stages, but it causes 73-80% of all deaths from skin cancer.[1, 2] According to recent data, melanoma is the fifth and sixth most common new cancer diagnosis among men and women in the United States, respectively. In 2014, there were 76,100 new cases of melanoma diagnosed and 9,710 deaths (1.7% of all cancer-related deaths) in the United States.[3] It is also the second leading cause of lost productive years among cancers.[4] The incidence of melanoma continues to climb, with estimated increases of 2-4%, annually.[3] Risk factors for melanoma include family history of melanoma, fair skin, light eyes, red or blonde hair, a predisposition to sunburns, history of extensive sunlight exposure, a history of at least one episode of a severe sunburn before the age of 18 (two- to three-fold increase in risk), a greater number of common nevi, dense freckling, immunosuppression, and advancing age.[3] Melanoma is of particular concern in the aviator population because it is one of the few malignancies that is often diagnosed in young and middle-aged persons. In fact, the incidence of cutaneous melanoma among middle-aged adults increased over the last forty years.[5]

Melanoma is the 3rd leading cause of brain metastasis after lung and breast cancer. Older studies suggested an approximately 13-20% risk of brain metastasis as first site of recurrence among those who eventually relapse.[6, 7] However, a more recent, prospective study of 900 melanoma patients found only a 10% incidence of brain metastasis over the period of the study (Aug 2002-Oct 2008).[8] Similarly, another retrospective review of the medical records of 211 patients who experienced a first recurrence of melanoma after definitive treatment of the initial malignancy demonstrated that 8% presented with the brain as the initial site of involvement.[9] In a study of 81 individuals with brain metastasis, 48% experienced seizures while 21% had seizures as the first manifestation of the brain metastasis.[10] In another study of 702 individuals with clinically significant brain metastasis, initial presentation included 39% with focal neurological symptoms, 13% with seizures, 3% with neurological catastrophes, and 2% with behavioral changes, all of which are of major concern in flight.[11]

Screening for melanoma in high-risk individuals in the primary care setting is considered cost effective and results in earlier diagnosis, which correlates with improved survival.[12] Clinical features used to screen for melanoma include mole **a**symmetry, **b**order irregularity or poor definition, **c**olor variation, **d**iameter larger than 6 mm, and **e**volving features (the ABCDEs). Suspicion is raised when a lesion appears different from other moles or undergoes changes, such as increasing size, asymmetric growth, an irregular pigment pattern or network, development of white, gray, or black areas, bleeding, itching or tenderness within the pigmented lesion.[3]

Excisional biopsy of the entire suspicious lesion should be performed and tissue submitted to pathology. It is of paramount importance to excise the lesion in its entirety and avoid bisecting any suspicious nevus so that an adequate depth can be assessed on pathologic analysis.[3] After melanoma is histologically confirmed, pathologic staging determines prognosis and treatment. The most powerful negative predictors of survival are greater thickness of the lesion, presence of ulceration, and high mitotic index.[13, 14, 15, 16] Other important factors include microsatellite instability, in-transit metastasis, lymph node involvement, and distant metastasis.[16, 17] Additional factors that are generally associated with a worse prognosis but are of less certain significance include anatomic site (trunk location worse than extremities), male gender, histologic subtype, presence of lymphovascular invasion or perineural invasion, and regression of the primary tumor. The presence of tumor-infiltrating lymphocytes shows potentially better survival outcomes.[16] If multiple primary melanomas are present, staging is classified according to the primary lesion demonstrating the worst prognostic features.[18] The characteristics of the primary lesion that are more likely to be associated with CNS metastasis are location of the primary lesion in the mucosal, head, neck or trunk area, acral lentiginous or nodular histologic subtypes, presence of lymph node involvement, or metastatic spread to the viscera.[11]

The 2009 American Joint Committee on Cancer Staging System (AJCC) for Melanoma reflects that the histological features of primary melanoma (thickness, mitotic rate, and ulceration) are important hallmarks for prognosis and staging.[13, 19]

Table 1 & 2 TNM, Clinical and Pathologic Staging[13]

Table 1. TNM Staging Categories for Cutaneous Melanoma

Classification	Thickness (mm)	Ulceration Status/Mitoses
T		
Tis	NA	NA
T1	≤ 1.00	a: Without ulceration and mitosis < 1/mm^2 b: With ulceration or mitoses ≥ 1/mm^2
T2	1.01-2.00	a: Without ulceration b: With ulceration
T3	2.01-4.00	a: Without ulceration b: With ulceration
T4	> 4.00	a: Without ulceration b: With ulceration
N	No. of Metastatic Nodes	Nodal Metastatic Burden
N0	0	NA
N1	1	a: Micrometastasis* b: Macrometastasis†
N2	2-3	a: Micrometastasis* b: Macrometastasis† c: In transit metastases/satellites without metastatic nodes
N3	4+ metastatic nodes, or matted nodes, or in transit metastases/satellites with metastatic nodes	
M	Site	Serum LDH
M0	No distant metastases	NA
M1a	Distant skin, subcutaneous, or nodal metastases	Normal
M1b	Lung metastases	Normal
M1c	All other visceral metastases	Normal
	Any distant metastasis	Elevated

Abbreviations: NA, not applicable; LDH, lactate dehydrogenase.
*Micrometastases are diagnosed after sentinel lymph node biopsy.
†Macrometastases are defined as clinically detectable nodal metastases confirmed pathologically.

Table 2. Anatomic Stage Groupings for Cutaneous Melanoma

	Clinical Staging*				Pathologic Staging†		
	T	N	M		T	N	M
0	Tis	N0	M0	0	Tis	N0	M0
IA	T1a	N0	M0	IA	T1a	N0	M0
IB	T1b	N0	M0	IB	T1b	N0	M0
	T2a	N0	M0		T2a	N0	M0
IIA	T2b	N0	M0	IIA	T2b	N0	M0
	T3a	N0	M0		T3a	N0	M0
IIB	T3b	N0	M0	IIB	T3b	N0	M0
	T4a	N0	M0		T4a	N0	M0
IIC	T4b	N0	M0	IIC	T4b	N0	M0
III	Any T	N > N0	M0	IIIA	T1-4a	N1a	M0
					T1-4a	N2a	M0
				IIIB	T1-4b	N1a	M0
					T1-4b	N2a	M0
					T1-4a	N1b	M0
					T1-4a	N2b	M0
					T1-4a	N2c	M0
				IIIC	T1-4b	N1b	M0
					T1-4b	N2b	M0
					T1-4b	N2c	M0
					Any T	N3	M0
IV	Any T	Any N	M1	IV	Any T	Any N	M1

*Clinical staging includes microstaging of the primary melanoma and clinical/radiologic evaluation for metastases. By convention, it should be used after complete excision of the primary melanoma with clinical assessment for regional and distant metastases.
†Pathologic staging includes microstaging of the primary melanoma and pathologic information about the regional lymph nodes after partial (ie, sentinel node biopsy) or complete lymphadenectomy. Pathologic stage 0 or stage IA patients are the exception; they do not require pathologic evaluation of their lymph nodes.

The primary treatment for all melanomas is wide local excision. Sentinel lymph node biopsy is recommended in any melanoma with high risk features for improved prognostic staging and to guide additional therapy.[3] Systemic adjuvant therapy remains a treatment option for metastatic disease. This includes cytotoxic chemotherapy, immunotherapy, or the combination of both. However, some of these drugs convey significant risk of toxicity with unclear survival benefit.[20]

II. Aeromedical Concerns.

Aeromedical concerns in the case of treated malignant melanoma center on both the risk of an in-flight incapacitating event and the risk of subtle performance decrement resulting from a recurrence of disease affecting the CNS. Other factors that must be considered prior to granting a waiver include the impact of surgical wounds, scars, or skin grafts on range of motion and proper/comfortable fit of flying/life support equipment.

III. Waiver Considerations

History of melanoma is disqualifying for all flying classes; as all malignancies require an MEB. The table below outlines the waiver potential for flying class (FC) I/IA, II, and III based on AJCC melanoma staging system.

Table 1: Waiver potential based on flying class and melanoma stage.

Flying Class	Melanoma Stage Including History of	Waiver Potential Waiver Authority‡	ACS Review/Evaluation
I/IA	0	Maybe#† AETC	No
	IA, IB, IIA, IIB, IIC, IIIA, IIIB, IIIC, IV	No AETC	No
II (pilot)	0, IA, IB	Yes† MAJCOM‡	Yes (Stage IA, IB)
	IIA, IIB, IIIA	Maybe* MAJCOM‡	Yes
	IIC, IIIB, IIIC, IV	No MAJCOM‡	No
II (non-pilot) RPA Pilot III	0, IA, IB	Yes†$ MAJCOM‡	Yes (Stage IA, IB)
	IIA, IIB, IIIA, IIC, IIIB, IIIC	Maybe* MAJCOM‡	Yes
	IV	No MAJCOM‡	No
ATC/GBC MOD**	0, IA, IB	Yes†$ MAJCOM‡	Yes (Stage IA, IB)
	IIA, IIB, IIIA, IIC, IIIB, IIIC	Maybe* MAJCOM‡	Yes
	IV	No MAJCOM‡	No

Waiver may be considered if no risk factors such as history of dysplastic nevus syndrome (greater than 50 atypical nevi, family history of atypical nevi and family history of melanoma) are present.
† Waiver may be considered by waiver authority 6-months post-completion of definitive treatments. No indefinite waivers will be granted except for Stage 0.
$ Waiver in untrained FC II/RPA Pilot/III/ATC/GBC/MOD personnel with stage 0, stage IA, or stage IB melanoma may be considered after member has been disease free for three years if no risk factors such as history of dysplastic nevus syndrome (greater than 50 atypical nevi, family history of atypical nevi and family history of melanoma) are present.
* Waiver may be considered by waiver authority three years post-completion of definitive treatments, if clinically stable with no evidence of local or distant recurrence.
** Waiver authority for MOD personnel is AFGSC.
‡ For all except FC I/IA, AFMSA is the initial waiver authority for malignant neoplasms.

All waivered cases require close follow-up for life, at intervals recommended by the evaluating dermatologist or oncologist, at least annually.

AIMWTS review through Feb 2016 revealed 324 cases of melanoma. Breakdown of these cases revealed: 6 FC I/IA cases (3 disqualified), 209 FC II cases (14 disqualified), 80 FC III cases (11 disqualified), 8 ATC/GBC cases (no disqualifications), and 20 MOD cases (1 disqualified). Of these, 286 (91%) received waivers and 29 (9%) were disqualified; the vast majority approved were Stage 0 or IA.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver should include the following:
A. History – summary of disease course, risk factors, review of systems, and activity level.
B. Physical - special attention to skin and lymph nodes. Need to also exam fundus and conjunctiva.
C. Dermatological consultation (and oncology/surgery consultation if indicated), with specific comments regarding work-up to rule-out metastatic disease.
D. Pathology report, specifically indicating histologic diagnosis of melanoma, presence or absence of tumor ulceration, and tumor thickness (AJCC melanoma staging system).
E. Confirmation of histology, ulceration, and thickness by AFIP or a DoD accredited dermatopathologist, with a copy of report attached.
F. Copies of all laboratory studies, radiological studies, and any other studies.
G. Statement that incision site does not interfere with flying duties and wearing of aircrew flying and life-support equipment.
H. Medical evaluation board (MEB) report.
I. Outline plan for follow-up.

The AMS for waiver renewal should include the following:
A. History – AJCC melanoma staging, interval frequency and results, and review of systems.
B. Physical – skin and lymph node. Need to also exam fundus and conjunctiva.
C. Dermatology consult to include follow-up plan.

ICD-9 code for Malignant Melanoma	
172	Malignant melanoma of the skin

ICD-10 codes for Malignant Melanoma	
C43.9	Malignant melanoma of the skin, unspecified
D03.9	Melanoma in situ

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WAIVER GUIDE
Updated: Jun 2015
Supersedes Waiver Guide of Dec 2011
By: Maj Jennifer Wolf (RAM 16) and Dr Dan Van Syoc
Reviewed by Col Roger Hesselbrock, ACS Neurologist

CONDITION:
Meningitis and Encephalitis (Jun 15)

I. Overview.

Meningitis is an inflammatory process involving the tissues surrounding the central nervous system. Encephalitis involves the brain parenchyma.[1] Some patients will have symptoms and signs suggesting involvement of both brain and meninges, blurring the distinction between the two. Characterization as meningitis or as encephalitis reflects the more dominant features although in some instances a diagnosis of meningoencephalitis is more appropriate. The process may be acute or chronic; the distinction for chronic tends to be when inflammation or infection persists beyond one month.[2] Clinical abnormalities in brain function such as altered mental status, motor or sensory deficits, altered behavior and personality changes, as well as speech or movement disorders are expected in encephalitis.[3] In meningitis, the patient may be uncomfortable, lethargic, or distracted by headache but will maintain normal cerebral function. The classic symptoms for bacterial meningitis are fever, neck stiffness, headache, and altered mental status.[4] Seizures may occur in encephalitis or meningitis.[5, 6] Simple aseptic meningitis is commonly diagnosed when there is no abnormality in brain function, when the CSF findings include a mild pleocytosis (100-1000 cell/mm^3 with either mononuclear or polymorphonuclear cell predominance), negative bacterial smears and cultures, normal to mildly elevated protein concentration, and normal to slightly depressed glucose level; additionally, the clinical course is relatively short and uncomplicated.[7]

Etiologies for meningitis and encephalitis include viral, bacterial, fungal, and parasitic infectious agents as well as neoplastic, vasculitic, and immune entities. In the United States, viral etiologies account for more infections than all other sources combined.[8] The annual incidence of community-acquired bacterial meningitis is 4 to 6 cases per 100,000 adults (>16 years old), the most common organisms are S. pneumonia, N. meningitidis, and L. monocytogenes. S. pneumonia and N. meningitidis account for 80 percent of cases.[9] Common viral etiologies for aseptic meningitis include enteroviruses, herpes simplex virus, HIV, and West Nile. Common viral etiologies for encephalitis include H. simplex type 1, arboviruses (St. Louis, Japanese encephalitis), and West Nile. Histoplasmosis and coccidiomycosis are the most common fungal etiologies while cysticercosis is a common parasitic form. A comprehensive evaluation is necessary to identify the etiological agent. Despite an intense evaluation, an exact agent may not be identified; in the California Encephalitis Project a responsible agent was identified in only 16% of 1,570 patients.[10]

Prognosis is dictated by the agent responsible for meningitis or encephalitis and the initial severity. Community-acquired S. pneumonia meningitis has a fatality rate between 19 and 37 percent.[9] The mortality for untreated bacterial meningitis approaches 100 percent.[11] Long-term neurological complications are seen in up to 30% of bacterial meningitis survivors.[12] Long-term complication rates depend upon the viral agent, ranging from rare to 46%.[8] St. Louis encephalitis is associated with extended convalescence in 30–50% of patients while West Nile virus has a mortality rate of 5-

10% in patients who exhibit neurological symptoms.[13] Late unprovoked seizures may occur in up to 65% of patients following H. simplex encephalitis; the presence of acute seizures increases the risk of long-term seizures 22-fold while the absence of acute seizures is associated with a 10-fold increase in long-term seizures.[14] Other neurological complications may be seen including a high incidence of neurocognitive and movement disorders in West Nile and Japanese encephalitis.[14] A 2007 French prospective cohort study of the sequelae of encephalitis found that symptoms can persist for 3 years after discharge; the most common persisting symptoms were decrease in concentration and behavioral disorders.[15]

II. Aeromedical Concerns.

Both acute and chronic neurological complications are of aeromedical concern. Acutely, cognitive impairment, obtundation, focal neurological deficits including cranial nerve deficits and hemiparesis, and seizures are significant issues. Residual neurocognitive impairments, movement disorders, and seizures are of concern.[16]

For purposes of aeromedical disposition, aseptic meningitis is defined as no abnormality in brain function (e.g., altered cognitive function, focal neurological deficit), when the CSF findings include a mild pleocytosis (100-1000 cell/mm^3 with either mononuclear or polymorphonuclear cell predominance), negative bacterial smears and cultures, normal to mildly elevated protein concentration, and normal to slightly depressed glucose level, and when the clinical course is relatively short. If there is any alteration of cognitive function, obtundation, focal neurological deficit, or complicated hospital or recovery course, then for purposes of aeromedical waiver that is considered to be no longer simple aseptic meningitis but is in the meningoencephalitis or encephalitis continuum.

The prognosis is highly variable depending upon the agent responsible for the meningitis or encephalitis. However, in general, the simple aseptic (viral) meningitis has an excellent prognosis, although definitive therapy is still somewhat controversial.[17] More complicated forms of viral meningitis, such as West Nile virus or HIV, as well as meningitis secondary to bacterial, fungal, or parasitic agents do not share the same good prognosis. All forms of encephalitis or meningoencephalitis have a significant risk of chronic neurocognitive or neurological impairment.

III. Waiver Considerations.

History of central nervous system infection (e.g., meningitis, encephalitis, meningoencephalitis) is disqualifying for all flying classes, as well as for ATC/GBC and MOD duties. Waiver may be submitted as soon as the individual is symptom free, cleared by neurology and has normal studies.

Table 1. Waiver potential for meningitis and encephalitis.

Flying Class	Condition	Waiver Potential Wavier Authority	ACS review/evaluation
I/IA	Simple aseptic meningitis within 3 years.	Yes+ AETC	Yes
	Simple aseptic meningitis greater than 3 years ago	Yes+ AETC	At AETC/SGP discretion
	Bacterial, fungal, parasitic meningitis, any meningoencephalitis or any encephalitis within the previous 3 years.	Yes+ AETC	Yes
	Bacterial, fungal parasitic meningitis, any meningoencephalitis or any encephalitis greater than 3 years ago.	Yes+ AETC	Yes
II/III, including untrained ATC/GBC MOD	Simple aseptic meningitis.	Yes+ MAJCOM*	At MAJCOM discretion**
	Bacterial fungal, parasitic meningitis, any meningoencephalitis or any encephalitis within the previous 3 years.	Yes+ MAJCOM*	Yes**
	Bacterial fungal, parasitic meningitis, any meningoencephalitis or any encephalitis greater than 3 years ago.	Yes+ MAJCOM*	Yes**

+ Potential for indefinite waiver.
*Waiver authority for MOD is AFGSC
**ATC/GBC and MOD cases do not need to be reviewed by ACS

Review of AIMWTS in May 2015 showed 77 cases of encephalitis and/or meningitis; 17 FC I/IA, 29 FC II, 28 FC III, and 3 ATC/GBC. Of the 77, 6 were disqualified (3 FC I, 1 FC II and 2 FC III).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for encephalitis, meningoencephalitis or bacterial, fungal, or parasitic meningitis within the last 3 years should include the following:
A. History – initial signs and symptoms, lumbar puncture results, treatment, current symptoms, and activity level.
B. Physical – neurological exam.
C. Neurology consult.
D. ACS Neuropsychological testing results.
E. EEG with awake and sleep recording.
F. MRI scan of the head. For cases reviewed by ACS, send report(s) and images to ACS. Images may be mailed to ACS on CD or uploaded to the USAFSAM ECG Library PICOM server.
G. Audiogram.

The AMS for simple aseptic meningitis within the last 3 years should include the following:
A. History – initial signs and symptoms, lumbar puncture results, treatment, current symptoms, and activity level.
B. Physical – neurological exam.
C. Neurology consult.
D. MRI/CT scan of the head. For cases reviewed by ACS, send report(s) and images to ACS. Images may be mailed to ACS on CD or uploaded to the USAFSAM ECG Library PICOM server.

The AMS for encephalitis, meningoencephalitis, bacterial, fungal, or parasitic meningitis, or aseptic meningitis that occurred 3 years or greater ago should include the following:
A. History – signs, symptoms, lumbar puncture results, treatment, current symptoms, and activity level.
B. Physical – neurologic exam.
C. Copy of medical records of illness.

ICD-9 Codes for Meningitis and Encephalitis	
047.9	Unspecified viral meningitis
320.9	Meningitis due to unspecified bacterium
322.9	Meningitis, unspecified
323.9	Unspecified cause of encephalitis, myelitis and encephalomyelitis

ICD-10 Codes for Meningitis and Encephalitis	
A87.9	Viral meningitis, unspecified
G00.9	Bacterial meningitis, unspecified
G03.9	Meningitis, unspecified
B04.90	Encephalitis and encephalomyelitis, unspecified

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WAIVER GUIDE
Initial Version: Jan 2016
Supersedes Waiver Guides of Aug 2014 (Mitral Regurgitation), Jul 2014 (Mitral Valve Prolapse), and Feb 2011 (Misc. Valvular Heart Disorders)
By: Dr Dan Van Syoc and Lt Col Steven M. Gore
Reviewed by: Lt Col Eddie D. Davenport, ACS Chief Cardiologist

CONDITION:
Mitral, Tricuspid and Pulmonic Valve Disorders (Jan 16)

I. Overview.

This waiver guide will combine three previous guides; mitral regurgitation, mitral valve prolapse, and miscellaneous valve disorders, which comprises disorders of the tricuspid and pulmonary valves as well as mitral stenosis.

A. Mitral Regurgitation - Abnormalities of the mitral valve annulus, the valve leaflets, the chordae tendinae, or the papillary muscles can cause mitral regurgitation (MR). In assessing a patient with mitral regurgitation, it is important to distinguish between primary (degenerative) MR or secondary (functional) MR. In primary MR, the pathology of ≥1 of the components of the valve (leaflets, chordae tendineae, papillary muscles, annulus) causes valve incompetence with systolic regurgitation of blood from the left ventricle to the left atrium. Younger populations usually present with severe myxomatous degeneration with gross redundancy of both the anterior and posterior leaflets and chordal apparatus. Older populations present with fibroelastic deficiency in which lack of connective tissue leads to chordal rupture.

In the United States and much of the Western world, the most common cause of MR is mitral valve prolapse (MVP), accounting for as much as one-half to two-thirds of cases. In the aircrew population, clinically significant MR is also most commonly associated with MVP/myxomatous mitral valve disease. Other causes of primary MR include rheumatic heart disease, infective endocarditis, collagen vascular disease, and cleft mitral valve and radiation heart disease. Causes of secondary MR include ischemic and idiopathic myocardial disease leading to a dilated cardiomyopathy.[1, 2] Aeromedical considerations for all etiologies of MR will be addressed by the underlying disease process in this waiver guide. Symptom manifestation depends on the etiology and severity of MR. Moderate or less MR should not cause symptoms. Symptoms due to chronic MR are related to progressive volume overload resulting in pulmonary congestion and left ventricular dysfunction. Symptoms of severe MR include reduced exercise tolerance, chronic weakness, fatigability, exertional dyspnea, dyspnea at rest, and orthopnea. However, some subjects with severe MR and associated left ventricular dysfunction may be asymptomatic, with symptom onset being insidious and not appreciated by the patient. A careful history is important to elicit subtle symptoms or lifestyle changes due to the patient "slowing down" or "not being in shape". Atrial fibrillation may be a resultant complication associated with severe MR.[1, 2]

In the aircrew population, MR is typically diagnosed by an echocardiogram (echo) ordered for murmur evaluation or for a variety of other clinical or aeromedical indications, such as an abnormal electrocardiogram. MR is graded on echo as trace, mild, moderate or severe. MR graded on echo as trace or mild is considered to be a normal variant (not disqualifying) and no waiver is required. For FC I/IA/II/RPA Pilot individuals, echocardiogram studies read locally as trace or mild MR

require Aeromedical Consultation Service (ACS) review via the ECG Library. The formal report and a CD/videotape copy are required to confirm the local read and to exclude underlying pathology such as MVP. ACS review for trace to mild MR is optional for FC III, and can be requested by the local flight surgeon or the waiver authority if desired. A waiver is required for all classes of flying duties when MR is graded moderate or severe.

B. Mitral Valve Prolapse (MVP) - The prevalence of MVP is reported to be 2-5% in the general U.S. population. The prevalence of MVP utilizing data from the USAF database of Medical Flight Screening (MFS) echocardiograms performed on pilot training candidates, was about 0.5% in males and females.[1, 2] The lower prevalence seen in the USAF database may be due to the young age of this population and elimination of some of the more obvious cases during the examination process. MVP may be diagnosed or suggested by the typical auscultatory findings of a mid-systolic click with or without a late systolic murmur, but is more typically diagnosed by echocardiography (echo) evaluation. The current echocardiographic definition of MVP is billowing of any portion of the mitral leaflets $\geq$ 2 mm above the annular plane in a long axis (parasternal or apical 3-chamber) view.[4] Echo criteria have evolved over the years, but current standards are widely accepted and unlikely to significantly change in the near future. These criteria have been followed by the ACS for over a decade since their earliest acceptance by the academic cardiology community, but many civilian cardiologists may not adhere to the currently defined strict criteria. Therefore, verification of a local MVP diagnosis needs to be completed by the ACS in all cases.

Historically, there have been reports of a possible association between panic disorder or social anxiety disorder and MVP. The purported relationship between these conditions is most likely a matter of chance and the result of a confluence of factors.[7] Additionally, other symptoms to include palpitations, dyspnea, exercise intolerance, dizziness, numbness or tingling, skeletal abnormalities, and abnormal resting and exercise electrocardiograms have been attributed to MVP. Recent investigations into these associations have not conclusively shown a direct link between and reassurance about the benign nature of MVP is usually enough to reduce the severity of associated symptoms.[8]

Progressive mitral regurgitation is one of the primary clinical and aeromedical concerns with MVP due to morphologic changes of the valve leaflets and chordae tendinae. In the aircrew population, clinically significant MR is commonly associated with mitral valve prolapse/myxomatous mitral valve disease. Given the progression rates, all MVP requires waiver for flight duties even if no associated regurgitation or stenosis. Despite some risk of progression to severe MR, most aviators with MVP can be reassured the condition (and associated MR) is not life threatening.[6]

C. Misc. Valvular Heart Disorders

1. Regurgitation/insufficiency of the tricuspid (TR) and pulmonic (PI) valves
2. Mitral stenosis (MS), Tricuspid stenosis (TS) and Pulmonic stenosis (PS)

These disorders are commonly asymptomatic and thus found incidentally during echocardiography evaluation for other reasons. The natural history and progression of disease depends on the underlying cause.[9, 10] These valve disorders will be rarely, if ever, seen in our aviator population. The most common pathology seen in the AIMWTS database search is TR with the majority being graded as trace to mild in severity, thus considered a normal variant.[1, 2]

In the aircrew population, regurgitation/insufficiency or stenosis of these cardiac valves will typically be diagnosed by an echocardiogram (echo) ordered for cardiac murmur evaluation or a variety of other clinical or aeromedical indications, such as an abnormal electrocardiogram. As with mitral regurgitation, tricuspid and pulmonic regurgitation is graded as trace, mild, moderate or severe. In the absence of morphologic valve pathology, tricuspid and pulmonic valve regurgitation graded as trace or mild are considered normal variants. They are not disqualifying and a waiver is not required. Conversely, any degree of mitral, tricuspid or pulmonary valve stenosis is considered abnormal.[1, 2]

For FC I/IA/II/RPA Pilot individuals, echocardiograms interpreted locally as trace or mild TR and/or PI (i.e. normal variants) require review and confirmation via the Aeromedical Consultation Service (ACS) ECG Library. The formal report and a CD/videotape copy are required for confirmation in order to exclude underlying pathology such as valve prolapse. If ACS ECG Library review confirms trace or mild PI and/or TR with no valve pathology, a letter to this affect will be sent and incorporated into the patient's medical record. The individual is considered medically qualified and no waiver or further work-up is required. If ACS ECG Library review determines TR and/or PI severity is worse than trace or mild, a letter will be sent directing the need for a waiver. ACS ECG Library review of trace to mild TR and/or PI is optional for FC III, but may be requested by the local flight surgeon or the waiver authority if desired. Locally interpreted echocardiograms with moderate or greater TR and/or PI and any degree of mitral, tricuspid, or pulmonic stenosis, will require ACS evaluation. The formal report and a CD/videotape copy are required for confirmation.

In early 2007, the American Heart Association published new infective endocarditis guidelines that are dramatically different from past recommendations.[3] Endocarditis prophylaxis is recommended only for specified high risk groups, and only for specified dental procedures, respiratory tract procedures, and procedures on infected skin, skin structures or musculoskeletal tissue. The high risk group was limited to prosthetic cardiac valves, previous endocarditis, select congenital heart conditions and cardiac transplant patients with valvulopathy. Prophylaxis was no longer recommended for gastrointestinal or genitourinary procedures. Conditions commonly seen by most aerospace medicine practitioners were not included in the list of high risk conditions. Common conditions no longer recommended for endocarditis prophylaxis included, but are not limited to, mitral valve prolapse, bicuspid aortic valve, mitral or aortic regurgitation with normal valve morphology and uncorrected small defects of the atrial and ventricular septum.

II. Aeromedical Concerns.

A. Mitral Regurgitation and Mitral Valve Prolapse (MVP): Two categories of aeromedical events must be considered with MVP and moderate or severe MR. First, events which might occur abruptly and impact flying performance include sudden cardiac death, cerebral ischemic events, syncope, presyncope and sustained supraventricular and ventricular tachydysrhythmias. Second, progression to severe MR, requirement for surgical mitral valve repair or replacement, other thromboembolic events and non-sustained tachydysrhythmias are of aeromedical concern.

ACS experience with moderate and severe primary MR is very limited. However, a review of the ACS experience with 404 trained aviators with MVP is applicable.[11, 12] This review yielded event rates of 1.5% per year for all aeromedical endpoints examined. Most of these could be readily tracked by serial evaluations and represented a low risk for sudden incapacitation. For events which might suddenly impact flying performance, the rate was only 0.3% per year. The majority of the

MVP subjects in this review had less than moderate or severe MR. The primary aeromedical concern of moderate to severe MR would be the development of symptoms and progression to severe MR that meets guideline criteria for surgical repair or replacement of the mitral valve. Fortunately, surgical criteria can be tracked and followed by serial echocardiogram studies and patients who are followed closely will usually be identified before symptom onset and elective surgery can be scheduled.

In general, exercise produces no significant change or a mild decrease in MR because of reduced systemic vascular resistance. However, patients with elevation of heart rate or blood pressure as a result of static or isometric exercise may manifest increased MR and pulmonary capillary pressures. Static exercises that increase arterial pressure are potentially deleterious. Ejection fraction usually does not change or decreases slightly with exercise. However, the ejection fraction response may be completely normal in younger asymptomatic subjects. These latter concerns may be more theoretical than clinically relevant, but nonetheless result in a recommendation for restricting static exercise in competitive athletes with significant MR.[9] In the aeromedical environment, "pulling Gs" is a similar situation and reduced +Gz tolerance and +Gz-induced tachydysrhythmias are of concern with severe MR. In an ACS MVP database review, 95 aviators had a monitored centrifuge assessment. Non-sustained supraventricular tachycardia and non-sustained ventricular tachycardia each occurred in one individual (1/95, 1%). G-loss of consciousness occurred in two individuals (2/95, 2%) without an associated cardiac dysrhythmia in either case. These occurrences are less than previously reported for apparently healthy centrifuge subjects or trainees.[13] Notably, a slight reduction in +Gz tolerance has been reported for MVP, but was operationally nonsignificant.[14-17] Therefore, monitored centrifuge assessment is no longer required for MVP or primary MR, but may be used on a case by case basis as deemed necessary by the ACS. An unrestricted waiver may be considered for moderate MR, but waiver consideration for severe MR is limited to low performance aircraft.

Medications that reduce afterload, such as ACE inhibitors, have a documented clinical benefit in acute MR and chronic aortic insufficiency. However, no studies have shown a clinical benefit for MVP or chronic primary MR. Although some studies have shown hemodynamic improvement and relief of symptoms, medication use has not been shown to delay the need for surgery or improve surgical outcome, in contrast to that seen for severe aortic insufficiency. Use of afterload reducing medications in symptomatic MR is appropriate, but at this stage, the aviator should be disqualified and aeromedical disposition should be secondary to clinical disposition regarding proper timing of valve surgery. The use of approved ACE inhibitors is acceptable in aviators with asymptomatic moderate or severe MR.[1]

B. Miscellaneous Heart Valve Disorders: In general, aeromedical concerns for these various valve disorders include progression of the regurgitation and/or stenosis, requirement for surgical or catheter-based valve repair or replacement, underlying or associated disease processes, thromboembolism and arrhythmias.[1, 2, 9, 10]

III. Waiver Consideration.

Per Air Force Instruction, any history of valvular heart disease to include mitral valve prolapse, mitral, pulmonic, and tricuspid valve regurgitation with a severity greater than mild, and any degree of valvular stenosis is disqualifying. ACS evaluation is required for waiver consideration. For MOD personnel, moderate to severe mitral regurgitation of any etiology is disqualifying if

symptomatic or associated with subnormal ejection fraction. Symptomatic MVP requiring treatment is also disqualifying.

A. Mitral Regurgitation:

1. Moderate MR may be eligible for an unrestricted FC II, RPA Pilot or FC III waiver.
2. Asymptomatic severe MR that does not meet ACC/AHA guideline criteria for surgery may be considered for a waiver restricted to low performance aircraft.
3. Asymptomatic severe MR that meets ACC/AHA guideline criteria for surgical repair/replacement and symptomatic severe MR are disqualifying without waiver recommendation.[9]

ACS re-evaluations will typically be performed at 1-3 year intervals, depending on the degree of MR and other associated findings such as cardiac chamber dilation and left ventricular dysfunction. The use of approved ACE inhibitors for afterload reduction is acceptable in aviators with moderate or asymptomatic severe MR. Waivers may be considered after surgery. Refer to the "Valve Surgery – Replacement or Repair" waiver guide. For further details of waiver criteria for MR, see Table 1.

B. Mitral Valve Prolapse (MVP):

1. MVP with MR mild or less in severity is eligible for FC I/IA waiver.
2. MVP with MR moderate or less in severity is eligible for unrestricted FC II, RPA Pilot or FC III waiver.
3. MVP with MR that is severe, but asymptomatic, and does not meet ACC/AHA guideline criteria for surgery may be considered for a waiver restricted to low performance aircraft.[9]
4. MVP with MR that is either "severe and symptomatic" or "severe and asymptomatic", but meets ACC/AHA guideline criteria for surgical repair or replacement, is disqualifying without waiver recommendation.[2]

ACS re-evaluations will be performed at 1-3 years intervals, depending on the degree of MR and other associated findings such as cardiac chamber dilation and left ventricular dysfunction. The use of approved ACE inhibitors for afterload reduction is acceptable in aviators with MVP and moderate or asymptomatic severe MR. For further details of waiver criteria for MVP, see Table 2.

C. Miscellaneous Heart Valve Disorders:

For retention purposes, severe valve or sub-valvular pulmonic stenosis is disqualifying in addition to most cases of symptomatic mitral stenosis. Table 3 summarizes disposition recommendations for several of these valve disorders. Due to the rarity of these valve disorders in our population, they will also be considered on a case-by-case basis.

Additional findings considered in waiver recommendations, include but are not limited to, normal atrial and ventricular size, normal ventricular function, no prior thromboembolic events, no associated tachydysrhythmias and no symptoms attributable to the specific valve disorder. Waivers may be considered after surgery. Refer to the "Valve Surgery – Replacement or Repair" waiver guide.

Table 1: Summary of Associated Clinical Conditions and ACS Requirements for Mitral Regurgitation

Degree of Primary Mitral Regurgitation (MR) Graded on Echocardiogram	**Flying Class (FC)**	**Waiver Potential** **Waiver Authority†**	**ACS Review and/or Evaluation Required**
Trace or mild MR (normal variant)	FC I/IA/II/RPA Pilot	Qualified* N/A	ACS review
	FC III, ATC/GBC, and MOD	Qualified* N/A	No ACS review required
Moderate MR	FC I/IA	No AETC	ACS review
	FC II/III	Yes MAJCOM	ACS evaluation
	ATC/GBC	Yes MAJCOM	ACS Review
	MOD**	Yes AFGSC	ACS Review
Severe MR – asymptomatic and nonsurgical per guidelines	FC I/IA	No AETC	ACS review
	FC IIA only	Maybe AFMSA	ACS evaluation
	RPA Pilot	Maybe MAJCOM	ACS evaluation
	FC IIIC (low performance only)	Maybe AFMSA	ACS evaluation
	ATC/GBC	Yes MAJCOM	ACS evaluation
	MOD	Yes AFGSC	ACS evaluation
Severe MR – symptomatic or surgical per guidelines &	FC I/IA	No AETC	ACS review
	FC II/RPA Pilot/III	No AFMSA	ACS review

	ATC/GBC[&]	Maybe AFMSA	ACS evaluation
	MOD[&]	Maybe AFGSC	ACS evaluation

*Qualified means no waiver required, however, for FC I/IA/II/RPA Pilot individuals, echos read locally as trace or mild MR require ACS review via the ECG Library. The report and a CD/videotape copy are required for confirmation and to exclude underlying pathology such as MVP.

**No waiver required if member asymptomatic and has a normal ejection fraction.

[&] Successful mitral repair with preservation of ejection fraction, no need for anticoagulants or anti-arrhythmics may be waived if exercise tolerance is normal, but DAWG review (with MEB/IRILO as appropriate) must precede surgery.

†Waiver Authority for IFCII (RPA) is AETC.

Table 2: Waiver Potential for MVP

MVP and Associated Levels of Mitral Regurgitation (MR) Documented by Echocardiogram	**Flying Class**	**Waiver Potential Waiver Authority†**	**Required ACS Review and/or ACS Evaluation**
MVP with mild or less MR	FC I /IA	Yes AETC	ACS evaluation
	FC II/RPA Pilot/III	Yes* MAJCOM	ACS evaluation
	ATC/GBC, MOD	Yes AFGSC	ACS review
MVP with moderate MR	FC I/IA	No AETC	ACS review
	FC II/ RPA Pilot/III	Yes* MAJCOM	ACS evaluation
	ATC/GBC	Yes MAJCOM	ACS review
	MOD	Yes AFGSC	ACS review

MVP with severe MR - asymptomatic and nonsurgical MR per guidelines	FC I/IA	No AETC	ACS review
	FC IIA only	Maybe* AFMSA	ACS evaluation
	RPA Pilot	Maybe* MAJCOM	ACS evaluation
	FC IIIC (low performance only)	Maybe* AFMSA	ACS evaluation
	ATC/GBC	Maybe MAJCOM	ACS review
	MOD	Maybe AFGSC	ACS review
MVP with severe MR – symptomatic or surgical MR per guidelines	FC I/IA	No AETC	ACS review
	FC II/ RPA Pilot/III	No MAJCOM	ACS review
	ATC/GBC	Maybe MAJCOM	ACS review
	MOD	Maybe AFGSC	ACS review
MVP: clinical (auscultation) only without a positive echo	FC I/IA/II/ RPA Pilot/III ATC/GBC MOD**	Yes MAJCOM	After 3 ACS evaluations/reviews without a positive echo, an indefinite waiver is recommended

* Waiver in untrained FC II and III individuals unlikely.
** MOD waiver authority is AFGSC.
†Waiver Authority for IFCII (RPA) is AETC.

Table 3: Summary of Associated Clinical Conditions and ACS Requirements

Type and Degree of Valvular Disease Graded on Echocardiogram	**Flying Class**	**Waiver Potential** **Waiver Authority†**	**ACS Review/Evaluation Required**
Trace or mild PI and TR	FC I/IA	Qualified N/A	ECG Library review
	FC II/ RPA Pilot/III ATC/GBC, MOD	Qualified N/A	FC II - ECG Library review, FC III, ATC/GBC, and MOD not required
Moderate PI and TR	FC I/IA	Maybe AETC	ACS evaluation
	FC II RPA Pilot//III ATC/GBC MOD	Maybe MAJCOM	ACS evaluation#
Severe PI and TR – asymptomatic and nonsurgical per guidelines	FC I/IA	No AETC	ACS review
	FC IIA only	Maybe* AFMSA	ACS evaluation
	RPA Pilot	Maybe* MAJCOM	ACS evaluation
	FC IIIC (low performance only)	Maybe* AFMSA	ACS evaluation
	ATC/GBC MOD	Maybe* MAJCOM	ACS evaluation#
Congenital mild PS	FC I/IA	Yes AETC	ACS evaluation
	FC II/ RPA Pilot/III ATC/GBC MOD	Yes MAJCOM	ACS evaluation
Any degree of mitral or tricuspid valve stenosis	FC I/IA	No AETC	ACS review
	FC II RPA Pilot//III	No MAJCOM	ACS review
	ATC/GBC MOD	Maybe MAJCOM	ACS review

*Waiver for untrained FC II and III individuals unlikely.
#ACS evaluation not required for ATC/GBC personnel and waiver may be recommended based on ACS review.
†Waiver Authority for IFCII (RPA) is AETC.

AIMWTS search in Jan 2016 revealed a total of 304 Air Force members with a waiver disposition for mitral valve, tricuspid valve, or pulmonic valve disorders. There were a total of 41 disqualifications (one was eventually given an ETP – FC III). Breakdown of the cases revealed 19 FC I/IA cases (4 disqualified), 162 FC II cases (13 disqualified), 113 FC III cases (21 disqualified), 5 ATC/GBC cases (1 disqualified), and 5 MOD cases (2 disqualified). Approximately 50% of the disqualified cases were due in part to the valvular disease.

IV. Information Required for Waiver Submission.

ACS review/evaluation is required for diagnosis confirmation and aeromedical disposition. The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

ACS review/evaluation is required at least once for all classes of flying duties for moderate or severe MR with waiver renewals recommended based on local studies. No additional studies are routinely required prior to ACS review/evaluation. If the treating physician deems it clinically necessary to perform additional studies, it is required that all studies be forwarded to the ACS for review. There is no minimum required nonflying observation period for ACS review/evaluation.

For initial ACS evaluation the aeromedical summary should contain the following information:

A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history and physical examination – to include detailed description of symptoms, medications, activity level and CAD risk factors (positive and negative).
C. Formal report and complete tracings (videotape or CD) of the echo documenting the findings. (Notes 1 and 2)
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. holter, treadmill, stress echocardiogram). (Notes 1 and 2)
E. Additional local cardiac testing is not routinely required, but may be requested on a case by case basis.
F. Medical evaluation board (MEB) reports and narrative if applicable.

For follow-up ACS evaluations (re-evaluations) the aeromedical summary should contain the following information:

A. Complete history and physical examination – to include detailed description of symptoms, medications, activity level, and interval history
B. All applicable labs and imaging tests as required in the initial aeromedical summary.
C. Local follow-up cardiac testing is not routinely required prior to ACS re-evaluation. If requested for individual cases, it will have been specified in the report of the previous ACS evaluation.
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. holter, treadmill, stress echocardiogram). (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manager for (patient's MAJCOM)
USAFSAM/FECI, Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in the aeromedical summary when studies were sent to ACS.

ICD-9 codes for mitral valve and misc. valve disorder	
394.0	Mitral Stenosis
394.1	Rheumatic mitral insufficiency
394.9	Other and unspecified mitral valve disease
397.0	Diseases of the Tricuspid Valve
397.1	Rheumatic diseases of the Pulmonary Valve
424.0	Mitral valve disorders
424.2	Tricuspid Valve disorders, specified as non-rheumatic
424.3	Pulmonary Valve disorders
742.02	Congenital Pulmonary Stenosis
746.02	Stenosis of Pulmonary Valve
746.6	Congenital mitral insufficiency

ICD-10 codes for mitral valve and misc. valve disorder	
I05.0	Rheumatic Mitral Stenosis
I05.1	Rheumatic mitral insufficiency
I07.8	Other rheumatic tricuspid valve diseases
I09.89	Other specified rheumatic heart diseases
I34.0	Nonrheumatic mitral (valve) insufficiency
I34.1	Nonrheumatic mitral (valve) prolapse
I34.8	Other nonrheumatic mitral valve disorders
I36.9	Other nonrheumatic tricuspid valve disorders
I37.7	Other nonrheumatic pulmonary valve disorders
Q23.2	Congenital mitral stenosis
Q23.3	Congenital mitral insufficiency

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WAIVER GUIDE
Updated: Mar 2015
Supersedes Waiver Guide of Feb 2011
By: ACS Neuropsychiatry Branch & Dr. Dan Van Syoc

CONDITION:
Mood Disorders: Depressive, Bipolar And Related Disorders (Mar 15)

I. Overview

DEPRESSIVE DISORDERS

Basic Features
These disorders are characterized by a disturbance in mood as the predominant psychological feature. The depressive disorders vary by length and severity and are divided into eight categories, of which major depressive disorder (MDD), other specified depressive disorder (formerly depressive disorder NOS), and persistent depressive disorder (dysthymia) are most common among aviators.

Diagnostic Considerations
DSM-5 is the mental health diagnostic standard. Typical symptoms of depression include: depressed mood, lack of pleasure in most activities (anhedonia), significant weight loss, insomnia/hypersomnia, psychomotor agitation or retardation, fatigue, feelings of worthlessness or inappropriate guilt, decreased concentration, and suicidal/morbid ideation.[1]

Prevalence
The prevalence of major depressive disorder in the US is approximately 7%, with female rates of depression 1.5-3 times higher than for males.[1] MDD affects 5 to 13% of medical outpatients, yet it is often undiagnosed and undertreated. Moreover, it is often undertreated when correctly diagnosed.[2, 3, 4]

Recurrence
Among persons with MDD, 75% to 85% have recurrent episodes.[5, 6] A history of two episodes increases the probability of recurrence to approximately 70%, and after three episodes the probability of recurrence increases to approximately 90%.[7] Risk of recurrence is higher in younger people, those who have already had multiple episodes of depression, and those whose preceding episode was severe.[1] In addition, 10 to 30% of persons with a major depressive episode recover incompletely and have persistent residual depressive symptoms or dysthymia, a disorder with symptoms that are similar to those of MDD but last longer and are milder.[6, 8] Peak onset is in the 20s but may occur at any age.[1]

Treatment Options
Standard treatment for depressive disorders includes psychotherapy, pharmacotherapy, and combination treatment. Of the talk therapies, cognitive-behavioral therapy has the most empirical support. Neither psychotherapy nor pharmacotherapy appears superior over the other, and combination treatment has been linked to lower attrition rates though not necessarily better treatment outcomes.[9] Current USAF aeromedically-approved antidepressant medications include sertraline, citalopram, escitalopram, and bupropion.

Special Considerations

Peripartum Depression (formerly "Postpartum" Depression): The occurrence of depression during the peripartum period is generally considered to result from a combination of physiological, psychological, and social factors. Changes in hormonal levels can be considered one physiological factor, particularly in a background of interpersonal variations in sensitivities and tolerance to these hormonal changes. The occurrence of peripartum depression is associated with an increased risk of future occurrences in subsequent pregnancies and even outside of pregnancy. It can also be associated with an underlying mood or psychological condition. DSM-5 emphasizes the importance of identifying major depressive disorder in the peripartum period by including it within the diagnostic category of Major Depressive Disorders as the diagnosis of "Major Depressive Disorder with peripartum onset." There is no evidence that depression in the peripartum period is distinct or different from major depressive disorder experienced at other times in life. There is still the acknowledgement that "baby blues" and other adjustments routinely occur during this time, but if a female aviator meets criteria for a major depressive episode, then the diagnosis of "Major Depressive Disorder with peripartum onset" is most appropriate. Providers are always expected to utilize their best clinical judgment to most accurately diagnose and understand the aviator. Aeromedically, Peripartum Depression will be considered under the criteria of MDD with peripartum onset, and waiver consideration will be consistent with other depressive disorder guidelines. This change in nomenclature reinforces the importance of early identification and treatment for depressive symptoms.

BIPOLAR and RELATED DISORDERS

Basic Features

Bipolar disorder is a complex genetic disorder in which the core feature is pathological disturbance in mood (affect) ranging from extreme elation, or mania, to severe depression usually accompanied by disturbances in thinking and behavior which may include psychotic symptoms such as delusions and hallucinations. The bipolar disorders include seven separate diagnoses (e.g., bipolar I, bipolar II, cyclothymic disorder) and are rarely seen in aviators. The bipolar disorders are distinguished from the depressive disorders by a history of manic, hypomanic, or mixed episodes; none of which occurs in the depressive disorders.

Diagnostic Considerations

DSM-5 is the mental health diagnostic standard. Classic manic symptoms include the following: persistently elevated or irritable mood, persistently increased goal-directed behavior, grandiosity, decreased need for sleep, pressured speech, flight of ideas, distractibility, and excessive involvement in high-risk activities.[1] However, individuals with bipolar disorder are more likely to present during the depressive phase than with hypomania or mania.[10]

Prevalence

Bipolar disorders are much less common than the depressive disorders. The 12-month prevalence rate is 0.6% for bipolar I disorder and 0.8% for bipolar II disorder. Mean onset of an individual's first manic, hypomanic or depressive episode is 18 years of age, though it can occur throughout the lifespan. Similar rates have been reported for male and females.[1]

Recurrence

Recurrent episodes are expected for individuals with bipolar disorders. Ninety percent who experience a manic episode will have recurrent mood episodes.[1] Bipolar disorder may have a latency of seven years or more between the first and second episode of mania.

Treatment Options

Pharmacotherapy (i.e., mood stabilizers and atypical antipsychotics) is standard treatment for bipolar disorders.[9] None of these medications are aeromedically-approved for aviators. Compliance with medications by bipolar patients is a challenge because many discontinue their medications due to undesirable side effects.[11]

Special Considerations

There is a 10% lifetime risk of developing bipolar disorder if it is diagnosed in one parent and a 29% risk if both parents are diagnosed with bipolar disorder.[12] No genetic markers or blood testing are available for bipolar disorders. The life expectancy of individuals with bipolar disorders is discouraging; 25 to 50% attempt suicide and 15% eventually die by suicide.[13]

II. Aeromedical Concerns

Mood disorders can be associated with a variety of cognitive, emotional, and behavioral symptoms including depressed mood, impaired judgement, slowed information processing speed, impaired memory and/or attention and concentration, inflated self-esteem or grandiosity, disturbances in energy and sleep, significant weight loss or gain, psychomotor agitation or retardation, fatigue, distractibility, flight of ideas, inappropriate guilt, indecisiveness, suicidal ideation, and excessive involvement in pleasurable activities that have a high potential for undesirable consequences (e.g., spending sprees, promiscuity, substance abuse). These cognitive, emotional, and behavioral difficulties can lead to observable as well as subtle changes in functioning that negatively affect performance under physically and psychological taxing conditions. As a result, mood disorders (as well as an elevated risk of recurrence for such conditions) are incompatible with aviation safety and flying duties.

Many aviators struggle with depressive disorders. Numerous emotional and behavioral manifestations of depression can impair an aviator's cognitive abilities (e.g. ability to focus, sustain attention and concentration, working and general memory, psychomotor coordination, reasoning, spatial judgement, and reaction time) as well as social functioning (e.g., social isolation and withdrawal, increased irritability/agitation). Some of the more severe symptoms of depression, such as suicidal ideation and impaired reality testing, may be acutely disabling. Furthermore, depression often coexists with anxiety and psychosomatic complaints, as well as substance abuse.

There are aeromedical concerns with the use of psychotropic medications for treatment as well. All psychotropic medications have potentially undesirable or dangerous side effects. Common side effects of antidepressants include nausea, vomiting, diarrhea, insomnia, jitteriness, tremor, agitation, restlessness, perspiration, dizziness, and headaches.[14, 15]

III. Waiver Consideration

Mood disorders are disqualifying for all flying classes to include ATC/GBC and MOD duties. Untreated or undertreated mood disorders may have potentially disastrous consequences. To mitigate such outcomes, the FAA, Transport Canada, Australia, and the US Army have policies allowing selected aviators to fly while on SSRI's.[16, 17, 18] The USAF has followed suit allowing select FC II/III personnel to be considered for waivers on the following monotherapies:

5. Sertraline (Zoloft®) up to 200 mg/day
6. Citalopram (Celexa®) up to 40 mg/day
7. Escitalopram (Lexapro®) up to 20 mg/day
8. Bupropion (Wellbutrin®) SR or XL up to 450 mg/day

If the diagnostic criteria for MDD, persistent depressive disorder (dysthymia), or unspecified depressive disorder are met, the aviator is disqualified. Recurrent episodes of the depressive disorders are generally disqualifying and not waiverable because of the likelihood of a continually emerging pattern of depressive symptoms negatively affecting overall performance and reliability.

Any aviator with any of the bipolar disorders is permanently disqualified due to the risk of recurrence, the presenting symptoms of loss of insight, tenuous reality-testing, and the unlikelihood of self-referral, poor judgment and poor treatment compliance; in such cases a medical evaluation board (MEB) should be held to determine fitness for general duty and retention. A family history of a bipolar disorder in both parents is disqualifying for FCI/IA (but can be considered for a waiver after a very thorough mental health evaluation).

MOD personnel may be permitted to perform their duty while on certain psychotropic medications listed on the Approved Space and Missile Operator Medications list, but a waiver is typically required.

To be considered for waiver, a mental health evaluation with accurate diagnosis per the Diagnostic and Statistical Manual (DSM) is the vital first step. USAF psychology and/or psychiatry specialists familiar with aeromedical standards are the preferred choice for evaluation and potential development of the treatment plan.

If the diagnosis of a depressive disorder is established, then grounding the aviator is necessary to allow optimal treatment to be initiated. Psychotherapy, healthy lifestyle interventions, and/or psychotropic medications may be utilized as treatment options until depressive symptoms are fully resolved (an important goal because partial resolution of symptoms may lead to long-term psychiatric morbidity). Typically, antidepressants are continued for 6-12 months after full resolution of depressive symptoms in order to prevent abrupt relapse after medication cessation. Psychotherapy may be continued after symptom resolution to bolster resiliency and coping mechanisms. A waiver may be considered after six months of demonstrated stability (i.e., aviator is back to best baseline functioning). Therefore, it is important for the mental health professional to designate the date of full resolution of symptoms. It is from that date that six months of stability should be measured from for potential waiver, regardless of ongoing psychotropic medication and/or psychotherapy in pursuit of optimal therapeutic benefit.

If depressive symptoms return after discontinuing treatment, a return to (or enhancement of) psychotherapy, healthy lifestyle interventions, and/or antidepressant medication for maintenance

treatment should be considered. The aviator on a maintenance antidepressant (only one aeromedically approved medication allowed) needs to be on the medication with a stable dose and remain clinically asymptomatic for at least six months before waiver consideration. If a psychotropic medication is ever discontinued in an aviator, a few weeks of observation should occur before considering resuming full flight duties to assure no adverse/unexpected side effects occur.

Medication is not waiverable for FCI personnel and is limited to FCIIC (multicrew aircraft, except for B-2), GBC, and FCIII. All FCII and FCIII listed (Boom Operator, Flight Engineer, Loadmaster, Aerial Gunner, Combat Control, Pararescue Jumper, Tactical Air Control Party) require ACS evaluation and AFMSA waiver. For all other FCIII AFSCs, ACS evaluation is encouraged, and MAJCOM dispositions the waiver.

Table 1: Waiver potential for mood disorders

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	Family history of bipolar disorder (both parents)	Maybe‡ AETC
	Bipolar disorders	No AETC
	Depressive disorders	Maybe† AETC
II/RPA/III*** ATC/GBC MOD**	Bipolar disorders	No AFMSA
	Major Depressive Disorder (MDD), single episode	Maybe*† MAJCOM#**
	MDD, recurrent episodes	No MAJCOM#**
	Persistent Depressive Disorder (Dysthymia)	Maybe*† MAJCOM#**

‡ Waiver may be considered after thorough psych evaluation of applicant
† For FC I/IA and untrained FC II/III individuals, waiver is considered after depression is completely resolved and medications and psychotherapy have been discontinued for a minimum of two years.
* For trained personnel, a waiver is considered after depression is completely resolved and stability has been demonstrated for six months.
** If categorical waiver (FC IIC or FC IIIC) is required due to medication requirements, then AFMSA is the waiver authority. If the aviator does not meet retention standards per the MSD, then AFMSA is the waiver authority.
*** Waiver may be considered for select FC II/III career fields on approved antidepressant medication if on a stable dosage and asymptomatic for at least six months.
# AFGSC is the waiver authority for MOD personnel who meet retention standards.

An AIMWTS search in Dec 2014 revealed a total of 1250 members with an aeromedical summary including the diagnosis of depression. There were a total of 773 disqualifications. A breakdown of the cases revealed: 64 FC I/IA cases (36 disqualified), 250 FC II cases (134 disqualified), 594 FC III cases (371 disqualified), 227 ATC/GBC cases (163 disqualified), and 115 MOD cases (69 disqualified). In addition, there were 53 members with an aeromedical summary including the diagnosis of bipolar disorder. There were a total of 51 disqualifications. Breakdown of the cases revealed: 3 FC I/IA cases (1 disqualified), 17 FC II cases (17 disqualified), 20 FC III cases (20 disqualified), 9 ATC/GBC cases (9 disqualified), and 4 MOD cases (4 disqualified). Both approved FC I cases were most likely incorrect diagnoses.

IV. Information Required for Waiver Submission

Submitting a Mental Health Waiver Guide:

AFI 48-123 –Chapter 6, USAF Medical Standards Directory, Section Q, and the Aeromedical Consultation Service (ACS) Waiver Guide addresses waiver evaluations

Step 1 - Is the aviator ready for waiver submission?

E. A waiver is submitted when the member is asymptomatic (back to best baseline functioning), as applicable to diagnostic category, for the specified time-frame below (Note: medications/psychotherapy for optimal therapeutic benefit are permissible and often advisable after initial symptom resolution):

- ☐ 6 Months—Mood Disorders, Anxiety Disorders, PTSD, & Suicidal Behavior

F. To be considered for an aeromedical waiver, any disqualifying condition must meet the following criteria per AFI 48-123 Section 6B, 6.2.1.1 through 6.2.1.6. (pg. 31):

- ☐ Not pose a risk of sudden incapacitation
- ☐ Pose minimal potential for subtle performance decrement, particularly with regard to the higher senses
- ☐ Be resolved, or be stable, and be expected to remain so under the stresses of the aviation environment
- ☐ If the possibility of progression or recurrence exists, the first symptoms or signs must be easily detectable and not pose a risk to the individual or the safety of others
- ☐ Cannot require exotic tests, regular invasive procedures, or frequent absences to monitor for stability or progression
- ☐ Must be compatible with the performance of sustained flying operations

Step 2 - Before beginning the Aeromedical Summary (AMS), Flight Surgeon must obtain Mental Health consultation and ensure it contains items specified below:

Instructions for the Mental Health Provider

The mental health evaluation must include a **comprehensive written report** addressing:

- ☐ Consultation must address each criteria in Step 1B
- ☐ Clinical mental health history (description of symptoms, treatment modality, frequency and compliance with treatment, relevant personal and family history, and perceived impact on occupational duties)
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Clinically relevant and appropriate laboratory results [such as thyroid, liver function tests, drug screen, chemistry profile, complete blood count, Carbohydrate-Deficient Transferrin (CDT) – for alcohol cases, please obtain serial CDT results – especially if on abstinence agreements]
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, input from line leadership, if possible, and please address current state of any triggers for the mental illness)
- ☐ Current and past aviation related duties and any history of current and past occupational performance difficulties (to include perceived impact of mental health condition on performance of duties)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)

- ☐ Summary and interpretation of psychological/neuropsychological testing results (recommend MMPI-2, NEO PI-III, PAI, or similar personality test, as well as cognitive testing/screening).
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly or engage in special duty operations (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)
- ☐ Please forward copies of all mental health or behavioral health records (Mental health, Behavioral Health, civilian provider, ADAPT, FAP, and/or inpatient treatment records) including the raw scores, standard scores, and in some cases T-scores from completed psychological or neuropsychological testing, in addition to the written report to ACS Neuropsychiatry Branch (address is below) when member completes the attached Release of Information form **(information will be reviewed by ACS Clinical Psychologist)**

Step 3 - Items for the Flight Surgeon to include in the AMS:

- ☐ AMS must clearly address each criteria in Step 1B and the risk to the member, mission, and safety
- ☐ Summarize Mental Health history and focus on occupational impact
  ***** If 2 or more months have passed since the comprehensive evaluation/report was completed, the flight surgeon should address how the member has done since and consult with the mental health provider if the member has been seen at mental health since the evaluation*****
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Appropriate laboratory results (i.e., thyroid, liver function tests, drug screen, CDT**, chemical profile…)
  ***** for alcohol cases, please comment on Carbohydrate-Deficient Transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, if possible - please address current state of any triggers for the mental illness)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)

Step 4 - Additional items to complete the waiver package:

- ☐ Letter of support from command
- ☐ Have member complete/sign a **Release of Information** f… Clinic (where treatment was provided) for processing. Instruct the MHC to release copies of MH record (provide MHC with ACS Neuropsychiatry Branch contact information, if necessary) and send to:

NOTE:
DO NOT SEND AHLTA NOTES AS A SUBSTITUTE FOR MENTAL HEALTH RECORDS!

ACS Aerospace Medicine Branch, USAFSAM/FECA
c/o Neuropsychiatry Branch
2510 Fifth Street Bldg 840
Wright Patterson AFB, OH 45433-7913
Fax: (937) 904-8753 DSN: 674-8753

Please feel free to contact the ACS Neuropsychiatry Branch with questions:

MSgt Walter Croft: DSN 798-2653
walter.croft@us.af.mil

Mr. John Heaton: DSN 798-2766
john.heaton.7@us.af.mil

AUTHORIZATION FOR DISCLOSURE OF MEDICAL OR DENTAL INFORMATION

PRIVACY ACT STATEMENT

In accordance with the Privacy Act of 1974 (Public Law 93-579), the notice informs you of the purpose of the form and how it will be used. Please read it carefully.
AUTHORITY: Public Law 104-191; E.O. 9397 (SSAN); DoD 6025.18-R.
PRINCIPAL PURPOSE(S): This form is to provide the Military Treatment Facility/Dental Treatment Facility/TRICARE Health Plan with a means to request the use and/or disclosure of an individual's protected health information.
ROUTINE USE(S): To any third party or the individual upon authorization for the disclosure from the individual for: personal use; insurance; continued medical care; school; legal; retirement/separation; or other reasons.
DISCLOSURE: Voluntary. Failure to sign the authorization form will result in the non-release of the protected health information.
This form will not be used for the authorization to disclose alcohol or drug abuse patient information from medical records or for authorization to disclose information from records of an alcohol or drug abuse treatment program. In addition, any use as an authorization to use or disclose psychotherapy notes may not be combined with another authorization except one to use or disclose psychotherapy notes.

SECTION I - PATIENT DATA

1. NAME *(Last, First, Middle Initial)*	2. DATE OF BIRTH *(YYYYMMDD)*	3. SOCIAL SECURITY NUMBER

4. PERIOD OF TREATMENT: FROM - TO *(YYYYMMDD)*	5. TYPE OF TREATMENT *(X one)*
ALL	☐ OUTPATIENT ☐ INPATIENT ☐ BOTH

SECTION II - DISCLOSURE

6. I AUTHORIZE *(Name of Facility/TRICARE Health Plan)* **TO RELEASE MY PATIENT INFORMATION TO:**

a. NAME OF PHYSICIAN, FACILITY, OR TRICARE HEALTH PLAN	b. ADDRESS *(Street, City, State and ZIP Code)*
Neuropsychiatry Branch - Aeromedical Consultation Service USAF School of Aerospace Medicine	2510 5th Street, Bldg 840, Area B Wright-Patterson AFB, OH 45433-7913
c. TELEPHONE *(Include Area Code)* (937) 938-2766	d. FAX *(Include Area Code)* (937) 904-8753

7. REASON FOR REQUEST/USE OF MEDICAL INFORMATION *(X as applicable)*

☐ PERSONAL USE ☐ INSURANCE ☐ CONTINUED MEDICAL CARE ☐ RETIREMENT/SEPARATION ☒ OTHER *(Specify)* **AEROMEDICAL CONSULTATION SERVICE WAIVER PACKAGE** ☐ SCHOOL

8. INFORMATION TO BE RELEASED

All Mental/Behavioral Health (Sections A-F), ADAPT, FAP, and/or civilian records (when applicable). Please include any and all of the records to include, but not limited to: background questionnaires, intake forms, psychological/personality testing (standard, raw, T scores/reports), OQ-45 questionnaires, PCL-M, inpatient records, treatment notes (not AHLTA copies), etc.

9. AUTHORIZATION START DATE *(YYYYMMDD)*	10. AUTHORIZATION EXPIRATION DATE *(YYYYMMDD)*	☐ ACTION COMPLETED
	☐	☐

SECTION III - RELEASE AUTHORIZATION

I understand that:
a. I have the right to revoke this authorization at any time. My revocation must be in writing and provided to the facility where my medical records are kept or to the TMA Privacy Officer if this is an authorization for information possessed by the TRICARE Health Plan rather than an MTF or DTF. I am aware that if I later revoke this authorization, the person(s) I herein name will have used and/or disclosed my protected information on the basis of this authorization.
b. If I authorize my protected health information to be disclosed to someone who is not required to comply with federal privacy protection regulations, then such information may be re-disclosed and would no longer be protected.
c. I have a right to inspect and receive a copy of my own protected health information to be used or disclosed, in accordance with the requirements of the federal privacy protection regulations found in the Privacy Act and 45 CFR § 164.524.
d. The Military Health System (which includes the TRICARE Health Plan) may not condition treatment in MTFs/DTFs, payment by the TRICARE Health Plan, enrollment in the TRICARE Health Plan or eligibility for TRICARE Health Plan benefits on failure to obtain this authorization.
I request and authorize the named provider/treatment facility/TRICARE Health Plan to release the information described above to the named individual/organization indicated.

11. SIGNATURE OF PATIENT/PARENT/LEGAL REPRESENTATIVE	12. RELATIONSHIP TO PATIENT *(If applicable)*	13. DATE *(YYYYMMDD)*
	self	

SECTION IV - FOR STAFF USE ONLY *(To be completed only upon receipt of written revocation)*

14. X IF APPLICABLE:	15. REVOCATION COMPLETED BY	16. DATE *(YYYYMMDD)*
☐ AUTHORIZATION REVOKED		

17. IMPRINT OF PATIENT IDENTIFICATION PLATE WHEN AVAILABLE	SPONSOR NAME: SPONSOR RANK: FMP/SPONSOR SSN: BRANCH OF SERVICE: PHONE NUMBER:

Revised: Sep-14

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for mood disorders should include:
A. History with special attention to symptoms, frequency, duration, treatment, precipitating factors, action taken to mitigate recurrence and any social, occupational, administrative or legal problems associated with the case.
B. Psychiatric/psychology evaluation and treatment summary (within 3 months of package submission).
C. List any medication usage, past or current, for the mood disorder.
D. Letters from aviator's squadron commander or operations officer supporting or refuting a return to flying status.
E. A copy of the MEB narrative if applicable.

The AMS for waiver renewal for mood disorders should include:
A. Intervening history with special attention to status of previously precipitating factors, any new stresses, coping skills and work performance should be addressed.
B. Psychiatric/psychology evaluation (within 3 months of package submission).

ICD-9 codes for mood disorders	
296.2	Major depressive disorder, first episode
296.3	Major depressive disorder, recurrent
300.4	Persistent depressive disorder (dysthymia)
311	Unspecified depressive disorder
296.xx	Bipolar I disorder
296.89	Bipolar II disorder
301.13	Cyclothymic disorder
296.80	Unspecified bipolar and related disorders

ICD-10 codes for mood disorders	
F32.9	Major depressive disorder, single episode, unspecified
F33.9	Major depressive disorder, recurrent, unspecified
F34.1	Dysthymic disorder
F31.9	Bipolar disorder, unspecified
F31.81	Bipolar II disorder
F34.0	Cyclothymic disorder

V. References

1. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed., American Psychiatric Publishing, Arlington, VA, 2013.

2. Coyne JC, Fechner-Bates S and Schwenk, TL. Prevalence, Nature, and Comorbidity of Depressive Disorders in Primary Care. Gen Hosp Psychiatry, 1994; 16:267-76.

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4. Goldman LS, Nielsen NH, and Champion HC. Awareness, Diagnosis, and Treatment of Depression. J Gen Intern Med, 1999; 14: 569-80.

5. Mueller TI, Leon AC, Keller MB, et al. Recurrence After Recovery From Major Depressive Disorder During 15 Years of Observational Follow-Up. Am J Psychiatry, 1999; 156: 1000-06.

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8. Judd LL, Akiskal HS, Maser JD, et al. A Prospective 12-Year Study of Subsyndromal and Syndromal Depressive Symptoms in Unipolar Major Depressive Disorders. Arch Gen Psychiatry, 1998; 55: 694-700.

9. Roth A and Fonagy P. *What Works For Whom? A Critical Review of Psychotherapy Research,* 2nd ed., Guilford Press, New York, 2005.

10. Das AK, Olfson M, Gameroff MJ, et al., Screening for Bipolar Disorder in a Primary Care Practice. JAMA, 2005; 293: 956-63.

11. Perlis RH. Bipolar Disorder. Ch. 30 in *Stern: Massachusetts General Hospital Comprehensive Clinical Psychiatry*, 1st ed., Mosby, 2008.

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15. Rayman RB, Hastings JD, Kruyer WB, et al. *Clinical Aviation Medicine, 4th Ed.*, Professional Publishing Group, Ltd., New York. 2006, pp. 309-12.

16. FAA. Special Issuance of Airman Medical certificates to applicants Being Treated with Certain Antidepressant Medications. Federal Register, 2010:75; 17047-50.

17. Transport Canada. Handbook for Civil Aviation Examiners: Psychiatry (SSRIs). Guidelines for the Non-psychotic Conditions. www.tc.ca.

18. US Army Aeromedical Policy Letters and Technical Bulletins, Fort Rucker AL: Retrieved November 2010 from https://aamaweb.usaama.rucker.amedd.army.mil/AAMAWeb/p3.html

WAIVER GUIDE
Updated: Jul 2014
Supersedes Waiver Guide of Apr 2010
By: Maj John E. Miles (RAM XV) and Dr Dan Van Syoc
Reviewed by Lt Col James Lasswell, AF/SG consultant for Aerospace & Operational Physiology

CONDITION:
Motion Sickness (Jul 14)

I. Overview.

Motion sickness is a common, even normal response, to un-adapted or unfamiliar movement. The term 'motion sickness' includes airsickness, seasickness, car sickness, space motion sickness, and other related entities. It is not typically considered a medical disorder and can be induced in anyone with an intact vestibular system given the right type and duration of provocative stimuli. The effects of motion sickness range from subtle performance deficit and distraction all the way to incapacitation. Motion sickness is thought to occur as a result of conflicting inputs to the brain from visual, vestibular, proprioceptive, and rarely, auditory systems. The term motion sickness is somewhat a misnomer, since it is possible to experience characteristic symptoms in the absence of unfamiliar motion, as in the case of "simulator-sickness," "virtual-reality-sickness," or "visually induced motion sickness."[1] The terms 'airsickness' and 'motion sickness' will be used interchangeably during this discussion.

Signs and symptoms of motion sickness can include pallor, cold sweats, dizziness, headaches, belching, nausea, vomiting, retching, apprehension, hyperventilation, lightheadedness, drowsiness and apathy.[2] Symptoms frequently begin with epigastric discomfort ("stomach awareness") and progress to nausea and malaise.[3] Nausea is typically the cardinal symptom. Significant variability in susceptibility and adaptation exists in different individuals. The affected individual may become distracted by the symptoms, leading to decreased situational awareness and performance decrements. Some individuals experience significant amelioration after vomiting, while others may continue to experience symptoms including lethargy, fatigue, and drowsiness for hours after the motion has stopped.[3] Most often, the brain is able to adapt to these mismatched sensations, and symptoms tend to decline or disappear with adaptation. Most aviators become asymptomatic after repeated exposures to the flying environment.

Reportedly 0.6% of civilian airline passengers experience airsickness and more than 75% of troops on military air transports have become motion sick under extreme conditions. US Navy studies determined that 63% of student pilots were sick on their first flight while only 15-30% did not experience motion sickness at all during training. Non-pilot flight crews experienced symptoms on 14% of flights with vomiting occurring in 6%. While most flyers accommodate to unusual attitudes, accelerations, etc., after repeated exposures, some will remain symptomatic.

The incidence of motion sickness peaks between the ages of 3 and 12 and then gradually decreases thereafter. Females are almost twice as likely to suffer motion sickness as males, with symptoms frequently increasing during menstruation and pregnancy. Unlike many medical conditions, motion sickness is more common among those who are aerobically fit, possibly due to a relationship between aerobic capacity and increased vasomotor activity.[3]

In the U.S. Air Force, motion sickness is most commonly encountered among personnel in flight training. Airsickness occasionally occurs in more experienced aircrew as they switch aircraft types, particularly in higher physical stress aircraft (heat, low level, limited visibility, etc). Airsickness may also occur when a previously adapted individual returns to duty after a period of non-flying. The USAF has defined two types of airsickness, active and passive, though it is recognized the phenomenon occurs along a continuum. Active airsickness includes vomiting; passive airsickness does not include vomiting, but because of discomfort or nausea, may result in significant deviation in a student's lesson profile or an aviator's ability to complete tasks.

Prevention education and early intervention through the Airsickness Management Program (AMP) have proven to be effective in helping undergraduate pilot training (UPT) and undergraduate combat systems officer training (UCT) students to overcome motion sickness (Table 1). Prevention education includes instructing students during initial physiological training prior to participation in flying about the causes of airsickness and strategies to prevent, manage, and treat symptoms. Practical prevention strategies include avoiding high-fat meals prior to flight, maintaining adequate hydration, watching the horizon, blowing cool air across the face, and performing slow diaphragmatic breathing.[4, 5] Other nonpharmacologic techniques for minimizing symptoms may be more difficult for an active aircrew member to implement. Such suggestions include avoiding reading or engaging in tasks that require frequent changes in visual fixation, avoiding unnecessary head movements, moving to a location near the center of the aircraft, lying supine, using sunglasses during the day to reduce visual stimulation, and avoiding unpleasant odors by ensuring adequate ventilation. Acupressure at a point 2 inches above the wrist is popular among sailors and commercial air travelers, but a recent controlled study found no evidence of benefit in an experimental setting.[3] Ginger and ginseng have been recommended for decreasing motion sickness symptoms, though clinical evidence is mixed. Supplemental oxygen has shown effectiveness in treating patients being transported by ambulance, but it does not alleviate motion sickness symptoms in otherwise healthy individuals.[2] In cases of intractable airsickness, desensitization training via progressive relaxation techniques coupled with incremental exposure to Coriolis stimulation (in a Barany chair or while flying) has been effective in the vast majority of affected individuals. Some UPT/UNT students find more benefit from early desensitization with the Barany chair while others prefer a medication protocol to improve adaptation to the flying environment.

The role for pharmacologic intervention is limited in flyers.[6, 7] Transdermal scopolamine or antihistamines such as promethazine and dimenhydrinate (Dramamine® and others) have been used to prevent and treat symptoms of airsickness. Unfortunately, these agents are prone to sedation, impaired cognition, and short-term memory loss at therapeutic dosages.[4, 6] Non-sedating antihistamines are unfortunately ineffective, probably due to their lack of central nervous system action.[4] Dextroamphetamine or ephedrine have been combined with either scopolamine or promethazine to limit side effects during USAF and USN military flight training but are authorized only for a total of three flights, and only when the student is accompanied by a flight instructor. Modafinil was thought to reduce motion sickness symptoms until a recent study found no benefit when used alone.[7] Newer agents are being studied, such as betahistine, but thus far have not shown significant efficacy.[4]

Medications currently deemed acceptable for use by aviators are detailed in the Air Force Approved Air Sickness Management Program Medications section of the Official Air Force Aerospace Medicine Approved Medications list. These medications are authorized for use by aircrew in student status only, for the treatment of airsickness, and only while under direct supervision. The

medications may not be used for trained personnel. No other medications may be taken without consultation with a flight surgeon, although the medications may be augmented by natural and non-pharmacologic techniques in coordination with the flight surgeon. Medication use, efficacy, and side effects should be documented clearly in the medical record and in the AMP reporting tools with the final outcome of each case documented and tracked for annual reporting to AETC/SGP.[8]

Table 1: Airsickness Management Program (AMP)[9, 10]

Airsickness Episode	Evaluations	Required Actions
None	AP	Pre-flight prevention education
1	FS	Assess compliance with Phase 0; rule out medical cause; consider adjunctive pharmacologic therapy*
2	FS and consider AP or MH	Assess compliance with Phase I; Progressive relaxation training**
3+	FS and AP, consider MH	Assess compliance with Phase II; Physiologic adaptation training*** (Barany chair); Assess motivation to fly

Key: FS: Flight Surgeon. AP: Aerospace Physiology Personnel. MH: Mental Health.
Note: Pilots undergoing any phase of treatment for airsickness will not fly solo.
*Pharmacologic intervention options: transdermal scopolamine 0.5mg/ dextroamphetamine sulfate 5mg (Scop/Dex patch), given 1-2 hours prior to flight for 3 consecutive flights, 1 flight per day. Alternative: Scopolamine HBR 0.45mg in 15ml of elixir with dextroamphetamine sulfate 7.5mg, or other approved medication.
**Progressive relaxation techniques include diaphragmatic breathing, biofeedback, cognitive restructuring and imagery skills.
***Barany chair refresher spin recommended with any additional (>3) airsickness episodes.

II. Aeromedical Concerns.

The effects of motion sickness can range from distraction to near-incapacitation. The corresponding degradation of situational awareness and performance is incompatible with flying duties. Most affected aircrew will adapt with repeated exposures to the flying environment. Flying personnel who experience their first episode of airsickness should be evaluated by the flight surgeon to rule out organic or psychiatric etiology. If no such etiology is found, the affected individual should be enrolled in the AMP (see Table 1) prior to determining a final aeromedical disposition.

III. Waiver Consideration.

Any history of motion sickness experienced in aircraft, automobiles, or watercraft after the age of 12 with any significant frequency in applicants for UPT and UNT (FC I/IA) requires a waiver. Those with a history only BEFORE age 12 do not specifically require a waiver, but any history of motion sickness does need to be explored. A complete and thorough history of motion sickness should be submitted in the aeromedical summary. Motion sickness is not disqualifying for ATC/GBC and MOD personnel.

Motion sickness in flying personnel is not cause for medical disqualification unless there is medical evidence of organic or psychiatric pathology. UPT (FC I) and UNT (FC IA) trainees who have intractable airsickness after completing AMP are usually handled administratively because they are unable to meet syllabus requirements or they demonstrated "lack of adaptability" to the flying environment. However, non-rated student fliers (FC III) enrolled in flying courses, who have intractable airsickness after completing the AMP, are usually medically disqualified and generally are not eligible for waiver. Final determination of medical qualification in these cases is made by the MAJCOM/SG.

Rated aircrew (FC II) with intractable airsickness who do not become asymptomatic after repeated exposures to the flying environment and who fail desensitization training are dealt with administratively through a Flying Evaluation Board (FEB). Prior to convening a board, these cases are typically reviewed by the MAJCOM/SG to rule out an organic or psychiatric etiology. Many times these individuals are reassigned to their previous platform.

Airsickness requiring pharmacologic therapy beyond the AMP is disqualifying and not eligible for waiver.

Table 2: Waiver potential for Motion Sickness

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority**
I/IA	History of Motion Sickness age <12 yrs	Yes* AETC
	History of Motion Sickness age >12 yrs	Maybe AETC
	Motion Sickness during UPT/UNT	Maybe AETC
II/III	Motion Sickness in trained aircrew	Maybe MAJCOM

*History of motion sickness only before age 12 does not specifically require a waiver, but if that history comes up during the evaluation, it needs to be addressed.

AIMWTS search in Jul 2014, showed 204 cases of motion sickness; 21 were FC I/IA, 37 were FC II, and 144 were FC III, and 2 were MOD. In the FC I/IA category, 12 were deemed medically qualified and 9 were medically disqualified; for FC II, 20 were returned, 6 were medically disqualified, and 12 were found medically qualified and specifically recommended for Flying

Evaluation Board; and in the FC III category, 132 were medically disqualified. In the MOD category, one was disqualified.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for motion sickness should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of motion sickness to include childhood and adolescent history of any type of motion sickness, history of vestibular disorders, motion sickness risk factors, Air Force experience with motion sickness and treatments attempted with results (to include any and all medications used). How do symptoms affect mission and/or training?
C. Physical – focus on CNS and ENT exams.
D. Discussion and results from any Airsickness Management Program (AMP) training.
E. Statement from aerospace physiologist regarding training and conditioning.

ICD-9 code for Motion Sickness	
994.6	Motion sickness, airsickness

ICD-10 code for Motion Sickness	
T75.3XXA	Motion sickness, initial encounter

V. References.

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8. Official Air Force Aerospace Medicine Approved Medications, 9 Jan 2014.

9. AETC Instruction 36-2205, Vol 1, *Formal Flying Training Administration and Management*, Chapter 3, 7 Nov 2013.

10. AETC Instruction 48-102, *Medical Management of Undergraduate Flying Training Students*, Chapter 15, 5 Nov 2013.

WAIVER GUIDE
Updated: Mar 2016
Supersedes Waiver Guide of May 2012
By: LtCol Michelle R Milner (RAM 17) and Dr Dan Van Syoc
Reviewed by Col Roger Hesselbrock, ACS Neurologist

CONDITION:
Multiple Sclerosis and Clinically Isolated Syndrome (Mar 16)

I. Overview.

Multiple Sclerosis (MS) is a demyelinating disease of the central nervous system, with versatile manifestation, an unpredictable course, and prognosis ranging from minimal neurologic impairment to severe disability. The pathologic hallmark of MS is focal demyelination within the brain and spinal cord. No cure for MS exists, and all currently available treatments are only partially affective in reducing MS symptoms and disability.[1] The most common form (85% to 90% at onset) of MS is relapsing-remitting MS (RRMS), an acute or subacute onset of clinical dysfunctions (relapses) with full recovery or with sequelae and residual deficit but no progression between relapses. Secondary progressive MS (SPMS) initially has a RRMS course that develops into progression with or without occasional relapses, minor remissions or plateaus. Primary progressive MS (PPMS) occurs in about 10% initially and is characterized by progression from onset with occasional plateaus and temporary minor improvements. Progressive relapsing MS (PRMS) is characterized by continuous progressive disease, with acute relapses additionally occurring, with or without full recovery.[2]

Clinically, MS is a disease of young adults, with onset ages 20-30, twice as common in women than in men. The peak age onset is about five years earlier for women than men.[3] MS is rarely diagnosed after the age of 65. The etiology is unknown, but it is believed that environmental and infectious factors, altered immune response and/or autoimmunity, genetic susceptibility, and neurodegenerative processes may all have some degree of relevance in the pathogenesis of MS. Growing evidence suggests that vitamin D insufficiency may account for the latitudinal gradient of MS. Many infectious etiologies have been suggested as triggers for MS, although proof of a causal association is missing.

MS predominately affects white matter, but there is also some gray matter involvement. Histopathological studies demonstrate more prominent extensive inflammatory reactions in focal white matter plaques during the earlier phases of MS while mild diffuse inflammatory reaction in normal-appearing white matter, widespread diffuse axonal injury, and cortical demyelination are prevalent in more advanced disease.[4] Three pathological processes (focal inflammatory demyelination in white matter; normal-appearing white matter damage; cortical demyelination) occur both in parallel and independently giving a combination of inflammation and neurodegeneration.

Clinical symptoms are unpredictable and variable, depending upon the specific area of CNS involvement, with symptoms progressing over hours to days. Common presenting symptoms of MS include sensory disturbances, unilateral optic neuritis (visual loss), limb weakness, diplopia, gait disturbance, balance problems, L'hermitte's sign (trunk and limb paresthesias evoked by neck flexion), vertigo, bladder problems, limb ataxia, acute transverse myelopathy, and pain. Many

individuals describe fatigue that is worse in the afternoon and is accompanied by physiologic increases in body temperature.[2]

Cognitive impairment can occur early in the course of MS. Learning and memory, conceptual reasoning, speed of information processing, attention, and executive functioning are most frequently affected.[5] Although 65% of MS patients will have some degree of cognitive impairment at some point in their illness, a recent study detected some degree of neurocognitive impairment early in the course of the disease in 49% of the subjects, based on a brief battery of cognitive tests.[6] Since there were no significant correlations between cognitive scores and MRI measures of disease severity including total T2 lesion volume, the authors concluded that cognitive impairment may predate the appearance of gross structural abnormalities on MRI.

Because MS is a disseminated disease that afflicts multiple areas of the CNS during an affected individual's disease course, it is said to evolve over space and time.[7] Diagnosis is based on evidence of lesions disseminated in time and space, with other potential explanations excluded. The McDonald criteria as revised in 2010 currently serves as the most commonly utilized standard for diagnosis.[8, 9] Demonstration of clinical events and lesions disseminated in time and space, utilizing a combination of clinical symptoms and signs and paraclinical tests, is necessary for a diagnosis of definite MS. The evolution of symptoms is usually within hours; however, there may be sudden episodes such as seizures. In those patients whose evaluation meets some but not all of the criteria, a diagnosis of possible multiple sclerosis may be made. The first demyelinating event suggestive of MS, called *clinically isolated syndrome (CIS)*, places the patient at risk for further relapses. The risk of having a second attack after 14 years of follow-up is 88% if any lesions are present on the initial brain MRI and only 19% if the MRI is normal.[10] Two prospective studies examined the risk of developing MS following a CIS. The Optic Neuritis Treatment Trial (ONTT) revealed a ten-year risk for MS of 38%.[1] In this trial the diagnosis of MS was based on clinical symptoms with the median time to diagnosis being three years. The presence of a single MRI lesion increased the 10-year risk to 56% while the absence of any MRI abnormality decreased the 10-year risk to 22%. The ONTT 15-year report continues this trend with the risk of developing MS being 25% with no MRI lesions and 72% with one or more lesions.[11] The greatest risk of progression was in the first five years with only a single patient developing MS in the 10-year to 15-year epoch if the initial MRI was negative. The United Kingdom (UK) 10-year follow up study of untreated CIS patients demonstrated an overall 59% likelihood of developing clinically definite MS.[12] In this cohort, presenting symptoms included optic neuritis (49%), brain-stem syndrome (21%), and spinal cord syndrome (30%). Abnormalities on the initial MRI increased the likelihood to 83% while a normal initial MRI decreased the likelihood to 11%.

Although the diagnosis of MS relies on recognition of the clinical pattern of disease, several laboratory studies are useful in confirming the diagnosis. MRI studies are particularly helpful to provide supportive evidence of spatial and temporal dissemination. Examination of the CSF for cell count, protein, glucose, IgG index, oligoclonal IgG bands, levels of myelin basic protein, and infectious/inflammatory markers is useful to assess for active inflammatory disease and exclude other confounding conditions. However, the diagnosis of MS remains a clinical one, incorporating the history, physical examination, laboratory studies, imaging studies, and possibly electrophysiologic tests. The brain MRI is abnormal in 95% to 99% of cases of RRMS. Although sensitive, the brain MRI is not specific because several other disease states are associated with a similar pattern.[13] Typically multiple areas of abnormal signal intensity are present on T2-weighted brain MRI imaging (T2, proton density, and fluid-attenuation inversion recovery sequences) that

often has a round or ovoid appearance and are located within the corpus callosum and the periventricular and subcortical white matter.[14, 15] Other typically affected areas include the white matter of the brainstem and cerebellum. Less often, gray matter structures, such as the thalamus and basal ganglia, are affected.[16] Gadolinium contrast enhancement corresponds pathologically to early active areas of inflammation and blood-brain barrier dysfunction. Traditional fast spin-echo T2-weighed images remain the most specific for lesion identification in the posterior fossa, where FLAIR sequences are subject to reduced contrast for lesions as well as artifacts.[17] Newer techniques such as diffusion tensor imaging, magnetization transfer imaging and MR spectroscopy are increasingly being incorporated into clinical trials and may ultimately provide improved specificity to the underlying pathology.[18]

Control groups from immunomodulatory trials provide information on the natural history of MS. The interferon-beta 1a (Avonex®) Controlled High-Risk Subjects Avonex Multiple Sclerosis Prevention Study (CHAMPS) trial detected a 50% risk of developing definite MS in the control group within three years while the risk in the treatment arm was 35%, based on a second clinical event.[19] In the placebo group, although only 25% experienced a second clinical event by 12 months, 75% developed new T2-MRI lesions with a mean of four lesions. Similar results were obtained in the interferon-beta 1a (Rebif®) Prevention of Relapses and Disability by Interferon-β1a Subcutaneously in Multiple Sclerosis (PRISM) trial and in the interferon beta-1b (Betaseron®) trial.[20, 21] In the copolymer 1 (glatiramer acetate; Copaxone®) trial of patients with relapsing/remitting MS, the placebo group experienced a relapse rate of 1.68 over two years.[22] Similarly the European/Canadian glatiramer acetate trial examined patients with a diagnosis of definite relapsing/remitting MS.[23] Over a nine-month period, 51% of control subjects experienced a clinical relapse, with a mean rate of 0.76 relapses/subject.

While all MS immunomodulatory therapies reduce the relapse rate, their impact on disease progression remains to be proven.[24] Immunomodulatory therapy will decrease the relapse rate by approximately 35 - 50% (reducing the clinical relapse rate from roughly 0.6 – 0.8 per year to roughly 0.35 – 0.5 relapses per year) with a similar reduction in clinically silent MRI lesions. These studies all demonstrate clinically silent MRI lesions occurring at five to ten times the rate of clinical events.

The American Academy of Neurology (AAN) 2002 practice guidelines recommend initiating immunomodulatory therapy in patients that are at high risk of developing definite MS or who already have a diagnosis of relapsing/remitting MS.[25] High-risk patients would be those with CIS and an abnormal MRI or cerebrospinal fluid (CSF) study. The PRISMS study published in *Journal of Neurology, Neurosurgery and Psychiatry*, a *British Medical Journal* subsidiary, found higher dosing and longer exposure to disease modifying treatment allowed for slower progression time to Expanded Disability Status Scale progression as well as improved outcomes after relapses and increased time between relapses.[26]

For patients with optic neuritis only, please refer to the separate waiver guide on that subject.

II. Aeromedical Concerns.

The primary aeromedical concern in MS is neurological impairment (motor, sensory, coordination, visual, cognitive) that is unpredictable by either exam or imaging study and may go unrecognized by aircrew member with or without treatment. Symptoms can present over a period of hours.

Unfortunately, there are no current clinical, biochemical or radiographic markers to prospectively identify those patients who will have 'benign' MS, and this assessment is based on retrospective analysis only. Cognitive deficits are common and unpredictable effecting approximately 40-60% of MS patients. The incidence of cognitive impairments does not correlate well with the degree of physical deficits, and may be present in all types of MS and at any stage of the disease.[27] Aeromedically-validated neurocognitive testing could only be repeated at six month intervals. Even if this could be considered practical, unpredictable interim neurocognitive changes could pose a potential threat to self, crew safety, and mission completion. Cognitive function is influenced not only by the disease itself, but by factors such as fatigue and medications.[28]

Another concern is the potential of sleep disturbance resulting in daytime sleepiness, worsening fatigue, depression, and lowered pain threshold.[29] Of particular importance, fatigue is considered the most frequent and often the most disabling symptom of MS reported by at least 75% of patients at some point during their disease course.[30-33] Given the profound effect that both MS and OSA can have on daytime functioning, it is important to identify MS patients at risk for OSA so as to institute earlier treatment in order to improve their overall health status and quality of life.

None of the currently-available disease-modifying agents, including the more recently-approved oral medications, are approved for use in aviators due to their side effect profiles.

III. Waiver Consideration.

The diagnosis of multiple sclerosis, CIS, or optic neuritis is disqualifying for flying classes I/IA, II, RPA Pilot, III, and for ATC/GBC personnel. As is the diagnosis of MS is disqualifying for retention purposes, MOD and OSF personnel will also require a waiver for this diagnosis.

The formal diagnosis of multiple sclerosis is a disqualifying medical condition for continued military service. In these cases, prior to submission of a waiver request, an initial RILO (and MEB as directed) must be performed. The following general conditions associated with demyelinating disease possibly will interfere with military service and should be referred to the DAWG for initial RILO consideration: Demyelinating processes, including but not limited to: Multiple sclerosis, transverse myelopathy, or neuromyelitis optica; Other neurological conditions. Any other neurological condition, regardless of etiology, when after adequate treatment, there remain residuals, such as persistent severe headaches, weakness or paralysis of important muscle groups, deformity, incoordination, pain or sensory disturbance, disturbance of consciousness, speech, or mental defects, or personality changes of such a degree as to definitely interfere with the performance of duty.

Table 1 - Waiver potential of multiple sclerosis and CIS

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	CIS with normal MRI and CSF***	No AETC	No
	CIS with positive MRI or CSF*** or multiple sclerosis	No AETC	No
II, RPA Pilot	CIS with normal initial MRI and CSF*** and normal repeated MRI at 3 months	Yes*† AFMSA	Yes
	CIS with positive MRI or CSF*** or definite multiple sclerosis	No AFMSA	Yes
III	CIS with normal initial MRI and CSF*** and normal repeat MRI at 3 months	Yes*† AFMSA	Yes
	CIS with positive MRI or CSF*** or definite multiple sclerosis	No AFMSA	Yes
ATC/GBC MOD**	CIS with normal initial MRI and CSF*** and normal repeat MRI at 3 months	Yes*† AFMSA	Yes
	CIS with positive MRI or CSF*** or definite multiple sclerosis	No AFMSA	Yes

* In untrained FC II and III waiver unlikely; if episode occurred 10 years previously with normal CSF, current and past MRI normal, then ACS evaluation may be warranted.
† ACS evaluations in person are generally at initial (after 3 month MRI), at one year, and then every three years thereafter. ACS review of local MRI in the years not seen in person at ACS (2, 3, 5, 6, etc.) are required. Waiver authority may require ACS evaluation at any time at their discretion.
** Waiver authority for MOD is AFGSC, delegated by AFMSA.
*** CSF studies are performed as recommended by specialty consultants.

AIMWTS search in Feb 2016 revealed 69 cases diagnosed as MS, CIS, or as compatible with demyelinating disease. Breakout of the cases was: 1 FC I/IA cases (1 disqualified); 40 FC II cases (36 disqualified); 19 FC III cases (19 disqualified); 6 ATC/GBC cases (6 disqualified); and 3 MOD cases (0 disqualified). There are cases of MS not recommended for waiver by ACS, but granted an Exception to Policy from AF/A3 (continuity of ETPs is handled administratively as waivers from AFMSA).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for MS or CIS should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of the demyelinating disorder.
C. Current complete neurological and mental status examination.
D. Consultation from a Neurologist.
E. Ophthalmology consult if visual symptoms (e.g., optic neuritis). See Optic Neuritis waiver guide.
F. Imaging: Pre/post-contrast brain MRI with T1, T2 and FLAIR sequences, initially and at 3 months. Pre/post-contrast cervical spine MRI with T1, T2 and FLAIR sequences initially, and at 3 months if spinal cord abnormalities are seen on the initial study. Send reports and images to ACS for review.
G. If lumbar puncture was performed, results of all CSF studies, including IgG index and oligoclonal band assessment.
H. If clinically indicated, polysomnography to assess for Sleep Disorder Breathing (SDB) or Obstructive Sleep Apnea (OSA).
I. MEB summary and results.

The AMS for waiver renewal for MS or CIS should include the following:
A. History of interval symptoms.
B. Current complete neurological and mental status examination.
C. Pre/post-contrast brain MRI with T1, T2 and FLAIR sequences, compared with previous studies. Send reports and images to ACS for review and reference.
D. Results of any other interim diagnostic testing.
E. Any RILO or MEB updates.

ICD-9 Codes for MS and CIS	
340	Multiple sclerosis
377.30	Optic neuritis, unspecified
341	Other demyelinating diseases of central nervous system

ICD-10 Codes for MS and CIS	
G35	Multiple sclerosis
H46.9	Optic neuritis, unspecified
G37.8, G37.9	Other demyelinating diseases of central nervous system

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WAIVER GUIDE
Updated Jun 2016
Supersedes Waiver Guide of Aug 2012
By: *Capt Ashley Franz (RAM 17), LtCol Eddie Davenport (ACS chief cardiologist) and Dr Dan Van Syoc*

CONDITION:
Myocardial Infarction (Jun 16)

I. Overview.

Myocardial infarction (MI) is a common problem in the United States, especially in the general population. Each year, approximately 735,000 Americans have an MI; for 525,000 of these people, it is their first event. Importantly, an estimated 20% of people have "silent" MIs and do not even know that they suffered from an incident.[1]

In the military, and the flying community in particular, MIs are far less common than in the general population. In this population, MI presents as it does in the general population; as an acute, symptomatic event or as a silent event. Such events are often discovered as a result of cardiac testing performed for other indications, such as evaluation of an asymptomatic aircrew with new Q waves on ECG. Post-MI outcomes are similar in these two scenarios and depend primarily on residual left ventricular function, severity of coronary artery disease (CAD), and classic risk factors.[2]

ACS cardiology staff members published a recent study regarding military aviators who have cardiac disease and an MI. This study shows that annual "cardiac event" rates in presumed healthy USAF aviators are 0.15% for males aged 35-54 years. Of particular note, for those aviators who eventually require revascularization, 34% had the MI at initial presentation. Tests designed to screen for MI in the presumed healthy aviator population yield a positive predictive value of 13%. Thus, the screening tests are not good predictors of the risk for MI in the aviator population. Fortunately, the aviators tend to have a much better outcome post CAD diagnosis than does the general population.[3]

There is increasing US Air Force experience with MI in aircrew since a policy change in 2008 allowing waivers for that condition. Policy previously did not allow for a waiver, but an analysis of the Aeromedical Consultation Service (ACS) coronary angiography database provides outcome data in former US Air Force aircrew. Between 1971 and 1999, 1487 asymptomatic male military aviators had an occupational coronary angiogram, and were followed for the cardiac end-points of cardiac death, nonfatal MI and coronary artery revascularization. During the follow-up, 57/1487 aviators (3.8%) had an MI as their first cardiac event. Their MI date was defined as the index date, and post-MI events were calculated at one, two and five year intervals. The events considered were: cardiac death, non-fatal second MI or first revascularization. No cardiac deaths or second MIs occurred within the 5 years of follow-up; all events were revascularizations. The calculated event rates were 4.0% per year at one year, 2.3% per year at two years and 2.4% per year at five years.[4]

The experience in the medical literature with MI in young populations is very sparse and therefore unreliable. It is also not very generalizable because of high variance in selected groups in term of

baseline medical conditions (diabetes, dyslipidemias, HTN) and different degrees of physical fitness. Despite these limitations, the rate of cardiac events is similar to the ACS experience. Batalla published a 2003 follow-up study of 229 male patients younger than 50 years old after their initial MI. The mortality at 3 years was 5% (annual rate of 1.6%) and for a repeat MI at 3 years was 4% (annual rate of 1.3%).[5]

Lopes published a 2008 study reporting on a cohort of 825 patients followed at a large medical center, comparing outcomes in patients with single vessel disease (SVD), two vessel disease (2VD) and three vessel disease (3VD). All patients had preserved left ventricular ejection fraction (LVEF) and optimal medical therapy (ASA, nitrates, β blockers, ACE inhibitors, statins and low fat/cholesterol diet). The patients with SVD, which are closer to the intended AF population, had a mortality of 1.2% per year and a new MI-rate of 1.3% per year.[6]

In summary, the post-MI event rate in the medical literature is about 2-3% per year in aeromedically appropriate populations. Low risk outcomes are attained by patient selection: absence of pre-morbid conditions like diabetes, no significant myocardial scars with normal left ventricular systolic function and no significant dysrhythmias following MI, aggressive reduction of risk factors (HTN, lipids, complete smoking cessation, weight control, dietary changes and regular physical activity).

II. Aeromedical Concerns.

The aeromedical concern is recurrent myocardial ischemia presenting as sudden cardiac death, second myocardial infarction, angina or ventricular dysrhythmias, all of which may cause sudden incapacitation or seriously impact performance of flight duties. Detecting the asymptomatic progression of CAD reliably without frequent invasive testing or noninvasive monitoring is the aeromedical challenge.

III. Waiver Considerations.

Myocardial infarction is disqualifying for all classes of flying duty as well as retention. ACS review and evaluation is required, in all cases, for waiver consideration. Waiver is restricted to low performance aircraft (defined as < 2.5 sustained +Gz) and may be considered for all trained aircrew; for pilots, the waiver is additionally restricted to flying with another qualified pilot. Waiver for trained aircrew was approved by the Aerospace Medicine Corporate Board in 2008. Myocardial infarction is also listed specifically as disqualifying for ATC/GBC duty and for MOD duty.

For aviators, criteria for waiver consideration include, normal left ventricular systolic function at rest and exercise (normal ejection fraction), adequate medical management (lipids, ASA use, HTN control, no diabetes), restricted to low performance aircraft (<2.5 Gz and with another qualified pilot), patent infarct-related artery, no noninvasive testing evidence of reversible ischemia off cardioactive medications at rest and at peak stress, and successful risk factor modification at initial ACS evaluation and at each re-evaluation. If revascularization has been performed, they must meet criteria for the coronary artery revascularization waiver policy. Initial minimum DNIF observation period is six months post-MI. ACS evaluation for initial waiver consideration will include complete noninvasive testing and coronary angiography. If waiver is recommended and granted, waiver will be valid for one year with annual ACS re-evaluation required for waiver renewal consideration. In addition, routine serial coronary *angiography is required at five year intervals*. This is based on a review of ACS database of repeat angiography which shows no recurrent disease at three years

following coronary revascularization. This is also consistent with recommendations in the current literature for repeat coronary angiography following revascularization. Follow-up coronary angiography may be recommended sooner if indicated by symptoms, noninvasive test results or failure to control risk factors.

Table 1: Myocardial infarction and Waiver Potential

Flying Class	**Waiver Potential** **Waiver Authority**	**ACS** **Review/Evaluation**
I/IA Untrained II and III	No AETC	NA
II	No	NA
IIA (flight surgeon, navigator)* IIC (pilot)* RPA Pilot	Yes AFMSA	Yes, Annual Visit
III*	Yes AFMSA	Yes, Annual Visit
ATC/GBC MOD**	Yes AFMSA	Review possible***

* Aircrew must meet all of the following criteria for consideration: normal LVEF, no wall motion abnormality, adequate medical management (including statin, ASA, nitroglycerine (PRN), ACE inhibitor and/or β blocker as clinically appropriate), controlled hypertension, no diabetes or other co-morbidities. Low performance aircraft defined as <2.5 sustained G with another qualified pilot. No altitude restriction in low performance aircraft.
** Waiver authority for MOD personnel is AFGSC following initial AFMSA waiver.
*** Annual testing may be done locally and sent to ACS for review at the request of the MAJCOM, alternatively all testing and follow-up can be done during annual ACS evaluations.

AIMWTS review in May 2016 revealed 76 submitted cases with a history of myocardial infarction. There were 0 FC I cases, 37 FC II cases (21 disqualifications), 32 FCIII cases (23 disqualifications), 6 ATC/GBC cases (2 disqualifications), and 1 MOD case (0 disqualifications).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations, and the MEB has recommended return to duty.

The AMS for the initial waiver for myocardial infarction should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history of the event, emergency care rendered, testing done to include all results.
C. Copy of the cardiac catheterization report and copy of the images (CD, cineangiogram or videotape).
D. Additional local cardiac testing is not routinely required but may be requested in individual cases.
E. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram, treadmill, nuclear myocardial stress perfusion imaging).

F. Results of MEB returning member to worldwide duty.

The AMS for waiver renewal for myocardial infarction should include the following:
A. Interval history since last waiver – any history of chest discomfort, shortness of breath, or fatigue.
B. Recent ECGs and any other applicable cardiac testing.

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manager for (patient's MAJCOM)
USAFSAM/Aeromedical Consultation Service
2510 5th Street, Bldg 840
WPAFB, OH 45433

For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD-9 Code for myocardial infarction	
410	Acute myocardial infarction

ICD-10 Codes for myocardial infarction	
I21.09	Acute myocardial infarction
I21.3	ST elevation (STEMI) MI of unspecified site
I21.4	Non- ST elevation (STEMI) MI

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WAIVER GUIDE
Updated: Aug 2013
Supersedes Waiver Guide of Jun 2009
By: Dr. Justin Nast (RAM 13) and Dr. Dan Van Syoc
Reviewed by LtCol Roger A. Wood, AF/SG Consultant for Hematology/Oncology

CONDITION:
Non-Hodgkin's Lymphoma (Aug 13)

I. Overview.

Non-Hodgkin's Lymphoma (NHL) is a diverse group of lymphoid malignancies and can range from aggressive to more indolent in behavior. More recent classifications have taken into account genetic information as well as cell morphology to better characterize the behavior of these neoplasms in individual patients. Additionally, it is also recognized that there is a continuum between leukemias and lymphomas and that they can represent the same disease entity.[1] There is an estimated 1 in 47 lifetime risk of being diagnosed with NHL, with approximately 75% of cases diagnosed at age 75 or older. While the incidence of the disease has been increasing so has the efficacy of the therapies so 5 year survival rates are now 68.1%.[2]

Abnormal immunologic status, certain viruses and bacteria, occupational exposures, and history of prior lymphoma have all been attributed to an increased risk of NHL. Presentation can include fever, weight loss, and sweats (B symptoms). Often, a patient will be asymptomatic except for an enlarging lymphatic mass.

The physical examination of individuals with suspected NHL should be directed at all lymphoid tissue sites and include special attention to the liver and spleen. Initial laboratory evaluation should include CBC, peripheral smear, complete metabolic panel, protein electrophoresis, hepatitis and HIV serology. Beta-2 microglobulin and bone marrow aspirate and biopsy should be obtained if indicated. CSF studies may also be indicated in the evaluation of CNS NHL. Biopsy tissue confirmation is essential for definitive diagnosis and therapy.

Initial imaging should include chest x-ray and computed tomography of the chest, abdomen, and pelvis. MRI of the brain is indicated for evaluation of CNS NHL. Positron emission tomography (PET) scanning may be helpful in determining the location of NHL and for monitoring treatment response.

The Ann Arbor Staging System with the Cotswold modifications is the standard for staging of NHL. Treatment is driven not only by staging, but also by molecular genetic factors and individual response to therapy.[3]

Table 1: Cotswold Modification of Ann Arbor Staging System[4]

Stage	Area of Involvement
I	Single lymph node group
II	Multiple lymph node groups on same side of diaphragm
III	Multiple lymph node groups on both sides of diaphragm
IV	Multiple extranodal sites or lymph nodes and extranodal disease
X	Bulk > 10cm
E	Extranodal extension or single isolated site of extranodal disease
A (not present)/B (present)	B symptoms: weight loss > 10%, fever, drenching night sweats

Treatment principles take into account the heterogeneous nature of NHL, cell cycle control, drug resistance, and dose intensity. Treatment regimens vary widely from radiation only for indolent early stage disease to aggressive multi-drug regimens with bone marrow transplant for more aggressive NHL. A common feature of current treatment regimens is the use of rituximab. Rituximab is an anti-human CD20 monoclonal antibody that increases the efficacy of other chemotherapeutic regimens but can also be used as monotherapy.[5] Newer therapies have changed the prognosis of NHL and future prognostic indices will likely be highly individualized. The most up to date treatment guidelines are detailed in the National Cancer Comprehensive Network Clinical Practice Guidelines in Oncology (NCCN).[6]

II. Aeromedical Concerns.

As with most malignancies, aeromedical concerns of NHL are based on the disease as well as the treatment regimen. With NHL, the risk for sudden incapacitation is minimal as disease involvement of the CNS or heart is rare. Although the most common presentation of NHL is peripheral lymphadenopathy, initial manifestations rarely may include neurologic symptoms from central nervous system involvement or spinal cord compression.

NHL survivors who received chemotherapy have the potential to suffer adverse consequences in relation to their work life and have poor perceptions of their health compared to peers as long as 5 to 15 years after completion of therapy.[7] They can also suffer from excess fatigue as long as 10 years after diagnosis. The source of this fatigue is multi-factorial and cannot be attributed to mode of treatment alone.[8] Although treatment regimens can be potentially neurotoxic, there is some evidence that the long term neuropsychiatric sequelae are minimal.[9] NHL survivors are at higher risk for second malignancies. This increased risk is likely related to therapy, but genetic predisposition and environmental exposures may also be involved.[10] NCCN follow-up guidelines take into account this increased risk.

In the past, the use of bleomycin in aviators would have been permanently disqualifying. This was based on the risk of pulmonary fibrosis with exposure to oxygen. The value of bleomycin in the treatment of malignancies is in part a function of its specific toxicity, since it does not induce bone marrow aplasia, and thus does not add to the toxicity that limits most oncologic drugs. Instead, the principal target organ of bleomycin-induced injury is the lung, with acute pulmonary damage occurring in 6-18% of treated patients. The pathophysiology of delayed toxicity of bleomycin is complex. In the medical literature of the last thirty years, a number of patients have been described who, having previously received bleomycin therapy; have developed pulmonary toxicity when undergoing subsequent surgery. Typically, these have been young individuals receiving modest

levels of oxygen (33-42%) during long operations (4-8 hours). The true incidence of such delayed toxicity is unknown, since the subsequent literature has largely consisted of isolated case reports or small series.[11] A more cogent argument can be made that the period of risk is primarily in the first year after therapy, since most cases occurred within that time frame. However, it is equally possible that this observation represents a bias related to the timing of operative intervention.

Applicable data had been non-existent, a state of affairs that has been somewhat altered by unpublished data recently supplied by the Duke Hyperbaric Unit.[11] Although it had been the practice in hyperbaric medicine to avoid hyperoxia in bleomycin-treated individuals, the undoubted benefit from hyperbaric oxygen (HBO) in wound healing and osteonecrosis posed against the uncertain risk of delayed bleomycin toxicity led several years ago to a change in policy. Since then, the Duke unit has treated 11 individuals previously exposed to bleomycin with HBO. There was a wide range of time between the last dose of bleomycin and the institution of HBO, ranging from 1 month to 22 years. The range of cumulative bleomycin doses was not noted. Anywhere from 8 to 44 treatments with 100% oxygen at 2 ATA (PiO2 ~ 1475 mmHg) were administered for two hours per treatment, once or twice daily. One individual experienced significant chest discomfort and a decline in diffusion capacity of 50%; both resolved following a break in treatment, and she successfully completed HBO treatment with a reduction in frequency of her sessions. While the Duke experience does not represent occupational exposure per se, and the number of individuals treated is small, the amount of oxygen exposure from HBO therapy is far in excess of what would be expected in aviation, and suggests that the risk of delayed toxicity outside the operating room may be minimal.

Based on this data, policy was changed for aviators treated with bleomycin. Those aviators returning to non-high performance aircraft would be evaluated as usual, addressing risks of tumor recurrence and potential toxicity from chemotherapy. Assuming they had not developed bleomycin pneumonitis during therapy, then no restrictions from altitude chamber or other sporadic oxygen exposure is warranted. Because it is possible, and biologically plausible, that the common perception of an increased period of risk within the first year is correct, a grounding period of one year from the end of treatment is required before waiver consideration in high performance aircrew. In most cases, this will coincide with the grounding period already recommended as a result of the disease/chemotherapeutic regimen.

There have been case reports of life-threatening pneumonitis developing in patients with a history of bleomycin-induced lung injury, who were later given supplemental oxygen for surgical procedures. Therefore, aviators who have a history of bleomycin-induced lung injury should not be allowed to return to airframes that require routine use of 100% oxygen. Also, they should be exempted from the portions of the altitude chamber qualification that require 100% oxygen use. Use of 100% oxygen during emergencies such as fire or rapid decompression is acceptable and should not be discouraged.

Aviators treated with anthracyclines (e.g. Adriamycin) are at risk of treatment induced cardiomyopathy. The aeromedical risk due to poor left ventricular function as a result of anthracycline containing treatment regimens requires demonstration of adequate cardiac function. An echocardiogram or Multi-Gated Acquisition (MUGA) scan may be required to demonstrate adequate cardiac function for consideration of returning an aviator to flying following treatment with anthracyclines.[6]

III. Waiver Considerations.

History of Non-Hodgkin's lymphoma is disqualifying for all flying classes in the US Air Force, as well as for ATC/GBC and MOD personnel.

Table 2: Waiver potential for Non- Hodgkin's Lymphoma

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	All stages	Maybe*+ AETC	Maybe†
II	All stages	Yes*#+ AFMSA	Yes†
III	All stages	Yes*#+ AFMSA	Yes†
ATC/GBC and MOD	All stages	Yes*#+ AFMSA	At the discretion of the waiver authority

* FC I/IA candidates, as well as untrained FC II, FC III, GBC, MOD; waiver may be considered five years after completion of treatment if asymptomatic and in full remission with a favorable prognosis.
# For trained FC II, FC III, ATC/GBC, MOD individuals only, waiver may be considered six months after completion of treatment if asymptomatic and in full remission; the exception is for fighter aircrew who need to wait 12 months prior to waiver consideration if they received bleomycin, otherwise 6 months.
+ No indefinite waivers will be granted.
† For high performance (routine use of aviator mask while flying) individuals treated with bleomycin, will no longer require an ACS evaluation unless problems arise and the evaluation is requested by the waiver authority.

AIMWTS review in Jul 2013 revealed a total of 36 cases. Breakdown of the cases was as follows: 2 FC I cases (both disqualified); 20 FC II cases (4 disqualified); 9 FC III cases (2 disqualified); 3 ATC/GBC cases (0 disqualified); and 2 MOD cases (1 disqualified).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for NHL should include the following:
A. History – initial symptoms, pathology, stage, treatment, surveillance plan, and activity level. History should also emphasize past personal or family history of malignancy, radiotherapy, chemotherapy, connective tissue disease, or immune-suppression.
B. Physical exam.
C. Hematology/oncology reports to include all follow-up studies consistent with current guidelines in National Cancer Comprehensive Network (NCCN).[6]
D. Lab/Rad –CBC, peripheral smear, serum creatinine, Complete metabolic panel, hepatitis panel and HIV serology. Serum beta-2 microglobulin levels for individuals with indolent NHL and serum protein electrophoresis for individuals with small lymphocytic lymphoma. Submit bone marrow and CSF studies if clinically indicated and obtained. Chest x-ray and any other imaging studies to include CT, endoscopic photographs, and PET scans should be provided. Submit echocardiogram or MUGA scan studies if the individual is treated with anthracycline containing regimens. Submit completed pulmonary function studies (any additional PFTs will be done in conjunction with the ACS evaluation).
E. Tumor board report, military or civilian, if applicable.
F. Medical evaluation board results.

The AMS of waiver renewal of NHL should include the following:
A. History – brief summary of stage, treatment, frequency of surveillance with results, symptoms, and activity level.
B. Physical exam.
C. Hematology/oncology consultation reports.
D. Lab/Rad – CBC, peripheral smear, complete metabolic panel, beta-2 microglobulin, and serum protein electrophoresis as clinically indicated.
E. All treatments and follow-up consistent with current guidelines in the NCCN.[6]
F. Any RILO summaries associated with persistent Assignment Limitation Codes.

ICD-9 Code	**Type of Non-Hodgkin's Lymphoma**
202.8	Lymphoma (malignant)
204.9	Chronic Lymphocytic Leukemia/Small Lymphocytic Lymphoma (CSLL-1)
202.0	Follicular Lymphoma
200.3	Gastric MALT Lymphoma (MALT-1)
200.3	Non-gastric MALT Lymphoma (NGMLT-1)
200.3	Nodal Marginal Zone Lymphoma (NODE-1)
200.3	Splenic Marginal Zone Lymphoma (SPLN-1)
200.4	Mantle Cell Lymphoma (MANT-1)
200.7	Diffuse Large B-Cell Lymphoma (BCEL-1)
200.2	Burkitt's Lymphoma (BURK-1)
200.1	Lymphoblastic Lymphoma (BLAST-1)
202.7	Peripheral T-Cell Lymphoma (TCEL-1)
202.1/202.2	Mycosis Fungoides/Sezary Syndrome (MFSS-1)
200.5	Primary CNS Lymphoma

ICD-10 Code	Type of Non-Hodgkin's Lymphoma
C85.80	Other specified types of non-Hodgkin lymphoma, unspecified site
C91.90	Lymphoid leukemia, unspecified not having achieved remission
C82.80	Other types of follicular lymphoma, unspecified site
C83.80	Other non-follicular lymphoma, unspecified
C83.87	Other non-follicular lymphoma, spleen
C83.88	Other non-follicular lymphoma, lymph nodes of multiple sites
C88.4	Extranodal marginal zoneB-cell lymphoma of mucosa-associated lymphoid tissue (MALT-lymphoma)
C83.10	Mantle Cell Lymphoma, unspecified site
C83.39	Diffuse large B-cell lymphoma, extranodal & solid organ sites
C83.38	Diffuse large B-cell lymphoma, lymph nodes of multiple sites
C83.70	Burkitt's lymphoma, unspecified site
C83.50	Lymphoblastic (diffuse) lymphoma, unspecified site
C84.40	Peripheral T-cell lymphoma, not classified, unspecifies site
C84.00	Mycosis fungoides, unspecified site
C84.10	Sézary disease, unspecified site

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WAIVER GUIDE
Updated: Mar 2016
Supersedes Waiver Guide of Jan 2013
By: LtCol Michelle R Milner (RAM 17) and Dr Dan Van Syoc
Reviewed by Dr. Leo D. Hurley, ACS Ophthalmology branch and LtCol Dan Lamothe, ACS Ophthalmology branch chief

CONDITION:
Ocular Histoplasmosis Syndrome (Mar 16)

I. Overview.

Ocular histoplasmosis is an inflammatory intraocular condition associated with systemic infection by the dimorphic fungus, *Histoplasma capsulatum*. The fungus is concentrated in soil, especially in and around old building excavations as well as bird and bat habitats[1]. Three types of ocular involvement have been described: histoplasmic endophthalmitis, solitary histoplasmic granuloma, and ocular histoplasmosis syndrome.

Histoplasmic endophthalmitis and solitary histoplasmic granuloma are conditions primarily seen in immunocompromised individuals. Histoplasmic endophthalmitis results from dissemination of active pulmonary or systemic infection leading to diffuse uveal and retinal involvement. Symptoms can include floaters, decreased vision, and pain in the affected eye. Prompt treatment with systemic amphotericin B or itraconazole is recommended.[2] In solitary histoplasmic granuloma, primary histoplasmic infection may not be readily identifiable. If the granuloma appears to be growing, systemic administration of amphotericin B should be considered.

Ocular histoplasmosis syndrome (OHS) is the most common form of ocular disease caused by *H. capsulatum*, with the primary/systemic infection typically occurring several years prior to the discovery of ocular findings[1]. In the United States, OHS is an important cause of loss of central visual acuity among adults less than 60 years of age. Previous studies indicate the prevalence of OHS ranges from 1.6% - 5.3%.[3] Most patients are diagnosed between 20 and 50 years of age with median age of 36. The highest prevalence in the United States occurs along the Ohio and Mississippi River valleys, while Tennessee has the highest new infection rate. Small endemic foci are also found in Mexico and India. The fungus exists in two forms: the filamentous form in soil and the spherule form found in the host. The relative humidity of the environment plays a large role in *H. capsulatum*'s presence and ability to aerosolize.[1] Once inhaled, patients exhibiting mild flu-like symptoms will recover and develop a positive histoplasmosis skin reaction. Annually, up to 12% of these patients will go on to develop choroidal neovascularization (CNV) and macular scars.[1]

Positive cultures in OHS are not appreciated. Pathogenesis of disease appears to be an exuberant cellular immune reaction to residual inert fungal antigens remaining within the eye.[4] This reaction leads to disruption of Bruch's membrane, the layer between the retinal pigment epithelium and the choroid, and increased potential for CNV from newly budding vascular tissue from the choriocapillaris. As a result, the mechanism of OHS is non-infectious and does not respond to antifungal therapy. Interestingly, genetic factors may be important in patients with macular or peripapillary hemorrhagic lesions. HLA-B7 has been reported more commonly in patients with OHS that developed choroidal neovascular membranes, whereas the presence of HLA-DR2 has been associated with disciform macular lesions and solitary peripheral lesions.[5] In patients whose

disease is limited to peripheral atrophic spots, the expression of HLA-B7 was found to be no different than the general population.[2] More recently, a study by Dabil et al. has detected an association between the HLA-DR15/HLA-DQ6 haplotype and the development of choroidal neovascularization in OHS, at least in the Midwest region of the United States.[6]

The diagnosis of OHS is clinical and made via fundoscopic examination and characterized by at least two components: peripapillary chorioretinal atrophy (PPA); peripheral "punched-out" chorioretinal scars; and/or CNV (or resultant disciform scars), without anterior segment or vitreous inflammation. Patients may present with metamorphopsia, distorted vision or paracentral scotoma (due to macular or peripapillary CNV) while typical PPA and chorioretinal scarring, if limited to the peripheral retina, do not produce symptoms.[1] Up to 20% of patients with OHS will develop new atrophic scars as seen in a study by Lewis et al.[7]

Skin testing with *H. capsulatum* is not recommended due to the high prevalence of positive results in endemic areas. In addition, concerns have been raised that the skin test may actually cause activation of otherwise quiescent atrophic chorioretinal scars.[2]

Patients with known, asymptomatic disease should be instructed to perform frequent Amsler grid testing for early detection of CNV. In those who have symptoms of metamorphopsia and central scotoma, fluorescein angiography may demonstrate hyperfluorescence and late leakage from a complex of lacy, small blood vessels, consistent with the diagnosis of CNV.

Several studies have examined the impact of CNV in OHS on overall vision quality. These studies typically delineate subfoveal and juxtafoveal lesions for interpretation of results. Natural history studies have demonstrated at 36 months after presentation, 77% of eyes with subfoveal membranes in the setting of OHS had a vision of 20/100 or worse; with 49% with 20/400 or worse vision. Patients with juxtafoveal lesions similarly had 74% of eyes with vision 20/40 or worse with the majority of these being no better than 20/200.[8] With several studies indicating an incidence of approximately 20-25% of CNV in the fellow eye, this is of concern for overall visual health. As documented by the Macular Photocoagulation Study (MPS) group, patients with neovascularization in one eye due to OHS have risk developing CNV in the second eye at a rate of 2% per year for five years or longer.[9] Several treatment modalities have been developed for many of these detrimental lesions.

Photocoagulation with lasers has been an effective treatment for well-defined, classic extrafoveal, juxtafoveal, and peripapillary CNV lesions, secondary to OHS. The Macular Photocoagulation Study (MPS) demonstrated only 12% of treated individuals experienced significant disease progression; as compared to 42% of the control population.[10] However, treatment with laser therapy caused permanent destruction of the retina and retinal pigment epithelium, leading to permanent visual scotomas. For this reason, foveal CNV is excluded from treatment with laser therapy. Anti-vascular endothelial growth factor (anti-VEGF) intravitreal injections, an off-label use with encouraging results and positive benefits compared to risks (HANDLE study, clinical trial #NCT01790893; and the Treatment of CNV Secondary to Presumed Ocular Histoplasmosis With EYLEA 2.0 mg, clinical trial #NCT01578720) may become standard of care once the above trials are completed.[1]

Intravitreal injections of steroids have small studies which show promise and relatively few complications however it is difficult to find all-round support for this until larger studies have been completed.

Photodynamic therapy (PDT) using verteprofin, a lipophilic-amphiphilic photosensitizer, has demonstrated promising results. Verteprofin is preferentially absorbed by the abnormal vasculature in CNV allowing more targeted therapy over a wider area. A study completed by the Verteprofin in Ocular Histoplasmosis (VOH) study group showed 56% of treated patients improved 7 or more ETDRS letters of visual acuity from baseline.[2]

Surgery can be an option with mixed results. Submacular surgery, if restoration of a perfused choriocapillaris is achieved, tends to obtain better visual acuity. Subfoveal CNV is not currently corrected surgically as VA was not appreciably improved and more than 50% of treated eyes went on to have a recurrence of CNV. Additionally, macular translocation (rotating the macula to a healthier area of the choroidal bed) is no longer used due to high perioperative complications and the superior outcomes from anti-VEGF injections.

The differential diagnoses for OHS include myopic degeneration, age-related macular degeneration, sarcoidosis, toxoplasmosis, angioid streaks, and idiopathic multifocal choroiditis with panuveititis.

II. Aeromedical Concerns.

Primary aeromedical concern in OHS is its potential to affect central and peripheral vision. Patients with peripheral inactive disease without evidence of macular involvement will maintain excellent visual acuity and have a good visual prognosis. Some of these patients may have residual visual field defects but most are minor and do not have substantial effects on peripheral vision. For those patients who develop macular disease, the prognosis is more guarded. Progression of disease with loss of vision depends upon size and location of the lesion, development of CNV and subsequent scaring. After three years, more than 75% of patients with subfoveal CNV will have a corrected visual acuity of 20/100 at best. If the patient is less than 30 years of age and has a small subfoveal CNV lesion with no visual loss secondary to OHS in the other eye, a visual acuity of 20/40 or better may be retained in up to 14% of eyes.[2] Currently available treatment may preserve vision, although treating the macular area with laser therapy will inherently degrade visual acuity. If subfoveal or juxtafoveal lesions are present treatment should involve intravitreal anti-VEGF injections, PDT or a combination of these two.

III. Waiver Consideration.

Patients who have active OHS lesions are disqualified for all flying class duties. In these cases, waivers will not be considered until the disease has resolved or the active lesions have been adequately treated. If an active lesion is treated by laser photocoagulation or PDT, patients should have at least one follow-up evaluation completed by the treating ophthalmologist 3-4 weeks post therapy prior to waiver submission. Follow-up examination must indicate extent of CNV eradication and if residual disease is present requiring further therapy. Inactive lesions which allow the airman to meet vision standards will be waived on a case by case basis. Local ophthalmology evaluation to include visual acuity, Amsler grid testing, Humphrey 10-2 visual fields, stereopsis and fundoscopic evaluation are required. Submit any ophthalmologic imaging obtained including optical coherence tomography (OCT) and fluorescein angiography. All cases will need to be

reviewed or seen by ACS Ophthalmology. In addition, any disease, injury, infection process, or sequelae involving the eye that is resistant to treatment and/or results in: distant visual acuity that cannot be corrected to the retention vision standards listed in Item C2, and/or a central field of vision defect, in the better eye, that reduces the field of view less than 20 degrees from fixation in any direction is disqualifying for retention and will require and MEB..

Table 1: Waiver potential for ocular histoplasmosis

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority†**	**ACS Review/Evaluation**
I/IA IFCII/IFCIII	OHS - inactive+*	Yes~ AETC	Yes
	OHS – history of CNV#	No AETC	
II/RPA Pilot/III	OHS - inactive*	Yes~ MAJCOM	Yes**
	OHS – history of CNV#	Maybe~ MAJCOM	If waiver considered**
ATC/GBC	OHS - inactive+*	Yes~ MAJCOM	At discretion of waiver authority
	OHS – history of CNV#	Maybe~ MAJCOM	At discretion of waiver authority
MOD	OHS - inactive+*	Yes~ AFGSC	At discretion of waiver authority
	OHS – history of CNV#	Maybe~ AFGSC	At discretion of waiver authority

+ History of macular disease will not be waived.
* Must meet retention and Flying Class-specific vision standards. Must not be expected to progress or recur. No active or reactivated disease are waiverable.
** For initial waiver consideration, AMS goes to AFMSA and subsequent requests may go to MAJCOM.
~ No indefinite waivers.
# No waiver for untrained assets for OHS with a history of CNV.
† If individual does not meet retention standard outlined in MSD, then waiver authority becomes AFMSA.

Review of AIMWTS in Dec 2015 identified 23 cases of OHS submitted for waivers. Of the 23 waivers, 4 were for FCI, 13 were for FCII, and 6 were for FCIII. One off the FCI waiver requests was disqualified for lesions in a high risk region; one FCII waiver request was disqualified due to significant visual field defects despite treatment with PDT and anti-VEGF while one was disqualified due to very poor vision in the affected eye; and one FCIII waiver request was

disqualified for poor visual acuity. The waivers returned as medically acceptable all had inactive disease and met vision standards.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Information required for a waiver for ocular histoplasmosis syndrome should include:
A. Complete history of all vision-related issues; all related medical records need to be submitted
B. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
C. Eye exam to include visual acuity, Humphrey visual fields (30-2 and 10-2 testing for a more thorough evaluation of the macula), and stereopsis testing.
D. Ophthalmology consultation report to include all follow-up reports.
E. If active lesions are part of the history and they were treated by laser photocoagulation, intravitreal injections or PDT, patients should have at least one follow-up evaluation completed by the treating ophthalmologist prior to waiver submission. The first follow-up typically occurs 3-4 weeks post therapy.
F. Ophthalmologic imaging test results to include fundus photos and fluorescein angiography.
G. MEB results if required.

ICD-9 codes for Ocular Histoplasmosis	
115.02	Ocular histoplasmosis syndrome
115.9	Histoplasmosis unspecified without manifestation
115.92	Histoplasmosis retinitis, unspecified
115.99	Histoplasmosis unspecified with other manifestation

ICD-10 codes for Ocular Histoplasmosis	
B39.4	Histoplasmosis capsulati, unspecified
B39.9	Histoplasmosis, unspecified
H32	Chorioretinal disorders in diseases classified elsewhere

V. References.

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WAIVER GUIDE
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Supersedes Waiver Guide of Mar 2011
By: Capt Marion Powell, Maj Tighe Richardson, Dr Leo Hurley, Dr Steven Hadley (all from ACS Ophthalmology Branch), and Dr Dan Van Syoc

CONDITION:
Optic Disc (Nerve Head) Drusen (Apr 14)

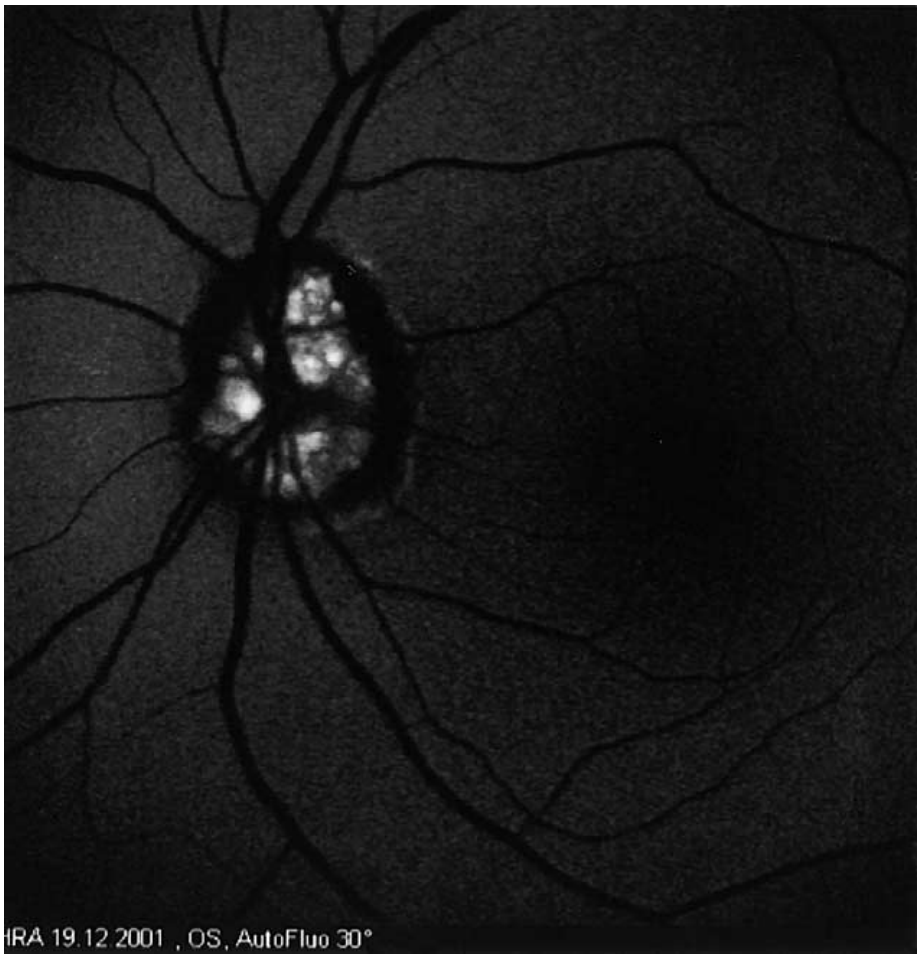
I. Overview.

Optic disc drusen (ODD) are congenital and developmental anomalies of the optic nerve head commonly seen as an incidental finding during routine eye exams. The term "Drusen" comes from the German word for "geode." These drusen are believed to be composed of calcified mitochondrial remnants excreted from damaged or dysfunctional nerve axons.[1] These bodies tend to lie beneath the surface of the optic nerve head but may become visible later in life as yellow-white refractile bodies, always found superficial to the lamina cribrosa.[2-3] Drusen may imitate the appearance of papilledema with elevation and blurring of disc margins (impaired axoplasmic flow), but can be differentiated clinically by evaluating signs and symptoms of increased intracranial pressure. Symptoms such as headache, especially increased upon awakening or after recumbency, and/or a pulsatile swishing sound heard by the patient (pulsatile tinnitus) are not expected with disc drusen and should initiate urgent neuro-imaging and neurologic workup. The pathogenesis of ODD is unproven but likely stems from small optic disc size and mechanical obstruction to axonal transport.[2-3] It's theorized that impaired ganglion cell transport mechanisms lead to abnormal axonal metabolism and mitochondrial damage, ultimately causing axonal deterioration and extrusion of calcified bodies.[3-4] ODD may be associated with retinitis pigmentosa and pseudoxanthoma elasticum.[2] Other conditions that share a similar name, e.g. macular drusen associated with age-related macular degeneration, are not pathologically related to optic disc drusen.

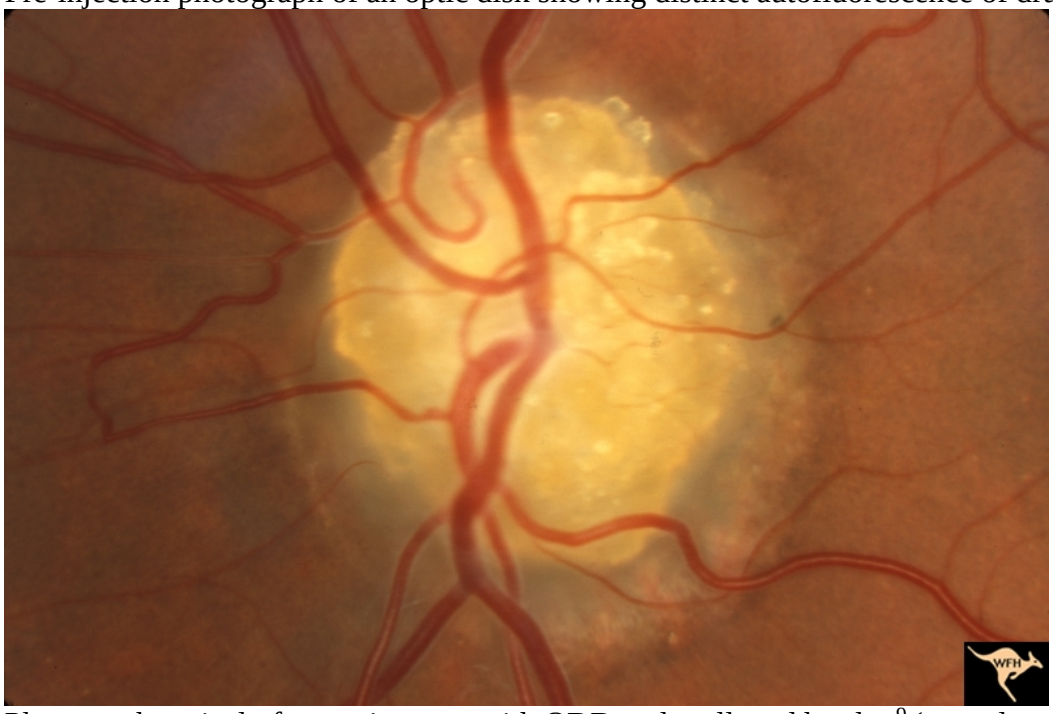
ODD is believed to have an autosomal dominant (partial penetrance) inheritance pattern. Previous autopsy studies on adult eyes revealed an incidence of optic disk drusen of 0.5% and 2.4%[1] with a ten-fold increase in prevalence in family members of patients with drusen.[3] Men and women are affected equally with an average age at diagnosis of 22 years and occurs bilaterally in 67-85% of cases.[2] As discussed above, the anatomy of the posterior aspect of the eye is believed to play a large role in the pathogenesis of drusen; specifically, eyes with optic disk drusen tend to have smaller scleral canals and optic disks. This is evident in the fact that ODD are rarely found in blacks whose scleral canal and optic disk tend to be larger.[1] Though ODD is typically diagnosed in the second or third decade, it is believed to be present at childhood. Diagnosis generally does not occur earlier as most drusen are buried deep in the optic nerve and are asymptomatic. These lesions progress in size and become more superficial with time, causing visual disturbances. Most patients with ODD remain asymptomatic with normal visual acuity, although transient visual obscurations secondary to disc ischemia have been reported in 8.6% of study patients.[2-3,5] Visual field defects with surface optic disc drusen are a common finding, occurring in 71 to 87% of cases but may be less common with buried drusen.[2, 3,5] Visual field defects are slowly progressive and often manifest as enlarged blind spots (60%) and arcuate defects (59%), typically sparing central vision.[2-3,6] These visual field defects are believed to be caused by several mechanisms to include impaired axonal transport due to a small scleral canal leading to attrition of axons, mechanical compression of nerve

fibers by drusen, and ischemia within the optic nerve head.[1] Central vision is rarely affected by ODD and, therefore, impairment of visual acuity seldom encountered.[1] Only in severe cases will visual acuity be affected, but only following significant deterioration in the peripheral visual fields. Potential complications related to ODD are: ischemic optic neuropathy, central retinal artery occlusion, and retinal vein occlusion.[3] Unfortunately, there is no effective treatment established for optic disc drusen and visual field defects attributed to nerve fiber loss are permanent.

Diagnosis of optic disc drusen can be challenging. Optic disks of adult patients with drusen characteristically show a "lumpy, bumpy" border and bright irregular deposits, usually located in the nasal half of the disk.[1] Many drusen can remain buried in the optic nerve causing only elevation which must be differentiated from other etiologies. Several modalities can be utilized to aid with the diagnosis of optic disk drusen, to include B-scan ultrasonography, autofluorescence, and computed tomography. A recent review of the literature demonstrated B-scan ultrasonography as the most reliable method in drusen detection.[1] However, more recent studies have shown ocular coherence tomography (OCT) to be of increasing importance. Several studies have reported increased rates of detecting drusen when using enhanced depth imaging versions of the OCT, as compared with B-scan and autofluorescence.[7-8] Though traditional spectral domain OCT does not have these enhanced imaging capabilities, it still can be a useful tool in examining complications from optic disc drusen. OCT can be utilized to quantify any loss of retinal nerve fiber layer (RNFL) which can demonstrate thinning associated with axonal damage. Additional tests that may be useful in evaluation of ODD include computed tomography (CT) and fluorescein angiography.



Pre-injection photograph of an optic disk showing distinct autofluorescence of drusen.[1]



Photograph typical of an optic nerve with ODD and scalloped border.[9] (reproduced with permission from NOVEL)

II. Aeromedical Concerns.

Clinically and aeromedically, the main concern with optic disc drusen is their propensity to induce slowly progressive visual fields loss. As high as 87% of individuals with optic nerve head drusen can expect to have visual field abnormalities.[1] Furthermore, transient disturbances in central acuity and visual field may occur in association with optic nerve head drusen. Color vision anomalies have also been described in 41% of USAF aviators with ODD in preliminary data collected at the Aeromedical Consultation Service. ODD have also been associated with retinal hemorrhage in 2-10% of patients, though most cases are incidental findings without visual impairment.[1]

Once the diagnosis of drusen is established, careful evaluation of optic nerve function is imperative. This should include visual acuity, visual field testing, Amsler grid, and color vision testing. Visual field loss has the most potential for aeromedical grounding and as such, visual field testing should be performed on a regular basis to ensure visual function remains adequate and consistent with mission effectiveness and flying safety. In addition, applanation tonometry should be completed in cases with known visual field or RNFL loss on OCT. This recommendation comes due to the theorized decreased threshold of damaged optic nerve fibers for compounding damage due to elevations in intraocular pressure.[1] Optic disc photodocumentation should be obtained for comparison during future monitoring. It is also important for patients to self-monitor their vision periodically with Amsler Grid testing. Periodic surveillance to assess visual function in aircrew with optic nerve head drusen is appropriate, since drusen-related optic nerve problems are often asymptomatic. Routine cases should be monitored every six to twelve months.

III. Waiver Consideration.

Optic nerve head drusen is a disqualifying condition for flying classes I/IA, II, III, and RPA pilots. It is not listed as a disqualifying diagnosis for ATC/GBC or MOD personnel, but for ATC/GBC personnel, it would be disqualifying if it results in a visual field defect. Aeromedical Consultation Service (ACS) evaluation is required for initial waiver of optic nerve head drusen for cases eligible for waiver. FC I/IA candidates with optic nerve head drusen are not eligible for waiver. Optic nerve head drusen in untrained FC II and FC III are also typically not eligible for waiver. Consideration will be given to RPA pilot applicants with optic nerve head drusen without visual field or retinal nerve fiber defects. ACS review is required for waiver renewal; depending on the results of local work-up, an ACS evaluation may be required. Waiver criteria for trained aircrew with optic nerve head drusen include acceptable visual performance on ophthalmologic examination including visual acuity, color vision and stereopsis, absence of transient visual loss, no aeromedically significant visual field deficit within the central 30 degrees of either eye, and a full binocular visual field.

Table I – Waiver criteria for aviators with optic nerve drusen

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	No AETC	No†
II/RPA/III	Yes* MAJCOM	Yes
ATC/GBC	Waiver not required#	N/A
MOD	Waiver not required#	N/A

* Waiver for untrained flying class II and III is unlikely.
† ACS evaluation only required if diagnosis is in question.
# Waiver will be required if the condition includes significant visual field or color vision defects.

AIMWITS search in Apr 2014 revealed a total of 140 members with an AMS containing the diagnosis of optic nerve head drusen. There were 51 disqualifications in that total. Breakdown of the cases revealed: 24 FC I/IA cases [22 disqualified (2 FC I/IA waivers exist in AIMWITS; both cases were misdiagnosed at the time of waiver submission as optic nerve head drusen and the diagnosis remained. However, subsequently no disc drusen were definitively identified following full ophthalmology evaluation in these individuals)], 54 FC II cases (1 disqualified), 58 FC III cases (26 disqualified), 4 ATC/GBC cases (2 disqualified), and no MOD cases.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

For optic nerve head drusen, the AMS for <u>initial waiver</u> or <u>waiver renewal</u> should include the following items:
A. Complete aeromedical history to include pertinent positives and negatives (e.g. headaches, pulsatile tinnitus, hypertension, diabetes, family history of drusen, etc.)

B. Presence or absence of visual symptoms and their operational impact (e.g. transient visual obscurations, perceived scotomas or metamorphopsia)
C. Results of complete optometric or ophthalmologic eye examinations to include, refraction to best Snellen visual acuity, intraocular pressure by applanation tonometry, color vision, Amsler grid, Humphrey visual field testing (preferably 30-2), ocular coherence tomography (OCT) of the retinal nerve fiber layer (RNFL), and stereoscopic optic disc evaluation.
D. Diagnostic tests supporting diagnosis (e.g. ophthalmic B-scan ultrasound, computed tomography of the orbit, etc.)

ICD-9 Codes for Optic Nerve Head Drusen	
377.21	Drusen of optic disc

ICD-10 Codes for Optic Nerve Head Drusen	
H47.329	Drusen of optic disc, unspecified eye

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WAIVER GUIDE
Updated: Jul 2015
Supersedes Waiver Guide of Nov 2011
By: Maj Benjamin J. Park (RAM 16) and Dr Dan Van Syoc
Reviewed by LtCol Dan LaMothe, ACS Ophthalmology branch chief and Col Roger Hesselbrock, ACS Neurologist

CONDITION:
Optic Neuritis (Jul 15)

I. Overview.

Optic neuritis (ON) is a demyelinating disorder of the optic nerve that typically presents as acute, painful, monocular vision loss.[1] Common visual deficits include visual field defects, color vision deficits, and reduced visual acuity. Onset generally occurs between 18 and 49 years of age with a mean age of onset of 32 years.[2, 3] It has an incidence up to 5 per 100,000, and is most common in northern latitudes (the United States and Northern Europe).[4] Diagnosis occurs more often in Caucasian-Americans than African-Americans with a 3:1 female to male ratio.[3] In 15% to 20% of patients subsequently diagnosed with multiple sclerosis (MS), ON is the presenting diagnosis and occurs in one-half to two-thirds of MS patients at some point during the course of their illness.[4]

Because ON typically manifests during the span that makes up the most active years of aircrew members' tour of duty and increases the risk of developing MS, the diagnosis can have profound implications on future career performance and longevity. In a study of thirty-one military aircrew who developed ON between 1963 and 1994, with follow-up ranging from 7 to 30 years, 39% went on to subsequently develop MS.[5] In the multicenter Optic Neuritis Treatment Trial (ONTT), thirty-eight percent of patients who had ON developed MS within 10 years of their initial presentation, and this increased to fifty percent 15 years after initial presentation.[1, 6]

The demyelination of the optic nerve in ON is believed to be an autoimmune phenomenon characterized by systemic T-cell activation.[7] Inflammatory cytokines are thought to be involved. Also, B-cell activation against myelin basic protein may be present in the cerebrospinal fluid. The inflammatory response results in edema and breakdown of the myelin sheaths and perivascular cuffing of the retinal vasculature. Genetic susceptibility for ON is suspected because of higher incidences of certain HLA types in those affected.[7]

ON is a clinical diagnosis based on history and physical examination findings. The ONTT reviewed visual symptoms and performed detailed visual assessments on 448 patients who had ON.[8, 9] Eye pain accompanied vision loss in 92% of patients. Vision loss was typically monocular and progressed rapidly over a period of hours to days. Even patients who had 20/20 vision at presentation had defects in their ability to perceive color and contrast; patients often described their vision as ''blurry'' or felt the color had been ''washed out." Loss of color vision occurred in 88% of involved eyes in the ONTT study.[9] Occasionally, there may be altered perception of moving objects (Pulfrich phenomenon).[10] Another interesting phenomenon, called Uhthoff's sign, is due to the fact that demyelinated lesions function worse with increased body temperature.[5] In cases of ON, this may manifest as transiently decreased vision after exercising or after a hot shower.

Although physical examination findings may vary in ON, pain with eye movements initially and the presence of an afferent pupillary defect are almost universally found. Even in those patients who have normal visual acuity, mild optic nerve dysfunction causes an asymmetry in the pupillary reflex that can be elicited by the swinging flashlight test. Visual acuity in the affected eye can range from 20/20 to no light perception. Although a central scotoma is the classic visual field deficit, a wide variety of visual field cuts may occur.[11, 12] Two-thirds of patients have a normal funduscopic examination with retrobulbar ON. One third of patients have optic disc swelling, blurring of disk margins, and swollen peripapillary veins caused by optic nerve head inflammation.[1] Abnormalities in visual evoked potentials may help demonstrate optic nerve dysfunction. Optical coherence tomography may be used to identify decreases in the retinal nerve fiber layer; a finding which is suspicious for axonal loss.[13-15] There has been some evidence to suggest that normal results on multifocal visual evoked response testing (mfVEP) may predict a better prognosis and a lower likelihood for progression to future MS.[16]

Although the diagnosis of ON is often made on clinical grounds, gadolinium-enhanced MRI is generally also obtained to help confirm the diagnosis and to risk-stratify patients who are likely to develop MS.[17, 18] Optic nerve inflammation can be demonstrated in 95% of patients who have ON utilizing gadolinium-enhanced fat-suppressed MRI of the orbits. In addition, assessing the longitudinal extent of optic nerve involvement as well as overall lesion burden on early brain MRI may help determine prognosis.[19, 20] The imaging may also demonstrate lesions in the periventricular white matter that are indicative of MS. In one study, the risk for MS 10 years after the first episode of ON was 56% with one or more lesions versus 22% in those who did not have lesions, and by 15 years it was 72% versus 25%.[6]

Laboratory evaluation of antinuclear antibodies, angiotensin converting enzyme, syphilis serology, and chest x-ray are not necessary in typical cases of ON, but should be considered in atypical presentations, such as African-American race, age < 16 years old, age > 45 years old, bilateral simultaneous ON, lack of ocular pain, lack of improvement within 4 to 6 weeks from symptom onset, progressive loss of visual function beyond 2 weeks after onset of symptoms, or the presence of retinal hemorrhages, cotton-wool spots or macular exudates that occur with neuro-retinitis.[1] Lumbar puncture may also be considered for atypical presentations. The absence or presence of CSF oligoclonal bands does not appear to add any additional information in predicting the development of MS in the setting of an abnormal MRI, but may be helpful if the baseline brain MRI is normal.[1]

The discovery of the neuromyelitis optic (NMO) antibody in 2004 has enabled classification of some cases of ON not associated with MS.[21] NMO and the Asian optico-spinal form of MS have been linked with a specific serum auto-antibody to aquaporin-4 water channels, which can be detected by an indirect immunofluorescence assay or a quantitative radioimmunoprecipitation assay. The importance is that compared to MS the visual prognosis in NMO is worse and management of ON in NMO is different than MS, usually requiring long-term immunosuppression to prevent relapses.[22]

Visual acuity in typical ON generally improves without treatment over the course of several weeks. 90% of patients have 20/40 or better vision at one year.[9] However, prognosis is poorer for those who present with lower visual acuity.[23] This is especially the case if vision loss persists beyond 1 month.[9, 24] Treatment is focused on hastening the return of vision, preventing recurrences, and reducing the incidence of MS. In the ONTT study that randomized affected patients to either high-

dose intravenous methylprednisolone or standard dose 1 mg/kg oral prednisone (or placebo), those who were given the methylprednisolone demonstrated a more rapid return to normal vision and a lower risk for recurrent ON.[25, 26] The differences in visual acuity were not significant at 2 years follow-up, however. Standard dose oral prednisone (1 mg/kg) was associated with an increased risk for recurrent demyelinating events compared with placebo. Oral prednisone at this dose has not been shown to be of benefit in acute mono-symptomatic ON and therefore is not recommended.[26] High dose methylprednisolone (1 gm IV daily for 3 days followed by oral steroid taper over 11 days) delayed the onset of MS compared with placebo at 2 years, but this advantage did not persist beyond this time frame. According to the American Academy of Neurology, although corticosteroids may hasten the return of vision in severe cases after initial presentation, there is no compelling evidence for long-term benefit for patients who have ON.[26, 27]

Several randomized trials (such as CHAMPS, PRISM, ETOMS, and BENEFIT studies) have demonstrated that disease modifying agents such as copaxone, interferon beta 1a and interferon beta 1b may reduce the development of MS in patients who have ON with an abnormal brain MRI.[1, 28, 29] Although these medications are typically started at the onset of symptoms, the initiation of this therapy should be done in conjunction with neurology consultation.

Recent studies are also indicating that anti-tumor-necrosis factor monoclonal antibody therapies, such as infliximab or adalimumab, or TNF circulating receptor fusion protein therapies, used for conditions such as Crohn's disease, rheumatoid arthritis, ankylosing spondylitis, and psoriatic arthritis, may cause an increased incidence of MS relapses, including ON, and other demyelinating disorders such as transverse myelitis and Guillain-Barré syndrome.[30, 31] Therefore, these should be used with caution in patients with known MS.

II. Aeromedical Concerns.

The primary aeromedical concerns with isolated ON (as defined by the absence of radiologic or clinical criteria for MS) are variable decreases in visual performance, that are unpredictable by either exam or imaging study and may go unrecognized by aircrew member with or without treatment. These visual changes include decreased visual acuity, degradation in color vision, visual field defects, and photopsias.[3, 9, 32, 33] Symptoms can present over a period of hours and may increase under physiologic stresses such as dehydration, hypoxia, fatigue or increases in body temperature. Additionally, Uhthoff's phenomenon was a common observation amongst USAF aircrew with ON. Military operational extremes characterized by increased heat exposure, such as in desert operations and in hot closed cockpits/crew stations, may place military personnel at an increased risk for Uhthoff related functional impairments.

The risk of relapse from typical isolated ON with normal brain CSF and MRI findings is low, as evidenced by the ONTT, enough that disease modifying immunomodulatory treatment is not recommended, and waiver is allowed.[34] Treatment with high dose intravenous methylprednisolone may be considered to hasten visual return in severe cases and possible earlier return to duty with isolated ON, but this must be balanced with the risks of such therapy, since long term visual performance is not changed. When ON is not isolated, the risk of relapse is very high. Unfortunately, the reduction in relapses seen with treatment is insufficient for aviation purposes and immunomodulatory therapy for MS is not currently approved for waiver. Thus, the issue of treatment is largely irrelevant for aeromedical purposes.

III. Waiver Consideration.

ON is disqualifying for flying classes I/IA, II, and III. It is not specifically listed as disqualifying for GBC and MOD duties, unless MS has also been diagnosed in which case the member is disqualified. If the ON is visually symptomatic, it would then be disqualifying for GBC and MOD duties.

Table 1: Waiver potential for optic neuritis

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority****	**ACS Review/ Evaluation**
I/IA	ON with normal MRI	No AETC	No
	ON with positive MRI or CSF or multiple sclerosis	No AETC	No
II/III$	ON with normal initial MRI and normal repeated MRI at 3 months	Yes*# MAJCOM	Yes
	ON with positive MRI or CSF or definite multiple sclerosis	No MAJCOM	At MAFCOM/AFMSA discretion
ATC/GBC	ON with normal initial MRI and normal repeat MRI at 3 months	Yes*# MAJCOM	Yes
	ON with positive MRI or CSF or definite multiple sclerosis	No MAJCOM	At MAFCOM/AFMSA discretion
MOD	ON with normal initial MRI and normal repeat MRI at 3 months	Yes*# AFGSC	Yes
	ON with positive MRI or CSF or definite multiple sclerosis	No AFGSC	At AFGSC/AFMSA discretion

* In untrained FC II and III waiver recommendation is unlikely; if episode occurred 10 years previously with normal current and past MRI studies an ACS evaluation may be warranted.
# All waivers are recommended to be valid for only one year. ACS evaluations should be "in person" at a minimum of initially (after 3 month MRI). An ACS review of local MRI is required in the years the aviator is not seen "in person" at ACS.
** If the cases also demonstrates MS, the waiver authority is AFMSA.
$ Waiver authority for initial FC II or III is AETC.

AIMWTS search in Jul 15 revealed a total of 45 cases with the diagnosis of ON. There were 0 FC I/IA, 22 FC II cases with 12 disqualifications (8 due to the progression to MS, 2 for progressive ON, 1 for RA, and 1 for night vision issues), 22 FC III cases with 9 disqualifications (4 for progression to MS, 2 due to initial qualification issues, 1 for cardiomyopathy, 1 for HNP, and 1 for multiple visual issues), 1 MOD case with no disqualification (although the AMS stated the member had MS), and 0 ATC/GBC cases.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for ON should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of ON.
C. Consultation from Ophthalmology and Neurology.
D. Threshold 30-2 Visual Field Studies at initial diagnosis and 3 months later.
E. Labs: If LP clinically indicated by a neurologist, submit cerebrospinal fluid results including oligoclonal bands and myelin-basic protein.
F. Imaging:
--Brain T1 and T2-weighted MRI with gadolinium and FLAIR sequences at initial presentation and 3 months later. For cases reviewed by the ACS, send report(s) and images to the ACS. Images may be mailed to ACS on CD or uploaded to the USAFSAM ECG Library PICOM servers.
--Optical Coherence Tomography (OCT) of the retinal nerve fiber layer (RNFL).

The aeromedical summary for waiver renewal for ON should include the following:
A. Interval history.
B. All applicable labs and imaging tests as in the initial aeromedical summary:
-- Repeat Brain T1 and T2-weighted MRI with gadolinium and FLAIR sequences. For cases reviewed by the ACS, send report(s) and images to ACS. Images may be mailed to ACS on CD or uploaded to the USAFSAM ECG Library PICOM servers.
-- Repeat Optical Coherence Tomography (OCT RNFL).
-- LP only if clinically indicated.
C. Follow-up consultations from Ophthalmology and Neurology.
D. Interval Threshold 30-2 Visual Field Studies.

ICD-9 code for Optic Neuritis	
377.30	Optic neuritis, unspecified

ICD-10 codes for Optic Neuritis	
H46.9	Optic neuritis, unspecified
H46	Optic neuritis

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WAIVER GUIDE
Updated: Apr 2016
Supersedes Waiver Guide of Jan 2013
By: Maj Andrew Timboe (RAM 17) and Dr Dan Van Syoc
Reviewed by: Col Matthew Carroll, AF/SG consultant for Rheumatology

CONDITION:
Osteoarthritis (Apr 16)

I. Overview.

Osteoarthritis (OA) is the most common joint disease worldwide, affecting an estimated 27 million Americans alone.[1, 2] It is a chronic disease of joint cartilage and bone and generally a disease of older individuals. Disease onset begins after age 40, with an estimated prevalence of 70% to 90% in people over the age of 75. Men and women are initially equally affected; after age 50, incidence is greater in women. Often symptoms appear earlier and can be more severe in women; moderate to severe radiographic OA is more prevalent in women than men for the hands, feet and knees (equal for hips). And, symptomatic OA prevalence is greater in women for hands, feet, knees and hips.[3-6] There is no known cure for the disease and current therapeutic strategies are directed at pain reduction and improvement of joint function.[7, 8] OA is a leading cause of disability in the workplace, particularly in people over the age of 55.[1, 9]

Osteoarthritis can be idiopathic (localized or generalized) or secondary to trauma (congenital, metabolic, endocrine, neuropathic or other medical causes).[1] The exact etiology of the pathology is unknown, but involves the complex interplay of biomechanics, genetics and biochemicals.[10, 11] OA is characterized clinically by joint pain, swelling and functional limitations/stiffness and most commonly affects the knees, hips, hands and spine. Radiographically, it is characterized by osteophytes, bony sclerosis and joint space narrowing, and histopathologically, there are alterations in cartilage and subchondral bone integrity.[10] Modifiable risk factors for OA are weight, high-impact repetitive activities, and osteoporosis. Increased weight is the most significant independent predictor of both incidence and progression of OA in weight-bearing joints. Studies have demonstrated that weight reduction can reduce the development and progression of OA of the knee.[11] Maintaining an appropriate body weight may be the most important factor in preventing OA from occurring in weight-bearing joints.[11-13] In order to label osteoarthritis as "idiopathic," causes need to be considered and ruled out. These include but are not limited to: rheumatoid arthritis, lupus/other autoimmune arthritides, Wilson's disease, hemochromatosis, Paget's disease, septic arthritis, gout, and diabetic arthropathy. OA is classically associated with the absence of rheumatoid factors and with normal levels of acute phase reactants. However, rheumatoid factors may be present, usually in low titer, consistent with a person's advancing age. In addition, the erythrocyte sedimentation rate (ESR) and serum C-reactive protein concentration may be somewhat elevated, this is usually secondary to an associated disease. New markers which may be prognostic for progression of disease risk are on the horizon.[14]

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) is a validated instrument for the assessment of pain, stiffness, and physical function in patients with OA of the knee or hip. It assesses patients using 24 parameters and is particularly useful to monitor the course of the disease or to determine the effectiveness of therapeutic modalities.[15] It tends to be used in the

research arena, but is a very useful tool for evaluating the status of OA patients. The American College of Rheumatology has clinical classifications for hand, hip and knee OA, as well.[16]

For our population of aviators, the major joints of concern with OA are the neck, spine, hands knees, and hips. Arthritis in the neck, spine and hands can be especially problematic in fighter/ ejection seat aircraft as well as for helicopter aircrew and for boom operators. Risk factors for OA of the knee include obesity, knee injury, previous knee surgery, and occupational bending and lifting.[13] For OA of the hip, the risk factors include older age, high bone mass, genetic predisposition, increased BMI, participation in weight-bearing sports, and occupations that require prolonged standing, lifting, or moving of heavy objects.[17]

The diagnosis of OA is mainly clinical. The main symptoms/signs that suggest the diagnosis are pain, stiffness, reduced movement, swelling, crepitus, age greater than 40, and the absence of systemic features such as fever.[11] Joint involvement is usually symmetric and morning joint stiffness that resolves within 30 minutes or occurs with mild-to-moderate activity is also common. With disease progression, more prolonged joint stiffness and joint enlargement becomes evident. Crepitus in the joint is a late manifestation of disease. Radiographic findings consistent with OA include presence of joint space narrowing, osteophyte formation, pseudocyst in subchondral bone, and increased density of subchondral bone. The absence of radiographic changes does not exclude the diagnosis of OA.[8]

Treatment modalities include nonpharmacologic, pharmacologic and surgery.[18] Surgical intervention will not be covered in this waiver guide. The pharmacologic modalities can be analgesics, anti-inflammatory agents, intra-articular agents and the use of glucosamine with chondroitin. With most OA patients, acetaminophen is the drug of choice; it can be used safely in doses up to 3g/day in patients not using other liver-metabolized medications or alcohol.[19] Occasionally, the pain may be severe, and in those cases, the use of opioid analgesics such as codeine can be used, but should be avoided for long-term use. Non-steroidal anti-inflammatory agents (NSAIDs), such as ibuprofen, are commonly used. There is no convincing evidence that any of the available NSAIDs is more effective than any other for OA of the hip or knee.[19] In comparing acetaminophen with NSAIDs, there is evidence that NSAIDs are superior to acetaminophen in terms of pain reduction and improvements in patient and physician global assessments and functional status. The relative superiority of NSAIDs over acetaminophen is most marked in those with moderate to severe levels of pain. The benefits of NSAIDs over acetaminophen are relatively modest, and therefore, additional factors are still important to consider in the decision to use these drugs.[20]

There has been considerable discussion over the past several years concerning the use of natural substances, glucosamine and chondroitin, for the treatment of OA. It has been touted to relieve symptoms and stop the disease progression, however data in the past failed to prove convincingly that it works, how it works, or whether it is even safe to take long-term.[20] Recent analysis showed the combination of glucosamine and chondroitin was non-inferior to celecoxib after 6 months of use and there were few risks from its use.[21] This natural combination therapy may be appropriate for a patient desiring to avoid acetaminophen or NSAIDs, but is not recommend for initial treatment.

Intra-articular corticosteroids can be very useful in OA patients who have pain despite appropriate dosing of an NSAID. Repeated injections over a period of up to two years appear to be safe and can be very effective.[19] In addition, hyaluronic acid injections have been used with some degree of

success in certain sub-populations. Randomized trials have shown success in OA of the ankles, shoulders, and hips. Multiple injections are required with approximately five injections necessary for adequate treatment; one injection weekly for five weeks. The exact mechanism of action is unknown, but there may be a combination of an anti-inflammatory effect, a local lubricant effect, and an analgesic effect by direct buffering of synovial nerve endings.[18] With any intra-articular injection, the aviator needs to be placed in a DNIF status until the treatments are completed and the disease symptoms have improved.

The major nonpharmacologic entities include weight loss, rest, physical therapy, and exercise. Obesity and weight reduction are important, as noted above. Resting of the affected joint often alleviates pain, but prolonged rest may lead to muscle atrophy and decreased joint mobility.[18] Physical therapy can improve flexibility and strengthen muscles supporting affected joints, and this often improves functional outcome and pain scores. In addition, there has been much discussion concerning orthoses, particularly for patients with OA of the knee. Research has suggested that neutral or laterally wedged shoe orthoses may be beneficial in the management of medial knee OA when used with walking shoes.[22] Lastly, most recent studies support an appropriate exercise program as an integral part of the management of OA. Exercise goals are to reduce pain and functional impairment, protect involved and at-risk joints, and to prevent disability related to a more inactive lifestyle.[23, 24] Use of heat and cold packs, as well as, topical capsaicin may be incorporated into the therapeutic regimen. Overall, pain and functional status of OA (especially of the hip and knee) seems to deteriorate slowly, and there is limited evidence of OA worsening after 3 years of follow-up; so, ultimately, any type of exercise program that is done regularly and monitored by health professionals is essential to improving activities of daily living and function.[18, 25]

II. Aeromedical Concerns.

The major concerns with aviators with OA are: distracting pain and joint limitations that may interfere with normal flight duties and with emergency egress activities. The chronic use of medications is of concern since it indicates ongoing pain; and the particular agents used to mitigate pain may result in other adverse aeromedical sequelae such as peptic ulcer disease, gastrointestinal bleeding, hepatic insufficiency, renal insufficiency or nephrolithiasis, altered mentation, sedation, etc. Acetaminophen and NSAIDs use can be waived on a regular basis, but use of opioid analgesics is not approved for aviation duties. If the aviator is using chronic NSAIDs, there must be regular follow-up with a CBC and BUN/Cr, and if using acetaminophen, to follow LFT level, and based on manufacturer recommendations.[26]

III. Waiver Consideration.

Arthritis of any type of more than minimal degree, which interferes with the ability to follow a physically active lifestyle, or may reasonably be expected to preclude the satisfactory performance of flying duties is disqualifying for all classes of flying. If the pain can be controlled with acetaminophen or an aeromedically approved nonsteroidal, the aviator can remain on these medications and be considered for a waiver. A waiver request that includes the use of an NSAID should include, at a minimum, a CBC and a comprehensive metabolic profile to monitor for adverse effects of the treatment, and done so in conjunction with manufacturer's recommendations.

Aviators with significant pain or limitations will need to be grounded until these issues are satisfactorily addressed. If pain and/or limitations persist despite maximal medical therapy, then

disqualification from flying duties may need to be considered. If joint replacement is deemed appropriate, then the information in the Retained Orthopedic Hardware and Joint Replacement waiver guide should be followed, for guidance. OA of the spine that requires medical therapy and close observation is not waiverable for ejection seat aircraft. ATC/GBC and MOD personnel are covered under retention standards; internal derangement of the knee complicated by arthritis and severe osteoarthritis are listed as disqualifying for retention standards. Any joint pain that interferes with the ability to successfully complete the mission is disqualifying.

Table 1: Waiver potential for Osteoarthritis

Flying Class	**Condition/Treatment**	**Waiver Potential Waiver Authority†**
I/IA	Stable OA on no meds+	Maybe AETC
	Symptoms controlled with meds	No AETC
	Symptoms not controlled with meds	No AETC
II/RPA Pilot/III	Stable OA on no meds+	Yes MAJCOM
	Symptoms controlled with meds#+	Yes MAJCOM
	Symptoms not controlled with meds*+	Maybe MAJCOM
ATC/GBC MOD	Stable OA on no meds+	Yes MAJCOM**
	Symptoms controlled with meds#+	Yes MAJCOM**
	Symptoms not controlled with meds*+	Maybe MAJCOM**

*Symptomatic patients who go on to joint replacement may be eligible for a waiver – see Retained Hardware and Joint Replacement Waiver Guide.
#Medications used to control OA must be on the approved medication list; see note at end of Aeromedical Concerns for appropriate f/u if on chronic NSAIDs.
+No indefinite waivers; waiver should be renewed approximately every three years if stable.
**Waiver authority for MOD personnel is AFGSC.
†If member does not meet retention standards, then the waiver authority is AFMSA.

Review of AIMWTS data in Mar 2016 revealed a total of 213 cases with the diagnosis of osteoarthritis. Breakdown of the cases revealed: 2 FC I/IA cases (both disqualified); 103 FC II cases (14 disqualified); 96 FC III cases (29 disqualified); 9 ATC/GBC cases (2 disqualified); and 3 MOD cases (none disqualified). Of the 47 disqualified cases, 17 cases were disqualified due to

severe joint disease and 30 cases for multiple medical problems which included varying degrees of joint disease.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for osteoarthritis should include the following:
A. History of symptoms, history of trauma and activities, limitations secondary to disease, summary of all treatments to date, present level of activity, medications (including over the counter medications), and functional limitations. Document gastrointestinal and/or renal symptoms and signs related to medications taken, if present.
B. Physical - addressing range of motion, tenderness, edema/effusion, deformity, associated muscle strength/atrophy and neurologic signs (if symptoms/ present). Document skin/nail findings, if abnormal.
C. Labs: ESR as clinically indicated. RF is not needed unless there are clinical indications to do so. CBC and metabolic profile if on NSAIDs for three or months continually; at three months and then periodically if WNL. Synovial fluid analysis, if clinically indicated.
D. Orthopedic or rheumatology consultation report (general internal medicine will suffice if orthopedics and rheumatology not available). Physical therapy evaluation for range of motion, muscle strength, activity level, and limitations.
E. Operative reports, if applicable.
F. Results of X-rays; X-rays should always be ordered based on clinical findings with results interpreted in the context of the patient's symptoms and the American College of Rheumatology (ACR) classification criteria. MRI and X-Rays have significant discord with clinical findings. In general, MRI detects more asymptomatic degenerative changes and X-Rays can miss some degenerative symptomatic findings. Additionally, sometimes OA progresses radiographically with little clinical change. When available, radiographic studies can be helpful, but they are not a reliable diagnostic or monitoring tool. ACR classification criteria allow you to diagnose knee OA without radiographs.
G. Medical evaluation board (MEB) results (if applicable).

The AMS for waiver renewal for osteoarthritis should include the following:
A. Interim history and physical – focus on any changes since most recent waiver, present level of activity, medications, and limitations.
B. Applicable consult(s).
C. X-rays and lab results, if applicable.
D. RILO (if applicable)

ICD-9 codes for osteoarthritis	
715	Osteoarthritis and allied disorders
715.9	Degenerative Joint Disease
716.59	Polyarthritis
716.9	Unspecified arthropathy, Arthritis

ICD-10 codes for osteoarthritis	
M15.8	Other polyosteoarthritis
M19.90	Unspecified osteoarthritis, unspecified site
M13.0	Polyarthritis, unspecified
M12.9	Arthropathy, unspecified

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WAIVER GUIDE
Updated: Mar 2015
Supersedes Waiver Guide of Feb 2012
By: Dr Dan Van Syoc
Reviewed by LtCol Mark True, AF/SG consultant for Endocrinology

CONDITION:
Osteoporosis/Osteopenia (Mar 15)

I. Overview.

Osteoporosis is the most prevalent disease of bone, affecting an estimated 10 million Americans.[1, 2] It is a disease characterized by low bone mass and microarchitectural deterioration of bone tissue, leading to enhanced bone fragility and an increase in fracture risk, and is a major public health problem world-wide.[3, 4, 5] Osteoporosis is caused by a combination of increased bone resorption and inadequate bone formation which result in deterioration of trabeculae.[6, 7] Although it may be of clinical significance in men, osteoporosis is four times as common in women and is especially active in the first ten post-menopausal years.[8, 9, 10] Osteopenia is defined as low bone mass, but does not meet the diagnostic criteria of osteoporosis. These individuals are considered at an increased risk of developing osteoporosis in the future.[11] In the US, approximately 56% of all postmenopausal women have decreased bone mineral density (BMD), as measured at the hip, and 16% actually have osteoporosis.[12] Hip fractures, most of which are secondary to osteoporosis, cause an excess mortality of 10 to 20 percent at 12 months, and up to 25 percent of hip fracture patients require long-term nursing care.[13] Osteoporosis is estimated to impact around 14 million adults over the age of 50 in the US by the year 2020.[4]

The initial clinical presentation of osteoporosis typically is a fracture which may be symptomatic or occult. In the latter case, the typical finding is one or more spinal compression fractures on radiographs taken for other reasons. Fractures (especially hip, forearm, and spine fractures) also account for most of the morbidity of the disease, which is further complicated in many cases by subsequent poor healing.[7] It is important to perform a diagnostic evaluation and to develop a prevention plan for these patients because a second hip fracture or a fragility fracture at another site is likely to occur. Consequently, patients may have chronic pain, postural/skeletal deformities, and in advanced cases restricted respiratory function from thoracic deformities. In the elderly population, osteoporotic fracture of the hip is frequently a pre-terminal event.[4] With occasional exceptions, most of these problems will occur after a normal flying career has ended, but the rapidity of bone loss immediately after menopause in women predisposed to osteoporosis means that prophylaxis concerns will routinely arise during a flying career.

Table 1. Clinical risk factors for osteoporosis[14]

Advancing age
Previous fracture
Glucocorticoid therapy
Parental history of hip fracture
Low body weight
Current cigarette smoking
Excessive alcohol consumption
Rheumatoid arthritis
Secondary osteoporosis (e.g., hypogonadism or premature menopause, malabsorption, chronic liver disease, and inflammatory bowel disease)

The commonest form of osteoporosis appears to be caused by low estrogen state (e.g., postmenopausal, bilateral oophorectomy); additional risk factors which increase the likelihood or severity are listed in Table 1. Osteoporosis may also be secondary to a variety of other medical conditions. Certain diseases like hyperthyroidism, hyperparathyroidism, hypogonadism, and Paget's disease, any of which might reasonably be encountered in an aviator, can cause or mimic osteoporosis. A number of other diseases are in the broader differential diagnosis, including acromegaly, Cushing's syndrome, osteomalacia, and malignancies such as lymphoma and multiple myeloma. Furthermore, the use of certain medications such as heparin, glucocorticoids, vitamin A, and chemotherapeutic agents may occasionally be complicated by bone loss.[12] Men have a lower incidence of osteoporosis than women and this is due to multiple factors to include larger bones in men, hormonal factors and vitamin D levels.[15] Young healthy males not predisposed to secondary osteoporosis may occasionally present with unexplained fractures that lead to a finding of osteopenia as seen in a 2008 report involving a high performance pilot.[16]

To identify osteoporosis before fractures occur, screening for this disease is important. Current guidelines from the National Osteoporosis Foundation, the American Association of Clinical Endocrinologists, the National Institutes of Health, the U.S. Preventive Services Task Force and others agree that women greater than 65 years old, women with a history of postmenopausal fracture, or any adult with a fracture occurring in the absence of sufficient trauma should be screened for osteoporosis.[9] Recently revised guidelines also recommend that postmenopausal women with risk factors for fracture be considered candidates for screening.

In the USAF aviator population, one is most likely to encounter perimenopausal women with concerns driven by a family history of postmenopausal osteoporosis. Consensus on how to proceed in this population has not been reached.[14] However, a 43-year-old, Caucasian female weighing 120 pounds with irregular menstrual cycle and a family history of osteoporosis may benefit from screening and, if appropriate, treatment. The health care provider must exercise clinical judgment on individual assessments.

Dual-energy x-ray absorptiometry (DEXA or DXA Scan) is the most popular method of densitometry and is readily available in most medical communities for osteoporosis screening. DEXA scan results have been well-correlated with fracture risk. The results of a DEXA scan are reported using T-scores and Z-scores. T-scores are standard deviations from a normal young healthy population mean. Z-scores are standard deviations from an age-matched, sex-matched, and

sometimes race-matched population mean. Women with a T-score of -2.5 or lower (i.e., a larger negative number) are said to have osteoporosis, and those with a T-score between -1.0 and -2.5 are said to have osteopenia. Osteopenia should not be thought of as a separate disease, but an early form of osteoporosis, with the significant caveat that some women in the osteopenic range may not progress to osteoporosis.[17]

In addition to bone densitometry, laboratory screening for underlying causes of osteopenia and osteoporosis has also been widely supported, although a precise algorithm has not been uniformly endorsed. The utility of a workup depends on the clinical scenario. A reasonable approach would be to evaluate individuals initially diagnosed with osteoporosis with a complete blood count, serum chemistries (electrolytes, blood urea nitrogen, creatinine, calcium, phosphorous, total protein, albumin, liver transaminases and alkaline phosphatase), 25-hydroxyvitamin D levels, urinalysis, and 24-hour urine for calcium excretion and creatinine. Additional studies should be driven by history and clinical exam and may include thyroid function tests, parathyroid hormone, serum testosterone (men), serum estradiol, urine free cortisol, or others. For individuals who fail to respond to alendronate therapy, biochemical markers of bone metabolism (e.g., urinary N-telopeptide crosslinks) can be evaluated.[7]

Current strategies in osteoporosis treatment are increasingly focusing on preventing and mitigating the loss of bone in the post-menopausal women, and therapy is generally tailored to the bone density as determined by DEXA scan. All women can probably benefit from a healthy diet high in calcium, supplementation with calcium and with vitamin D, smoking cessation (when applicable), moderation of alcohol (if consumed), and regular weight-bearing exercise of any intensity.[6]

The American Association of Clinical Endocrinologists (AACE) has endorsed the National Osteoporosis Foundation Clinician's Guide to Prevention and Treatment of Osteoporosis.[18] Pharmacologic treatment for postmenopausal women is recommended for the following:

- A hip or spine fracture (either clinical spine fracture or radiographic fracture).
- A T-score of -2.5 or below at the spine, femoral neck, or total hip.
- A T-score between -1.0 and -2.5 at high 10-year risk of fracture with use of the US-adapted FRAX tool provided by the World Health Organization at www.shef.ac.uk/FRAX, where treatment is considered cost-effective if the 10-year risk is 3% or more for hip fracture or 20% or more for 'major' osteoporosis-related fracture (humerus, forearm, hip, or clinical vertebral fracture)."[11]

Both hormone replacement therapy (HRT), with estrogen alone or combined with a progestin, and bisphosphonates have been considered first-line therapies for the management and treatment of osteoporosis. However, recent results from the Women's Health Initiative have raised concerns about breast cancer and cardiovascular risks due to HRT. For this reason, bisphosphonate therapy is the preferred first-line therapy in most cases.[11, 19]

Alendronate is a bisphosphonate approved by the US Food and Drug Administration (FDA) for the prevention and treatment of osteoporosis in postmenopausal women and is on the Official Air Force Approved Aircrew Medication List. Common side effects of alendronate for which aircrew should be monitored when using this medication include thoracic and abdominal pain (due to esophageal or gastric ulcerations), nonspecific gastrointestinal symptoms (nausea, vomiting, diarrhea, constipation), melena, hematochezia, musculoskeletal pain, headache, and allergic reaction. These risks are minimized by technique of administration, which is outlined below.[20] Teriparatide

(Forteo®), a recombinant parathyroid hormone, is also available; unlike bisphosphonate therapy, this agent consistently induces regrowth of bone. Major disadvantages of parathyroid hormone, besides expense and the necessity for refrigeration, include consistent elevations of serum calcium (with excursions into the abnormal range about 11% of the time), and the risk of inducing osteosarcoma. This agent is usually reserved for those with progressive failure of bisphosphonates, and for those with extreme levels of osteoporosis, and as such is rarely indicated. Therapy with teriparatide is not waiverable. Calcitonin therapy is very rarely employed; the usual indication is pain control in the face of recurrent fragility fractures, and thus neither the condition nor the therapy would be waiverable.[17]

Monitoring the efficacy of osteoporosis treatment is medically and aeromedically important, though there is some disagreement on how to monitor appropriately. The commonly accepted method to monitor sufficiency of treatment is to repeat bone densitometry at two year intervals.[11] Some patients will experience an increase in bone density on bisphosphonate therapy, but in general treatment is considered satisfactory if it results in arrest of bone loss. DEXA scanning should include the lumbar spine and bilateral hips. While bone density measurement of the left hip can be acceptable for making the diagnosis of osteoporosis, assessment of therapy requires serial measurement of lumbar spine and total hip scores. The lumbar spine value is based on AP lumbar spine, not the lateral. (The same is true for initial diagnosis; unlike the left hip T-score, the lateral spine T-score is not useful for diagnosis either.) Absolute BMD, rather than T-score, is assessed for response to therapy; a loss of 4% of hip density, and/or 5% of spine density, is considered significant. If this happens despite alendronate therapy, work-up should address poor absorption of the drug, and include re-evaluation of vitamin D levels. Finally, some investigators have advocated for the use of biochemical markers of bone turnover to monitor effectiveness of medical therapy. Currently there is controversy on which marker to use and if they truly give useful information to guide therapy.[22]

II. Aeromedical Concerns.

While certain aviation career fields, such as loadmaster or aeromedical evacuation crewmembers, routinely involve weight bearing labor, any aircrew member may be called upon for physical exertion. All aircrew have the potential need to quickly egress their aircraft. In many cases the egress route may involve climbing up or down, with drops or falls of several feet, and may necessitate the rapid movement of heavy objects or assistance to other crew members. These conditions would further increase the likelihood of pathologic fractures in an osteoporotic aviator. Furthermore, a fracture while egressing emergently would pose an additional threat to the safety of the injured aviator and other aircrew by delaying evacuation.

In high-performance aircraft, aviators have a known, increased risk of cervical and lumbar injury due to the large forces experience in high “G” maneuvers. No body of data exists regarding the response of osteopenic/osteoporotic aviators in this environment due to a paucity of affected individuals who have been exposed, although anecdotal cases have certainly occurred (e.g., symptomatic vertebral fracture during initial centrifuge training in an osteoporotic male). It is almost certain that acceleration stresses on bone tissue weakened by osteoporosis would result in a higher incidence of these types of injuries. A fragility fracture occurring under high-G conditions could even result in a catastrophic mishap.

Alendronate is a reasonably effective drug, and the risk of side effects is minor as long as proper technique of administration is followed. It should be taken on a fasting stomach with water only, and no other food or beverage should be consumed for an hour after medicating to prevent inactivation of the drug. To avoid esophageal damage, an upright posture needs to be maintained for at least an hour after ingestion. (The drug's inactivation by food can be useful; to further avoid the risk of esophageal ulceration, and the need to continue remaining upright, individuals are typically advised to eat a snack or meal an hour after taking the drug.) In high-performance aircraft some concern exists about the risk of inducing regurgitation of gastric contents due to G-suit abdominal compression, negative G_z forces, and reclined seating. In order to minimize this risk, it is recommended that high-performance aviators dose alendronate on a day when no flying is planned. If conflict with the flying schedule is unavoidable, the aviator should medicate at least 30-60 minutes prior to flying, and should eat a snack just before taking off, which will effectively neutralize any remaining drug.[16]

III. Waiver Consideration.

Osteoporosis or osteopenia is disqualifying for FC I/IA, II, and III. It is not listed as disqualifying for RPA Pilot, ATC/GBC or MOD, and is also not listed as disqualifying for retention purposes, unless the osteoporosis interferes with wear of required deployment equipment or requires ongoing specialist follow-up more than annually. For FC I/IA or FC II, if an underlying cause for osteoporosis was identified, the underlying disease must be eligible for waiver, and must be treated effectively enough that the osteoporotic process is reversed. For FC II, the finding of osteopenia or osteoporosis, whether or not of a degree that requires prophylaxis, would not require airframe restriction, but the occurrence of a fragility fracture would require restriction from high-performance and ejection seat aircraft. For FC III, the variety of duties requires individual consideration; for instance, severe osteoporosis or the occurrence of a fragility fracture would contraindicate parachute duty.

Table 2: Waiver potential for osteoporosis and osteopenia

Flying Class (FC)	**Condition**	**Waiver Potential** **Waiver Authority**
I/IA	Treated disease on approved medication	Maybe AETC
II/III	Treated disease on approved medication	Yes MAJCOM
RPA Pilot ATC/GBC MOD	Osteoporosis*	N/A

*Osteoporosis is not disqualifying for RPA Pilot, ATC/GBC and MOD personnel

AIMWTS search in Jan 2015 revealed 65 cases with a diagnosis of osteoporosis or osteopenia. Of that total, 20 were disqualified. Breakdown was: 1 FC I case (disqualified); 33 FC II cases (10 disqualified); 27 FC III cases (8 disqualified); and 0 ATC/GBC cases, and 2 MOD cases (1 disqualified). About half of the cases were disqualified primarily due to the diagnosis of osteoporosis or osteopenia, and about 80%of the cases were on medication for the condition, the most common being Fosamax®.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for osteoporosis or osteopenia should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of the condition to include any falls, possible secondary causes, or any other metabolic conditions.
C. Labs: Chemistry profile (electrolytes, blood urea nitrogen, creatinine, calcium, phosphorus, total protein, albumin, liver transaminases, and alkaline phosphatase), complete blood count, vitamin D level, and a 24-hour urine calcium
D. Imaging: Bone density measurement (total hip and lumbar spine).
E. RILO/MEB results if applicable.

The AMS for waiver renewal for osteoporosis or osteopenia should include the following:
A. Interval history since last waiver
B. Labs as above.
C. Imaging: Bone density measurement (total hip and lumbar spine).

ICD-9 codes for osteoporosis and osteopenia	
733.00	Osteoporosis
733.90	Osteopenia

ICD-10 codes for osteoporosis and osteopenia	
M81.8	Other osteoporosis without current pathologic fracture
M89.9	Disorder of bone, unspecified

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WAIVER GUIDE
Updated: Jun 2015
Supersedes Waiver Guides of Jul 2014 and May 2010
By: Dr. Terry Correll (ACS psychiatrist) and Dr Dan Van Syoc
Reviewed by Col Mark Hubner, psychiatrist and chief, and the entire ACS Neuropsychiatry Branch team.

CONDITION:
Other Conditions That May Be A Focus of Clinical Attention (V and Z Codes) (Formerly Titled V Codes) and Miscellaneous Disorders (Jun 15)

I. Overview.

DSM-5 covers "other conditions and problems" that may be a focus of clinical attention or that may otherwise affect the diagnosis, course, prognosis, or treatment of a patient's mental disorder. These conditions are presented in the DSM-5 with their corresponding codes from ICD-9-CM (usually V codes) and ICD-10-CM (usually Z codes). Conditions or problems may be coded as such if they are a reason for the current visit or they help to explain the need for a test, procedure, or treatment. They may be a stand-alone reason for a patient visit, they may result from another mental disorder, or they may precipitate or exacerbate a mental disorder. Such conditions/problems may also be included in the medical record as useful information on circumstances that may affect the patient's care, regardless of their relevance to the current visit. The conditions are broadly divided into Relational Problems, Abuse and Neglect, Educational and Occupational Problems, Housing and Economic Problems, Other Problems Related to the Social Environment, Problems Related to Crime or Interaction with the Legal System, Other Health Service Encounters for Counseling and Medical Advice, Problems Related to Other Psychosocial, Personal, and Environmental Circumstances, and Other Circumstances of Personal History. The DSM-5 greatly expanded upon the 23 "V codes" listed in the DSM-IV-TR.

Family and relational issues are common reasons for aviators to seek assistance. Marital relations have the strongest influence on health. The oft-used Holmes and Rahe scale demonstrates that 10 of the 15 most stressful events are family events. For example, divorce can have long-lasting effects on all members of a family. Multiple studies have indicated that divorce is more traumatic for boys than for girls in divorced families.[8] Similarly, family environments that are characterized by verbal conflict or physical violence can have a negative impact on a person's psychosocial development. These negative influences can extend well into adulthood for both males and females.[9]

Every aviator has unique experiential histories. How that person responds to the stressors of life is highly dependent on their home of origin and how they were conditioned as a child and adolescent. Similar stressors applied to multiple individuals will elicit a wide range of responses. We see this often after disasters and major accidents. Flight surgeons need to be aware of stressors in the lives of their aviators and pay close attention to the response to past and current stressors.

Previously there were several psychiatric diagnostic categories in the waiver guide which have since been removed. The reason for so doing is that there have been practically no AIMWTS submissions in these categories, and the few cases submitted had a strong predilection for a permanent disqualification or administrative/punitive separation from military service. Good initial

screening of our aviation applicants significantly minimizes the chances of these individuals ever achieving flight status.

However, there are rare cases of aviators with a disorder that falls in one of such diagnostic categories (for example, Impulse Control Disorder, Psychological Factors Affecting Medical Conditions, and Sexual Dysfunction), or who have another miscellaneous condition not on the current waiver guide list, who will be successfully treated by mental health professionals and deemed cured or in a long-term state of remission. After a thorough evaluation it may be determined that the aviator is fit for waiver consideration.

II. Aeromedical Concerns.

The "other conditions" represent a psychiatric gray area in aerospace medicine. Many of the everyday problems faced by flyers - and therefore by flight surgeons - may be described by these conditions. These involve the kinds of situations discussed in flying safety talks by flight surgeons, or in stress management lectures by aerospace psychologists or physiologists, because they may interfere with safe or effective flying. Matters such as adjusting to different cultures, dealing with a recalcitrant child, or trying to save a failing marriage are of obvious aeromedical concern, but whether they are grounds for administrative or medical removal from flying duties, or for establishing a psychiatric diagnosis, are clearly matters of degree.[10-12] What becomes most relevant to aeromedical decision-making is the response of the aviator rather than the severity of the stressor. Numerous "small" stressors can produce as much fatigue, irritability, early task saturation, distraction, and cognitive inefficiency as a single major stressor.

Aeromedically dangerous responses to stressors include those of worry, anxiety, anger, depression, guilt, somatization, and behavioral acting-out. These responses may occur during stable situations, or during such contingencies as unexpected TDYs, deployments, or a PCS. Other aeromedically relevant issues include disruption of sleep, significant weight loss or gain, preoccupation, inability to relax, overall mood, affective changes, duty requirements, and especially flying performance as assessed by the flyer, peers, and the supervisor. Because these conditions and their impact can be insidious, the flight surgeon should approach such life problems in flyers carefully, using techniques that range from informal discussion, as the least intrusive intervention, all the way to a referral for full mental health workup/treatment. Each type of assessment or intervention should consider whether the aviator should continue to fly. In some cases, the aviator may be able to resolve the troubling issue without being placed in a DNIF status. If placed DNIF, once the flyer has completed use of any medications/psychotherapy, and the symptoms are sufficiently relieved so that return to flying is possible, then decide whether a waiver will be necessary. *Note: A flyer may be recommended for return to flying even though non-medication "talk therapy" is continuing when the symptoms have subsided sufficiently (during marital therapy, for example).*

If the concerning responses to the stressor persist or are severe, a formal mental health diagnosis may be warranted. The flight surgeon must always be vigilant for more severe pathology. Relationship distress is a good example of a stressor that may precipitate multiple DNIF periods due to loss of sleep and evolve into an "other condition" requiring evaluation and treatment. It may be that the relationship issue precipitates a Major Depressive Disorder that requires treatment and a waiver. The relationship problems may even be the result of a Major Depressive Disorder that began affecting the aviator's personal relationships. If a diagnosis seems warranted, establish it in accordance with DSM-5 criteria, and see that the flyer receives proper treatment. The length of

demonstrated stability post-treatment prior to submission of a waiver is at the discretion of the flight surgeon. *NOTE: Beware of delaying or withholding proper treatment solely in order to avoid DNIF or to "protect the aviator's career."*

Most flyers with the more unusual mental health diagnoses typically have other concurrent emotional disturbances such as anxiety, depression, or substance abuse/dependence that may be aeromedically significant. Others have personality issues or traits that are problematic. Flyers with these unusual traits should be individually assessed with attention given to rule out a DSM-5 diagnosis.

Some of the diagnoses (primary such as an impulse control disorder or secondary such as antisocial personality traits/disorder) tie in closely with reliability, integrity, and security concerns. Returning these aviators to flight status may cause subsequent issues in the squadron and morale problems among the flight crew. Many of these individuals also have unstable interpersonal relationships with family which can have a significant negative impact on flying operations. Administrative, legal, or security clearance action may be required even if the primary problem is not medically disqualifying.

III. Waiver Consideration.

"Other conditions" are not specifically mentioned in Medical Standards Directory (MSD), but the problems that may arise such as worry, anxiety, anger, depression, guilt, somatization, and behavioral acting-out may indeed lead to the need for grounding or disqualification. The following may cover many such conditions: "Any psychiatric condition, or history thereof, which would interfere with AFSC-specific aviation, controller or special duty performance (such as claustrophobia)". In addition, ARMA unsat (or its equivalent) is disqualifying for all duty positions.
Additionally, there are numerous conditions listed in the Medical Standards Directory (MSD) Psychiatry and Mental Health section that do not have a corresponding waiver guide topic. If any of those conditions apply to the aviator under consideration for a waiver, the guidance in this chapter applies.

Before submitting the case for waiver consideration, the base-level flight surgeon must first discern whether the condition is unsuiting vs. unfitting for service. If the Airman requires a fit/unfit determination, the case needs MEB action; if the airman requires suited/unsuited determination, the case then needs consideration of an administrative separation or discharge via the chain of command.

Table 1: Waiver potential for "Other Conditions" Diagnoses

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	Yes AETC	At the request of AETC
II/II	Yes MAJCOM	At the request of MAJCOM
ATC/GBC	Yes MAJCOM	At the request of MAJCOM
MOD	Yes AFGSC	At the request of AFGSC

An AIMWTS search in Jun 2015 revealed 83 cases with a V-code diagnosis. There were 4 FC I cases (all disqualified), 21 FC II cases (6 disqualified), 33 FC III cases (21 disqualified), 17 ATC/GBC cases (16 disqualified), and 8 MOD cases (all disqualified). Most of the disqualified cases were due to a mental health disorder other than the V code with the exception of 9 cases that were disqualified for V62.2 (ARMA unsat).

IV. Information Required for Waiver Submission.

Submitting a Mental Health Waiver Guide:

Medical Standards Directory (MSD) and the Waiver Guide addresses waiver evaluations

Step 1 - Is the aviator ready for waiver submission?

A. A waiver is submitted when 1) the member is asymptomatic and 2) medications/psychotherapy treatment have been completed, as applicable to diagnostic category, for the specified time-frame below (Note: psychotherapy "booster sessions", and sometimes aeromedically-approved antidepressants, are permissible and often advisable after initial symptom resolution):

- ☐ 1 Year—Psychotic Disorders & Somatoform Disorders
- ☐ 6 Months—Mood Disorders, Anxiety Disorders & Suicidal Behavior
- ☐ Discretion of Flight Surgeon—Adjustment Disorders & "Other Conditions" requiring waiver
- ☐ For Traumatic Brain Injury cases, please refer to TBI Waiver Guide
- ☐ For aviators with any other psychiatric disorders, please refer to Medical Standards Directory (MSD) and ACS Waiver Guide

B. To be considered for an aeromedical waiver, any disqualifying condition must meet the following criteria per AFI 48-123 Section 6B, 6.2.1.1 through 6.2.1.6. (pg. 57-58):

- ☐ Not pose a risk of sudden incapacitation
- ☐ Pose minimal potential for subtle performance decrement, particularly with regard to the higher senses

- ☐ Be resolved, or be stable, and be expected to remain so under the stresses of the aviation environment
- ☐ If the possibility of progression or recurrence exists, the first symptoms or signs must be easily detectable and not pose a risk to the individual or the safety of others
- ☐ Cannot require exotic tests, regular invasive procedures, or frequent absences to monitor for stability or progression
- ☐ Must be compatible with the performance of sustained flying operations

Step 2 - Before beginning the Aeromedical Summary (AMS), the Flight Surgeon must obtain a Mental Health consultation and ensure it contains the items specified below:

Instructions for the Mental Health Provider

The mental health evaluation must include a **comprehensive written report** addressing:

- ☐ Consultation must address each criteria in Step 1B
- ☐ Clinical mental health history (description of symptoms, treatment modality, frequency and compliance with treatment, relevant personal and family history, and perceived impact on occupational duties)
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results as appropriate to individual case (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…) ***** for alcohol cases, please comment on carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, input from line leadership, if possible, current state of any triggers for the mental illness)
- ☐ Current and past aviation related duties and any history of current and past occupational performance difficulties (to include perceived impact of mental health condition on performance of duties)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Summary and interpretation of psychological/neuropsychological testing results (recommend MMPI-2, NEO PI-R, or similar personality test). For neuropsychological cases, please contact the ACS neuropsychologist (Dr. Gary Ford, DSN: 798-2704) for guidance on recommended neuropsychological tests.
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly or engage in special duty operations (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)
- ☐ Copies of all records (mental health/ADAPT/inpatient) and raw testing data should be on hand for shipment to ACS Neuropsychiatry Branch

Step 3 - Items for the Flight Surgeon to include in the AMS:

- ☐ AMS must clearly address each criteria in Step 1B and the risk to the member, mission, and safety
- ☐ Summarize Mental Health history and focus on occupational impact

***** If 2 or more months have passed since the comprehensive evaluation/report was completed, the flight surgeon should address how the member has done since and consult with the mental health provider if the member has been seen at mental health since the evaluation*****

- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results as appropriate to individual case (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…) ***** for alcohol cases, please comment on carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, if possible - please address current state of any triggers for the mental illness)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)

Step 4 - Items to complete the waiver package:

- ☐ Letter of support from command
- ☐ Comprehensive mental health written report
- ☐ Confirm mental health has made copies of chart(s) and testing. When requested send to:

ACS Aerospace Medicine Branch, USAFSAM/FECA
c/o Neuropsychiatry Branch
2510 Fifth Street Bldg 840
Wright Patterson AFB, OH 45433-7913
Fax: (937) 904-6296 DSN: 674-9296

Please feel free to contact the ACS Neuropsychiatry Branch with questions:
SSgt Krista Traut 798-2653, or Mr. John Heaton: 798-2766

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. If the "other condition" designation is an additional diagnostic code listed for completeness during the treatment of another disqualifying mental disorder, waiver action should be taken primarily in accordance with the requirements for the primary disqualifying diagnosis. If the "other condition" resulting in prolonged interference with duty stands alone or there is a miscellaneous disorder not elsewhere covered by a waiver guide topic, then the AMS for the initial waiver should include the following:
A. Any pertinent social, occupational, legal, or financial information, as well as a good history of the particular stressor. A paragraph describing the rationale why the member should be safe to return to flying status especially if the situational stressor is not completely resolved or if it could reasonably be expected to recur.

B. A recent mental health evaluation, to include all treatment notes from the treating mental health professional as well as an MEB-type narrative summary of the mental health record.
C. Any psychological testing or evaluation reports that may have been done in the evaluation and treatment.
D. A letter from the flier's supervisor rendering an opinion about the aviator's readiness to return to flying status.

The AMS for a waiver renewal should include the following:
A. History and assessment of recurrence during the intervening period between last waiver and current request. Include an assessment of any situational stressors that previously existed or new stressors and how they affect the individual at this point.
B. A recent mental health evaluation, to include all treatment notes from the treating mental health professional, if the nature of the condition originally warranted such re-evaluation.

ICD-9 and ICD-10 codes		**ICD-10 Codes**
V62.3	Academic or Educational Problem	Z55.9
V62.4	Acculturation Difficulty	Z60.3
V71.01	Adult Antisocial Behavior	Z72.811
V62.82	Bereavement, Uncomplicated	V62.82
V61.03	Disrusption of family by separation or divorce	Z63.5
V62.22	Exposure to Disaster, War, or Other Hostilities	Z65.5
V61.8	High Expressed Emotion Level Within Family	Z63.8
V65.2	Malingering	Z76.5
V15.81	Nonadherence to medical treatment	Z91.19
V62.29	Other problem Related to Employment	Z56.9
V62	Other Psychosocial Circumstances	
312.89	Other specified disruptive, Impulse-Control, and Conduct Disorder	F91.9
278.00	Overweight or Obesity	E66.9
V61.20	Parent-Child Relational Problem	Z62.820
	Personal history (past history) of neglect in childhood	Z62.812
	Personal history (past history) of physical or sexual abuse in childhood	Z62.810
	Personal history (past history) of psychological abuse in childhood	Z62.811
V62.89	Phase of Life Problem	Z60.0
V62.21	Problem Related to Current Military Deployment Status	Z56.82
316	Psychological Factors Affecting Medical Conditions	F54
V61.10	Relationship Distress With Spouse or Intimate Partner	Z63.0
V62.89	Religious or Spiritual Problem	Z65.8
302.70	Unspecified Sexual Dysfunctions	F52.9

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WAIVER GUIDE
Updated: Aug 2013
Supersedes Waiver Guide of Nov 2009
By: LtCol. Sanjay A. Gogate (RAM 13) and Dr. Dan Van Syoc
Reviewed by Col Mark Packer, AF/SG Consultant for Neuro-otology

CONDITION:
Otosclerosis/Stapedectomy (Aug 13)

I. Overview.

Otosclerosis is characterized by an abnormal deposition of bone at the footplate of the stapes. It is a disease of unknown etiology and appears to affect genetically predisposed individuals generally in an autosomal dominant pattern with incomplete penetrance of around 40%.[1, 2] This bony deposition leads to fixation of the stapes at the oval window inhibiting normal transmission of sound. It is the leading cause of conductive hearing loss in adults who do not have a middle ear effusion.[3] Stapes fixation was first described by Valsalva in 1704 during an autopsy on a deaf patient, and in 1860 Toynbee first described the condition causing a hearing loss by fixation of the stapes. In 1894 Politzer first referred to the fixation of the stapes as otosclerosis. Successful surgery for this condition dates back to Holmgren who fathered the practice of fenestration surgery in 1923.[4, 5] Although the major concern with otosclerosis is conductive hearing loss, it can also cause a sensorineural hearing loss when it invades the otic capsule. Additionally an estimated 10-30% of patients will also present with vestibular symptoms or demonstrate abnormalities on vestibular testing.[6]

The overall prevalence of histologic otosclerosis is about 10%. Around 10% of these are affected clinically making the overall prevalence of noticeable hearing loss secondary to otosclerosis approximately 1% in the US population. This disease is more common in Caucasians than in other races. Women more commonly seek medical attention for hearing loss secondary to otosclerosis; however, studies looking at histologic prevalence of otosclerosis show no difference in men versus women. However, pregnancy seems to hasten presentation.[7] The incidence of otosclerosis also increases with age. The most common age group presenting with hearing loss from otosclerosis is 15-45 years; however, it has been reported to manifest as early as 7 years and as late as the mid 50s.[4] Approximately 80% of patients will develop bilateral otosclerosis, though the progression of each ear may be different. Diagnosis is based on history and clinical exam.

Clinical exam may show a reddish blush on the promontory mucosa (Schwartze's sign—associated with active early disease). Screening with 512-Hz and 256-Hz tuning forks will often show a reverse Rinne test.[7] Audiometric screening includes air conduction, bone conduction, acoustic reflexes and speech audiometry.[5] Typically depending on how advanced the disease is, the audiogram will show varying degrees of conductive hearing loss. As mentioned above some advanced forms may cause a sensorineural hearing loss. Carhart's notch is a consistent audiometric feature associated with otosclerosis showing a decline in the bone conduction threshold by 10-30 dB at 2K Hz. When present, Carhart's notch is virtually diagnostic of otosclerosis. Importantly, acoustic reflexes are absent due to stapes fixation which can differentiate this pathology from Superior Canal Dehiscence Syndrome (SCDS) which can also manifest with mild low frequency conductive hearing loss and an otherwise normal ear exam. Acoustic reflexes in SCDS are normal.

Imaging studies are rarely indicated for diagnosis in otosclerosis, however, in recent years, high-resolution CT (HRCT) is able to identify subtle bony changes due to the disease process and is the radiologic method of choice in the assessment of the labyrinthine windows and otic capsule when indicated.[1] Recent estimates demonstrate the sensitivity of CT for the diagnosis of otosclerosis to be at least 90%.[2] The differential diagnosis for conductive hearing loss in patients without discernible ear pathology includes superior semicircular canal dehiscence syndrome, congenital malleus/incus fixation, congenital stapes fixation, other congenital ossicular abnormalities (1st or 2nd arch syndromes), post-inflammatory ossicular fixation, ossicular discontinuity, osteogenesis imperfecta tarda, Paget's disease, and osteopetrosis.

For many people with otosclerosis, no treatment is indicated initially. For rapidly progressive otosclerosis, especially for those with a bilateral sensorineural component of a mixed loss due to otosclerosis, medical therapy with sodium fluoride or fluorical may stabilize or slow progression of the disease in up to 80%.[8] As the hearing loss progresses, the patient may opt for a trial of amplification with hearing aids. Use of hearing aids in the cockpit environment may be a handicap as the aviator will be unable to tune out unwanted sounds and transmissions. In fact the phenomenon of "Paracusis of Willis" allows patients with otosclerosis to hear better in a noisy environment than in a quiet locations. Hearing aids work by essentially amplifying all sound transmitted to the ear, and can distort sound at times.[9] However, modern hearing aids can offer a variety of noise filters for different listening environments. For all applicable aviators, the flight surgeon needs to refer to the waiver guide for Hearing Loss. One possible future treatment to prevent sensorineural hearing loss progression due to otosclerosis may be the use of bisphosphonates which are aeromedically approved for osteoporosis prophylaxis and treatment.[10]

The gold standard surgical treatment for otosclerosis is stapedectomy, first performed by John Shea in 1956. This procedure is still commonly performed, with some modifications, by many ENT surgeons throughout the world. With increasing availability of good surgical care and of adequate screening tests, the average age of presenting patients has declined over the past fifty years (52 to 50) as has the number of years with noticeable hearing loss (18 to 11).[11]

There are actually three surgical options for otosclerosis: total stapedectomy, partial stapedectomy, and stapedotomy. The different designations correspond to the amount of footplate removed. Partial stapedectomy involves removal of the posterior third of the footplate while stapedotomy is the term for creating a small hole in the footplate with a drill or a laser. Once the inner ear is exposed by one of the previous techniques, a prosthesis is inserted through the hole to the oval window and anchored to the incus by various techniques. The technique chosen depends on the degree of sclerosis and surgeon preference. Currently most surgeons perform a stapedotomy. In experienced hands, the success rate of these procedures is in excess of 90%, as measured by return of hearing to normal or near normal.[4, 12] A small percentage of patients may experience complications temporally related to the surgery, or delayed over time. Early complications may relate to loss or leak of perilymphatic fluid causing vertigo with or without straining and fluctuating or declining hearing. Inflammation entering into the inner ear was traditionally associated with Teflon prostheses and yielded loud tinnitus, vertigo and hearing loss and required urgent evaluation and reoperation. Limited exposure of the inner ear through stapedotomy or less than total stapedectomy has shown decreased complication rates. Still delayed complications include a return of conductive hearing loss dizziness or vertigo, sensori-neural hearing loss, distortion of sound or tympanic membrane complications. Depending on the cause, a revision procedure can be accomplished. Expected outcomes for these patients were traditionally not as good as with the

primary procedure; successful hearing results range from 16% to 80% with a mean of 53-66%%, with the variability in results due to the indication for the revision.[13, 14] Facial nerve and chorda tympani injury increase in revision due to adhesions.

II. Aeromedical Concerns.

Loss of normal hearing capability is a concern in aircrew. Otosclerosis may progress to the point of hearing loss or more rarely vestibular symptoms significant enough to compromise flight safety. Aircrew may delay surgical intervention because of the Paracusis of Willis phenomenon. However, when the hearing begins to compromise communications, they may consider amplification or surgical remediation (Again, refer to Hearing Loss waiver guide in such cases). Surgery offers freedom from having to use amplification. Fortunately complications following surgery are rare, but may be significant. These include the following: acute otitis media, suppurative labyrinthitis and meningitis, vertigo, reparative granuloma, perilymph fistula, facial paralysis, fluctuating conductive hearing loss, persistent perforation of the tympanic membrane, taste disturbance, dry mouth, postoperative fibrosis, incus necrosis, and delayed sudden deafness.[13] Vertigo may occur immediately after stapedectomy, or its onset may be delayed by weeks or years. Vertigo that is not resolved with treatment is incompatible with flying duties. Perilymph fistula postoperative risk is 0.34—9.0%, with symptoms similar to those of endolymphatic hydrops (hearing loss, vertigo, ear fullness, and tinnitus) and may be incompatible with flying duty if definitive treatment is not achieved. Rare facial nerve paralysis may cause dry eye which may present significant problems for aviators flying in dry cockpit conditions, or facial droop which may interfere with wear of aviator masks. Persistent perforation of one tympanic membrane could theoretically lead to alternobaric vertigo and is not compatible with flying duties.

Return to aviation duties following stapedectomy or stapedotomy has been controversial within the aeromedical community for the past forty years. In the 1960s and 1970s, concern with barometric pressure changes causing a perilymph fistula led to Air Force policy that prevented return to flying duties for aviators after these procedures.[15] As more and more affected individuals had this procedure for a return to flying duties, pressure mounted on medical authorities to develop a more relaxed policy. Dr. Rayman's proposed criteria in his 1972 paper opened the door to continued flying options for these airmen.[16] Revising policy has been a long process, but results so far have been very encouraging with the dreaded complication of a perilymph fistula being very rare in the carefully selected group of aviators.[17-19]

III. Waiver Consideration.

Otosclerosis and stapedectomy are not specifically mentioned in AFI 48-123, but it is noted that a history of surgery involving the middle ear is disqualifying. Also, hearing defects are well described as are conditions that interfere with auditory or vestibular functions. For ATC/GBC and MOD personnel, the only concern is a hearing loss that precludes safe and effective performance of duty.

If the otosclerosis results in hearing loss and/or vertigo, then waiver guidelines for those diagnoses should be followed as well. In the past, if the aviator undergoes successful surgical treatment, an evaluation at the USAF Aeromedical Consultation Service (ACS) is required for single seat high performance aircrew and FC I/IA candidates, and may be scheduled no earlier than 12 weeks postoperatively. As the 88th MDG has no neuro-otology capabilities, the requirement for in-person

ACS evaluation is not viable. Cases that need expert evaluation prior to disposition will most likely need to be referred to WHMC ENT to be seen by the neuro-otologist. Diagnostic audiology including air conduction threshold measurement; bone conduction threshold measurement (if indicated); speech reception threshold; speech discrimination testing; acoustic impedance testing and ENG should be accomplished if indicated. An altitude chamber flight with a flight surgeon is required only for those who have had the traditional stapedectomy surgery, to test for perilymph fistula**.** For those who have undergone the newer stapedotomy surgery, an altitude chamber evaluation is not required. If a chamber flight is performed, it should include a rapid descent (5000 feet/min) from 10,000 feet. A rapid decompression is also required. Additional tests are done as clinically or aeromedically indicated. If ACS review reveals no post-op sequelae, the aviator may be recommended for an unrestricted waiver.

Table 1: Waiver potential for otosclerosis

Flying Class (FC)	**Waiver Potential** **Waiver Authority**	**ACS Review/Evaluation**
I/IA	Yes[#] AETC	ACS review necessary if stapes surgery performed
II	Yes[#] MAJCOM	ACS review necessary if stapes surgery performed[&]
III	Yes[#] MAJCOM	No
ATC/GBC MOD	Yes MAJCOM**	No

& Single seat high performance aircrew only.
# No indefinite waivers.
** Waiver authority for MOD personnel is AFGSC.

An Aug 2013 review of AIMWTS revealed a total of 41 cases submitted for a waiver with the diagnosis of otosclerosis. This total included 1 FC I case, 26 FC II cases, 12 FC III cases, 1 ATC case, and 1 MOD case, all receiving a waiver except one permanent disqualification due to a permanent hearing loss post procedure in a FC II member. In 10 of the cases, the airman had surgery, which was a stapedectomy in each case and there were 4 cases where it was stated the airman was wearing a hearing aid. There were a total of 7 females in the database.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMC for the initial waiver for otosclerosis should include:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history to include all hearing and vertiginous symptoms and impact on activities of daily living and aviation duties. Discuss all attempted treatments such as hearing aids.
C. Exam: complete audiologic exam to include air conduction threshold measurement; bone conduction threshold measurement (if indicated); speech reception threshold; speech discrimination testing; acoustic impedance testing and ENG if clinically indicated. Also complete report of ENT exam.
D. Consult: ENT surgeon and audiologist.
E. All surgical reports to include details of technique used, type of prosthesis and type of graft used.

The AMS for waiver renewal every three years (if any abnormalities surface in the interim, they will need to be addressed appropriately):
A. Interim history to include any change in hearing, any side effects such as vertiginous symptoms, and any operational problems.
B. Exam: ENT and audiology evaluations.

ICD-9 codes for Otosclerosis and Stapedectomy	
387	Otosclerosis
387.9	Otosclerosis, unspecified
19.1	Stapedectomy
19.19	Other stapedectomy
19.9	Stapedotomy

ICD-10 codes for Otosclerosis and Stapedectomy	
H80.83	Other otosclerosis, bilateral
H80.93	Unspecified otosclerosis, bilateral
Use ICD-9	Stapedectomy
Use ICD-9	Other stapedectomy
Use ICD-9	Stapedotomy

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WAIVER GUIDE
Updated: Jul 2013
Supersedes Waiver Guide of Jan 2010
By: Maj Calen Wherry (RAM 13) and Dr. Dan Van Syoc
Reviewed by Col Pat Storms (RAM 05) and gastroenterologist

CONDITION:
Pancreatitis (Jul 13)

I. Overview.

Pancreatitis is a condition in which digestive enzymes are activated within the pancreas instead of the small intestine, causing organ injury with a significant and damaging inflammatory response in the pancreas.[1] The disease can present as either an acute or chronic condition.

Acute pancreatitis has an incidence of 70-80 per 100,000 people in the United States.[2] Symptoms typically include an abrupt onset of constant, dull, posteriorly radiating abdominal pain (due to the retroperitoneal location of the pancreas), and nausea and vomiting.[1] The physical exam will generally reveal an anxious patient in some distress with tachycardia, low-grade fever, hypotension and reluctance to lay supine since that position stretches the pancreas and increases pain. The abdomen may be diffusely tender and rigid with diminished bowel sounds. Lab abnormalities may include leukocytosis, elevated amylase and lipase (over 3 times normal), hyperglycemia, hypocalcemia, elevated liver function tests, elevated C-reactive protein or Neutrophil–Lymphocyte Ratio (NLR), hypertriglyceridemia (in cases where elevated triglycerides are the cause of the problem), hemoconcentration and hypoxia.[3, 4] Imaging tests include chest and/or abdominal x-ray, ultrasound and CT scan which can be used to not only diagnosis pancreatitis but also to assess the severity and predict complications of acute pancreatitis.[5] Fortunately, the disease resolves spontaneously in 85-90% of patients. Approximately 20% of acute pancreatitis cases are severe with organ failure and local complications such as pancreatic necrosis, or by the formation of a pancreatic pseudocyst. Death, if it occurs, is due to metabolic derangement, renal failure, infection, hemorrhage, or multi-organ failure.[1]

Acute pancreatitis can be due to a number of causes, but 40% of cases result from cholelithiasis (or microlithiasis with stones <5 mm in size), and 35% from heavy alcohol use. Of note, pancreatitis due to alcohol abuse develops after about four to seven years of drinking and can have a more gradual onset of abdominal pain than the abrupt pain associated with cholelithiasis-induced pancreatitis.[2] Pancreatitis can also be caused by trauma (especially abdominal) or can present as a postoperative complication. Metabolic causes include acute fatty liver of pregnancy, hypertriglyceridemia (2% of pancreatitis cases), and hypercalcemia. If hypercalcemia is present, consider the diagnosis of hyperparathyroidism. Rare metabolic causes include apolipoprotein CII deficiency. Neoplasms such as pancreatic cancer can also cause pancreatitis. Infectious causes include mumps, viral hepatitis, ascariasis, mycoplasma, campylobacter, M. avium complex, and a variety of viruses, such as coxsackievirus, echovirus and cytomegalovirus. A variety of medications are also known to cause pancreatitis. These include sulfonamides, oral contraceptive pills and other estrogens, tetracycline, thiazide diuretics, azathioprine, furosemide, valproic acid, acetaminophen, nitrofurantoin, erythromycin, salicylates, metronidazole, NSAIDs, ACE inhibitors, and methyldopa. Connective tissue disorders that cause vasculitis can also cause pancreatitis. These include systemic lupus erythematosus, necrotizing angiitis and thrombotic thrombocytopenic

purpura. Pancreatitis can be a complication of a penetrating peptic or duodenal ulcer. Any condition that obstructs the ampulla of Vater can cause pancreatitis, such as a duodenal diverticulum or regional enteritis. Pancreatitis can also be hereditary, caused by carrying the cystic fibrosis gene or by a mutation in the trypsinogen gene, and can be caused by congenital malformation of the pancreas. Finally, pancreatitis is idiopathic in approximately 20% of cases. If pancreatitis is recurrent and no obvious cause is found, consider occult biliary disease, neoplasm, cystic fibrosis, hypertriglyceridemia, sphincter of Oddi dysfunction, or pancreas divisum.

Chronic pancreatitis results from recurring, progressive pancreatic inflammation leading to permanent organ damage, and loss of endocrine and exocrine function.[6] It has an incidence of about 3-10 per 100,000. The most common cause is alcohol abuse. CT findings show parenchymal loss and calcifications within the pancreas. Cystic fibrosis can cause chronic pancreatitis, as can hypertriglyceridemia, hemochromatosis, severe malnutrition, gastric surgery or pancreatic resection, neoplasm of the pancreas or duodenum, gastrinoma, and abdominal radiation therapy. Chronic pancreatitis can also be idiopathic or hereditary. A rare cause is alpha-1 antitrypsin deficiency. Chronic pancreatitis may present with chronic pain, malabsorption with malnutrition, weight loss, steatorrhea, or gastroparesis. Complications may include narcotic addiction, diabetes mellitus, pancreatic cancer, and permanent pancreatic insufficiency.[2]

Treatment of acute pancreatitis is generally supportive and includes pain control and aggressive IV fluid replacement.[7] The topic of nutritional support in acute pancreatitis is not without controversy. Recommendations for gut rest conflict with recommendations to pursue enteral nutrition via nasogastric or nasojejunal routes.[8] Local complications from acute pancreatitis include pancreatic necrosis, acute fluid collections, and ductal disruption. While prophylactic antibiotics are not recommended, infected necrosis should drive the use of antibiotics and percutaneous drainage in a "step up" approach.[8] If the etiology of acute pancreatitis is cholelithiasis then laparoscopic cholecystectomy may be indicated, as early cholecystectomy has been shown to decrease complications in those with gallstone pancreatitis.[9] Urgent endoscopic retrograde cholangiopancreatography may be recommended within the first 24 hours in patients who have severe biliary pancreatitis with organ failure or cholangitis.[8] Chronic pancreatitis may require pancreatic enzyme replacement as well as pain control and management of its complications. Occasionally, chronic pancreatitis can be relieved by endoscopy or surgery to open the sphincter of Oddi or by removing part of the pancreas.[6]

II. Aeromedical Concerns.

Acute pancreatitis can be sudden and devastating in its onset, and as such, it poses a danger to flight and to mission completion. The complications of chronic pancreatitis such as chronic pain, diabetes, pancreatic cancer, and the drugs required to treat those complications, likewise endanger flying safety and mission completion. Furthermore, the underlying cause of the pancreatitis (such as alcohol abuse) may pose a serious danger to the safety of flight.

The flight surgeon must determine if the underlying cause of the pancreatitis is waiverable in its own right (refer to AFI 48-123 and AF Waiver Guide). For example, alcohol abuse complicated by pancreatitis is generally not waiverable; cholelithiasis corrected by surgery is waiverable. If the cause was a medication, the aviator must be switched to a drug that is waiverable (and the pancreatitis must resolve without sequelae). It is important to caution the patient to NEVER use the offending drug in the future. If the underlying cause requires a Medical Evaluation Board, that

must be accomplished prior to requesting a waiver. Waivers for pancreatitis caused by cholelithiasis will not be considered unless the gallbladder has been removed, after which an indefinite waiver is possible. Waivers for hereditary pancreatitis or pancreatitis due to uncorrectable factors will generally not be considered. If the pancreatitis was caused by binge drinking, the flyer must have undergone an ADAPT evaluation demonstrating that he or she is not an alcoholic and that he or she has gone through alcohol counseling and education.

III. Waiver Consideration.

Pancreatitis, regardless of the etiology, is disqualifying for all classes of flying in the USAF. It is not listed specifically as disqualifying for ATC/GBC or MOD duties, but so if the diagnoses of pancreatitis does not meet retention standards per the DAWG, then a waiver is required.

Table 1 – Waiver Potential for Pancreatitis

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority**	**ACS Evaluation or Review**
I/IA	Acute	Yes* AETC	If requested by AETC
	Chronic	No AETC	No
II/III	Acute	Yes* MAJCOM	If requested by MAJCOM
	Chronic	Yes*+# MAJCOM	Yes
ATC/GBC MOD	Acute	N/A	No
	Chronic	Yes*+# AFMSA	No

* Waiver possible with resolution of the acute phase and no sequelae from chronic state.
+ MEB required prior to waiver consideration.
# No indefinite waiver.

A review of AIMWTS records in Jun 2013 disclosed 64 waiver requests for pancreatitis, and 7 of them resulted in a disqualify disposition. There were 5 FC I/IA cases (1 disqualified), 32 FC II cases (2 disqualified), 26 FC III cases (4 disqualified), 0 ATC/GBC cases, and 1 MOD case (0 disqualified). Of the 7 DQ cases, 3 were for EtOH or substance abuse, 2 were related to the diagnosis of pancreatitis, 1 for another medical problem, and 1 for an unknown reason.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Acute pancreatitis (All flying classes):
The AMS for acute pancreatitis should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history and etiology of the condition and how it was treated.
C. A statement that the aviator is completely recovered from the illness, that he/she has not suffered any complications, and that he/she is tolerating a regular diet, and is capable of normal activities.
D. Consultation report by a gastroenterologist specifically addressing the likelihood of recurrence.
E. Documentation:

- Reports: Operative reports, consultation reports, hospital discharge summary.
- Imaging studies: Post-recovery abdominal CT scan (demonstrating a healthy pancreas without pseudocyst or calcifications), and an ultrasound or other study demonstrating the absence of gallstones or sludge
- Lab studies: CBC, glucose, calcium, amylase, lipase, trypsin, fasting lipid panel, and liver function tests.

Chronic pancreatitis:
Active chronic pancreatitis is not waiverable. Patients with a history of chronic pancreatitis, who are currently asymptomatic with no sequelae such as chronic diarrhea, chronic pain, or diabetes mellitus, may be considered for a waiver following MEB with a "return to duty" recommendation. Patients with a history of surgical interventions for chronic pancreatitis, such as segmental pancreas resection or Puestow procedure are unlikely to be considered for waiver, and would have to demonstrate complete functional recovery post operatively with no sequelae from the surgery or chronic pancreatitis prior to any waiver consideration.

Waiver Renewal: For a time limited waiver, a renewal aeromedical summary is needed. It should include all interim history and medical information necessary to update the case.

ICD-9 Codes for Pancreatitis	
577.0	Acute pancreatitis
577.1	Chronic pancreatitis
072.3	Mumps pancreatitis

ICD-10 Codes for Pancreatitis	
K85.9	Acute pancreatitis, unspecified
K86.1	Other chronic pancreatitis
B26.3	Mumps pancreatitis

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WAIVER GUIDE
Updated: Mar 2016
Supersedes Waiver Guide of June 2012
By: LtCol Tracy Bozung (RAM 17) and Dr. Dan Van Syoc
Reviewed by Col Pat Storms, AF/SG consultant for gastroenterology

CONDITION:
Peptic Ulcer Disease (Mar 16)

I. Overview.

Peptic ulcer disease (PUD) is characterized by mucosal damage secondary to pepsin and gastric acid secretion, and is most often encountered in the stomach and proximal duodenum. Ulcers may also be found in the lower esophagus, distal duodenum, or jejunum in unopposed hypersecretory states such as Zollinger-Ellison syndrome, in hiatal hernias, or in ectopic gastric mucosa (e.g., in Meckel's diverticulum).[1] The incidence of peptic ulcers is declining, possibly as a result of the increasing use of proton pump inhibitors and decreasing rates of *Helicobacter pylori* infection.[2, 3, 4]

H. pylori infection and the use of nonsteroidal anti-inflammatory drugs (NSAIDs) are the predominant causes of peptic ulcer disease in the United States. Along with smoking, they account for 89% to 95% of PUD and related serious upper GI events.[5] A variety of other infections and comorbidities are associated with a greater risk of peptic ulcer disease (e.g., cytomegalovirus, tuberculosis, Crohn's disease, hepatic cirrhosis, chronic renal failure, sarcoidosis, myeloproliferative disorder). Critical illness, surgery, or hypovolemia leading to splanchnic hypoperfusion may result in gastroduodenal erosions or ulcers (stress ulcers); these may be silent or manifest with bleeding or perforation. Smoking also increases the risk of ulcer recurrence and slows healing.[6] Among those patients not using NSAIDs, the incidence of PUD increases with age and is approximately two times more common in men.[7]

Although *H. pylori* is present in the gastroduodenal mucosa in most patients with duodenal and gastric ulcers, the majority of patients with *H. pylori* infection do not develop peptic ulcer disease.[8] *H. pylori* bacteria in the gastric tract adheres to the gastric mucosa, beneath the protective mucus layer. The presence of an outer inflammatory protein and a functional cytotoxin-associated gene island in the bacterial chromosome increases virulence and probably ulcerogenic potential.[9] Patients with *H. pylori* infection have increased resting and meal-stimulated gastrin levels, decreased gastric mucus production, and decreased duodenal mucosal bicarbonate secretion, all of which favor ulcer formation. Ulcer recurrence has been shown to be much less common in those patients who are *H. Pylori*-cured (6%) vs. non-cured (67%) in patients with duodenal ulcers and in patients with gastric ulcers, cured (4%) vs. uncured (59%).[10]

Topical effects of NSAIDs cause submucosal erosions. In addition, by inhibiting cyclo-oxygenase, NSAIDs inhibit the formation of prostaglandins and their protective cyclo-oxygenase- 2–mediated effects (i.e., enhancing gastric mucosal protection by stimulating mucus and bicarbonate secretion and epithelial cell proliferation and increasing mucosal blood flow). Coexisting *H. pylori* infection increases the likelihood and intensity of NSAID-induced damage.[11] As many as 25% of chronic NSAID users will develop ulcer disease and 2 to 4 % of those patients will develop GI bleeding or perforation.[12] NSAID use is responsible for approximately one half of perforated ulcers, which occur most commonly in older patients using chronic aspirin or other NSAIDs.[13, 14] Proton pump

inhibitors minimize the ulcerogenic potential of NSAIDs and reduce NSAID-related ulcer recurrence.[1] A meta-analysis in 2015 showed a 73% reduction in peptic ulcers with those patients taking a PPI with aspirin as compared to aspirin alone.[15] There is also evidence that COX-2 inhibitors have a lower incidence of gastric and duodenal ulcers compared to traditional NSAIDS; although, that risk is negated if the patient is also taking low dose aspirin.[12]

Typical symptoms of peptic ulcer disease include episodic gnawing or burning epigastric pain; pain occurring two to five hours after meals or on an empty stomach; and nocturnal pain relieved by food intake, antacids, or antisecretory agents. A history of intermittent epigastric pain, relief of pain after food intake, and nighttime awakening because of pain are the most specific findings for peptic ulcer and help rule in the diagnosis. Less common features include indigestion, vomiting, loss of appetite, intolerance of fatty foods and heartburn.[16] The physical examination is typically unreliable. The natural history and clinical presentation of peptic ulcer disease may differ in certain populations.[17] Abdominal pain is absent in at least 30 percent of older patients with peptic ulcers.[18] Postprandial epigastric pain is more likely to be relieved by food or antacids in patients with duodenal ulcers than in those with gastric ulcers. Weight loss precipitated by fear of food intake is characteristic of gastric ulcers. Silent ulcers and complications are more common in older patients and in patients taking NSAIDs.[18, 19]

If the initial clinical presentation suggests the diagnosis of peptic ulcer disease, the patient should be evaluated for alarm symptoms, to include: evidence of bleeding, to include anemia, hematemesis, melena, and heme-positive stools, vomiting, anorexia, and weight loss. Patients older than 55 years and those with alarm symptoms, regardless of age, should be referred for prompt upper endoscopy.[1] Esophagogastroduodenoscopy (EGD) is more sensitive and specific for peptic ulcer disease than upper gastrointestinal barium studies and allows biopsy of gastric lesions.[20] Patients younger than 55 years with no alarm symptoms should be tested for *H. pylori* infection and advised to discontinue the use of NSAIDs, smoking, and alcohol. Presence of *H. pylori* can be confirmed with a urea breath test, serum enzyme-linked immunosorbent assay (ELISA), stool antigen test, endoscopic biopsy, culture or polymerase chain reaction. The urea breath test and stool antigen ELISA testing are the two most accurate tests (each with greater than 90% for both sensitivity and specificity) without being significantly invasive.[1, 22] Both tests can also be used to check for eradication. If test results are positive for *H. pylori*, the infection should be eradicated. After treatment for *H. pylori*, patients with persistent symptoms should be referred for endoscopy to rule out refractory ulcer and malignancy. Patients without alarm symptoms who respond well to therapy without relapse do not necessarily need endoscopy or radiographic studies.

Treatment of peptic ulcer disease should include eradication of *H. pylori* if the patient tests positive. Over the past 20 years, *H. pylori* eradication therapies have mainly consisted of antimicrobial agents combined with antisecretory drugs. Treatment of active ulcers always necessitates the use of a PPI as they have been shown to heal peptic ulcers more rapidly than H_2-blockers or any other drug.[21] The most common first-line treatment is a triple therapy with a PPI twice daily plus clarithromycin 500 mg twice daily and either amoxicillin 1 g twice daily or metronidazole 500 mg twice daily for 7–14 days.[22] Another first-line treatment option includes sequential treatment consisting of five days of a PPI plus amoxicillin followed by five additional days of a PPI plus clarithromycin and tinidazole. However, this sequential treatment has not been validated in the US.[22, 24] Several other treatment options are considered second line, including non-bismuth-based quadruple therapy, bismuth-based quadruple therapy and levofloxacin triple therapy.[1, 22] Research has shown improved eradication rates and less diarrheal side effects if probiotics *Saccharomyces*

boulardii (*S. boulardii*) and *Lactobacillus* strains are added to the current first line treatments.[1, 22] A 2015 review directly compared 34 different treatment combinations and determined that the standard 7 day triple therapy was the least effective in eradicating *H. pylori*.[25] The most effective treatments were found to be concomitant treatments (simultaneous PPI plus three antibiotics), 10 to 14 day probiotic supplemented triple therapy, 10 to 14 day levofloxacin-based triple therapy, 14 days of hybrid treatment (7 days simultaneous PPI plus amoxicillin, followed by 7 days simultaneous PPI with amoxicillin, clarithromycin and nitroimidazole) or 10 to 14 days of sequential treatment.[25] Increased resistance to antibiotics, especially clarithromycin needs to be considered in the selection of treatment. If there is 15 to 20% resistance rate to clarithromycin in the geographic region, a non-clarithromycin treatment should be used.[1, 22, 24] *H. pylori* eradication should be confirmed 4 weeks or more after treatment is completed in those with *H. pylori*-associated ulceration.[1, 22] Patients who are smokers are two times more likely to fail *H. pylori* treatment.[24]

Eradicating *H. pylori* is often sufficient treatment for patients with small duodenal ulcers. Repeated EGD with biopsy is recommended to confirm healing of gastric ulcers and to rule out malignancy. A systematic review of randomized controlled trials showed that proton pump inhibitors healed duodenal ulcers in more than 95 percent of patients at four weeks and gastric ulcers in 80% to 90% of patients at eight weeks.[23] Therefore, there is little reason to prescribe proton pump inhibitors for longer than four weeks for duodenal ulcers unless the ulcers are large, fibrosed, or unresponsive to initial treatment. Maintenance therapy with H_2 blockers or proton pump inhibitors prevents recurrence in high-risk patients (e.g., those with a history of complications, frequent recurrences, ulcers testing negative for *H. pylori*, refractory giant ulcers, or severely fibrosed ulcers). However, maintenance therapy is not generally recommended for patients in whom *H. pylori* has been eradicated and who are not taking NSAIDs long-term.

II. Aeromedical Concerns.

Sudden incapacitation due to perforation or hemorrhage is of primary concern. Ulcer pain may be distracting and interfere with performance during critical phases of flight. Chronic blood loss from PUD may lead to anemia, which can cause fatigue, weakness, lightheadedness and decreased Gz tolerance. Additionally, it could contribute to hypoxia and decreased tolerance of physical exertion.

III. Waiver Consideration.

Active peptic ulcer disease is disqualifying for all flying classes, ATC/GBC and MOD personnel. If the disease process leads to repeated incapacitation or absences from duty, or requires frequent specialty follow-up, it is also disqualifying for retention and an IRILO is required.

Table 1 – Waiver Potential for PUD for FC I/IA, FC II and FC III

Flying Class (FC)	Condition	Waiver Potential Waiver Authority#	ACS Review/Evaluation
I/IA Initial II or III	Peptic ulcer disease, active or refractory	No AETC	No
	Peptic ulcer complicated by hemorrhage, obstruction or perforation.	Maybe*+ AETC	Yes
II/RPA Pilot/III	Peptic ulcer disease, active or refractory	Maybe*+# MAJCOM	Yes
	Peptic ulcer complicated by hemorrhage, obstruction or perforation.	Maybe*+# MAJCOM	Yes
ATC/GBC	Peptic ulcer disease, active or refractory	Maybe*+MAJCOM	At MAJCOM request
	Peptic ulcer complicated by hemorrhage, obstruction or perforation.	Maybe*+MAJCOM	At MAJCOM request
MOD	Peptic ulcer disease, active or refractory	Maybe*+ GSC	No
	Peptic ulcer complicated by hemorrhage, obstruction or perforation.	Maybe*+ GSC	No

* Waiver possible with documentation of treatment and resolution of symptoms or documentation of adequate control measures.
+ MEB required first if individual experiences repeated incapacitations or absences from duty because of recurrence of symptoms despite good medical management which is supported by laboratory and/or X-ray evidence of activity or severe deformity.
# AFMSA is waiver authority if aviator does not meet retention standards or if limitation code C from MEB in place.

Review of AIMWTS in Mar 2016 revealed 77 waiver requests for peptic ulcer disease. Breakdown of the cases demonstrated 4 FCI cases, 30 FCII cases, 36 FCIII cases, and 7 ATC/GBC cases. Of the 77 cases, four (5.2%) were disqualified; one ATC/GBC and one FCIII were disqualified for unrelated medical issue (neck pain and IBS) and one FCII and one FCIII were disqualified for multiple disqualifying conditions in addition to PUD.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for peptic ulcer, regardless of etiology, must include the following:
A. History and physical with note of presence or absence of ulcer complications (obstruction, perforation, or bleeding), and NSAID, tobacco and alcohol use
B. Documentation of *H. Pylori* status, treatment and eradication (as applicable)
C. Documentation of cessation of NSAID use (as applicable)
D. Documentation of ulcer healing by confirmatory endoscopy
E. Report of current (returned to baseline) hemoglobin and hematocrit result
F. Documentation that the aviator has been counseled about the warning symptoms of ulcer recurrence and complications (pain, melena, BRBPR, hematemesis, nausea and vomiting, lightheadedness, dyspnea on exertion)
G. Documentation that the aviator is asymptomatic without acid-suppressing medication (waiver may be considered on a case-by-case basis with chronic acid suppression therapy)
H. MEB results if aviator does not meet retention standards.

Recurrence risk of peptic ulcers without clear etiology is unknown. Waiver may be considered on a case-by-case basis.

ICD 9 Codes for Peptic Ulcer Disease	
533	Peptic Ulcer, Site Unspecified
533.0	Acute Peptic Ulcer of Unspecified Site with Hemorrhage
533.00	Acute Peptic Ulcer of Unspecified Site with Hemorrhage, without Mention of Obstruction
533.1	Acute Peptic Ulcer of Unspecified Site with Perforation
533.3	Acute peptic ulcer of unspecified site without mention of hemorrhage and perforation
533.4	Acute Peptic Ulcer of Unspecified Site with Hemorrhage
533.9	Peptic Ulcer of Unspecified Site Unspecified as Acute or Chronic, Without Mention of Hemorrhage or Perforation

ICD 10 Codes for Peptic Ulcer Disease	
K27.0	Acute peptic ulcer, site unspecified, with hemorrhage
K27.1	Acute peptic ulcer, site unspecified, with perforation
K27.2	Acute peptic ulcer, site unspecified, with both hemorrhage and perforation
K27.3	Acute peptic ulcer, site unspecified, without hemorrhage or perforation
K27.4	Chronic or unspecified peptic ulcer, site unspecified, with hemorrhage
K27.5	Chronic or unspecified peptic ulcer, site unspecified, with perforation
K27.6	Chronic or unspecified peptic ulcer, site unspecified, with both hemorrhage and perforation
K27.7	Chronic peptic ulcer, site unspecified, without hemorrhage or perforation
K27.9	Peptic ulcer, site unspecified, unspecified as acute or chronic, without hemorrhage or perforation
Z87.11	Personal history of peptic ulcer

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WAIVER GUIDE
Updated: Dec 2013
Supersedes Waiver Guide of May 2010
By: Dr Dan Van Syoc
Reviewed by Maj Eddie Davenport, chief ACS cardiologist

CONDITION:
Pericardial Disorders Including Myopericarditis (Dec 13)

I. Overview.

The pericardium is a fibrous structure surrounding the heart composed of visceral and parietal layers separated by a pericardial cavity, which normally contains about 15-50 mil of straw-colored fluid.[1, 2] Pericardial disorders include any abnormality involving the pericardium. Acute pericarditis most commonly arises either from idiopathic causes or a precipitating viral illness such as an upper respiratory infection (URI). Acute disease is common and must be considered in the differential diagnosis of chest pain in adults.[3] The incidence of acute pericarditis is unknown, but it does account for approximately 5 percent of patients presenting with nonischemic chest pain to emergency departments. Interestingly, patients with congenital or surgical absence of the pericardium show few, if any, clinical problems.[2, 4, 5]

Other less frequent causes of acute pericarditis include other infectious etiologies (such as tuberculosis), cancer, rheumatic disease, metabolic conditions (hypothyroidism, uremia), drug-related, radiation-induced and post acute myocardial infarction (MI). Post-traumatic pericarditis may also occur, including post-surgical.[6] Most cases of idiopathic or viral-related acute pericarditis are self-limited disorders and resolve either spontaneously or with conservative treatment. Pericarditis may occasionally be complicated by the presence of a pericardial effusion or by pericardial thickening. Only rarely do acute pericarditis-associated effusions result in clinically significant situations such as pericardial tamponade. Inflammatory-associated pericardial thickening may rarely progress to constrictive pericarditis.[5]

Other conditions involving the pericardium are rarer. Myopericarditis is a condition in which the inflammation of the pericardium spreads to the underlying myocardium itself. This is marked by the presence of positive cardiac enzymes in routine blood work, and can be complicated by myocardial wall-motion abnormalities, although overall left ventricular systolic function is usually normal. Myopericarditis typically resolves with usual anti-inflammatory therapy. This should be differentiated from primary myocarditis without associated pericarditis, typically associated with either global hypokinesis and/or a reduction in overall left ventricular ejection fraction.[2] This usually portends a much poorer prognosis (see cardiomyopathy waiver guide). Additional unusual pericardial diseases include pericardial cysts and congenital absence of the pericardium.

Acute pericarditis is typically diagnosed by a triad of historical symptoms, clinical signs, and routine testing (e.g. ECG). The usual pain is a pleuritic-type pain which is often worse when lying supine and relieved by sitting upright. It may or may not have a respiratory component. The classic three-phase friction rub is highly specific, but sensitivity varies as the rub is variably present on physical examination. The typical ECG pattern of diffuse ST-segment elevation may or may not be present.[3, 7] Most cases of acute pericarditis resolve after a few days to weeks of anti-inflammatory drug therapy such as aspirin and nonsteroidal anti-inflammatory drug (NSAID). Aspirin (2 to 4

grams), indomethacin (75 to 225 mg daily), and ibuprofen (1600 to 3200 mg daily) are prescribed most often, with ibuprofen preferred, since it has a lower incidence of adverse effects than the others.[1]

The literature state that 10% to 30% of all cases of acute pericarditis will go on to recurrent disease.[3, 8] Recurrence of symptoms following an acute uncomplicated case of pericarditis are usually related to premature discontinuation of anti-inflammatory treatment.[9] The underlying inflammatory process usually lasts 6-8 weeks, although symptoms typically resolve within just a few days of initiating anti-inflammatory treatment. The tendency to suspend treatment (often done after about two weeks if the patient is asymptomatic) with resolution of symptoms should therefore be avoided, and a 6-8 week course of treatment is recommended to avoid symptom recurrence. If recurrence does occur then NSAID and colchicine are the preferred treatment, with glucocorticoids reserved for treatment failure.[7] Another encouraging fact is that the vast majority of patients with recurrent pericarditis have an excellent overall life prognosis with a very small incidence rate of cardiac tamponade and no reported cases of restrictive pericarditis.[10]

II. Aeromedical Concerns.

Aeromedical concerns surrounding uncomplicated, acute pericarditis revolve around the potential for sudden complications, the ability to perform flight duties while the active inflammatory state is underway, recurrence of symptoms, and medical treatment. Arrhythmias are very rare occurrences in individuals with idiopathic or viral pericarditis, and as such the risk for sudden incapacitation is rare.[11] Treatment regimens for acute, uncomplicated pericarditis typically are limited to NSAIDs or glucocorticoids. NSAIDs (ibuprofen, aspirin and naproxen) are waiverable medications once symptoms have resolved. Glucocorticoids and colchicine are not waiverable, as side-effects are not compatible with aircrew duties.

Aviators with a history of completely treated (6-8 weeks anti-inflammatory drug) idiopathic or viral pericarditis are very unlikely to develop recurrent episodes of pericarditis. In aviators with pericarditis complicated by significant pericardial effusion or myocardial inflammation, the aeromedical risks increase as effects on myocardial cellular function and overall hemodynamics are potentially increased. Complicated cardiac arrhythmias may occur, and regional wall motion abnormalities may compromise cardiac responses to physiologic stress. Furthermore, myopericarditis may require an extended period of treatment for complete resolution of any underlying wall motion abnormalities or resolution of associated pericardial effusion.

III. Waiver Consideration.

Pericardial disorders including myopericarditis are disqualifying for all classes of flying duties. ACS review and evaluation is required in all cases for waiver consideration. For ATC/GBC and MOD personnel, “Chronic constrictive pericarditis, unless successful surgery has been performed and return of normal hemodynamics objectively documented, and chronic serous pericarditis” is disqualifying for retention and will therefore require an MEB and waiver.

Table 1: Waiver potential for pericardial disorders.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	Uncomplicated idiopathic/viral pericarditis, off all medications and ≥6 months since episode	Yes AETC	Yes
	Complicated pericarditis including pericarditis with effusion and myopericarditis, off all medications and ≥1 year since episode	Maybe AETC	Yes
	Other pericardial disorders	Maybe AETC	Yes
II/III	Uncomplicated idiopathic/viral pericarditis*	Yes MAJCOM	Yes
	Complicated pericarditis including pericarditis with effusion and myopericarditis†	Maybe MAJCOM	Yes
	Other pericardial disorders	Maybe MAJCOM	Yes
GBC/ATC MOD	Uncomplicated idiopathic/viral pericarditis*	N/A	No
	Complicated pericarditis including pericarditis with effusion and myopericarditis†	Yes AFMSA	No
	Other pericardial disorders	Yes AFMSA	No

* Waiver for pericarditis and the use of NSAID (total of 6-8 weeks of treatment) may be submitted one month after complete resolution of symptoms.
† Waiver may be submitted three months after complete resolution of clinical illness.

AIMWITS search in Nov 2013 revealed 70 cases with the diagnosis of pericarditis. There were a total of six disqualifications. Breakdown of the cases was as follows: 5 FC I/IA (0 disqualifications), 42 FC II (1 disqualification), 22 FC III (4 disqualifications), and 1 ATC/GBC (1 disqualification). Only one of the cases was primarily disqualified due to issues with pericardial disease.

IV. Information Required for Waiver Submission.

Prior to waiver submission for uncomplicated pericarditis there is a minimum nonflying observation period of one month after symptom resolution (6 months for FC I/IA). The aviator may be on an approved NSAID at the time of waiver submission, in order to complete above recommended 6-8 weeks of anti-inflammatory therapy. For aviators with complicated pericardial disorders (e.g. pericarditis with effusion or myopericarditis), there is a minimum nonflying observation period of three months (12 months for FC I/IA). The minimum three month observation period should start at the resolution of the clinical illness (e.g. echo-proven resolution of associated effusions or wall-motion abnormalities).

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for pericardial disorders should include the following:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level. Pertinent negatives should include absence of disorders known to affect the pericardium (e.g. uremia, tuberculosis, recent MI, prior trauma).
B. Electrocardiogram (ECG).
C. Chest x-ray report.
D. Copy of all local echocardiogram reports. Send videotape/CD copy of the echocardiographic images to the ACS. (Notes 1 and 2)
E. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)
F. Results of medical evaluation board (MEB) if required (worldwide duty evaluation for ARC members).
G. Additional local cardiac testing is not routinely required but may be requested in individual cases.

The AMS for waiver renewal for pericardial disorders should include the following:
A. Interval history since last waiver approval
B. All applicable labs and imaging tests as in the initial aeromedical summary.
C. Consultation from treating cardiologist or internist

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD-9 codes for Pericarditis and Myopericarditis	
420	Acute pericarditis
420.9	Other and unspecified pericarditis

ICD-10 codes for Pericarditis and Myopericarditis	
I30.9	Acute pericarditis, unspecified
I32	Pericarditis in diseases classified elsewhere

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WAIVER GUIDE
Updated: Jun 2013
Supersedes Waiver Guide of Jun 2009
By: Lt Col Stephanie Davis (RAM 13) and Dr Dan Van Syoc
Reviewed by Col Kent McDonald, psychiatrist and chief of Neuropsychiatry branch at ACS.

CONDITION:
Personality Disorders (Jun 13)

I. Overview.

Personality *traits* are enduring patterns of perceiving, relating to, and thinking about the environment and are exhibited in a wide range of contexts. When these traits are inflexible, maladaptive and cause significant functional impairment, the individual is then identified as having a personality *disorder*.[1] By definition, the symptoms of personality disorders cannot be caused by a major psychiatric disorder as diagnosed in DSM-IV.[2] But it is not uncommon for patients with a personality disorder to have another psychiatric condition and it may be the other diagnosis that brings the case to the attention of mental health professionals and drives a psychiatric evaluation. DSM-IV places personality disorders on a separate axis (Axis II) from the more circumscribed and episodic Axis I disorders such as major depression and schizophrenia to emphasize that the personality disorders may coexist with and even complicate treatment of these other mental disorders.[1, 3]

Personality disorders are common in US society; the prevalence is reported to be 4% to 13% in the general population. The rates increase dramatically in select populations – it is estimated that more than 28% of patients with alcohol disorders and 47% of patients with drug use disorders also have a personality disorder.[4] Although these conditions are chronic, they often will improve over time. The prognosis for many with personality disorders is better than for most serious Axis I disorders.[5] This improvement in personality psychopathology may be associated with a real reduction in ongoing personal and social burdens according to a 2008 review of four large-scale studies.[6] Conversely, findings by Skodol et al support the growing clinical literature on the negative prognostic effects of personality disorders on the course of major depressive disorder.[7] Current classifications of personality disorders in DSM-IV have no measure of severity. Patients with more severe forms do not have stronger manifestations of one single disorder, but instead their personality disturbance extends almost ripple-like across all domains of their personality, so that there remains almost no satisfactory personality function in any area.[8]

Personality disorders are divided into three major areas called clusters and there are further breakdowns within each of the clusters. Cluster A is identified as odd or eccentric. Within Cluster A are the subtypes of paranoid, schizoid, and schizotypal. The second cluster, Cluster B is identified as dramatic, emotional or erratic. Subtypes in this cluster are antisocial, borderline, histrionic, and narcissistic. The last cluster, Cluster C is identified as anxious or fearful and its subtypes are avoidant, dependent, and obsessive-compulsive.[2] A particular patient may have traits from different clusters and may meet criteria from more than one personality disorder. Despite the specific classification, these patients often come to the attention of the medical community because they make the provider feel uncomfortable in some fashion.[9]

The most common personality disorder in clinical setting is borderline personality disorder. The essential feature of borderline personality is a pervasive pattern of instability of interpersonal relationships, affects, self-image, and a marked impulsivity. It causes marked distress and impairment in numerous settings and is associated with high rates of self-destructive bahavior.[10] Despite a quarter century of research suggesting that the course of borderline personality disorder is both more heterogeneous and more benign than originally thought, many clinicians still believe that borderline personality disorder is chronic and consumes the use of a disproportionate share of mental health services.[11] The 10-year outcome of borderline patients in the McLean Study of Adult Development found that 93% of patients achieved a remission that lasted at least two years, but only 50% attained a 2-year recovery; recovery from borderline personality disorder occurred at a lower rate and more slowly than recovery from other personality disorders.[11]

Management of these patients is directed primarily toward the particular cluster they belong to or in which they have the more predominant symptom characteristics. Initially, efforts are focused on maintaining and supporting the patient-physician relationship and establishing a working alliance. The treating physician needs to have a good understanding of the personality characteristics of these patients and work to adapt his or her style in order to optimize communication and the ultimate clinical outcome. In the case of borderline personality disorder, dialectical behavior therapy is an evidence-based, intensive, outpatient cognitive-behavioral treatment for individuals who meet criteria for this disorder.[12] Psychotropic medications are not a front-line approach to the care of most of these patients. If a particular case lends itself to treatment with medications, it should not be attempted by a non-mental health professional.

II. Aeromedical Concerns.

For all flying classes the question of "suitability" is important. Personality disorders and traits may impact performance of military duty, including aviation duty and flight safety, because of associated social, occupational, administrative, and legal ramifications. As a general rule, successful treatment requires long-term, time intensive psychotherapy that can render the service member unavailable for full duty performance for a prolonged period of time. When a personality disorder diagnosis is confirmed by mental health consultation, administrative separation due to psychological unsuitability for military service is often pursued. This administrative action requires evidence of negative impact on duty performance due to the disorder, in addition to the diagnosis of the disorder itself. Typically, other potentially medically disqualifying disorders are considered and ruled out before taking this action.

Unfortunately, many persons with personality disorders spend a long time between initial referral for evaluation and final diagnosis and disposition decision making. Care is needed to avoid hasty over-diagnosis of personality disorders in personnel with idiosyncratic personality traits presenting for evaluation. Thus, in questions of possible administrative separation action by command, consultation with a mental health provider should be considered by the flight surgeon early on in the process. The flight surgeon and mental health provider may assist the commander in the decision-making process through explanation of personality disorder manifestations and discussion of the associated prognosis.

People with personality disorders often have difficulty working closely with others under stressful conditions, in adhering to discipline, and in responding appropriately to authority, all of which can threaten flight safety and mission completion. They can be rigid, unwilling to compromise and

often express anger explosively or indirectly, thereby creating interpersonal tension that can be disruptive to the good order and discipline of a unit. Behavior rooted in personality disorders, e.g., temper outbursts, unreliability, chronic non-adherence to unit or flight discipline, and passive-aggressive behavior can lead to command-directed mental health evaluations. It is appropriate to DNIF such a flyer pending mental health evaluation. It is also paramount that supervisors document all negative behavior as the diagnosis is made by examining behavior patterns over time. These disorders are considered to be inherent to the individual and a permanent part of their personality. These behaviors can be a real threat to flight safety.[13]

III. Waiver Consideration.

Personality disorder that is severe enough to repeatedly manifest itself by significant interference with safety of flight, crew coordination, or mission completion is disqualifying for all flying classes and special duties positions. In addition, unsatisfactory duty performance due to personality disorder may cause the member to be technically unsuitable as opposed to unfit and subject to administrative separation. If the member has personality traits but does not meet the criteria for personality disorder, he or she still may be deemed ARMA unsat. All cases that are being considered for a waiver MUST be seen at the ACS.

Table 1: Waiver potential for Personality Disorders+

Flying Class (FC)	**Waiver Potential** **Waiver Authority**	**ACS Review/Evaluation**
I/IA	No AETC	Only if requested by AETC
II/III ATC/GBC	Yes*# MAJCOM	Yes
MOD	Yes*# AFGSC	Yes

*Waiver not recommended for any initial flying class for individuals with a history of personality disorder.
#No indefinite waivers.
+All cases considered for waiver must be considered psychologically stable and manifestations no longer interfering with duty.

AIMWTS review in April 2013 produced a total of 75 cases with the diagnosis of personality disorder. Of this total, 5 were for FC I/IA, 10 were for FC II, 35 were for FC III, 17 were for ATC/GBC, and 5 were for MOD. All but 12 of the total of 72 cases resulted in a disqualification; 3 approved waivers for FC II, 6 approved for FC III, 2 for ATC/GBC, and 1 approved for MOD. Most of the total had at least one other psychiatric diagnosis in addition to the diagnosis of personality disorder.

IV. Information Required for Waiver Submission.

Submitting a Mental Health Waiver Guide:

AFI 48-123 –Chapter 6 (pg. 55) and the Aeromedical Consultation Service (ACS) Waiver Guide addresses waiver evaluations

Step 1 - Is the aviator ready for waiver submission?

A. Waiver is submitted when 1) the member is asymptomatic and 2) medications/psychotherapy treatment have been completed, as applicable to diagnostic category, for the specified time-frame below (Note: psychotherapy "booster sessions", and sometimes SSRIs, are permissible and often advisable after initial symptom resolution):

- ☐ 1 Year—Psychotic Disorders & Somatoform Disorders
- ☐ 6 Months—Mood Disorders, Anxiety Disorders & Suicidal Behavior
- ☐ Discretion of Flight Surgeon—Adjustment Disorders & V-Codes requiring waiver
- ☐ For Traumatic Brain Injury cases, please refer to TBI Waiver Guide
- ☐ For aviators with any other psychiatric disorders, please refer to AFI 48-123 and ACS Waiver Guide

B. To be considered for an aeromedical waiver, any disqualifying condition must meet the following criteria per AFI 48-123 Section 6B, 6.2.1.1 through 6.2.1.6. (pg. 57-58):

- ☐ Not pose a risk of sudden incapacitation
- ☐ Pose minimal potential for subtle performance decrement, particularly with regard to the higher senses
- ☐ Be resolved, or be stable, and be expected to remain so under the stresses of the aviation environment
- ☐ If the possibility of progression or recurrence exists, the first symptoms or signs must be easily detectable and not pose a risk to the individual or the safety of others
- ☐ Cannot require exotic tests, regular invasive procedures, or frequent absences to monitor for stability or progression
- ☐ Must be compatible with the performance of sustained flying operations

Step 2 - Before beginning the Aeromedical Summary (AMS), Flight Surgeon must obtain Mental Health consultation and ensure it contains items specified below:

Instructions for the Mental Health Provider

The mental health evaluation must include a **comprehensive written report** addressing:

- ☐ Consultation must address each criteria in Step 1B
- ☐ Clinical mental health history (description of symptoms, treatment modality, frequency and compliance with treatment, relevant personal and family history, and perceived impact on occupational duties)
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…)
  ***** for alcohol cases, please comment on Carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, input from line leadership, if possible, and please address current state of any triggers for the mental illness)
- ☐ Current and past aviation related duties and any history of current and past occupational performance difficulties (to include perceived impact of mental health condition on performance of duties)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)

- ☐ Summary and interpretation of psychological/neuropsychological testing results (recommend MMPI-2, NEO PI-R, or similar personality test). For neuropsychological cases, please contact ACS neuropsychologist (Dr. Gary Ford, DSN: 798-2704) for guidance on recommended neuropsychological tests.
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly or engage in special duty operations (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)
- ☐ Copies of all records (mental health/ADAPT/inpatient) and raw testing data should be on hand for shipment to ACS Neuropsychiatry Branch

Step 3 - Items for the Flight Surgeon to include in the AMS:

- ☐ AMS must clearly address each criteria in Step 1B and the risk to the member, mission, and safety
- ☐ Summarize Mental Health history and focus on occupational impact
  ***** If 2 or more months have passed since the comprehensive evaluation/report was completed, the flight surgeon should address how the member has done since and consult with the mental health provider if the member has been seen at mental health since the evaluation*****
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…)
  ***** for alcohol cases, please comment on Carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, if possible - please address current state of any triggers for the mental illness)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)

Step 4 - Items to complete the waiver package:

- ☐ Letter of support from command
- ☐ Comprehensive mental health written-report
- ☐ Confirm mental health has made copies of chart(s) and testing. When requested send to:

ACS Aerospace Medicine Branch, USAFSAM/FECA
c/o Neuropsychiatry Branch
2510 Fifth Street Bldg 840
Wright Patterson AFB, OH 45433-7913
Fax: (937) 904-6296 DSN: 674-9296

Please feel free to contact the ACS Neuropsychiatry Branch with questions:
TSgt Tonya Merriweather: DSN 798-2703 or Mr. John Heaton: 798-2766

The AMS should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for personality disorders should include the following:
A. History – symptoms, good time-line of events; how symptoms affect job, home life, finances, legal issues and relationships. Discuss all other psychiatric conditions. Include drinking and drug use history, if applicable.
B. List and fully discuss all clinical diagnoses requiring a waiver.
C. Treatment – medications and therapy used for all psychiatric conditions.
D. Psychiatry/psychology consultation report(s).
E. Report of all psychological testing, if performed.
F. Letters of support from squadron commander
G. Medical evaluation board results, if applicable.

The AMS for waiver renewal for personality disorders should include the following:
A. History – interim history since last waiver submission to include reports of any legal or job-related problems.
B. Treatment – current therapy for the condition, if any.
C. Psychiatry/psychology consultation report(s).

ICD-9 code for Personality Disorder	
301	Personality disorders

ICD-10 code for Personality Disorder	
F60.9	Personality disorder, unspecified

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WAIVER GUIDE
Updated: Aug 2016
Supersedes Waiver Guide of Mar 2012
By: LtCol Bryant Martin (RAM 2017) and Dr Dan Van Syoc
Reviewed by Lt Col Irene Folaron, AF/SG consultant for Endocrinology

CONDITION:
Pituitary Tumors (Aug 16)

I. Overview.

Pituitary tumors represent 15% of all primary intracranial tumors and are derived from hormone-secreting adenohypophyseal cells.[1] Primary pituitary tumors are either adenomas or carcinomas. Fortunately, pituitary carcinomas are exceedingly rare with an incidence of less than 0.5% of symptomatic lesions.[2, 3] Pituitary adenomas are benign anterior pituitary lobe neoplasms that comprise over 90% of pituitary tumors. The annual incidence of pituitary adenoma traditionally has been reported as approximately 1 in 10,000.[4] However, the prevalence of pituitary adenomas was 16.7% on a recent meta-analysis of autopsy (14.4%) and radiological (22.5%) data.[5] A more recent study of a population in the UK showed a prevalence of 77.6 per 100,000.[6, 7]

Pituitary adenomas are the most common cause of sellar masses from the third decade on, accounting for up to 10 percent of all intracranial neoplasms.[8] They are classified by their size and hormone secreted. Microadenomas are less than 10 mm and macroadenomas are 10 mm or greater.[9, 10] The five types based on hormone secretion are lactotroph (prolactin [PRL]), gonadotroph (nonfunctioning), somatotroph (growth hormone [GH]), corticotroph (adrenocorticotropic hormone [ACTH]), and thyrotroph (thyroid-stimulating hormone [TSH]). Some pituitary adenomas have multiple hormones released, such as PRL/GH and LH/FSH/TSH.[1] Approximate frequency of adenomas are PRL (35%), nonfunctioning (30%), GH (20%), PRL/GH (7%), ACTH (7%), and LH/FSH/TSH (1%), and TSH (<1%).[11, 12]

Prolactinoma (lactotroph adenoma), the most common category causes hyperprolactinemia. Common signs and symptoms are amenorrhea/oligomenorrhea with anovulation, galactorrhea, and infertility in females and impotence, infertility, and diminished libido in men.[13, 14, 15] Gonadotrophs, nonfunctioning adenomas, are the most common macroadenomas due to the late presentation of symptoms secondary to local mass effects.[16] Typical findings would include headache, visual field defects (classically bitemporal hemianopsia from optic chiasm compression), diplopia, hypopituitarism, and hypogonadism.[4] Although all types of adenomas can present with mass effect findings, primary secretory hormone types usually will present with their hormonal based symptoms earlier. Somatotroph produces hypersecretion of GH and the liver secretes insulin-like growth factor-1 (IGF-1) in response to the GH, which leads to acromegaly in adults. Physical findings include coarse facial features, acral enlargement, prognathism, hirsutism, and osteoarthritis.[17] Corticotrophs produce ACTH, which act on the adrenal gland and lead to hypercortisolemia, also known as Cushing's disease. Most are diagnosed as microadenomas secondary to relatively early clinical findings of truncal obesity, facial plethora, acne, hirsutism, striae, hypertension, osteopenia and muscle weakness.[4] Thyrotrophs produce TSH, which act on the thyroid gland and cause hyperthyroidism. The clinical findings are goiter, visual impairment, and thyrotoxicosis.[12]

The evaluation of pituitary adenomas involves endocrinological, neurological, ophthalmological, and radiological considerations. The evaluation is driven by clinical findings discussed previously and appropriate screening tests looking for hyposecretion or hypersecretion of related hormones to support clinical findings. These screening tests are summarized in Table 1.[1, 12]

Table 1. Screening tests for functional pituitary adenomas.[31]

Condition	Test	Comments
Acromegaly	IGF-I.	Interpret IGF-I relative to age- and gender-matched controls.
Prolactinoma	Serum PRL level	Exclude medications. Magnetic resonance imaging (MRI) of the sella should be ordered if PRL levels elevated.
Cushing's disease	24-hr urinary free cortisol.	Ensure urine collection is total and accurate.
	Dexamethasone (1 mg) at 11 pm and fasting plasma cortisol measured at 8 am.	Normal subjects suppress to <1.8 µg/dL (sensitivity of 95%). Other cut-offs such as < 3-5ug/dL are used at the expense of sensitivity.
	Late-night Salivary cortisol test.[18]	Normal subjects should be < 145 ng/dL or reference range
Hyperthyroidism	Serum TSH and free thyroxine (T4) levels.	Normal to elevated TSH and elevated free T4 levels.

For radiological evaluation of the pituitary, high resolution T-1 weighted MRI in coronal and sagittal planes with and without gadolinium is the gold standard.[1] However, the increasing resolution and availability of MRI and CT in brain imaging has spawned more incidental findings of pituitary tumors (incidentalomas) with these asymptomatic lesions present in 10% of the general population.[19, 20] The majority of these lesions are microadenoma; in two years of follow-up only two percent showed enlargement as compared to about a third of macroadenomas.[21] In asymptomatic patients, a single assay for PRL is usually sufficient for hormonal evaluation of an incidentally found microadenoma, although the Endocrine Society suggests an assessment for hypersecretion of prolactin, GH, and ACTH as part of the initial workup.[4] For microadenomas (less than 1 cm), a sella MRI should be repeated annually for up to 3 years, then less frequently thereafter if there has been no change in the lesion size.[21]

The primary goals of treatment are to normalize excess pituitary secretion, alleviate signs and symptoms, shrink or eliminate compression of vital structures, and preserve or restore normal pituitary function.[13] These goals are approached by medical therapy, surgery, irradiation, or a combination.

Prolactinomas, the most common of pituitary adenomas, are primarily treated with pharmacotherapy or observation. Observation is a viable option in asymptomatic microprolactinomas because 95% of tumors do not enlarge in four to six years of observation.[22] Dopamine agonists such as bromocriptine (Parlodel®) and cabergoline (Dostinex®) are the mainstay of therapy. Bromocriptine is taken two to three times daily compared with the longer

acting cabergoline, which is taken twice weekly.[23, 24] Both drugs are effective in decreasing PRL levels and tumor size reduction in over 90% of patients, with cabergoline demonstrating slightly greater efficacy.[22] Withdrawal of dopamine agonists after 1-3 years have shown no recurrence of hyperprolactinemia in 25.8 – 69%; the ideal candidate is one with normal prolactin concentrations while on dopamine agonists and small or no visible tumor on MRI prior to discontinuation of the dopamine agonist.[22] The principal side effects of dopamine agonists are nausea, vomiting, postural hypotension, mental fogginess, and infrequently nasal stuffiness, psychosis, depression, hallucinations, nightmares, insomnia, vertigo, and Raynaud's phenomenon.[13, 22] Many of the adverse symptoms can be managed clinically with reduction in dose.[13, 22, 25] Nonetheless, the adverse effects are highly significant from an aeromedical standpoint.

If pharmacotherapy does not control the symptoms of hyperprolactinemia, or shrink a prolactinoma that is exerting mass effect, then surgery is an option.[26] For all other pituitary tumors, surgery is the primary treatment modality.[1] Endoscopic pituitary surgery has emerged as the first-line surgical treatment of choice with the exception of prolactinomas.[27] Postoperative remission for pituitary adenomas range from 73-96% (lowest GH secreting, highest nonfunctional), recurrence over 10 years is 8-13%. In adenomas which have resulted in visual deficits, visual recovery rates range from 88-92%.[4] All individuals should have extensive neuro-ophthalmological examination to include visual fields and acuity as well as fundoscopic exam prior to and following surgery.

For nonprolactinomas, other pharmacologic agents may be used as adjuncts to surgery. Acromegaly is treated primarily with somatostatin analogs, such as octreotide (Sandostatin®) and lanreotide (Somatuline®). Somatostatin analogs have been shown to shrink GH-secreting adenomas by 19.4%.[28] Somatostatin analogs are limited by side effects to include gallstones and biliary sludging, nausea, cramps, and steatorrhea.[29, 31] Somatostatin analogs have shown good efficacy in TSH-secreting adenomas as well.[13] Ketoconazole, which inhibits steroid biosynthesis at the adrenal gland, is used as adjuvant therapy in Cushing's disease, both prior to surgery and afterwards if resection fails to result in complete control. Liver enzyme elevations, gynecomastia in men, gastrointestinal upset, and edema are common side effects and ketoconazole is notorious for a wide range of serious drug interactions.[13]

Pituitary radiation is indicated for surgical failure, residual mass effects, persistent hormone hypersecretion, or when surgery is contraindicated. Concerns with pituitary radiation are hypopituitarism (80% within 10 years), other primary brain tumors (< 5% gliomas/meningiomas), optic nerve damage (2%), and brain necrosis (potential cognitive dysfunction, especially memory loss).[1] The introduction of more precise techniques, such as gamma-knife and linear accelerator, should decrease the amount of radiation and collateral impact mentioned previously. Follow up after surgery or radiation should include serial clinical, endocrinologic, ophthalmologic, and radiologic studies. A postoperative MRI should be performed within three months of surgery or treatment and annual evaluations for tumor recurrence or residual.[4] A summary of the management and control of pituitary adenomas is summarized in Table 2.[13]

Table 2. Management and control of hormone hypersecretion in pituitary adenomas.

Approach	*Prolactin-Secreting Tumors*	*Growth Hormone-Secreting Tumors*	*ACTH-Secreting Tumors*	*TSH-Secreting Tumors*	*Nonfunctioning Tumors*
Primary Approach	**DA: microadenomas, 80% to 90% response; macroadenomas, 60% to 75% response**	**Surgery: microadenomas, 70% response; macroadenomas, 50% response**	**Surgery: microadenoma, 80% to 90% response; macroadenoma, 50% response**	**Surgery plus irradiation, 67% response**	**Surgery: improved vision, 70% response**
Secondary Approach	**Surgery: microadenomas, 55% response; macroadenomas, 20% response**	**Somatostatin analogues, 60% response; DA, 20% response; irradiation, 50% response (by 12 years)**	**Irradiation plus cortisol-decreasing drugs**	**Somatostatin analogues, 75% response**	**Irradiation**
Novel medical developments	**Depot long-acting DA, somatostatin receptor subtype-selective analogues**	**Long-acting somatostatins, somatostatin receptor subtype-selective analogues, growth hormone receptor or GHRH antagonist**		**Long-acting somatostatins**	**Gonadotropin-releasing hormone antagonists**

ACTH – adrenocorticotropin hormone; DA – dopamine agonists; GHRH – growth hormone releasing hormone; TSH – thyroid-stimulating hormone; Response refers to normalization of hormone secretion or ablation of tumor mass

Long-term monitoring of these conditions is variable, related to the condition and the response of the condition to the medical treatment. In general, normalization of abnormal hormone secretion and prevention of clinical signs and symptoms is the goal. The monitoring of serum markers will be more frequent (every 4-6 weeks) initially until stability is achieved. Pituitary MRI should show stability for 1-2 years before the interval is extended.[27]

II. Aeromedical Concerns.

Pituitary apoplexy, a hemorrhage into the pituitary tumor, is likely to cause sudden incapacitation but is exceedingly rare.[32] The main concerns for the pituitary tumors are related to hormone hypersecretion, the medications used to treat them, and mass-effect. For prolactinomas the primary concern is the side effects of the centrally-acting dopamine agonists used to treat some of these tumors, such as bromocriptine and cabergoline. These agents commonly cause headache and dizziness, as well as hypotension, syncope, drowsiness, fatigue, and vertigo. Dopamine agonists are

frequently sedating, and reports of sleep attacks, which initially were described in Parkinson's patients, have now been described in other conditions with these agents.[34] (Whether these drugs are excitatory or sedating is dependent on dose, time, and individual variance.) Psychosis, predominantly mania, occurs at unpredictable intervals; in one study, the average delay was 13.5 months (range 4-52 months) after inception of therapy.[11] Given the role of dopamine antagonism in the mechanism of action of antipsychotic drugs, the occasional occurrence of psychosis with dopamine agonism is not surprising. In addition, therapy with bromocriptine and cabergoline has been clearly associated with impulse control disorders, such as pathologic gambling, hypersexuality, and other behaviors.[34, 35]

These medications are not compatible with flying. GH-secreting adenomas, which cause acromegaly, are primarily treated with surgery, but somatostatin analogs are used for tumor shrinkage and suppression of GH prior to surgery. Common somatostatin analogs are octreotide and lanreotide and may be used continuously if individual is not a surgical candidate. These agents have common side effects to include biliary dysfunction, hypo/hyperglycemia, hypothyroidism and arrhythmias. The drug preparation requires refrigeration for storage since it is stable for only two weeks at 25°C. These considerations are clearly not compatible with either the flying or the deployed environment. Cushing's disease usually presents with hypersecretion symptoms that are adverse for flying such as hypertension, truncal obesity, hyperglycemia, and bruising.[4] Surgery is the preferred method of treatment secondary to poor medical response to treatment. These patients typically have a fair response to surgery, but need steroid replacement for up to 12 months after surgery.[4] Persistent steroid use and high recurrence rates after 5 years make this condition incompatible with aviation. TSH-secreting adenomas are more aggressive and cause all the side effects of hyperthyroidism with visual impairment and goiter. Pituitary carcinomas are extremely aggressive and have very poor prognosis.[3, 30]

The mass-effect seen with macroadenomas is another concern. Common symptoms related to this include headache and panhypopituitarism. With only a 1 cm gap between the pituitary and the optic chiasm, visual complications are common, and a complete visual workup needs to be done to evaluate for visual defects from compression of the chiasm or diplopia from oculomotor nerve impingement. Neuro-ophthalmologic finding could clearly impact individual performance and mission accomplishment. Except for prolactinomas, surgery is indicated when mass effect is present. If the prolactinoma doesn't respond to therapy, surgery may be indicated if the mass effect is clinically significant (i.e. mass effect on the optic chiasm causing bitemporal hemianopsia). As above, surgery has good remission rates and 10-year recurrence rates around 1% per year. Potential complications of surgery include CSF leak, transient diabetes insipidus, and inappropriate ADH secretion.[1] Adjuvant radiotherapy or radiosurgery results in good control, but high rates of subsequent hypopituitarism. This may lead to issues with hormone replacement in the future.

III. Waiver Consideration.

All pituitary tumors, whether benign or malignant, are disqualifying for all flying classes, ATC/GBC and MOD duties, as well as retention. The severity of the condition, the medications required to control the condition and/or complications/results of surgery impact the waiver decision-making process.

Table 3. Waiver potential for pituitary tumors.

Flying Class	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Incidental microadenomas, non-functional, unchanged for 2 years	Yes AETC	Yes
	Nonfunctioning micro or macroadenomas treated with surgery and requiring no pharmacotherapy	Maybe AETC	Yes
	Secreting microadenoma or macroadenoma treated with or without pharmacotherapy or treated with surgery and requiring pharmacotherapy	No AETC	No
	Pituitary carcinoma	No AETC	No
II//RPA Pilot/III ATC/GBC MOD**	Microadenomas, non-functional	Yes MAJCOM	Yes
	Secreting prolactinoma, asymptomatic requiring no pharmacotherapy	Yes* AFMSA	Yes
	Micro or macroadenomas treated with surgery, in remission and requiring no pharmacotherapy	Maybe* AFMSA	Yes
	Micro or macroadenomas treated with or without surgery and requiring pharmacotherapy	No AFMSA	No†
	Pituitary carcinoma	No AFMSA	No

* Waiver for untrained FC II and III is unlikely.
† If pharmacotherapy is stopped after an interval (12-24 months) and remission is maintained for six months, waiver will be considered after ACS review.
** Waiver authority for MOD personnel is AFGSC.

AIMWTS search in Jun 2016 revealed a total of 58 individuals with a diagnosis of a pituitary tumor. There were a total of 11 disqualifications. Breakdown of the cases was as follows: 4 FC I/IA cases (4 disqualifications), 29 FC II cases (1 disqualification), 19 FC III cases (4 disqualifications), 4 ATC/GBC cases (2 disqualifications), and 2 MOD cases (0 disqualifications. All 11 disqualified cases were related to the pituitary diagnosis.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver should include the following:

A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Thorough history and physical to identify possible endocrinologic, neurologic, or ophthalmologic clinical findings with directed evaluation based on findings.
C. MRI of pituitary or CT if unable to perform MRI.
D. Serum PRL level for all pituitary tumors.
E. Endocrinology consult to include need for further hormonal evaluation and management.
F. Neurosurgery consult for evaluation for surgery on any pituitary tumor other than prolactinoma or incidentaloma, or any pituitary tumor with suspected mass effect.
G. Baseline formal visual field testing (Humphrey visual field 30-2), acuity, and dilated fundoscopic exam. If surgery is performed, then repeat testing afterwards.
H. Echocardiogram in GH secreting pituitary adenoma.
I. MEB results.

Note: If steroids are temporarily required after treatment of ACTH pituitary adenoma, see waiver guide on systemic glucocorticoid (steroid) treatment.

The AMS for waiver renewal for pituitary tumor should include the following:
A. History – brief summary of initial work-up, interval signs or symptoms including pertinent negatives.
B. Physical – complete with focus on previous findings.
C. MRI/CT of pituitary annually for first two years, then every two years if stable.
D. Endocrinology consult.
E. Formal visual field testing and acuity testing annually for macroadenomas (not needed if a macroprolactinoma and has responded to therapy), history of surgery/radiation therapy, or increase in tumor size, and more frequently as indicated for any visual complaints.

ICD-9 codes for pituitary tumors	
194.3	Malignant neoplasm in pituitary gland
227.3	Benign neoplasm of pituitary gland craniopharyngeal duct (pouch)
242.8	Thyrotoxicosis (overproduction of TSH)
253.0	Acromegaly and gigantism (overproduction of growth hormone)
253.1	Other and unspecified anterior pituitary hyperfunction (except ACTH and TSH)
255.0	Cushing syndrome (overproduction of ACTH)

ICD-10 codes for pituitary tumors	
C75.1	Malignant neoplasm of pituitary gland
D35.2	Benign neoplasm of pituitary gland
E23.6	Other disorders of the pituitary gland
E22.0	Acromegaly and pituitary gigantism
E22.8	Other hyperfunction of pituitary gland
E24.0	Pituitary-dependent Cushing's syndrome

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WAIVER GUIDE
Updated: Aug 2016
Supersedes waiver guide of Dec 2013
By: Dr. Christopher Keirns and Dr. Dan Van Syoc
Reviewed by Lt Col Dara Regn, Chief, ACS Pulmonary and Sleep Medicine and Dr. Joshua Sill

CONDITION:
Pneumothorax (Aug 16)

I. Overview.

Spontaneous pneumothorax is best defined as "air in the pleural space of non-traumatic cause." Secondary spontaneous pneumothorax is one that occurs in the presence of underlying parenchymal or airway disease, and for aviation purposes will not be considered further. Primary spontaneous pneumothorax, by default, is one that occurs in the absence of such underlying disease.[1] However, it would be incorrect in such cases to define the lung as normal, since the vast majority prove to have visceral subpleural blebs at thoracoscopy.[2] Most cases of primary spontaneous pneumothorax occur at rest, and it is actually unusual to see cases in the athletic realm.[3, 4]

Primary spontaneous pneumothorax typically peaks in the 10 to 30 year age group, affecting males about 5 to 10 times more frequently than females. The age-adjusted incidence in males and females varies widely in the clinical literature with reported rates from 7.4 per 100,000 in United States to 37 per 100,000 in United Kingdom.[5] It occurs primarily in tall, thin individuals and is rare in those over the age of 40. Smoking has been shown to increase the risk of primary spontaneous pneumothorax by a factor of 20 in a dose-dependent manner. More than 20,000 new cases of spontaneous pneumothorax occur each year in the United States at a cost of more than $130 million (2006 costs).[6] Although the incidence in the general population is usually quoted as 9 per 100,000, the real incidence is probably higher.[7] In most large series, 1% to 2% are incidentally found on chest film; since small pneumothoraces resolve themselves within a few days, the odds of identifying an asymptomatic pneumothorax in this way are slim, arguing that the disease is probably more common than thought.[8] Fortunately, primary spontaneous pneumothorax has low mortality, with death rare in those cases occurring below age 50.[9]

The classic presentation in a symptomatic patient with spontaneous pneumothorax is dyspnea and pleuritic chest pain. The chest pain is almost always ipsilateral and may radiate to the shoulder, neck, and into the back. Physical exam may demonstrate tachycardia, tachypnea, hyperresonance to percussion, diminished breath sounds, and asymmetrical chest wall expansion may be present.[4] There are also a multitude of possible ECG changes that can be seen in the setting of a pneumothorax. The diagnosis is best confirmed with a standard chest film. Expiratory films are no more sensitive than inspiratory films in detecting pneumothoraces and are not recommended unless there is high clinical suspicion of pneumothorax and the inspiratory film is non-diagnostic. If present on the chest film, it will demonstrate a pleural line.[1]
A specific subcategory that deserves mention is catamenial pneumothorax. This is a spontaneous pneumothorax occurring in a female within 48 to 72 hours of the onset of menses. Although these are often ascribed to endometriosis, pleural endometrial implants have been identified in only a third of patients. It is important to question any female with a spontaneous pneumothorax about the timing in relationship to menses, since the initial treatment of catamenial pneumothorax is

hormonal. Should the patient fail a trial of contraceptive steroids, this disorder responds well to the same prophylactic surgical treatments described below.[10]

The major issue with spontaneous pneumothorax is recurrence. After an initial pneumothorax, the chance of recurrence in the absence of definitive treatment is 20 to 50%, a risk which probably rises after subsequent episodes. (some researchers have shown that after two pneumothoraces, the risk of a third is 62%; of those who have had three episodes, 83% will have a fourth).[11, 12] The clinical standard of care for a number of years has been to perform a definitive surgical procedure after the second pneumothorax, but with the availability of thoracoscopic pleurodesis, there are many who feel that surgery is indicated after the first episode, particularly in those who are at high risk because of their occupation or because of travel to remote areas.[6]

Depending on the size of the pneumothorax, acute treatment may consist of observation, usually combined with oxygen, which hastens resolution (rate of pleural air absorption in the absence of supplemental oxygen is 1.25%/day; this is increased 3-4X in the presence of supplemental oxygen); simple aspiration of the air, which is successful about 65% of the time; or catheter or tube thoracostomy.[11] There has been discussion for many years as to the emergency management of spontaneous pneumothorax. For many years, the gold standard was insertion of a chest tube (tube thoracostomy). Recent evidence indicates that needle aspiration is at least as safe and effective as tube thoracostomy and also carries the benefit of fewer hospital admissions and shorter length of hospital stay.[13] Some emergency departments have begun to adopt ambulatory care treatment in small uncomplicated cases of pneumothorax. This is accomplished through the use of a one way Heimlich valve. While data for this treatment is limited, it offers the obvious advantage of eliminating an admission, and provides improved patient comfort.[14]

The definitive procedure until relatively recently was chemical pleurodesis which was accomplished via the chest tube by inserting a sclerosing substance into the pleural space causing the pleura to adhere to the chest wall thereby preventing recurrences. The most common substances used were tetracycline derivatives or talc slurry. The recurrence rate with each of these was not totally acceptable and also was potentially fraught with unacceptable side effects. Problems with talc range from pain and fever to respiratory failure and ARDS. The newer and more successful interventions are surgical and include video assisted thorascopic surgery (VATS) or open thoracotomy. These procedures can lead to recurrence prevention by either mechanical abrasion pleurodesis or pleurectomy.[11]

II. Aeromedical Concerns.

The most likely symptoms are chest pain and dyspnea, either of which could be incapacitating in aircrew. There is also the concern with gas expansion at altitude in untreated pneumothorax in aviators, in accordance with Boyles Law.[15] The level of expansion can be calculated using Boyles equation P1V1=P2V2. For example, assuming a total lung volume of 6 L and a one sided 20% pneumothorax traveling from sea level to 8000 ft: (760 mmHg)(600 mL)=V2(567 mmHg), then V2=804 mL or approximately a 33% expansion. Given the above calculation it is possible that the gas expansion may cause significant physiological deficit.[9] In a review of 112 aviators with spontaneous pneumothorax, 37% admitted they could have been incapacitated had the episode occurred during flight. Overall, seventeen percent of the episodes occurred under operational conditions. Eleven percent actually occurred during flight, although it was unclear how many of

these resulted in mission aborts. Of note, another 6% occurred in the altitude chamber, and all but one of those occurred after rapid decompression.[3]

III. Waiver Considerations.

As of the July 2016 MSD, Air Force policy regarding spontaneous pneumothoraces has been significantly revised effectively making spontaneous pneumothorax disqualifying for FCI/IA/FCII/RPA Pilot/FCIII/OSF aviation duties. This new guidance applies to all initial flying class exams regardless of the date of prior pneumothorax as well as fully trained FCII/RPA/FCIII/OSF aviators experiencing a primary pneumothorax after the date of this publication. A single episode of spontaneous pneumothorax in a fully trained aviator prior to publication of this new MSD guidance would not require a waiver as long as results of PA inspiratory and expiratory chest radiographs and CT chest imaging are clearly documented in the medical record and show full expansion of the lung with no demonstrable pathology which would predispose to recurrence. If a fully trained FCII/RPA Pilot/FCIII/OSF aviator were to experience a recurrent pneumothorax, they would then require a waiver. Pneumothorax is not disqualifying for GBC/ATC or MOD personnel.

In summary, aeromedical waiver for spontaneous pneumothoraces may be considered only if PA inspiratory and expiratory chest radiograph and CT chest scan show full expansion of the lung and no demonstrable pathology which would predispose to recurrence, such as blebs or bullae, or after definitive surgery to prevent recurrence if CT demonstrates residual blebs. Any form of definitive surgical pleurodesis is acceptable for waiver, but thoracoscopic abrasive pleurodesis performed by a Thoracic or Cardiothoracic trained surgeon, appears to offer the best combination of efficacy and minimal morbidity. Chemical pleurodesis with talc slurry, tetracycline compounds, or other pleurodesing agents is generally not acceptable for waiver. If chemical pleurodesis has been completed prior to entry into the military service or an aviation career field, a waiver may be considered on a case-by-case basis after review by the ACS.

Table 1: Waiver potential for Pneumothorax

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review
I/IA	Primary pneumothorax	Yes+ AETC	Yes
	Multiple pneumothoraces or pathology noted on chest CT	Yes*+ AETC	Yes
II/RPA	Primary pneumothorax	Yes+ MAJCOM	Yes
	Multiple pneumothoraces or pathology noted on chest CT	Yes*+ MAJCOM	Yes
III/OSF	Primary pneumothorax	Yes+ MAJCOM	Yes
	Multiple pneumothoraces or pathology noted on chest CT	Yes*+ MAJCOM	Yes
GBC/ATC MOD	Recurrent spontaneous pneumothorax, when the underlying defect is not correctable by surgery	Yes AFMSA	No

* If definitive surgery has been performed with resolution of symptoms.
+ Indefinite waiver possible after ACS verification that CT imaging is without demonstrable pathology which would predispose to recurrence.

AIMWTS review in Aug 2016 revealed 111 aircrew members with an aeromedical summary and the diagnosis of spontaneous pneumothorax (traumatic and iatrogenic cases were excluded). There were 29 FC I/IA cases, 40 FC II cases, and 42 FC III cases. Of the 22 disqualified (5 FC I/IA, 4 FC II, and 13 FC III), 3 were due to the aviator's voluntary decision not to pursue definitive treatment in order to become eligible for a waiver; 8 of the disqualified individuals had no other disqualifying conditions.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for pneumothorax should include the following:

A. A complete history of the event to include any possible predisposing factors.
B. Documentation of all treatments given.
C. Labs/Imaging: Reports of all imaging exams. CT chest imaging required with the actual images forwarded to the ACS for formal review.
D. Copies of all operative reports and a statement from treating physician.
E. Spirometry results including pre- and post-bronchodilator challenge, lung volume and DLCO studies by plethysmography.

In cases not felt to be appropriate for indefinite waiver by the ACS, the AMS for waiver renewal for pneumothorax should include the following:
A. Interval history specifically noting any symptoms, changes in disease course and treatments since the last waiver submission.
B. Current CT chest imaging with actual images forwarded to the ACS for formal review.
C. Statement of patient condition from treating physician.
E. Spirometry results including pre- and post-bronchodilator challenge, lung volume and DLCO studies by plethysmography.

ICD-9 codes for Pneumothorax	
512	Pneumothorax
512.0	Spontaneous tension pneumothorax
512.1	Iatrogenic pneumothorax
512.8	Other spontaneous pneumothorax
860	Traumatic pneumothorax and hemothorax
860.0	Traumatic pneumothorax without mention of open wound into thorax

ICD-10 codes for Pneumothorax	
J93.11	Primary spontaneous pneumothorax
J93.0	Spontaneous tension pneumothorax
J95.811	Postprocedural pneumothorax
J93.12	Secondary spontaneous pneumothorax
S27.2XXA	Traumatic hemopneumothorax
S27.0XXA	Traumatic pneumothorax

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Additional Readings:

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WAIVER GUIDE
Updated: Feb 2014
Supersedes Waiver Guide of Nov 2010
By: Maj Angela Albrecht (RAM XV), CDR Michael Acromite (ACS RAM and active OB/GYN), and Dr Dan Van Syoc
Reviewed by LtCol Mark True, AF/SG consultant for Endocrinology and CDR Michael Acromite

CONDITION:
Polycystic Ovary Syndrome (PCOS) (Feb 14)

I. Overview.

Polycystic ovarian syndrome (PCOS) is the most common endocrine disorder in reproductive aged women, affecting between 6.5% and 8% of women overall. It is an important cause of menstrual irregularity and androgen excess in females. Its etiology is unknown and its treatment is generally empirical and symptom-based. The common manifestations include hyperandrogenism, ovulatory dysfunction, and polycystic ovaries.[1] It is typically characterized by irregular menses, hirsutism, acne, and obesity.[2, 3] Several professional groups have proposed diagnostic criteria for PCOS, using the criteria of ovulatory dysfunction, hyperandrogenism, polycystic ovaries in varying combinations with the exclusion of other disorders. The National Institutes of Health (NIH) Evidence-based Methodology Workshop Panel on PCOS suggested renaming the disorder to more adequately reflect the complex interactions between the metabolic, hypothalamic, pituitary, ovarian, and adrenal systems that characterize this syndrome and maintain the NIH and Rotterdam inclusion diagnostic criteria.[4] The 1990 NIH conference on PCOS developed the following minimal criteria for the diagnosis of PCOS: 1) menstrual irregularity due to oligo- or anovulation, 2) evidence of hyperandrogenism, whether clinical (hirsutism, acne, or male-pattern balding) or biochemical (high serum androgen concentrations), and 3) the exclusion of other causes of hyperandrogenism and menstrual irregularity, such as congenital adrenal hyperplasia, androgen-secreting tumors, and hyperprolactinemia. In 2003, revised criteria were developed at the American and European consensus meeting in Rotterdam. These criteria encompass a broader spectrum of phenotypes considered to represent PCOS. In the revised criteria, two out of three of the following are required to make the diagnosis: 1) oligo- and/or anovulation, 2) clinical and/or biochemical signs of hyperandrogenism, and 3) polycystic appearing ovaries on ultrasound.[5, 6] The evolving diagnostic criteria reflect the varying clinical findings and incomplete knowledge of the exact etiology and pathophysiology of PCOS. Many patients have evidence of abnormal luteinizing hormone (LH) secretion and a significant percentage of PCOS patients display insulin resistance.[7] Some suggest that insulin resistance may be part of the PCOS etiology as hyperinsulinemia induces androgen secretion from the ovary and adrenal gland, and decreases sex hormone binding globulin (SHBG), which in turn increases the bioavailability of the androgens.[8] Although obesity is a common comorbidity and acts to amplify the effects of the disorder, it is not included in diagnostic criteria and not found in up to 20% women with PCOS.[1]

PCOS patients experience increased ovarian androgen biosynthesis as a result of abnormalities occurring at all levels of the hypothalamic-pituitary-ovarian axis. PCOS is both a reproductive and metabolic disorder, with significant psychological manifestations as well. In the fertility arena, PCOS accounts for 70% of anovulatory infertility and probably accounts for up to 20% of infertile couples. The menstrual irregularity typically manifests at the time of menarche in PCOS women, and menarche may even be delayed.[9] The manifestations of PCOS may be masked and its diagnosis

delayed as a result of the empiric initiation of effective treatment with oral contraceptive for unexplained abnormal uterine bleeding at an early age. The chronic anovulation seen in PCOS is associated with an increased incidence of dysfunctional uterine bleeding, endometrial hyperplasia, and possibly endometrial cancer.[10] These women also have many features of the metabolic syndrome with a strong propensity to develop type 2 diabetes mellitus (T2DM), which makes it important to diagnose and treat at an early age due to the many long-term risk factors related to diabetes.[11] From the psychological standpoint, there is evidence that women with PCOS are more likely to have mood disorders to include depression and anxiety, an impaired quality of life, and higher emotional distress scores compared to women of similar BMI without PCOS.[12, 13] The multiple ovarian cysts, increased ovarian mass, abnormal uterine bleeding, and mood effects each or in combination may be associated with pelvic pain. Women with PCOS, also have higher rates of miscarriage.[14]

Patient evaluation should include a detailed menstrual history and an outline of the onset and the duration of any hyperandrogenism symptoms. The exam should include assessment of blood pressure, body mass index, and waist circumference. The skin should be examined closely for evidence of insulin resistance (which may manifest as acanthosis nigrans or skin tags) and hyperandrogenism (evidence of hirsutism, acne, and male-pattern hair loss). Lab tests are performed to confirm the diagnosis as well as to exclude other etiologies. Glucose tolerance should be assessed with a fasting blood glucose followed by a two-hour glucose tolerance test (75g), where the glucose tolerance test has a better sensitivity for glucose intolerance in PCOS.[1] All patients should have a pregnancy test, TSH, and prolactin level to exclude other common causes of anovulation. Serum androgen testing should include total and free (bioavailable) testosterone concentrations and dehydroepiandrosterone sulfate (DHEAS) level. 75% of testosterone is from the ovary, whereas 90% of DHEAS originates from the adrenal gland. An elevated DHEAS may indicate an adrenal dysfunction such as congenital adrenal hyperplasia (CAH) or Cushing syndrome. CAH can be ruled out by measuring an AM serum 17-hydroxyprogesterone concentration. Cushing syndrome may be ruled out with a 24-hour urinary free cortisol level.[6]

Treatment of PCOS depends on the most bothersome and concerning symptoms and whether or not the patient is seeking fertility treatment. If overweight or obese, weight loss can greatly ameliorate many of the symptoms. Improved ovulatory function and menstrual cycles can be prompted by weight loss in women with PCOS and obesity. Regarding androgen excess, oral contraceptives are considered the treatment of choice for those women who are not planning for pregnancy. Oral contraceptives suppress ovarian production of testosterone and additionally, induce increased levels of SHBG, which preferentially bind androgens. Therapy typically begins with a preparation containing 30 to 35 mcg of ethinyl estradiol combined with a progestin with minimal androgenicity. Endometrial protection can also be provided by using oral contraceptives. In addition, spironolactone can be used to decrease hirsutism by blocking peripheral androgenic effects, although it is not FDA approved for that purpose. The insulin resistance seen in many of these patients is first addressed by lifestyle modifications such as weight loss, diet, and exercise. However, insulin-sensitizing agents, such as metformin, have been shown to improve hirsutism, obesity, and glucose intolerance.[10, 15] Metformin was formally approved for used in aviation in late 2010.

Metformin has been highly utilized over the past decade to treat women with PCOS. It acts indirectly and modestly to improve ovulation and to reduce long-term metabolic complications. It also acts to reduce the circulating levels of many markers of atherosclerosis and subclinical chronic

inflammation.[16] The target dose of metformin is 1500 to 2500 mg daily, and most clinical responses are not seen in doses less than 1000 mg daily. The most common side effects are gastrointestinal: diarrhea, nausea or vomiting, flatulence, indigestion, and abdominal discomfort. Lactic acidosis has been described, but is extremely uncommon in otherwise healthy subjects. Cimetidine competes for renal clearance with metformin and can cause an increase in metformin levels. Finally, 10% to 30% of patients develop vitamin B_{12} malabsorption with decreased serum concentrations of the vitamin. In most patients, this does not create a problem and subsequent anemia is rare.[7] In the aviator population, there is concern with hypoglycemia with the use of metformin. Studies of metformin in the absence of T2DM do not appear to demonstrate hypoglycemia of any level and metformin usage in such a setting should be safe in the aviation environment.[17]

For those women with PCOS that are planning for pregnancy, many clinicians recommend oral clomiphene citrate (Clomid®) to initiate ovulation. Clomiphene citrate blocks the hypothalamic-pituitary-ovarian response to endogenous estrogens to increase the serum FSH concentration, to induce ovarian follicular development and ovulation. The primary indication for Clomid® is infertility in euthyroid women with normal serum concentrations of FSH and prolactin. This group includes women with PCOS.[18] Side effects are not dose-related and can occur at the minimum 50 mg dose. They include hot flashes, abdominal distention and pain, nausea and vomiting, breast discomfort, headaches, mood swings, and depression. Ovarian enlargement and multiple ovarian cyst development can occur, increasing the risk of subsequent ovarian torsion. Most important to the aviator, blurry vision, diplopia, and scotomata develop in 1 to 2 percent of women and are usually reversible. These conditions may persist, however, and necessitate termination of the treatment with this medication.[19] Clomiphene citrate treatment sometimes fails in obese, anovulatory women with PCOS and hyperinsulinemia. Other treatment options in these cases include weight loss, exercise, ovarian drilling, gonadotropin injections, and combination therapy.[20] Aeromedical concerns with the use of clomiphene citrate and gonadotropin injections is that although they are administered at specific times in the menstrual cycle, their side effects can occur throughout the entire menstrual cycle. Although tolerated by most women, these side effects can vary from month to month in an individual, and vary across individuals making a predictable assessment of tolerance difficult.

II. Aeromedical Concerns.

Most symptoms related to PCOS when mild or well controlled will not normally be problematic with aviation duties. However, if untreated or unrecognized, PCOS may lead to distracting gynecological problems such as abnormal bleeding or pain, as well as non-gynecological problems such as glucose intolerance, weight gain, mood disorders, and even atherosclerotic heart disease, all of which can be associated with significant aeromedical risk. The treatment of PCOS includes lifestyle changes, hormonal contraceptives, surgery, anti-estrogenic medications, and a variety of other less common treatments. The various medications have different safety profiles and must be considered individually. Not all medications used to treat PCOS are safe or approved for use by the flyer in the US Air Force.

III. Waiver Consideration.

Polycystic ovary syndrome is potentially disqualifying for all classes of flying and special duty in the US Air Force. This diagnosis is not specifically mentioned in the AFI or MSD, but is covered

under a number of the other GYN topics. PCOS IS disqualifying per MSD when it results in symptomatic and persistent ovarian cysts, symptomatic menstrual irregularities, or when the condition requires treatment beyond OCPs, all of which are common, and all of which are usually present when the actual diagnosis is made. The disqualification concern is similar to symptomatic and persistent ovarian cysts and abnormal uterine bleeding. If these are mild, resolved, and controlled with OCPs, they are also not disqualifying. The issues with PCOS are its association with insulin resistance, an increased risks of endometrial cancer, requirements for treatment beyond OCP, and closer follow up. Although OCPs are the most common treatment, metformin has become a standard treatment to address the insulin resistance, as well as its stronger effect on lowering serum androgen levels. Members are disqualified when the condition results in an inability to perform normal duties, results in frequent absences from duty, there is a need for use of medication requiring a waiver (such as metformin), or there is a need for ongoing specialty follow-up more than annually. PCOS can be considered for waiver if its symptoms are well controlled without medication, or with aircrew approved medications that are determined to be well tolerated and without significant side effects.

Oral contraceptives are approved after a seven day grounding period. The aeromedical concerns for estrogen containing oral contraceptives include risk of hypertension, increased risk of clotting in women with a history of thrombosis, and a contraindication in women with a history of migraine headaches with aura due to a significantly increased risk of stroke. Spironolactone is approved for use, but requires a non-high performance waiver restriction and monitoring for side effects and hypotension. Metformin is approved for use in aircrew (FC IIC – dual pilot, FC IIU, and FC III) and also requires waiver and monitoring. Oral clomiphene citrate is not an aircrew-approved medication for the treatment of PCOS. Other medications used to treat PCOS are currently not approved for use by Air Force aviators, but in some cases can be used on a case by case basis. For those medications approved for the treatment of PCOS, refer to the Aircrew Approved Medication List for the appropriate DNIF/DNIC duration and other waiver requirements.

Table 1: Waiver potential for PCOS

Flying Class (FC)	**Condition**	**Waiver Potential** Waiver Authority**
I/IA	PCOS	Yes AETC
II/III	PCOS	Yes MAJCOM*
ATC/GBC	PCOS	Yes MAJCOM*
MOD	Symptomatic PCOS	Yes AFGSC

*Waiver authority for initial FC II, FC IIU, FC III and ATC/GBC candidates is AETC.
**Waiver candidates on medication must be utilizing medications authorized for use by aircrew.

AIMWTS search in Oct 2013 revealed a total of 40 submitted cases. There was 1 FC I/IA case, 11 FC II cases, 18 FC III cases, 7 ATC/GBC cases, and 3 MOD cases. Of the total, 5 resulted in a disqualification disposition; 4 FC III cases and 1 ATC/GBC; 2 of the disqualified cases were related to the PCOS diagnosis or medication utilized.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for PCOS should include the following:
A. Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. List and fully discuss all clinical diagnoses and medications requiring a waiver.
B. A complete history to include a detailed menstrual history and an outline of the onset, duration, and stability of any symptoms of PCOS and its treatment.
C. Exam should include assessment of blood pressure, body mass index, careful skin exam, and waist circumference. Include report of a current gynecological exam.
D. Labs: HCG, CBC, fasting blood glucose, 2-hour (75g) glucose tolerance test, prolactin, thyroid studies, total/free testosterone, DHEAS, and any other endocrine studies used to evaluate for PCOS and its complications.
E. Radiology: current pelvic ultrasound report and any other pertinent radiological report.
F. Statement from treating physician summarizing treatments and intended follow-up.

The AMS for waiver renewal for PCOS should include the following:
A. Interval history specifically noting any changes in disease course and treatments since the last waiver submission.
B. Documentation of all exam elements.
C. Labs: any completed since last waiver submission.
D. Radiology: reports of pertinent exams completed since last submission.
E. Report of current exam with statement of patient condition from treating physician.

ICD-9 codes for PCOS	
256.4	Polycystic ovaries
620.2	Other & unspecified ovarian cyst

ICD-10 codes for PCOS	
E28.2	Polycystic ovarian syndrome
N83.20	Unspecified ovarian cyst
N83.20	Other ovarian cysts

V. References.

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WAIVER GUIDE
Updated: Aug 2013
Supersedes Waiver Guide of Mar 2010
By: Lt Col Stephanie Davis (RAM 13) and Dr Dan Van Syoc
Reviewed by Col Kent McDonald, psychiatrist and chief of Neuropsychiatry branch at ACS; and Dr. Wayne Chappelle and Dr. Joe Wood, ACS clinical psychologists.

CONDITION:
Post-Traumatic Stress Disorder (PTSD) (Aug 13)

I. Overview.

In the revised American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, DSM-5, the criteria for PTSD are very similar to that presented in DSMIV, however the individual exposed to one or more traumatic events, directly or indirectly, no longer has to respond with "intense fear, helplessness or horror". That part of criterion A has been eliminated. The term PTSD was first used in 1980 in DSM-III. PTSD is characterized by intrusive thoughts, nightmares and flashbacks of past traumatic events, avoidance of reminders of the trauma, hypervigilance, and sleep disturbances, which cause considerable social, occupational, and interpersonal dysfunction.[1] It is a relatively common anxiety disorder affecting men and women of all ages and racial backgrounds, with a lifetime prevalence rate ranging from 8% to 12% in the general population.[2] The lifetime prevalence rate is thought to be twice as high for women as men.[3]

The diagnostic term PTSD is relatively new, but descriptions suggestive of the syndrome have been found as far back as ancient Greek literature. The most common condition encountered in all wars has been "battle fatigue" or "shell shock", which would now be referred to as acute stress disorder (ASD) if the duration is greater than 2 days but less than 30 days, and PTSD if greater than 30 days.[3] PTSD becomes chronic if the duration exceeds 90 days. It has been described in veterans of the Civil War and was called "shell shock" in World War I. The term "combat neurosis" was coined during World War II and the "rape trauma syndrome" was identified in 1957. Other labels for wartime PTSD have included "soldier's heart, fright neurosis, combat fatigue, railway spine, concentration camp syndrome, and post-Vietnam syndrome."[3, 4] The paradox of war-related PTSD is that reactions labeled "symptoms" upon return home can be highly adaptive in combat, fostered through rigorous training and experience.[4]

Exposure to trauma in the population at large is the rule rather than the exception. Lifetime prevalence rates of exposure to trauma are greater than 50%.[5] Not all individuals respond to traumatic events in the same fashion. It is estimated that the overall conditional probability of PTSD after a traumatic event is about 9.2%. The risk varies with the type of trauma experienced and assaultive violence demonstrates the highest probability, over 20%. In fact, nearly 40% of all PTSD cases result from assaultive violence. For men, combat exposure accounts for approximately 30% of PTSD cases.[6] Over 2 million US service members have now deployed over 3 million times to the Iraq and Afghanistan conflicts, and mental health providers in the Department of Defense (DoD) and Veterans Affairs (VA) healthcare systems have consequently observed steep increases in mental health service use among these personnel.[6] It is estimated that from 13% to 20% already have or will develop PTSD.[7] The post-deployment PTSD prevalence in US infantry personnel has averaged 10% to 20%, often coexisting with depression, substance misuse, and other concerns.[4]

With PTSD in the general population, psychiatric co-morbidity is the rule rather than the exception. There is a high percentage of lifetime history of other psychiatric disorders in individuals diagnosed with PTSD, with both men and women reporting other co-morbid psychiatric conditions. Major depressive disorder is among the most common co-morbid conditions for both men and women, affecting nearly 50%.[8] Alcohol abuse is highly co-morbid in men (seen in over half of all cases). Additionally, there is a threefold to sevenfold increased risk for both men and women with PTSD for diagnosis with other anxiety disorders, including generalized anxiety disorder (GAD), panic disorder, and specific phobias.[8]

In the military, the presenting signs and symptoms associated with PTSD include insomnia, apprehension, repetitive dreams, nightmares, excessive startle responses, difficulty with concentration and focus, fear of return to combat, feelings of guilt and shame, tachycardia, sweating, nausea and vomiting, vertigo, and other somatic symptoms. Individuals with PTSD may also describe painful guilt feelings about surviving when others did not survive or about the things they had to do to survive.[2] The historical approach to such afflicted aviators was to send them to a rear echelon treatment facility for rest and relaxation for weeks to months prior to return to active flight status. More recent reports, particularly from the Israelis, postulate less disability if treated at or close to the battle front.[8] Psychological resilience, the ability to maintain relatively normal levels of mental and physical functioning following exposure to a traumatic event has become increasingly studied and the focus of programs that aim to foster improved deployment mental health outcomes.[6] The US Army has taken great interest in the issue of combat stress. The Army tool, Battlemind Training system, has been developed to treat stressed soldiers quickly close to the combat areas and return them as soon as possible to their units and has been incorporated into the Army's resiliency training. The DoD and the Department of Veterans Affairs are continuing to study this system and its effects very closely.[9]

Recovery from acute PTSD is likely to occur within the first year following trauma. However, more than 30% of those diagnosed with PTSD fail to show a clinical remission and develop disease symptoms exceeding one year.[8, 10] With longer disease duration treatment becomes more difficult.[5, 11] With only 50% of veterans seeking care and a 40% recovery rate, current strategies will effectively reach no more than 20% of all veterans needing PTSD treatment.[6] Hoge suggested that "meeting veterans where they are" is the next step in attempting to find a viable intervention to mitigate post-deployment mental health problems. Primary care settings tend to be the principal point of contact for patients with PTSD, although such patients rarely identify themselves as suffering from the disorder. The initial step in identifying individuals with PTSD involves screening for recent or remote trauma exposure, although the clinical approach may vary depending on the proximity of the traumatic event. If eliciting vivid and detailed recollections of the traumatic event immediately after exposure enhances the patient's distress, the interview may be limited to gathering information that is essential to provide needed medical care.[12]

Early intervention and treatment may prevent chronic disease and should commence once symptoms of PTSD persist for three or more weeks following the initiating trauma. Long-term multifaceted treatment has shown the greatest benefit to those afflicted, given the complex nature of PTSD. Various psychotherapeutic modalities have been shown to be effective in PTSD. Behavioral (exposure), cognitive, cognitive-behavioral, and eye movement desensitization therapies (eye movement desensitization and reprocessing or EMDR) have been found effective in randomized trials. Evidence suggests that the key component of success with cognitive behavioral therapy and EMDR is exposure to traumatic memories.[11] Exposure therapy and cognitive-restructuring

therapeutic modalities also help prevent thought entrenchment, extinguish autonomic mis-firing, and identify patients that are motivated to complete treatment. It is advisable for primary care providers and flight surgeons to refer these patients to a therapist or treatment team with experience in such therapies. The therapeutic goals of psychopharmacologic therapy are to decrease intrusive thoughts and images, phobic avoidance, pathological hyperarousal, vigilance, impulsivity, and depression. Selective serotonin reuptake inhibitors (SSRIs) were found to be effective as first-line drug therapy in a systematic review of 35 randomized trials and are recommended in treatment guidelines for PTSD from the American Psychiatric Association. SSRIs reduce flashbacks, arousal, and avoidance in patients with PTSD.[1, 12] Most military treatment facilities have mental health providers trained to treat combat casualties using prolonged exposure therapy, which is felt to be the most effective treatment modality for these patients.

Despite the progress made in understanding the disease process and therapy of PTSD, many patients continue to suffer despite treatment. There is currently no effective way to prevent the disorder under its naturally occurring circumstances. Despite advances in knowledge, PTSD remains prevalent, chronic, disabling, and costly. Nonetheless, the emergence of theory-driven biological therapies designed to alter the longitudinal course of the disorder is encouraging, particularly when such therapies are applied during the disorder's critical first few months.[8] The key element for our aviator population is quick recognition of the disease and prompt therapy by qualified mental health providers. Focused efforts to reduce stigma, eliminate barriers to care, and increase viable options for assistance and treatment may all help mitigate PTSD and prevent long term disability.

II. Aeromedical Concerns.

The diagnosis of PTSD, especially in the combat environment, is fraught with difficulty. Normal reactions to combat, operational stress, and emotional/stressful events can all be confused with and labeled as PTSD, especially when the member is routinely exposed to the stressful environment. While symptoms are similar, the course of treatment and aeromedical dispositions of the reactions are extremely different. Flight surgeons and mental health providers need to consider the length, severity, and functional impact of PTSD symptoms along with the situationally-induced nature and accompanying stressors that triggered the condition.

Prolonged severe operational stress can cause symptoms of ASD and PTSD. For operational stress reactions, the individual's symptoms typically clear shortly after removal /restriction from duty. Specific situational anxiety reactions that develop after traumatic incidents (e.g. claustrophobia, flying phobia), when symptoms do not interfere with duty, are best treated with occupational exposure with or without short term DNIF. In situations in which exposure-based therapies would facilitate resolution of symptoms, prolonged restriction from duty may delay recovery.

In some instances a member's symptoms are more generalized, accompanied by a change in social or occupational functioning, and do not clear with time off, adequate sleep and initial treatment attempts. In these cases, consider the diagnosis of PTSD, other associated conditions, and the member's motivation. Many of the symptoms of PTSD can interfere with flying safety and mission completion. Severe anxiety symptoms markedly impair the ability to focus and concentrate on the task at hand. Some of the more severe symptoms, such as flashbacks, may be acutely incapacitating. Associated mental health conditions can also negatively affect the ability of the aviator to successfully complete the mission. DNIF and treat whenever symptoms interfere with safety of flight, the mission, or the member's safety, regardless of diagnosis.

Even if diagnosed with PTSD, no waiver is required if the member is able to return to full duty within 60 days of initiation of treatment (minor residual symptoms are acceptable). However, the condition is disqualifying and a waiver will be required before consideration of return to flight status if any of the following conditions are met: (a) DNIF lasts greater than 60 days; (b) member experiences a recurrence of debilitating symptoms upon return to the operational environment; or (c) original symptom severity was such that in the opinion of the flight surgeon, return to the operational environment would entail high risk to the member, the mission or flight safety should the symptoms recur. Flight surgeons caring for afflicted aviators, especially in times of combat, need to be particularly sensitive to these issues and work closely with a psychiatrist or psychologist early in the evaluation, treatment and aeromedical disposition of these aviators whether or not their symptoms are caused by combat/operational stress or other traumatic incidents.

III. Waiver Consideration.

PTSD, causing DNIF greater than 60 days from diagnosis, or causing an operationally significant recurrence upon operational re-exposure is disqualifying for all aviation duties in the USAF. It is not mentioned specifically in AFI 48-123 for FC I/IA, II or III, but would be covered under the general category of anxiety. Most waivers granted to date have been limited to those with six months of sustained remission and off all pharmacotherapy.

Table 1: Waiver potential for PTSD

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Evaluation or Review
I/IA	Maybe* AETC	Yes#
II	Yes MAJCOM	Yes#
III	Yes MAJCOM	Yes#
ATC/GBC	Yes MAJCOM	Yes
MOD	Yes MAJCOM	Yes

*Must clearly demonstrate complete resolution of all PTSD symptoms before acceptance into initial flying training and have complete documentation from mental health providers.
#Must be reviewed by the ACS prior to consideration for a waiver.

AIMWTS review in Jun 2013 revealed a total of 130 aviator cases submitted with a diagnosis of PTSD. There were no FC I/IA cases, 23 FC II cases, 82 FC III cases, 22 ATC/GBC cases, and 3 MOD cases. Of that total, there were 96 cases resulting in a disposition of disqualified; 13 were FC II, 62 were FC III, 18 were ATC/GBC, and 3 were MOD. The major factors resulting in a disqualification were persistent symptoms, chronic disease, other mental health diagnoses, and the need to treat with medications not approved for use in USAF aircrew.

IV. Information Required for Waiver Submission.

Submitting a Mental Health Waiver Guide:

AFI 48-123 –Chapter 6 (pg. 55) and the Aeromedical Consultation Service (ACS) Waiver Guide addresses waiver evaluations

Step 1 - Is the aviator ready for waiver submission?

A. Waiver is submitted when 1) the member is asymptomatic and 2) medications/psychotherapy treatment have been completed, as applicable to diagnostic category, for the specified time-frame below (Note: psychotherapy "booster sessions", and sometimes SSRIs, are permissible and often advisable after initial symptom resolution):

- ☐ 1 Year—Psychotic Disorders & Somatoform Disorders
- ☐ 6 Months—Mood Disorders, Anxiety Disorders & Suicidal Behavior
- ☐ Discretion of Flight Surgeon—Adjustment Disorders & V-Codes requiring waiver
- ☐ For Traumatic Brain Injury cases, please refer to TBI Waiver Guide
- ☐ For aviators with any other psychiatric disorders, please refer to AFI 48-123 and ACS Waiver Guide

B. To be considered for an aeromedical waiver, any disqualifying condition must meet the following criteria per AFI 48-123 Section 6B, 6.2.1.1 through 6.2.1.6. (pg. 57-58):

- ☐ Not pose a risk of sudden incapacitation
- ☐ Pose minimal potential for subtle performance decrement, particularly with regard to the higher senses

- ☐ Be resolved, or be stable, and be expected to remain so under the stresses of the aviation environment
- ☐ If the possibility of progression or recurrence exists, the first symptoms or signs must be easily detectable and not pose a risk to the individual or the safety of others
- ☐ Cannot require exotic tests, regular invasive procedures, or frequent absences to monitor for stability or progression
- ☐ Must be compatible with the performance of sustained flying operations

Step 2 - Before beginning the Aeromedical Summary (AMS), Flight Surgeon must obtain Mental Health consultation and ensure it contains items specified below:

Instructions for the Mental Health Provider

The mental health evaluation must include a **comprehensive written report** addressing:

- ☐ Consultation must address each criteria in Step 1B
- ☐ Clinical mental health history (description of symptoms, treatment modality, frequency and compliance with treatment, relevant personal and family history, and perceived impact on occupational duties)
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…) ***** for alcohol cases, please comment on Carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, input from line leadership, if possible, and please address current state of any triggers for the mental illness)
- ☐ Current and past aviation related duties and any history of current and past occupational performance difficulties (to include perceived impact of mental health condition on performance of duties)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Summary and interpretation of psychological/neuropsychological testing results (recommend MMPI-2, NEO PI-R, or similar personality test). For neuropsychological cases, please contact ACS neuropsychologist (Dr. Gary Ford, DSN: 798-2704) for guidance on recommended neuropsychological tests.
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly or engage in special duty operations (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)
- ☐ Copies of all records (mental health/ADAPT/inpatient) and raw testing data should be on hand for shipment to ACS Neuropsychiatry Branch

Step 3 - Items for the Flight Surgeon to include in the AMS:

- ☐ AMS must clearly address each criteria in Step 1B and the risk to the member, mission, and safety
- ☐ Summarize Mental Health history and focus on occupational impact ***** If 2 or more months have passed since the comprehensive evaluation/report was completed, the flight surgeon should address how the member has done since and consult with the mental health provider if the member has been seen at mental health since the evaluation*****
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…) ***** for alcohol cases, please comment on Carbohydrate-deficient transferrin (CDT) results*****

- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, if possible - please address current state of any triggers for the mental illness)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)

Step 4 - Items to complete the waiver package:

- ☐ Letter of support from command
- ☐ Comprehensive mental health written-report
- ☐ Confirm mental health has made copies of chart(s) and testing. When requested send to:

ACS Aerospace Medicine Branch, USAFSAM/FECA
c/o Neuropsychiatry Branch
2510 Fifth Street Bldg 840
Wright Patterson AFB, OH 45433-7913
Fax: (937) 904-6296 DSN: 674-9296

Please feel free to contact the ACS Neuropsychiatry Branch with questions:
TSgt Tonya Merriweather: DSN 798-2703 or Mr. John Heaton: 798-2766

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for <u>initial waiver</u> for PTSD should include the following:
A. History – symptoms to include the inciting event(s), good time-line of events; how symptoms affect job, home life, finances, and relationships. Discuss all other psychiatric conditions and comorbid diagnoses. Include drinking and drug use history, if applicable.
B. List and fully discuss all clinical diagnoses requiring a waiver.
C. Treatment – medications and therapy used for PTSD and any other psychiatric conditions.
D. Psychiatry/psychology consultation: Need all treatment notes from treating mental health professional as well as an MEB-type narrative summary of the mental health record.
E. Report of all psychological testing, if performed.
F. Basic labs – CBC, Chem 7, LFTs, TSH.
G. Letter of support from immediate commander.

The AMS for <u>waiver renewal</u> for PTSD should include the following:
A. History – interim history since last waiver.
B. Treatment – current therapy for the condition, if any.
C. Psychiatry/psychology consultation report(s) if accomplished since last waiver request.

ICD-9 code for PTSD	
309.81	Post-traumatic stress disorder

ICD-10 codes for PTSD	
F43.10	Post-traumatic stress disorder, unspecified
F43.12	Post-traumatic stress disorder, chronic

V. References.

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WAIVER GUIDE
Updated: Jan 2015
Supersedes Waiver Guide of July 2013
By: LtCol Justin Nast, CDR Michael Acromite and Dr. Dan Van Syoc

CONDITION:
Pregnancy (Jan 15)

I. Overview.

Pregnancy is associated with typical physiological changes, pregnancy-specific diseases, effects on preexisting medical conditions, and effects on medications, all of which individually and in combination may be aeromedically significant. The physiological changes vary within and across pregnancies. These novel physiological states can be quite different from the female flyer's baseline physiological state experienced during initial flight training and during typical non-pregnancy flying experiences. As such, these often unperceived changes have the potential to result in unexpected, subtle, or profound physical responses to create aeromedical risks. Pregnancy related changes may cause aeromedically significant changes to the state of preexisting diseases, or its treatment, requiring reassessment. Pregnancy-specific diseases and conditions arising at various points in the pregnancy create their own aeromedical risks and conditions that are often incompatible with flying. Additionally, the physical changes of pregnancy can create occupational limitations for the pregnant flyer. Finally, the flying environment may create environmental exposure risks to the fetus. Therefore, prior to returning to the flight environment, it is essential that pregnant flyers and their medical care team are aware of these circumstances, the potential effect on flying performance and safety. It is essential to establish awareness, an accurate assessment, and appropriate monitoring methods to mitigate these risks.

Assessed risk is a combination of severity and likelihood. Predicting the likelihood for these hazards is challenging due to the variability in their expression and paucity of human research in pregnant flyers. The uncertainty of each hazard's likelihood requires an increased vigilance in the aeromedical risk assessment. An understanding and familiarity of these pregnancy-related changes allows for the most appropriate risk assessment and the earliest identification of conditions that should preclude flying. This is best accomplished through a coherent collaboration between the flyer, flight surgeon, obstetrical care provider, her squadron commander, and waiver authority.

II. Aeromedical Concerns.

There is evidence that pregnant active-duty women in general, represent a high risk group.[1-3] The scarce evidence in pregnancy for the adverse effects of aviation-related occupational exposures such as noise, vibration, jet fuel exposure, exposure to fumes, shift work, long hours, heavy lifting, hypoxia, G-force, and altitude exposure, is related to the paucity of human studies in the flying environment, especially in military flying. Despite this, the risks are real and must be individually assessed, addressed and monitored to assure a risk-appropriate flying disposition.

Pregnancy is a disqualifying condition for all flying classes (except GBC) for which a waiver is possible. The pregnancy must first be confirmed with human chorionic gonadotropin (HCG) testing and when confirmed, accurate dating must be established as early in the pregnancy as possible. The pregnancy must then be assessed by the obstetrical care provider to confirm an intrauterine location

to avoid the risk of ectopic pregnancy. This is followed by a determination whether the pregnancy is considered "normal" or "high risk" based on the pregnancy state, previous medical history, and associated conditions. A pregnancy determined to be "high risk" initially or at any time in the pregnancy is not considered for initial or continuation of a waiver.

The decision to fly while pregnant remains a personal one for most women.[4] In order for the pregnant flyer to continue flying duties, the flyer, her flight surgeon, obstetrical care provider, and commander must continually coherently collaborate to determine her specific flight risk. The flyer must personally request to continue flying after considering the condition of her pregnancy and its associated risks. The areas of concern for aeromedically risk areas are included below.

A. Physiological Changes of Pregnancy:

Vision: Corneal thickening due to edema can occur as early as 10 weeks gestation, and can persist for several weeks postpartum. This change is variable, and can affect visual acuity differently throughout the pregnancy.[5-7] The visual acuity should be checked every one to two weeks to assure vision standards appropriate for their duty are met. In addition, an immediate assessment should be performed for any visual complaint. The use of contact lenses in pregnancy is not recommended.

Hypercoagulability: Pregnancy is a hypercoagulable state with a risk of venous thrombosis or thromboembolism increased at least five-fold over the non-pregnant state.[8] Venous thromboembolism is the leading cause of maternal deaths in developed countries.[8] This is related to increases in fibrinogen, von Willebrand Factor, clotting factors (V, VIII, and X), and changes in plasminogen activating inhibitors 1 and 2. In addition, venous stasis is more likely due to decreased systemic vascular tone and compression of the pelvic veins by the enlarging uterus. Periods of inactivity or remaining in a cramped cockpit during flying duties can also contribute to venous stasis and the risk of thrombosis. Underlying hypercoagulable states, such as Factor V Leiden, are associated with 20-25% of venous thromboembolism in pregnancy and as such, can add substantially to the venous thrombosis risk.[9] Screening for thrombophilia is not recommended routinely in pregnancy, but can be considered based on clinical or family history.

Hemodynamic: Blood volume increases during pregnancy to accommodate the pregnancy requirements and benefit placental perfusion. Plasma volume increases by 45%, and red cell mass increases 20-30% over the non-pregnant state.[10] A relative anemia is common in pregnancy due to the increased ratio of plasma volume to red cell mass and resulting hemodillution. Iron deficiency anemia is also common in pregnancy due to the substantial increase in iron requirement for the growing fetus. The obstetrical care provider may tolerate lower hemoglobin and hematocrit levels considered "normal" for pregnancy, but these levels may not be adequate for a pregnant aviator. In addition, the intravascular blood volume can decline during pregnancy due to decreased venous tone and extravascular fluid shifts as edema. Changes in maternal pH from respiratory changes, cause a right shift in oxygen dissociation of hemoglobin to facilitate oxygenating the fetus.[10] These volume, hemoglobin, and anemia-related circumstances can affect a pregnant flyer's G-tolerance, vision, endurance, fatigue, and tolerance for hypoxia. Monitoring of the hemoglobin and hematocrit is common in routine prenatal care, but requires additional monitoring for symptoms if flying is considered. The standard replacement of iron and folate in prenatal vitamins is generally adequate, but additional supplementation is often required.

Cardiovascular: The base-line heart rate gradually increases throughout a normal pregnancy. There is a 10-fold increase in uterine blood flow resulting in a shift from 2% of total cardiac output

pre-pregnancy to over 17% at term.[10] The growing uterus exerts pressure on the pelvic veins and vena cava that can reduce venous return and preload to the heart. Maternal posture can decrease cardiac output by 25-30%, and 8% of women experience supine hypotension with possible syncope.[10] The vascular tone and its pressor-responsiveness to systemic requirements are suppressed in the normal pregnancy due to increased systemic progesterone, changes in prostaglandins, low resistance within the placenta, and other factors. Vascular collagen changes increase vascular compliance as early as 5 weeks of pregnancy.[11] The vascular pressor response is decreased from renin-angiotensin refractoriness.[12] During a normal pregnancy, the average blood pressure begins to decrease by 7 weeks of gestation, reaching a nadir by 24 to 32 weeks, gradually increasing in the third trimester, and returning to pre-pregnancy levels following delivery.[10] These changes can have significant or subtle effects on the pregnant flyer's cardiac performance, and in turn, can affect G-tolerance, vision, endurance, fatigue, and hypoxia tolerance.

Pulmonary: Pulmonary changes can be significant in the aviation environment. There is an increase in maternal oxygen consumption with a 40% increase in tidal volume and a stable baseline respiratory rate. This results in a hyperventilation, hypocapnia and pH changes. The lung volume is decreased from physiological changes and uterine encroachment. These changes result in 20% decreases in each of the expiratory reserve volume, residual volume, and functional residual capacity, and can result in early decompensation in the face of infection, or other pulmonary disease.[10] In the flight environment, these can affect hypoxia tolerance, especially in a situation of rapid decompression.

Renal: In pregnancy, renal blood flow increases by 50%, renal plasma flow increases by 60-80%, and glomerular filtration rate increases by 50%.[10] The increased renal function and uterine compression of the bladder result in more urine production during a normal pregnancy. This results in more frequent urination, a higher risk of dehydration, and increased potential for kidney stones. The dry flight environment can further induce dehydration. These factors can have significant or subtle effects on the pregnant flyer's G-tolerance, vision, endurance, fatigue, or hypoxia tolerance. Elevated systemic progesterone decreases the peristalsis of the ureters to increase the risk of kidney stones, ureteral reflux, and ascending urinary tract infections. As such, urinary tract infections must be treated with more vigilance in pregnancy due to the greater risk of pyelonephritis, and its higher risk of complications.

Gastrointestinal: During normal pregnancies, high circulating levels of progesterone, a smooth muscle relaxant, causes hypoactivity of the gastrointestinal tract, a decrease transit time, relaxation of the lower esophageal sphincter, and increased vomiting. Pregnancy-associated vomiting occurs most commonly during the first trimester, but can occur throughout the pregnancy.[13] The vomiting may become frequent enough to require anti-emetic medications. In the rare cases of hyperemesis gravidarum, the episodes become frequent and severe that parenteral fluid/nutrition is required in addition to anti-emetic medications. Although severe cases of nausea and vomiting are less common, any nausea, vomiting, and retching, can result in significant aeromedical distractions and additional dehydration.

Endocrinology: Pregnancy is a diabetagenic state associated with hyperinsulinemia and insulin resistance.[10] These changes are primarily due to increases in human chorionic somatomammotropin and growth hormone both from the placenta. These ensure a consistent glucose to the growing fetus. For the mother, this can result in relative hyperglycemia or frank (gestational) diabetes. In cases of gestational diabetes, control can be achieved with diet and the use of glyburide, although

sometimes insulin is required. Maternal screening for diabetes generally occurs at 26-28 weeks of gestation, but may be performed earlier for risk factors or clinical findings.

Immune System: A normal pregnancy has changes that can suppress the immune system. This change allows the maternal system to tolerate the antigenic difference of the fetus. As a consequence, a pregnant female can be more susceptible to general infections, and infections can be more severe. More aggressive treatments may be required. Live virus vaccinations are not recommended in pregnancy, but other routine non-live vaccines are acceptable and recommended according to the American College of Obstetricians and Gynecologists and Centers for Disease Control and Prevention (CDC).

Ergonomic Considerations: As the uterus grows during pregnancy, it emerges from the pelvis after 12 weeks and begins to increase abdominal circumference thereafter. Breast tissue enlarges in response to human chorionic somatomammotrophin. Size and weight distribution changes can result in requirements for changes within the flight environment or equipment. Localized or generalized edema can occur in normal pregnancies and may increase the circumference of the lower extremities, the upper extremities, and occasionally other areas of the body. Esophageal reflux is also more common during pregnancy, particularly when recumbent. These changes may affect the fit and safety of life support equipment in the aircraft and must be considered initially and throughout the pregnancy.

Sleep: Sleep disturbances during pregnancy are common and can contribute to excess fatigue in the pregnant aviator. These disturbances tend to increase as the pregnancy progresses resulting in additional aeromedical significance.

B. Environmental Effects on the Mother and Fetus:

Heat exposure: The fetus generates additional heat. The mother is expected to gain 25-35 pounds during the pregnancy. The flight environment and safety equipment may further increase heat exposure to the flyer. The combination of increasing body mass index, the flight environment, and fetal heat generation can result in maternal heat intolerance and adverse effects to the fetus. Elevated core body temperature has been shown to double the risk of neural tube defects in the fetus.[14] Elevated ambient temperatures are associated with a significant increase in risk of preterm labor.[15] These should be addressed when considering continuation of flight duties in these environmental conditions.

Sound and Vibration Exposure: Sound and vibration exposure during the second trimester has been associated with hearing changes identified in the newborn.[16] The hearing organs are developed before 20 weeks gestation and may be susceptible to vibration and noise damage. [16] Noise exposure has also been associated with fetal growth restriction and preterm labor.[17, 18] Animal studies have shown some increased risk of miscarriage with hypoxia and G-force exposure, but there are no such studies in human pregnancies.

Radiation Exposure: Radiation exposure is a potential risk factor for the fetus. It is most vulnerable during organogenesis in the first trimester. Evidence suggests that no adverse fetal effects have been seen with radiation exposures of less than 50 mSv. The average exposure during a 10 hour flight is 0.05 mSv.[19] Population based studies of pregnant commercial airline workers and the associated radiation exposure are reassuring - showing no adverse fetal outcomes, but are not necessarily applicable to military aviation.[20, 21]

Altitude Exposure: A new study suggests that an increase in altitude exposure may be associated with a reduction in birth weight, which increases with increasing altitude.[22]

C. Pregnancy-Specific Medical Conditions: Pregnancy-specific conditions can induce a "high risk" pregnancy that is incompatible with flight duties. It is essential for the obstetrical care provider to perform a complete initial assessment, as well as subsequent assessments to identify these conditions. Prompt notification of the flyer, and her flight surgeon is necessary to identify those conditions incompatible with flying duties. Examples of pregnancy-specific "high risk" conditions include, but are not limited to: ectopic pregnancy, spontaneous miscarriage, molar pregnancy, incompetent cervix, vaginal bleeding, preterm labor, spontaneous rupture of membranes, preeclampsia, hyperemesis gravidarum, gestational diabetes, struma ovarii, uterine anomaly, and fetal conditions such as multiple gestation, birth defects, growth restriction, oligohydramnios, chorioamnionitis, or others. These conditions can be associated with sudden and unexpected pain, bleeding, severe headaches, or even seizure. These can cause life-threatening conditions to the flyer, and significant adverse risk to the pregnancy and fetus. In addition, they can result in subtle or profound distraction or frank incapacitation within the flight environment. Therefore, it is of utmost importance to confirm that a pregnancy is intrauterine, normal, and remains normal throughout any period of continued flight duty.

D. Preexisting Medical Conditions or Medication Use Affected by Pregnancy. There are a variety of medical conditions where the disease, the treatment, or both are affected by pregnancy. Such conditions include chronic hypertension, impaired glucose tolerance, diabetes, thyroid disease, inherited thrombophilias, migraines with aura, or history of thromboembolic disease. In many cases, a chronic medication or its dose must be changed. Therefore, when a pregnant flyer has a preexisting medical condition and/or stable use of a medication previously waived, these must be re-considered prior to returning to flying duties.

E. Training Qualifications. Pregnancy is disqualifying for initial flight training and waivers are not considered. Waivers are only considered for trained aircrew. Pregnancy is considered disqualifying for physiological training, hyperbaric duty, or operational flying support. Aerospace Physiology training is prohibited during pregnancy. Waivers or deferrals are not recommended for these training requirements. Pregnancy is disqualifying for hypobaric/hyperbaric duty as an inside observer.

III. Waiver Considerations.

Pregnancy is disqualifying for all flying classes except GBC. Waivers may be considered for all trained flying class duties including RPA. RPA-only pilots are not exposed to many stressors of the flight environment, and as such can request waivers from 1st through 34th weeks of pregnancy (see Table 1). For all flying classes, there should be consideration for duty modification in cases where the time to urgent obstetrical care is greater than 2 hours, or a shorter time appropriate for the condition of the pregnancy. Ensure Aerospace Physiology training will not expire during the pregnancy since this training is prohibited during pregnancy (see section E).

GBC and MOD: Although pregnancy is not disqualifying for GBC duties, it may be appropriate to remove an individual from her duties if she is experiencing side-effects from her pregnancy that affect the safe performance of her duties. GBC and MOD activities may require pregnant females to travel for several hours to locations very remote from urgent obstetrical care. There should be

consideration for duty modification in cases where the time to urgent obstetrical care is greater than 2 hours, or a shorter time appropriate for the condition of the pregnancy.

Aircrew: Trained aircrew only may be eligible for FC IIC, RPA, FC III waivers with the following guidelines:
1. The waiver request is voluntary and must be initiated by the crewmember with concurrence from the squadron commander, flight surgeon and appropriate level obstetrical provider.
2. Aerospace Physiology training is prohibited during pregnancy.
3. Flying is restricted to pressurized, multi-crew, multi-engine, non-ejection seat aircraft in which cabin altitude remains at or below 10,000 feet MSL.
4. Crewmembers are released from mobility commitments.
5. The waiver is valid from the 13th to 24th week of gestation (see Table 1 for exception for RPA only pilots).

Uncomplicated Pregnancy: The pregnancy must be a singleton and considered uncomplicated. An uncomplicated pregnancy is one without evidence of significant physiological changes and no significant pregnancy-specific condition. Preexisting medical conditions, medications, and waivers must be reconsidered in the context of the pregnancy. Note: twin pregnancies have higher risks for preterm labor, preeclampsia, gestational diabetes, pain, hyperemesis, and more significant ergonomic factors.

The flight surgeon must ensure that the pregnant female is voluntarily requesting a waiver to continue flying with concurrence from the squadron commander, flight surgeon, and the appropriate level obstetrical provider. This document will aid in the assuring the flyer, commander, and medical providers understand the factors and their risks that must be considered. Medical co-morbidities and existing waiver conditions should be taken into account when evaluating a pregnant flyer for a waiver. While pregnancy is not strictly disqualifying for GBC duties, the flight surgeon should also take into account pregnancy related conditions and individual risk factors when managing duty restrictions.

Postpartum. After delivery, returning an aviator to flying status is considered after a minimum of six weeks post-partum, and then as soon as practical. It may be longer depending on mode of delivery and any complications. Consider the potential risks in the post-partum period including post-partum depression, bleeding, surgical complications, blood pressure, infection, glucose intolerance, as well as the persistence of the thrombophilic state for up to six weeks after delivery.

Table 1: Waiver Potential for Pregnant Aircrew

Flying Class	Condition	Waiver Potential Waiver Authority
I/IA	Pregnant	No AETC
II	13th through 24th gestational weeks+@#	Yes* MAJCOM
III	13th through 24th gestational weeks+#	Yes# MAJCOM
MOD	After 24th gestational week†	No MAJCOM

* FC IIC waiver may be granted for pressurized, multi-crew, multi-engine, non-ejection seat aircraft. AFMSA has delegated this FC IIC waiver (must meet restrictions) to the MAJCOM who may delegate further if desired. For aircraft that do not meet **all** of the above guidelines, waiver authority remains AFMSA.
# Restricted to pressurized, multi-crew, multiengine, non-ejection seat aircraft.
+ Other than designated gestational period, waiver not allowed.
@ FCII performing only RPA pilot duties can request waivers from 1st through 34th weeks of pregnancy.
† Missileers must be removed from alert duty after 24th gestational week, sooner if needed.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS must include the following:
A. Flying class (or special duty), aircraft, location, (note: necessary level of obstetrical care availability). Expiration date of Aerospace Physiology training qualifications.
B. Date of pregnancy confirmation, estimated current gestational age, and estimated date of confinement, verification of normal singleton intrauterine pregnancy.
C. Date of start of 13th week of gestation (start of waiver eligible period) and date of end of 24th week of gestation (end of waiver eligible period).
D. Current status of pregnancy: any significant symptoms, or significant conditions.
E. Past obstetrical history (pregnancies (dates), delivery type, complications, etc.) and past gynecological history (ectopic pregnancy, miscarriages, fibroids, dysplasia, etc.).
F. Past medical and surgical histories.
G. Aeromedical history to include preexisting condition (and current status), medication, including changes due to pregnancy, and any other existing waivers.
H. Physical: documentation from the obstetrical provider, including: blood pressure, visual acuity (reassess every 1-2 weeks, or sooner for flyer symptoms), pelvic findings (absence of cervical changes or bleeding), and ultrasound findings.
I. Labs: CBC, urinalysis and urine culture, and any other standard initial pregnancy labs.
J. Statement that the obstetrical provider has documented an uncomplicated pregnancy in the context of aeromedical concerns.

K. Statement that the waiver request was voluntarily initiated by the aviator, that she understands the potential risks of flying duties while pregnant, and any changes in her status require follow-up with flight medicine prior to resuming flight duties.
L. Statement that her squadron commander, flight surgeon, and appropriate level obstetric provider agree with the request for waiver to continue flying during pregnancy.
M. Statement regarding automatic disqualification from and prohibition of Aerospace Physiology training until pregnancy is completed and member returned to flight status.
N. Flight surgeon statement regarding request for waiver, Flying Class, adherence to required pregnancy-specific restrictions, pre-existing waivers, and any additional duty-specific limitations or restrictions.

ICD-9 Code for Pregnancy	
V22	Normal Intrauterine Pregnancy

ICD-10 Code for Pregnancy	
Z33.1	Pregnant state, incidental

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WAIVER GUIDE
Updated: Jan 2014
Supersedes Waiver Guide of Sep 2010
By: Dr Dan Van Syoc
Reviewed by Col Pat Storms, RAM and Gastroenterologist

CONDITION:
Primary Sclerosing Cholangitis (Jan 14)

I. Overview.

Primary sclerosing cholangitis (PSC) is a chronic, progressive cholestatic liver disease that is characterized by inflammation, fibrosis and stricturing of medium and large ducts in the intrahepatic and extrahepatic biliary tree leading to the formation of multifocal bile duct strictures.[1] It is likely an immune mediated progressive disorder that eventually leads to cirrhosis, portal hypertension and hepatic decompensation in the majority of patients.[2] PSC and primary biliary cirrhosis represent the two most common adult chronic cholestatic liver diseases, and PSC is one of the most common indications for liver transplantation in adults. There are no good data regarding the overall prevalence of PSC; the estimated incidence in the United States is 0.9 to 1.3 cases per 100,000 population. It is predominately a disease of young and middle-aged men (male:female = 2:1) with a mean age at the time of diagnosis of 40 years, but children can also be affected.[3, 4] The prevalence of PSC appears to be increased among first-degree relatives of patients with PSC, with studies showing a 100-fold increased risk of disease in first-degree relatives of patients with PSC.[5, 6]

The first description of sclerosing cholangitis was by the French surgeon Pierre Delbet in 1924. It was considered a rare condition until the advent of endoscopic retrograde cholangiopancreatography (ERCP) in the 1970s, which aided in the understanding of the disease prevalence and its natural history. Pathogenesis is unclear, and the most commonly accepted theory is that in genetically predisposed individuals, an initial insult to the cholangiocytes via environmental exposure to toxins or infectious agents (such as bacterial translocation across a leaky gut) result in immune-mediated damage with progressive destruction of bile ducts. Given the strong association with inflammatory bowel disease, the leaky gut hypothesis is given considerable credence.[6, 7] A progressive disease, PSC often leads to biliary cirrhosis within 10 to 15 years. Patients who are asymptomatic at the time of diagnosis fare better than those who are symptomatic, but the disease tends to progress in either case. The average overall survival time is approximately 10 years from the date of diagnosis.[8] Independent risk factors correlating with a poor prognosis for PSC include increased age, hypoalbuminemia, persistently elevated bilirubin over three months, hepatomegaly, splenomegaly, dominant bile duct stenosis and changes in the intra- and extrahepatic ducts at the time of the initial diagnosis.[9] The clinical course of PSC is unpredictable due to the highly variable segmental involvement. A 2012 Swedish study demonstrated a four-fold increase in mortality in PSC patients compared with the general population and a dramatically increased risk of hepatobiliary cancer.[10]

The majority of patients with PSC are asymptomatic at the time of diagnosis, although a few may have advanced disease. The disease should be considered in patients with inflammatory bowel disease who have otherwise unexplained abnormal liver function tests, particularly if the elevation is in the serum alkaline phosphatase. The great majority of cases (80%) are associated with inflammatory bowel disease (IBD), although PSC occurs in only a small minority (2.4% to 4 %) of

individuals with IBD. IBD patients also diagnosed with PSC have a significantly increased risk of colorectal dysplasia and cancer.[11] In addition, individuals with PSC have a 10% to 15% lifetime risk of developing cholangiocarcinoma.[7]

PSC can be considered to progress through four distinct phases (though individuals may not develop all phases):
A. Asymptomatic – cholangiographic evidence of PSC but no symptoms and normal liver function tests.
B. Biochemical – no symptoms but have abnormal liver function tests, typically serum alkaline phosphatase (ALP) and variable serum bilirubin and aminotransferase levels.
C. Symptomatic – symptoms of cholestasis, liver injury or both, typically pruritus, fatigue, symptoms of cholangitis and jaundice. Fatigue and pruritus are very common features in symptomatic patients.
D. Decompensated cirrhosis – worsening symptoms and complications of end-stage liver disease, such as ascites, encephalopathy and variceal bleeding.

ERCP remains the gold standard for the diagnosis of PSC, but magnetic resonance cholangiopancreatography (MRCP) has been used with success as a diagnostic tool. A liver biopsy may necessary as an additional data point in a patient with unexplained cholestasis and a non-diagnostic imaging study (particularly in children). Focal concentric edema and fibrosis around the interlobular bile ducts are the main histologic features of PSC, with loss of very small bile ducts seen in many cases.[12] While a liver biopsy may support the diagnosis of PSC, it is rarely diagnostic of its own accord.

Unfortunately, there are no proven effective treatments for this condition. It has been postulated that successful stenting of these sclerotic segments may subsequently lead to normalization of the biochemical tests and symptoms. To date this approach has met with mixed results and there have been no comparative trials to identify a preferred endoscopic strategy.[13] The only drug extensively evaluated for PSC is ursodeoxycholic acid (UDCA) also known as ursodiol (Actigall®, Ursosan®, Ursofalk®, Urso®, and Urso Forte®). Its use in PSC is based on its believed capacity to improve bile viscosity. A large prospective trial with UDCA at 17 to 23 mg/kg/day revealed a trend toward improved survival and decreased transplantation rate, but the outcome results were not statistically significant. A number of other drugs have been used in the past, but none have shown any benefit.[13, 14] A Cochrane review in 2011 concluded that there was insufficient evidence to support or refute the use of bile acids in the treatment of PSC. It was noted, though, that there was a significant improvement in liver biochemistry.[15]

Many patients ultimately progress to the point where liver transplantation is the best option. In the absence of hepatic transplantation, median survival after diagnosis is approximately 10 years.[7] Disease-specific clinical indications for transplantation in PSC include the development of intractable severe pruritus, recurrent episodes of bacterial cholangitis or sepsis, and progressive severe bone disease. Outcomes for liver transplantation in PSC compare favorably to transplants for other indications, with five-year survival rates as high as 85 percent.[13, 14]

II. Aeromedical Concerns.

In primary sclerosing cholangitis, symptoms relevant to aviation include pruritus, fatigue, nausea, vomiting and abdominal pain. The symptoms are of concern primarily due to the potential impact

while performing aircrew duties and the effects on mission safety and completion. UDCA is the only widely used drug that has shown benefit in providing symptomatic relief. As it is not currently on the approved medication list, AFMSA will be the waiver authority for all PSC cases.

III. Waiver Consideration.

PSC is not mentioned by name in AFI 48-123, but "bile duct abnormalities or strictures" is mentioned as disqualifying for FC I/II/III. There is no similar statement for ATC/GBC or MOD duties. For the latter career fields, cholestatic disease severe enough to lead to the use of medication or surgical procedures would likely place continued special duty functions in jeopardy.

Table 1: Waiver potential for Primary Sclerosing Cholangitis (PSC)

Flying Class (FC)	**Waiver Potential#** **Waiver Authority**	**ACS Review/Evaluation**
I/IA	No AFMSA	N/A
II/III	Yes* AFMSA	Yes
ATC/GBC	Yes* AFMSA	If requested by AFMSA
MOD	Yes AFMSA	If requested by AFMSA

* Waiver not recommended for untrained members.
# To be considered for a waiver, the member must asymptomatic with stable LFTs.

AIMWITS search in Aug 2013 revealed 10 total cases with the diagnosis of primary sclerosing cholangitis. Breakdown of the cases was as follows: 0 FC I/IA cases, 3 FC II cases (1 disqualified), 5 FC III cases (2 disqualified), and 2 MOD cases. The 3 disqualified cases were all due to some aspect of the disease process.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for PSC should include the following:
A. History - symptoms and signs of cholestasis, cholangitis, liver injury, end-stage liver, including negatives (e.g. pruritus, fatigue, fever, abdominal pain, jaundice, ascites, encephalopathy and variceal bleeding).
B. ERCP or MRCP report.
C. Gastroenterology/Hepatology consultation report.
D. LFTs, chemistry 7, CBC, and PT/PTT. (LFTs need to be current)

The AMS for waiver renewal for PSC should include the following:
A. Interval history since last AMS.
B. All applicable labs and imaging tests as in the initial aeromedical summary.

C. Gastroenterology/Hepatology consultation report.

ICD-9 code for Primary Sclerosing Cholangitis	
576.1	Cholangitis

ICD-10 code for Primary Sclerosing Cholangitis	
K83.0	Cholangitis

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WAIVER GUIDE
Updated: Jan 2016
Supersedes Waiver Guide of Jun 2012
By: LtCol Charles G. Mahakian (Ram17) and Dr Dan Van Syoc
Reviewed by LtCol Timothy Phillips, AF/SG consultant for Urology

CONDITION:
Prostate Cancer (Jan 16)

I. Overview.

Prostate cancer is the most common cancer in men, and the second leading cause of cancer death for men, with increasing incidence with age (the median age at diagnosis is 72 and more than 75% of all cases are diagnosed in men older than age 65).[1] It has a tendency to metastasize to bones and lymph nodes. In 2012, the disease was diagnosed in 177,489 men in the United States, and there were 27,244 deaths, with an incidence rate of 105.3 per 100,000 men per year in the US.[2, 3] With the increased utilization of Prostate-Specific Antigen (PSA) screening, the majority of cases are localized at presentation (i.e.. not metastatic) and at least 95% of all cases are pathologically classified as adenocarcinoma.[4]

A number of risk factors for prostate cancer have been identified, including increasing age, as noted above. Other factors which confer increased risk for prostate cancer include African-American race and family history. African Americans have the highest incidence of disease and the lowest rates are in men from China and Japan.[5] A positive family history is a risk factor and that risk increases with the number of affected relatives. Diet does appear to play a role in risk as well although not definitively proven as yet. Data does seem to point to an increased risk with consumption of red meat, animal fat, and a higher total fat consumption. Infection and/or inflammation have also been proposed to confer increased risk for prostate cancer, but specific causative organisms have not been identified.[6] For many men, the development of prostate cancer likely results from exposure to multiple environmental factors superimposed on a background of variable genetic susceptibility, making it difficult to identify specific causal events or agents.

The vast majority of cases are found after a routine screening with PSA plus digital rectal exam. PSA does not obviate the need for a digital rectal exam, as some cancers may present with a low PSA but abnormal prostate exam (nodule, induration or asymmetry). Screening with the PSA test has greatly improved detection and most cases are asymptomatic at the time of diagnosis. Symptoms at the time of presentation usually indicate locally advanced or metastatic prostate cancer. Local symptoms can include dysuria, hematuria, difficulty voiding, frequency, urinary retention, hematospermia or renal colic from ureteral obstruction. Metastatic disease can present with back or hip pain from bone metastases.

One issue is that screening has led to the detection of clinically insignificant prostate cancers that might never progress over a man's lifetime. PSA-based screening has led to an increase in the diagnosis of lower grade, localized prostate cancer.[7] In the United States, 90% of men diagnosed with prostate cancer will seek some form of treatment. With early detection of small tumors, many of these men may incur the side effects of treatment many years before the disease reaches a state where it poses a threat to health or longevity, and as a result may not benefit from early detection. As a result, the U.S. Preventive Services Task Force (USPSTF) recommends against prostate cancer

screening, citing that the harms of prostate cancer screening and subsequent treatment outweigh potential benefit in lives saved.

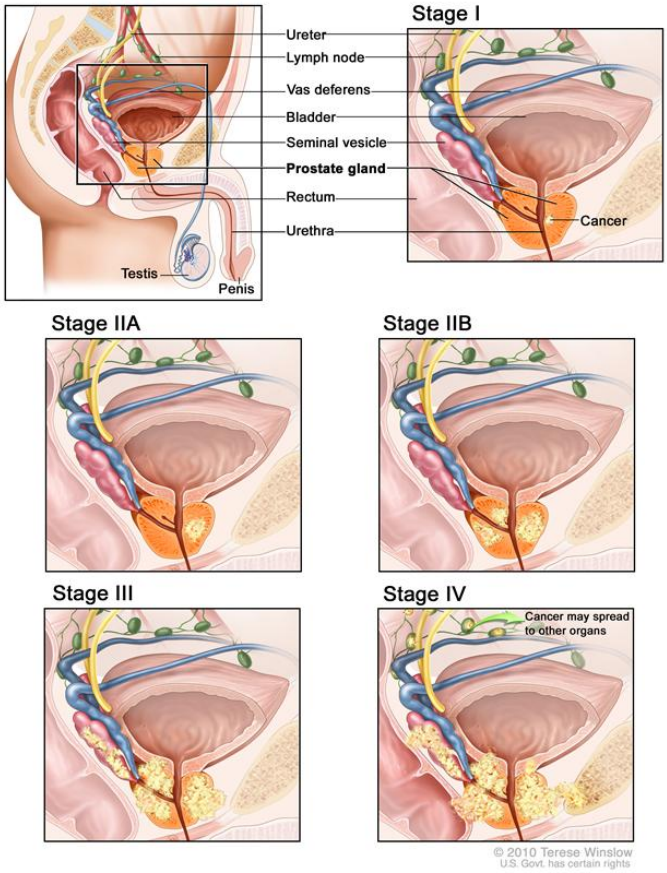
However, the costly problems of over-diagnosis and over-treatment of clinically insignificant prostate cancer must be balanced against incontrovertible public health data that demonstrate a substantial reduction in prostate cancer death with PSA-based screening. The American Urological Association is currently revising its prostate cancer screening guidelines in light of USPSTF recommendations which discourage screening. Their most recent guideline from 2013 recommends against baseline PSA screening between ages 40 to 54 years, in men of average risk.[8] Periodic screening may ensue, but annual screening is no longer recommended for all men, and frequency of screening should be based on baseline PSA and other risk factors. At this time, the American Cancer Society recommends screening with an annual digital rectal exam (DRE) beginning at age 50 for men at average risk and are expected to live at least 10 more years, and recommends earlier screening (age 45) for men at high risk for prostate cancer, which include African American race and first degree relatives diagnosed with prostate cancer before age 65.[9] Men with multiple first degree relatives diagnosed with prostate cancer before age 65 should consider screening as early as age 40.[9]

If screening with PSA and digital rectal examination indicates an increased risk for prostate cancer, transrectal ultrasound guided (TRUS) biopsy with 10-12 cores (concentrated in the peripheral zone of the gland) is performed for definitive diagnosis.

A PSA of 4 ng/mL is frequently used as the “upper limit of normal”, but in actuality there is no level of PSA below which the risk of prostate cancer is negligible.[10] Lower PSA generally indicates lower likelihood of finding prostate cancer on a biopsy. For this reason, men with a lower baseline PSA may consider less frequent screening, although optimal screening intervals have not been validated in large clinical trials. Because benign prostatic hyperplasia (BPH) can also be a source for PSA and because of the increased incidence of BPH as men age, some propose lower thresholds of PSA for recommending biopsy in younger men.[11] In addition, some have identified rate of increase in PSA over time (PSA velocity) as a risk for prostate cancer.[12] These issues make it difficult to identify a “normal cutoff” for PSA. PSA represents a range of risk for prostate cancer, and the risk for prostate cancer should be weighed against a patient’s competing risks for morbidity and mortality, such as age, cardiovascular disease, and other serious health conditions.

Table 1. Prostate Cancer Staging Definitions.[13]

Stage (cT)	Clinical Tumor (cT) Stage
Tx	Primary tumor cannot be assessed
T0	No evidence of primary tumor
T1	Clinically inapparent tumor neither palpable nor visible by imaging
T1a	Tumor incidental histologic finding in 5 % or less of tissue resected
T1b	Tumor incidental histologic finding in more than 5 % of tissue resected
T1c	Tumor identified by needle biopsy (e.g., because of elevated PSA)
T2	Tumor confined within the prostate
T2a	Tumor involves one-half of one lobe or less
T2b	Tumor involves more than one-half of one lobe but not both lobes
T2c	Tumor involving both lobes
T3	Tumor extends through the prostate capsule
T3a	Extracapsular extension (unilateral or bilateral)
T3b	Tumor invades the seminal vesicle(s)
T4	Tumor is fixed or invades adjacent structures other than seminal vesicles: bladder neck, external sphincter, rectum, levator muscles, and/or pelvic wall
Stage (pT)	**Pathologic Tumor (pT) Stage**
pT2	Organ confined
pT2a	Unilateral, involving one-half of one lobe or less
pT2b	Unilateral, involving more than one-half of one lobe, but not both lobes
pT2c	Bilateral
pT3	Extraprostatic extension
pT3a	Extraprostatic extension
pT3b	Seminal vesicle invasion
pT4	Invasion of bladder, rectum
	Regional Lymph Nodes - Clinical
NX	Regional lymph nodes not assessed
N0	No regional lymph nodes metastasis
N1	Metastasis in regional lymph node(s)
	- Pathologic
pNX	Regional nodes not sampled
pN0	No positive regional nodes
pN1	Metastases in regional node(s)
	Distant Metastasis
M0	No distant metastasis
M1	Distant metastasis present
M1a	Non-regional lymph nodes
M1b	Bone(s)
M1c	Other site(s) with or without bone disease
	Histological Grade Scoring (Gleason)
Gleason X	Grade cannot be assessed
Gleason ≤ 6	Well differentiated (slight anaplasia)
Gleason 7	Moderately differentiated (moderate anaplasia)
Gleason 8-10	Poorly differentiated/undifferentiated (marked anaplasia)



Staging (an estimation of the extent of the tumor) is based on the clinical exam and biopsy findings. If metastatic disease is suspected, additional studies such as CT, MRI or bone scans can be performed, but are not frequently indicated in patients presenting with localized disease. Radiolabelled monoclonal antibody scanning (Prostascint) or PET scanning with 11C-Acetate or 11C-Choline have been used for prostate cancer staging, but both modalities have significant limitations due to poor specificity and sensitivity. Prostate adenocarcinoma is graded, using the Gleason grading or scoring system. Gleason grading is based on glandular architecture and a score ranging from 2 to 10 is assigned. A score of 2 to 6 indicates a well differentiated tumor, a score of 7 indicates a moderately differentiated tumor, and a score of 8-10 indicates a poorly differentiated tumor. Although tumors with a score of 7 have traditionally been grouped with moderately differentiated tumor, a Gleason score of 7 is associated with increased risk for disease progression and cancer-specific mortality compared to a score of 6 or less.[14, 15]

Patients can be grouped into risk strata or categories according to the 2009 American Joint Committee on Cancer AJCC Anatomic Stage/Prognostic Group, which is based on tumor size, Gleason score, PSA level, the presence or absence of spread to regional lymph nodes, and the presence or absence of distant metastases.[16] These risk categories correlate with increasing risk of PSA failure and prostate cancer-specific mortality following radical prostatectomy, external beam radiotherapy, or interstitial prostate brachytherapy.[14, 17]

Table 2 – Anatomic Stage/Prognostic Groups.[13]

Stage	Primary Tumor (T)	Regional Lymph Nodes (N)	Distant Metastasis (M)	Prostate-Specific Antigen (PSA)	Histologic Grade (Gleason)
I	T1a-c	N0	M0	PSA <10	Gleason ≤6
	T2a	N0	M0	PSA <10	Gleason ≤6
	T1-2a	N0	M0	PSA X	Gleason X
IIA	T1a-c	N0	M0	PSA <20	Gleason 7
	T1a-c	N0	M0	PSA ≥10<20	Gleason ≤6
	T2a	N0	M0	PSA ≥10<20	Gleason ≤6
	T2a	N0	M0	PSA <20	Gleason 7
	T2b	N0	M0	PSA<20	Gleason ≤7
	T2b	N0	M0	PSA X	Gleason X
IIB	T2c	N0	M0	Any PSA	Any Gleason
	T1-2	N0	M0	PSA ≥20	Any Gleason
	T1-2	N0	M0	Any PSA	Gleason ≥8
III	T3a-b	N0	M0	Any PSA	Any Gleason
IV	T4	N0	M0	Any PSA	Any Gleason
	Any T	N1	M0	Any PSA	Any Gleason
	Any T	Any N	M1	Any PSA	Any Gleason

For men with prostate cancer clinically confined to the gland, risk is defined as:

•Very low risk – T1c, Gleason score ≤6, PSA <10 ng/mL, fewer than 3 prostate biopsy cores positive, ≤50 % cancer in any core, or PSA density <0.15 ng/mL/g.
•Low-risk disease – T1-T2a, Gleason score ≤6, PSA <10 ng/mL.
•Intermediate-risk – T2b-T2c, Gleason score 7, or PSA 10-20 ng/mL.
•High-risk – T3a, Gleason score 8-10, or PSA >20 ng/mL.
•Very high-risk – T3b-T4, primary Gleason pattern 5, or >4 cores with Gleason score 8 to 10
•Metastatic – Any T, N1.[16]

The decision whether or not to treat prostate cancer and the choice of treatment should depend on a man's expected longevity, comorbidities, and genitourinary health status (such as erectile function, fertility concerns, symptoms of BPH), in conjunction with the clinical characteristics of his cancer (symptoms, stage, grade, PSA, risk category). Currently, high level evidence to support one form of treatment over others is lacking, and the decision should be individualized, based on above factors. Treatment options for localized prostate cancer include active surveillance, radical prostatectomy (RP), external beam radiotherapy (EBRT), and brachytherapy. Practice guidelines for the management of localized prostate cancer have been developed by the American Urological Association and can be found at www.AUAnet.org.

Patients falling into a low risk category may do well with any of the above options, as monotherapy. Intermediate risk tumors have an increased risk for progression, and therefore may not be good candidates for active surveillance in men with expected longevity of 10 or more years. Patients with high risk disease are very likely to progress and therefore are not good candidates for active surveillance unless they have significant competing risks for mortality in the short term. In addition, both intermediate and high risk tumors are more likely to require more than one mode of

therapy for disease control, and more likely to recur and progress despite therapy. Combination therapy (i.e. radiotherapy + androgen deprivation) appears to afford better disease control for intermediate and high risk disease compared to monotherapy.

When metastatic disease is likely or definitively diagnosed, the first line treatment is androgen deprivation therapy (ADT). This can be accomplished with surgical castration, or with depot injections or implants of LHRH agonists. ADT is the primary therapeutic approach for men with metastatic disease, alleviating bone pain in 80 to 90 percent of men and leading to objective responses in the serum PSA, and it may modestly prolong survival.[18] Other options for advanced disease or failure of previous therapies include RT (if previous therapy was surgery), RP in a small well-selected group of men with previous RT, and cryotherapy. Systemic chemotherapy (docetaxel and cabazitaxel) is used to treat metastatic prostate cancer that has progressed despite androgen deprivation therapy. Recently, sipuleucel-T (Provenge), an immunotherapy, was approved for treatment of castration-resistant prostate cancer.

The choice of therapy is based on stage of the disease, patient age, any co-morbid conditions, concern about treatment side effects on the quality of life (QOL), and ultimately, the patient's desires. As with any cancer treatment, the goals are to prevent death and disability and to minimize the complications of the therapy. Goals need to be very clear to all involved (patient, family and treatment team). As prostate cancer is a disease of older men, life expectancy (is there a reasonable chance that the man will be alive in ten years?), rather than patient age, should be a major factor in the selection of treatment for a given man. Other factors are overall health status, and tumor characteristics. Currently, there are no evidence-based recommendations for when to intervene in patients with a long life expectancy since markers of disease progression are poorly validated.[16, 19]

Radical prostatectomy (RP) has been used to treat prostate cancer for many years. It can be performed by a retropubic or perineal approach, laparoscopically, and with robotic assistance. In 2008, the majority of treated men chose radical prostatectomy (this is also true in our Air Force population).[19] Life-threatening complications to this procedure are very rare, but there are complications that are common and can be troublesome to the patient. Urinary incontinence, due to damage to the urinary sphincter, can occur and is more common in older men, but normally diminishes with time. Impotence, or erectile dysfunction (ED), can result due to damage to the cavernosal nerves. Nerve-sparing can be performed for clinically localized prostate cancer, with 2/3 to 3/4 of men recovering erectile function if they have good pre-surgical function and if bilateral nerve sparing can be performed.

The two forms of RT available to treat prostatic cancer are EBRT and interstitial implantation, also known as brachytherapy. ERBT is administered daily for 7-8 weeks, and is usually photon therapy. Proton therapy can also be used in conjunction with photon therapy, but is not widely available and evidence is lacking to demonstrate superiority of proton therapy in terms of both cancer control and treatment morbidity. Prospective trials investigating higher dose fractionation are underway to determine if a tumoricidal dose can be delivered over a shorter time frame with acceptable toxicity and cancer control. Brachytherapy involves placing radioactive, rice-sized pellets directly into the prostate gland, in a same-day outpatient procedure. The advantages to this approach over EBRT are convenience and better preservation of sexual function. Brachytherapy results in negligible radiation exposure to medical personnel and family members.[17] Sexual dysfunction is very common after EBRT, but is better preserved with brachytherapy. Urinary incontinence is not as common as with RP, but irritable bowel and bladder complaints can occur.[7]

Patients with low risk disease or significant competing risks for mortality may be candidates for active surveillance. Unfortunately, a standardized, ideal follow-up regimen supported by high level evidence does not yet exist. Active surveillance regimens are currently being evaluated in several prospective trials, but due to the long natural history of prostate cancer, it may be quite some time before the optimal candidates for active surveillance and the optimal regimen of surveillance are identified. Current regimens include periodic PSA, digital rectal exams and repeat biopsies, but it is not known whether these are sufficient to identify incipient progression before it is too late to successfully intervene. Advantages of active surveillance include (1) avoiding some of the more troublesome side effects of treatment, (2) maintenance of quality of life and daily activities, (3) avoidance of unnecessary treatment of low-grade tumors, and (4) decreased initial costs.[7] It is unknown whether patients managed with active surveillance will have cancer-specific survival comparable to those managed with early intervention.

The largest randomized prospective trial to date investigating early treatment with prostatectomy vs. no treatment (watchful waiting) in men with localized prostate cancer recently published 10-year follow up data.[20] Investigators identified significantly reduced disease specific mortality and reduced risk of metastatic disease among men randomized to radical prostatectomy, compared to those with no treatment. Interim reports at 5 and 8 years identified a cancer-specific and overall mortality advantage to prostatectomy over watchful waiting. Overall mortality at 10 years, however, was not significantly different. It would seem, then, that the prostate cancer intervention allowed men to live long enough to die from other causes, and reinforces the common practice of deferring definitive local therapy for men not expected to live 10 or more years. Two positive predictors for survival in those randomized to no initial treatment were a Gleason score less than 7 and a PSA level less than or equal to 10 ng/mL at the time of diagnosis, i.e. men with favorable risk disease.[21] It would appear that younger patients electing no treatment have a significant probability of progression from localized and indolent to metastatic mortal disease after long-term follow-up.[22] Due to the age of most Air Force aviators with the disease, active surveillance would be an unlikely treatment choice.

At this time, there is little high-quality evidence to guide physicians, patients, and families to formulate the best treatment plan, especially in men with PSA-detected disease. The very few randomized controlled studies are either inconclusive or have not reached maturity in order to give more definitive guidance.[15] All treatments (including no treatment) can cause adverse events and the severity varies among treatments.[23]

For patients with metastatic or locally advanced disease (stages III and IV), more aggressive options need to be considered after the standard three (RP, RT, and active surveillance).

One of the more important considerations in the care of men with prostate cancer is appropriate follow-up care. There are no clearly-defined criteria to prompt therapy in those undergoing active surveillance or to signal recurrence in those who have undergone some form of definitive therapy. Some of the widely used strategies include: a significant increase in serum PSA or a decrease in PSA doubling time to three years or less; a change in the DRE; or a detection of disease progression on surveillance biopsies. For the majority of men in our aviation population who undergo RP and are pathologic stage T2 with negative surgical margins, with a Gleason score of six or less, the follow-up should consist of a PSA at three months post-operatively, and then every six months for four years and then annually. If the Gleason score is seven or greater, there are positive surgical

margins, or pathologic stage is >T2, the testing should be every three months for two years, then every six months for an additional two years, followed by annual testing thereafter.[24] Those men on active surveillance and not electing RP or other primary treatment modality should have a new biopsy annually for the first several years to confirm lack of disease progression. If there is a concern about possible metastasis, an initial or repeat bone scan is in order to rule out bone metastasis.

II. Aeromedical Concerns.

The aeromedical concerns for most men are based more on the treatment and possible complications than on the disease itself. If the aviator is off all treatment medications and is disease-free (considered to be in remission) and asymptomatic, he can be considered for a waiver.

III. Waiver Consideration.

Prostate cancer, as with all malignancies, is disqualifying for all classes of aviation, as well as for retention.

Table 3. Waiver potential of prostate cancer (assume all cases are adenocarcinoma).

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA Untrained II, III, and ATC/GBC	Stages 1 and 2	Yes#† AETC	Yes
II, RPA Pilot	Stages, 1, 2 and possibly early 3	Yes+† AFMSA	Yes
III	Stages, 1, 2 and possibly early 3	Yes+† MAJCOM	Yes
ATC/GBC	Stages, 1, 2 and possibly early 3	Yes+† MAJCOM	No
MOD	Stages, 1, 2 and possibly early 3	Yes† AFGSC	No

For FC I/IA and untrained individuals, waiver may be considered after 5 years of remission, asymptomatic.
+ For trained individuals waiver may be considered six months after treatment completed, in remission and asymptomatic.
† No indefinite waivers.

Review of AIMWTS through Jan 2016revealed 97 cases of prostate cancer. Of this total, 0 were FC I/IA, 65 were FC II, 26 FC III, 4 MOD, and 2 ATC. A total of 86 waivers were granted and 11 were disqualified. Of the eleven disqualifications (7 FC II, 3 FC III, and 1 MOD), four were disqualified for medical reasons other than prostate cancer.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for prostate cancer should include the following:
A. History – symptoms, pathology, stage, treatment, including date of last treatment, surveillance plan and activity level.
B. Physical – genital, DRE.
C. Urology/oncology consults to include the six month follow-up - all consistent with National Comprehensive Cancer Network (NCCN) guidelines.
D. Labs – All PSA tests with dates.
E. Pathology report to include Gleason scoring results.
F. Results of all applicable staging evaluations, including radiology reports.
G. Tumor board report, military or civilian, if applicable.
H. Medical evaluation board results.
I. List any and all treatment for erectile dysfunction or other complication secondary to disease or treatment.

The AMS for waiver renewal for prostate cancer should include the following:
A. History – brief summary of stage, treatment, frequency of surveillance and results, any symptoms, activity level; all must be consistent with NCCN guidelines.
B. Physical – DRE.
C. Urology/oncology consult.
D. Labs – all PSA test results since previous waiver.
E. List any and all treatment for erectile dysfunction or other complication secondary to disease or treatment.

ICD-9 Codes for Prostate Cancer	
185	Malignant neoplasm of prostate
233.4	Carcinoma in situ of the prostate

ICD-10 Codes for Prostate Cancer	
C61	Malignant neoplasm of prostate
D07.5	Carcinoma in situ of the prostate

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WAIVER GUIDE
Updated: Feb 2014
Supersedes Waiver Guide of Jan 2010
By: Michael D. Jacobson (RAM 13) and Dr Dan Van Syoc
Reviewed by LtCol Edith Canby-Hagino, AF/SG consultant for Urology

CONDITION:
Prostatic Hyperplasia, Benign (Feb 14)

I. Overview.

Benign prostatic hyperplasia (BPH), one of the most common diseases of aging men, can be associated with bothersome lower urinary tract symptoms (LUTS) that include increased urinary frequency, nocturia, hesitancy, urgency and a weak urinary stream.[1] Chronic inability to completely empty the bladder may cause bladder distention with hypertrophy and instability of the detrusor muscle.[2] BPH can affect quality of life by interfering with normal daily activities and sleep patterns. The prevalence of histopathologic BPH is age-dependent, with initial development usually after age 40. By age 60, its prevalence is greater than 50% and by age 85 it is as high as 90%.[2, 3] Similar to that of histologic evidence, the prevalence of bothersome symptoms also increases with age. Approximately one half of all men who have a histologic diagnosis have moderate to severe LUTS.[3] Determining prevalence of BPH across different populations groups is problematic due, at least in part, to lack of a common definition. Nevertheless, some studies have indicated a lower prevalence of BPH among Asians compared to blacks or whites.[4] Despite similar prevalence, black men are more likely than white men to have more severe LUTS.[5]

Causally, there is growing interest in the relationship of inflammation and BPH. In fact, inflammation of the prostate appears to be more closely related to BPH than chronic prostatitis.[6] In the future, this may lead to treatment of BPH with therapies that target inflammation, but there is no good evidence at this time to support the treatment of BPH with antibiotics or anti-inflammatory medications, such as NSAIDs.

Because long-term data from population-based studies have only recently become available, the risks of developing complications and morbidities from untreated BPH are unclear. For example, despite recent evidence, there is still uncertainty regarding the likelihood that a patient with a specific symptom complex will develop acute urinary retention within a particular time frame. Nonetheless, BPH-associated mortality is rare in the United States, and serious complications are uncommon.[7] In contrast, LUTS are bothersome to many patients, and the degree of complaint varies greatly among individuals with the same symptom frequency and severity. Since the impact of LUTS on the patient's quality of life is highly variable and not directly related to measurable physiological factors, the patient's perception of the severity of the condition, as well as the degree to which it interferes with his lifestyle, should be primary considerations in choosing therapy.[3] Large-scale studies of different populations have demonstrated consistent evidence of a relationship between LUTS symptoms and ejaculatory dysfunction that is independent of age and other comorbidities.[8]

BPH has been defined as prostate enlargement from progressive hyperplasia of stromal and glandular prostatic cells, and clinically as LUTS associated with benign prostatic enlargement (BPE) causing bladder outlet obstruction (BOO).[6] The diagnosis of BPH is made by a combination

of history (see above), physical examination (symmetrically enlarged prostate without asymmetry or nodularity on digital rectal exam), and laboratory tests (esp. urinalysis and prostate specific antigen or PSA). An American Urological Association Symptom Index (AUA-SI) (see Table 1) of > 7 AUA-SI and a peak urinary flow rate < 15 mL/s[4] are also suggestive of BPH. However, the greatest value of the AUA-SI is not in making the diagnosis of BPH, but in assessing the severity of symptoms and their progression. Other diagnoses that should be considered with this clinical presentation include urethral stricture, bladder neck contracture, carcinoma of the prostate or bladder, bladder calculi, urinary tract infection, prostatitis, and neurogenic bladder).[9]

For all men presenting with LUTS, the AUA recommends the following:

1. Relevant medical history.
2. Assessment of LUTS, including determining severity and symptom bother with AUA-SI.
3. Physical examination with DRE.
4. Urinalysis (helps rule out other conditions).
5. Serum PSA (tends to correlate with prostate volume; may also point to prostate cancer).

Note: urine cytology should also be obtained in men at risk of bladder cancer, particularly if they have associated urinary frequency and urgency or hematuria.[2, 3]

Table 1 - AUA Urinary Symptom Index (AUA-SI)[3]

Questions to be Answered	**Not at all**	**Less than 1 time in 5**	**Less than half the time**	**About half the time**	**More than half the time**	**Almost always**
			Circle one number for each question			
1. Over the past month, how often have you had a sensation of not emptying your bladder completely after you finished urinating?	0	1	2	3	4	5
2. Over the past month, how often have you had to urinate again less than 2 hours after you finished urinating?	0	1	2	3	4	5
3. Over the past month, how often have you found you stopped and started again several times when you urinated?	0	1	2	3	4	5
4. Over the past month, how often have you found it difficult to postpone urination?	0	1	2	3	4	5
5. Over the past month, how often have you had a weak urinary stream?	0	1	2	3	4	5
6. Over the past month, how often have you had to push or strain to begin urination?	0	1	2	3	4	5
7. Over the past month, how many times did you most typically get up to urinate from the time you went to bed at night until the time you got up in the morning?	0 (none)	1 (1 time)	2 (2 times)	3 (3 times)	4 (4 times)	5 (5 or more times)
Sum of circled numbers (AUA symptom score): _____						

0 to 7: Mild symptoms
8 to 19: Moderate symptoms
20 to 35: Severe symptoms

Treatment options for BPH include watchful waiting, medications and surgery. The decision to treat involves balancing the severity of the patient's symptoms with potential side effects of therapy. Watchful waiting is recommended in men who have mild symptoms (AUA-SI of less than 7) or who do not perceive their symptoms to be particularly bothersome. These men should be monitored at least annually for symptom progression.[2] For those whose symptoms are more bothersome, further evaluation is warranted with a Frequency-Volume Chart to establish polyuria and the degree of nocturia. The AUA has published a Clinical Practice Guideline (CPG), which contains helpful treatment guidance (see Figure 1 below and the reference for more complete and detailed information).[9]

When selecting a pharmacologic agent, the treating physician needs to take into consideration the nature of the patient's disease, side effects of the selected agent and the potential for drug interactions with other medications in use. The BOO of BPH involves both a dynamic and a structural pathophysiologic component. The dynamic (physiologic, reversible) component is related to the tension of prostatic smooth muscle in the prostate, prostate capsule, and bladder neck. The fixed (structural) component is related to the bulk of the enlarged prostate impinging on the urethra. Alpha-adrenergic antagonists and 5-alpha-reductase inhibitors act upon the dynamic and fixed components, respectively. Alpha-adrenergic antagonists (terazosin, doxazosin, tamsulosin, alfuzosin, and prazosin) appear to be more effective for short-term treatment of symptoms but do not appear to have an impact on reducing long-term complications, such as urinary retention or the need for surgical intervention. Only 5-alpha-reductase inhibitors (finasteride and dutasteride) have demonstrated the potential for long-term reduction in prostate volume, which in turn reduces the long term risks of urinary retention and surgical intervention.[10] Regarding erectile dysfunction, the alpha-adrenergic antagonists appear to have a lower incidence of this potential side effect than do the 5-alpha-reductase inhibitors.[8]

There is increased interest in "natural" remedies for BPH. The most popular such agent over the past few years has been saw palmetto, an extract of the berry by that name. In 2001 an estimated 2.5 million adult Americans used this product. A recent trial compared saw palmetto with placebo and found that there was no difference after one year in the two groups in AUA-SI scores, maximal urinary flow rates, prostate size, residual volume after voiding, quality of life, or PSA scores.[11] This study and others examining the efficacy of dietary supplement-like substances (including beta-sitosterol) raises questions about the variability of botanical products as well as their overall efficacy compared to their claims.[12, 13]

Historically, the most commonly performed surgical treatment for BPH is transurethral resection of the prostate (TURP). Post-operatively, the patient is left with a wide open prostatic fossa bound by a denuded surgical capsule that will be lined by a newly regenerated epithelial surface in 6 to 12 weeks. Until this occurs, the patient is vulnerable to bleeding and most surgeons encourage avoidance of straining for at least six weeks. Most men note a marked decrease in symptom scores and a substantial increase in maximal urinary flow rates post-operatively. Side effects to this procedure include bleeding, incontinence and urethral strictures, all relatively uncommon. Most men will experience retrograde ejaculation after this procedure.[14] Newer surgical options include

several procedures with lasers, transurethral incision of the prostate, electrovaporization of prostate tissue, as well as several minimally invasive procedures such as transurethral needle ablation of the prostate and microwave thermotherapy. These have demonstrated efficacy as well, but are not appropriate for all TURP candidates. Urethral stents have been studied for BPH indications and are available, but have been abandoned by most urologists due to the tendency for tissue growth through stent fenestrations and encrustation of stent material.

II. Aeromedical Concerns.

The presence of BPH symptoms alone is not automatically disqualifying for flying duties. The primary aeromedical and operational concern with BPH relates to the potential for urinary obstruction/retention. The symptoms of acute urinary retention include severe lower abdominal pain, a distended abdomen, and the sudden inability to pass urine. Operationally, urinary frequency can be disruptive, and nocturia can result in sleep disruption and fatigue. The tendency to delay bladder emptying while in-flight can lead to excessive bladder distention and acute urinary retention. As such, judgment should be used in determining the aeromedical significance of reported symptoms.

Medical therapy for BPH should also be assessed for the possibility of aeromedically significant side effects. Regarding the 5-alpha-reductase inhibitors, specifically finasteride, a detailed aeromedical medication review in Sep 04 concluded it to be both effective and safe in the aerospace environment.[15] More recently, three alpha-1-adrenergic antagonists (silodosin, tamsulosin, and alfuzosin) were reviewed for use in flyers.[16-18] These medications were approved for aviator use but restricted to non-high performance aircraft due to the risk of orthostasis. Pilots are *also* restricted to flying with another qualified pilot if tamsulosin or alfuzosin is used. Silodosin does *not* require the latter restriction for pilots since it has a more favorable cardiac side effect profile due to its exceptional alpha-1 subtype selectivity.[16] Surgical treatment for BPH should only result in grounding for several weeks, with a return to flying as long as the symptoms are relieved with the procedure. Furthermore, "natural" products such as saw palmetto and beta-sitosterol should be considered cautiously, with the knowledge and approval of the flight surgeon, due to significant questions regarding efficacy, side effect profile, and the lack of regulation regarding contents and purity of these over-the-counter supplements.

III. Waiver Consideration.

Symptomatic BPH with urinary retention (AUA-SI score of 7 or greater) is disqualifying for all classes of flying in the Air Force per AFI 48-123. Asymptomatic BPH, and history of invasive surgical therapy such as TURP are not disqualifying, and do not require waiver submission if the obstructive symptoms are relieved, urinary continence is maintained, and healing is complete. Of note, it is recommended that after invasive surgery, the aviator remain DNIF for a <u>minimum</u> of 3 weeks to heal due to the risk for acute bleeding and post-operative urgency. Furthermore, DNIF is required if the patient's symptoms remain operationally significant, regardless of the treatment course. BPH is not disqualifying for retention or for ATC/GBC or MOD duties.

Table 2: Waiver potential for Benign Prostatic Hyperplasia

Flying Class (FC)	Waiver Potential Waiver Authority	Review/Evaluation at the ACS
I/IA	Maybe*# AETC	No
II	Yes*+&$ MAJCOM	No
III	Yes*+&$ MAJCOM	No
ATC/GBC MOD	N/A	N/A

*No indefinite waivers

This problem is very unlikely in the predominately young population contemplating flying training. Such a case will need to be worked up very carefully to rule out other sources of GU pathology.

+ No waiver required if symptoms are mild (less than seven on the AUA-SI Scale) without evidence of urinary retention and watchful waiting is the "treatment".

& No waiver required if surgery is the treatment of choice and there is no post-operative evidence of urinary retention.

$ If treated with an approved alpha-blocker, waiver should be restricted to non-high performance aircraft. Pilots on alfuzosin and tamsulosin should also be restricted to flying with another qualified pilot, e.g., FC IIC (non-high performance, with another qualified pilot). Pilots on silodosin are eligible for FC IIA waiver (see "Aeromedical Concerns" above).

AIMWTS review in Jan 14 revealed 136 cases submitted with a diagnosis of BPH. Of the total, there was 1 FC I/IA cases, 78 FC II, 44 FC III, 2 ATC/GBC, and 11 MOD cases. There were 14 disqualifications, however only 7 in which BPH was a principal disqualifying diagnosis (usually for BPH treated with alpha blockers). Of the 7 disqualifications, four were FC II (3 pilots and 1 flight surgeon) and 3 were FC III.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the <u>initial waiver</u> for benign prostatic hyperplasia should include the following:

A. Complete symptom history to include sensations of incomplete emptying of the bladder, urinary frequency, stopping and starting of urinary stream, urinary urgency, weak stream, difficulty initiating stream and nocturia. Discuss all attempted treatments/medications to include results and side effects.

B. AUA-SI score.

C. List and fully discuss all clinical diagnoses requiring a waiver.

D. Exam: GU exam to include a digital rectal exam.

E. Laboratory: urinalysis, PSA, urine flow rate, and post-void residual. Some cases may require a more detailed evaluation to include cystoscopy, 24-hour urine for creatinine clearance and protein, IVP, renal/prostate ultrasound, and serum creatinine.

F. Consult: Urology evaluation if surgery performed or symptoms severe, otherwise, a report from the treating physician will suffice if treated medically.

The following information will be required for waiver renewal every three years (if any abnormalities surface in the interim, they will need to be addressed appropriately). Each item should highlight any evidence for or against progression from earlier assessments:

A. Interim history to include change in symptoms, medication usage, and side effects.
B. AUA-SI Score with prior year(s) comparison.
C. Exam: digital rectal exam and any other pertinent exam findings.
D. Serum PSA with prior year(s) comparisons.
E. Current treatment doses and documentation of therapeutic benefit.
F. Report from treating physician.

ICD-9 code for Benign Prostatic Hyperplasia	
600	Hyperplasia of prostate

ICD-10 code for Benign Prostatic Hyperplasia	
N40.0	Enlarged prostate without lower urinary tract symptoms

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WAIVER GUIDE
Updated: Jun 2016
Supersedes: Waiver Guide of Jun 2012
By: Lt Col Tracy Bozung (RAM 17) and Dr. Dan Van Syoc
Reviewed by LtCol Timothy Phillips, AF/SG consultant for Urology

CONDITION:
Prostatitis (Jun 16)

I. Overview.

Prostatitis is the most common urologic diagnosis in men younger than 50 years of age and is the 3rd most common diagnosis in men above that age. It is defined as an increased number of inflammatory cells in the prostatic parenchyma. In the US, prostatitis accounts for nearly two million encounters annually and for 8% of visits to urologists and 1% of visits to primary care physicians.[1, 2] The National Institutes of Health (NIH) classification for prostatitis is recognized as the best clinical classification system.[3, 4, 5, 6]

1. Acute bacterial prostatitis (NIH category I) – This category is relatively uncommon in the general population but flight surgeons may see it more often due to the preponderance of male gender in flying career fields. Findings may include fever, genitourinary pain, obstructive voiding symptoms, dysuria, urgency and frequency. Individuals may also present with malaise, nausea, vomiting and can progress to frank septicemia. The most common organisms are gram negative enterobacteriaceae such as *E. coli* from gastrointestinal sources and less commonly gram positive enterococci.[5, 7] Risk factors for acute prostatitis include ascending genitourinary infections, functional or anatomic abnormalities that increase the likelihood of infection or any recent urogenital instrumentation (i.e. urethral catheterization, transurethral prostate biopsy.)[8] Initial diagnosis is made by history, physical, urinalysis and culture. In a retrospective analysis of almost 1000 patients with acute bacterial prostatitis, the prostate was tender in over 90% of patients; while commonly edematous, the prostate was actually small in 75% of cases.[9] A digital rectal exam may be performed with gentle prostatic palpation but prostatic massage should never be performed if prostatitis is suspected because it can lead to bacteremia. The prostate specific antigen (PSA) may be acutely elevated but will subside over the ensuing weeks and should be followed toward normal particularly in the older population. For this reason, it may be preferable to defer PSA testing reason until acute prostatitis is treated. Midstream urine will show significant white blood cells (WBCs) and may show bacteriuria with a positive culture.[5] Treatment for uncomplicated cases requires 2-4 weeks of oral antibiotics depending on the antibiotic chosen.[5, 10, 11] For those who are significantly ill, or who fail to respond to oral treatment, consider an abscess and treat with intravenous antibiotics and urologic referral.[5] Consult a current antibiotic reference book for the most appropriate agent based on patient age, potential pathogens or resistance patterns as recommendations change with time and location. Fluoroquinolones, macrolide or sulfa antibiotics are the usual treatments of choice.[11] For effective treatment, the chosen antibiotic must achieve high concentrations in urine and tissue.

2. Chronic bacterial prostatitis (NIH category II) – NIH II typically affects men aged 40-70 years of age but can affect younger men as well.[7] The patient usually has a history of recurring lower urinary tract infections (UTIs).[4, 5] The bacteria reside in aggregates or biofilms found in ducts and acini of the prostate gland. The risk for recurrence is greater in those with functional voiding

abnormalities or inadequate initial treatment for an acute infection.[7, 11] Diabetes, prior manipulation and urethral catheterization are also risk factors affecting the potential progression from acute to chronic prostatitis.[12] Organisms such as *Chlamydia trachomatis* may also play a role in some patients.[4, 7] For NIH category II or higher, examination of urine and culture before and after prostatic massage is indicated. A digital rectal exam with gentle prostatic massage should be performed after the patient has produced the first urine specimen followed by a post-massage urine sample. This massage is not done on a patient with a significant acute illness to prevent inducing a bacteremia.[4, 7] Often times, the post-massage urine sample has increased WBCs and may reveal pathogens but cultures may be sterile unless an acute UTI is also present.[4] Antibiotic treatment may range from 1-3 months depending on the medication selected and the severity of illness. Although currently most antimicrobial guides still recommend fluoroquinolones as a first-choice agent, macrolide antibiotics are emerging as an important alternative option for the treatment of chronic bacterial prostatitis.[11] Treatment of chronic infections of the prostate gland are not easily amenable to drug therapy and this category requires a urologist consultation to evaluate for any possible functional abnormality.[7, 11]

3. Chronic pelvic pain syndrome (CPPS) (NIH category III) – This category is composed of two sub-types and accounts for the majority of all prostatitis cases in the general population.[4, 7] NIH III type A and B CPPS have persistent chronic genitourinary pain without uropathogenic bacteria.[3, 4] The syndrome becomes chronic after three months of duration and the patient's quality of life is significantly affected. Examination of urine and culture before and after prostatic massage is required. Treatment may involve anti-inflammatory therapy and/or alpha-adrenergic blockers to improve urine outflow. Empiric antibiotic therapy may be useful, but it is not understood if improvement results from the antimicrobial effect on uncultured organisms or from an anti-inflammatory affect.[4, 7] Urologic consultation is required. A prospective cohort study of almost 21,000 men showed increased leisure time physical activity decreased the likelihood off developing chronic pelvic pain/chronic prostatitis.[15]

A. Nonbacterial prostatitis or inflammatory CPPS (NIH category IIIA) – Patients may complain of traditional symptoms of prostatitis but report increased pain localized to the perineum, suprapubic area, penis, groin or lower back. Additionally, they may report pain during or after ejaculation.[4] Increased numbers of WBCs are found in expressed prostatic secretions and may also be found in the post-prostatic massage urine or semen. All cultures are negative. There may be an association between this syndrome and an increased incidence of depression or psychological disturbances.[4, 13]

B. Prostatodynia or noninflammatory CPPS (NIH category IIIB) – The symptoms are similar to IIIA and all cultures are sterile. However, there are few to no WBCs found in expressed prostatic secretions, urine or semen.[4, 13] The etiology is unknown, but some postulate that symptoms result from smooth muscle tone abnormalities in the prostatic urethra.

4. Asymptomatic inflammatory prostatitis (AIP) (NIH category IV) – In category IV, WBCs are expressed in prostatic secretions, post-prostatic massage urine sediment, semen or histological specimens of the prostate gland but the patient is completely asymptomatic. No infection is present, cultures are negative, and patients frequently have benign prostatic hypertrophy and/or an elevated PSA. A noninfectious etiology may be present such as prostate cancer.[3, 4] Urologic consultation is required.

Treatment:

Antibiotic selection for NIH I and II should be based on positive culture results when available. Common choices include: quinolones, macrolides, doxycycline and trimethoprim-sulfamethoxazole (TMX/SMX). Other drugs, such as erythromycin have been previously advocated in literature as second line agents. Current medical literature review does not support the use of ampicillin unless specific sensitivities prove effective.

Unless complicated by an abscess, acute prostatitis does not usually require urologic consultation. NIH categories II – IV do require consultation. Individuals with NIH category II-IV may have reasons for recurring infections or inflammation such as dysfunctional voiding, intraprostatic ductal reflux, pelvic floor musculature abnormalities, neural dysregulation or prostatic calculi requiring urological evaluation and/or therapy.[5] Although a causal association between prostatitis and prostate cancer has not been definitively established, prostatic inflammation has been associated with prostatic epithelial changes that may be precursors to invasive carcinoma. In addition, locally advanced prostate cancer may cause symptoms similar to prostatitis. Therefore, prostate cancer should be in the differential diagnosis for men with prostatitis symptoms. Screening for prostate cancer and urologic consultation are required.

II. Aeromedical Concerns.

Acute prostatitis symptoms are not compatible with flying duties. Symptoms include urinary frequency, urgency, back and perineal pain, fever and chills. Chronic bacterial prostatitis is often asymptomatic between episodes but bacteriuria persists. The likelihood of recurrent acute UTI with rapid onset of symptoms makes this condition not compatible with flying duties unless cured or suppressed with antibiotics. Vibration in the cockpit may traumatize the perineal area and aggravate prostatitis.[11] Those assigned to high G-force aircraft may also exacerbate the condition secondary to G-load on the perineal area.[14]

Doxycycline, TMP/SMX, and erythromycin are all antibiotics listed on the Official Air Force Approved Aircrew Medications list. Short courses of therapy (2-4 weeks) for uncomplicated acute prostatitis treated with these antibiotics allows a return to flying status (RTFS) once idiosyncratic medication reactions are ruled out and the symptoms of infection have resolved. While quinolones have very good penetration into prostatic secretions and can shorten the course of therapy, they are not approved for flying duties. Ciprofloxacin may be used for biological warfare exposure but due to the increased risk for CNS side effects is not otherwise approved for flying duties. If an aviator does need a quinolone for therapy, it can be used as long as the flyer is DNIF during the entire antibiotic duration. Chronic prostatitis may require 1-3 months of antibiotics depending on the medication selected and the severity of illness.[4, 11] The subsequent waiver for chronic prostatitis may allow treatment with the same antibiotic in the future (if the bacteria are sensitive) and a smoother RTFS.

For those requiring prolonged antibiotic therapy during times of significant sun exposure, one must be cognizant of drugs with increased risk for photodermatitis such as doxycycline and Bactrim® (TMP/SMX). Use good operational risk management (ORM) for drug selection and reference your antibiotic pocket guide as recommendations change with time.

III. Waiver Considerations.

Chronic prostatitis (NIH II – IV) and abscess of the prostate are disqualifying for all flying classes including RPA pilots. Prostatitis is not listed as disqualifying for ATC/GBC and MOD personnel, nor is it disqualifying for retention purposes.

Table 1: Waiver potential of prostatitis based on NIH category.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	NIH I	N/A
	NIH II	No* AETC
	NIH III	No† AETC
	NIH IV	No# AETC
II/RPA Pilot/III**	NIH I	N/A
	NIH II	Yes MAJCOM
	NIH III	Maybe†$ MAJCOM
	NIH IV	Maybe# MAJCOM

* Risk of recurrent and prolonged infections prevents waiver for I/IA.
** Waiver authority for IFC II for URT is AETC.
† Treatment of chronic pain is usually with alpha blockers and they are not waivered for FC I/IA or II and are rarely waivered for FC III (alpha blocker's aeromedically significant side effects include postural hypotension, dizziness, vertigo and syncope).
# Responsive conditions like prostate cancer may be waived for trained FC II or III once treatment completed and six months has elapsed. See prostate cancer waiver guide.
$ Waiver for untrained FC II and III is unlikely.

Review of AIMWTS in Jun 2016 showed waiver submissions for 60 cases of prostatitis: 1 FCI, 33 FCII, 24 FCIII, and 2 ATC/GBC. Of the 60 cases, 6 (10%) were disqualified. Two FCIII personnel were disqualified for multiple disqualifying medical conditions in addition to prostatitis. One ATC/GBC member and one FCII aviator were disqualified for unauthorized medications for prostatitis and/or chronic pelvic pain (Flomax and Neurontin). One FCII aviator did not want a waiver as his prostatitis flared with his navigation duties. One FCIII aviator was disqualified for unresolved urinary retention secondary to prostatitis.

IV. Information for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver of prostatitis should include the following:
A. History (present and past) plus current absence of symptoms and medication side effects.
B. Complete examination. In addition to a general physical exam with temperature, this exam includes an external urologic exam as well as a rectal exam.
C. Urinalysis, cultures and labs such as PSA and CBC if required.
D. Urologist's consultation, diagnosis and study results to rule out other abnormalities. (Consultation notes and test results may be scanned into the AIMWTS program.)
E. In NIH III/CPPS cases, consider the psychological status of the flyer.

The AMS for waiver renewal for prostatitis should include the following:
A. History – address recurrence frequency, symptoms, treatment and any side effects, and activity levels.
B. Physical – External urologic exam and rectal.
C. Urology consult.

ICD-9 codes for Prostatitis	
601.0	Acute prostatitis
601.1	Chronic prostatitis
601.2	Chronic prostatitis
601.4	Prostatitis in disease classified elsewhere
601.8	Other specified inflammatory diseases of the prostate
098.12	Gonococcal prostatitis (acute)
098.32	Gonococcal prostatitis (chronic)
131.03	Trichomonal prostatitis

ICD-10 codes for Prostatitis	
N41.0	Acute prostatitis
N41.1	Chronic prostatitis
N41.3	Prostatocystitis
N41.4	Granulomatous prostatitis
N41.8	Other inflammatory diseases of prostate
N41.9	Inflammatory disease of prostate, unspecified
A54.22	Gonococcal prostatitis (acute or chronic)
A59.02	Trichomonal prostatitis

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WAIVER GUIDE
Updated: Sep 2015
Supersedes Waiver Guide of Nov 2011
By: LtCol An Duong (RAM 16) and Dr. Dan Van Syoc
Reviewed by LtCol Eric Barnes, AF/SG consultant for Nephrology

CONDITION:
Proteinuria & IgA Nephropathy (Sep 15)

I. Overview.

Proteinuria is an early and sensitive marker for renal damage in many types of chronic kidney disease.[1] It characterizes most forms of glomerular injury, but is not necessarily diagnostic for renal injury. Urinalysis is a common test in the clinic and is performed for many reasons. Urinalysis is often part of a screening exam such as school physicals, preplacement exams and flight physicals. Annual screening for proteinuria is no longer felt to be cost-effective in the general population for those less than 60 years of age, but the National Kidney Foundation recommends regular surveillance for those at risk of kidney disease. Risk factors for kidney disease include family history of kidney disease, diabetes, hypertension, ethnic minority, obesity, and metabolic syndrome.[2, 3] For patients at risk, it is important to detect disease early in its course as current therapy can significantly slow progression of proteinuric chronic kidney disease.

Urinary protein excretion in the normal adult should be less than 150 mg/day. If the excretion exceeds this level beyond a single measurement, the patient needs to be evaluated for possible glomerular disease. Transient proteinuria can occur in up to 7% of women and 4% of men and is often associated with fever or exercise. Such benign proteinuria nearly always resolves on follow-up; thus, isolated proteinuria is normally not evaluated unless confirmed on repeat analysis. The gold standard for quantification of proteinuria is a 24 hour urine collection. It is important to note that 24 hour collections are inconvenient for most patients and can be inaccurate due to over or under collecting of urine. For patients with albuminuria on urinalysis, a urine albumin/creatinine (UACR) (normal < 30 mg/L) or urine protein/creatinine (UPCR) (normal ≤0.150) should be obtained for further evaluation.[2]

Common causes of proteinuria in an adult population include isolated proteinuria, orthostatic proteinuria, conditions causing nephritis, and as a result of systemic illness. Isolated proteinuria can result from problems such as febrile illness, other physiologic stress or vigorous exercise or from abnormal production in conditions including myeloma and monoclonal gammopathies, or from toxins such as cadmium.

Orthostatic proteinuria is not an uncommon condition in adolescents and young adults but it is rare after age 30. This condition is characterized by an increase in protein excretion in the upright position, but a normal excretion (< 50 mg/8 hours) when supine. This postural response contrasts with most patients with glomerular disease who will normally demonstrate a modest reduction in protein excretion while supine, but commonly not to normal levels. Glomerular disease may initially present with mild manifestations therefore people with orthostatic proteinuria should have a follow-up evaluation after one year to evaluate for persistence or progression.[4]

Patients with signs or symptoms suggestive of glomerular disease, such as persistent proteinuria or hematuria and/or impaired renal function, should be considered for a renal biopsy in order to obtain a diagnosis. The risks associated with a biopsy, such as bleeding, are minimal with experienced clinicians. The most frequent adult primary glomerular disorders are IgA nephropathy followed by focal and segmental glomerulosclerosis (FSGS) and then membranous nephropathy.[5]

IgA nephropathy was first described by Berger and Hinglais in 1968. It is now the most prevalent primary chronic glomerular disease worldwide and is defined as an immune-complex-mediated disease characterized by the presence of glomerular IgA deposits accompanied by a variety of histopathologic lesions.[6]

IgA nephropathy presents with episodic hematuria and often follows an upper respiratory infection – so called "synpharyngitic hematuria". It has macroscopic and microscopic forms; the latter is the more common form seen in adults. Between episodes of macroscopic hematuria, the urinalysis is often normal. The presence or absence of increasing proteinuria at the time of clinical diagnosis often determines whether patients with asymptomatic hematuria are biopsied.[7, 8] The disease was initially considered a benign form of hematuria, but it is now clear that up to 50% of patients may progress to end-stage renal disease.[6, 9] The remaining patients may enter a sustained clinical remission or have persistent low grade hematuria or proteinuria. The prognosis is variable and the outcome difficult to predict with accuracy in individual patients. It can present at any age, but is more common in the second and third decades. There is a male to female ratio ranging from 2:1 to 6:1 in Europe and the US. Ethnically, Caucasians and Asians are much more prone to this disease than are African Americans.[6]

IgA nephropathy may present in one of three ways. About 40-50 percent of patients present with one or more episodes of gross hematuria usually following an upper respiratory infection. Another 30-40 percent have microscopic hematuria and mild proteinuria incidentally detected on a routine examination. Less than 10 percent of patients present with nephrotic syndrome, or with acute rapidly progressive glomerulonephritis characterized by hematuria, edema, hypertension and renal insufficiency. A definitive diagnosis can only be made by renal biopsy and immunohistologic examination. In patients who have isolated hematuria, a renal biopsy is usually performed only if there are signs suggestive of severe disease or progressive protein excretion above 0.5 to 1 gram/day, an elevated plasma creatinine, or hypertension. A skin biopsy looking for IgA deposition in the dermal capillaries has not proven to be predictive in IgA nephropathy.[10]

While there is no recognized cure for this disease, there are treatment options that slow disease progression, and up to 23% of patients will show a complete remission. A very important part of the evaluation of patients with IgA nephropathy is to predict their risk for progression to renal failure.[11] Risk factors for progressive renal failure include: elevated serum creatinine above 2.5 mg/dL at the time of diagnosis, hypertension, and persistent proteinuria above 0.5 to 1 g/day. The relationship between increasing proteinuria and a worse prognosis is probably a reflection of proteinuria as a marker for the severity of glomerular disease. The rate of progression is low among patients excreting less than 500 mg/day and fastest among those excreting more than 3.0 to 3.5 g/day of protein.

There are two separate approaches to the treatment of IgA nephropathy. General interventions to slow progression of renal disease that are not specific to IgA nephropathy include blood pressure control, angiotensin converting enzyme (ACE) inhibitors or angiotensin II receptor blockers

(ARBs) in patients with proteinuria. Reduction in proteinuria is the hallmark of effective treatment in preserving renal function in other types of nondiabetic proteinuric renal diseases.[6, 12] Corticosteroids can be used in advanced cases of IgA nephropathy. Statin therapy for lipid-lowering is recommended in the majority of chronic kidney disease patients to lower cardiovascular risk and possibly reduce disease progression. Fish oil has been studied but its role in treating IgA nephropathy is not well defined.[9] Some studies indicate that it may be useful for reducing renal inflammation and glomerulosclerosis.

The treatment of choice for individuals who progress to end-stage renal disease is preemptive renal transplantation – that is, transplantation before they require hemodialysis. Many of these patients are younger and otherwise healthy. Transplantation provides a reasonable quality of life and a lifespan longer than that of the hemodialysis patient. Kidney disease recurrence does occur in transplanted kidneys, however transplant centers are accustomed to monitoring patients at risk. Nearly one-third of transplant recipients will develop a clinically apparent recurrence of the disease in the transplanted kidney.[13] The rate of recurrence is equal between cadaveric and living donors.[7]

II. Aeromedical Concerns

Regarding proteinuria, flyers will be disqualified when diagnosed with "Proteinuria under normal activity (at least 48 hours post strenuous exercise) greater than 200 mg in 24 hours , or protein to creatinine ratio greater than 0.2 (by random urine sample), or other findings indicative of urinary tract disease unless consultation determines the condition to be benign. ." In other words, if the protein loss can be explained by a relatively benign process or is stable (protein cannot be > 500mg/24 hours), the aeromedical concerns would be negligible and waiver is favorably considered. For IgA nephropathy, the aeromedical concerns would be related to the renal function, any symptoms, and the medications being used. For most flyers, a return to flying (waiver) would be in order once the disease is in remission and requires no medication. In those with a more chronic or indolent form, the disease is usually one that is slowly progressive. Typically such patients are treated with ACE inhibitors to preserve renal function, and a waiver will likely be granted if the patient is otherwise stable.[14]

III. Waiver Considerations.

Benign forms of proteinuria are routinely waived for all flying classes if it is deemed to be benign after specialty consultation. IgA nephropathy is disqualifying for FC I/IA, II, and III duties if the proteinuria exceeds 200 mg/24 hours. Chronic nephritis with renal function impairment and nephrosis worse than mild are disqualifying for all flying and special operational duties and require an MEB prior to waiver submission. Certain ACE inhibitors and ARBs are approved for aircrew use, as are a number of statins, though the role of the latter in IgA nephropathy is unclear. Corticosteroid therapy is not waiverable. If significant hematuria is also present, please consult with the waiver guide for hematuria for assistance.

Table 1 – Waiver potential for proteinuria and IgA Nephropathy

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA Untrained II/III	Proteinuria without evidence of renal disease or hypertension	Yes AETC
	Proteinuria without evidence of renal disease, but with hypertension*+∫	Maybe AETC
	Proteinuria with evidence of renal disease with or without hypertension	No AETC
	IGA Nephropathy with proteinuria	
II/III	Proteinuria without evidence of renal disease or hypertension	Yes MAJCOM
	Proteinuria without evidence of renal disease, but with hypertension *+#	Yes MAJCOM
	Proteinuria with evidence of renal disease with or without hypertension *+#	Yes MAJCOM
	IGA Nephropathy with proteinuria +	
ATC/GBC MOD**	Chronic nephritis with renal function impairment	Maybe, after MEB MAJCOM
	Nephrosis worse than mild	Maybe, after MEB MAJCOM

***** Hypertension controlled on low dose HCTZ, chlorothiazide, triamterene, lisinopril, ramipril, benazepril, telmisartan or losartan may be considered for waiver.
** Waiver authority for MOD personnel is AFGSC.
+ No indefinite waivers.
# FC IIA waiver can also be considered with HCTZ combined with lisinopril, ramipril, benazepril, telmisartan or losartan; atenolol alone or in combination; nifedipine (coat-core or GITS) alone or in combination; or amlodipine alone or in combination.
∫ Waiver for FC I/IA and untrained FC II and FC III may be considered if sustained HTN control well documented, on low standard dosage, no evidence of end organ damage and no side effects.

AIMWTS review in Sep 2015 for the diagnoses of proteinuria and IgA nephropathy revealed a total of 95 cases, with 19 of those resulting in a disqualification disposition. Breakdown of the cases

revealed: 14 FC I/IA cases (6 disqualified), 43 FC II cases (5 disqualified), 28 FC III cases (6 disqualified), 7 ATC/GBC cases (1 disqualified), and 3 MOD cases (1 disqualified).

IV. Information for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver for proteinuria and/or IgA nephropathy should include the following:
A. Complete history of the problem to include all consultants seen.
B. Physical exam results.
C. Labs – all urinalysis tests to include microscopic results, BUN/Cr, 24 hour urine, renal biopsy results if done.
D. Nephrologist consultation report if completed.
E. Current treatment to include all medications and dates started.
F. Results of MEB if aviator has IgA nephropathy, or nephropathies, or nephritis.
G. Detail of all other medical problems, if applicable.

The aeromedical summary for waiver renewal for proteinuria and/or IgA nephropathy should include the following:
A. Updated history since last waiver
B. Physical exam results.
C. Labs – all urinalysis tests, other labs and additional renal biopsies since last waiver.
D. Nephrologist consult report if new one accomplished.
E. Current treatment to include all medications and dates started.

ICD-9 Codes for Proteinuria	
791.0	Proteinuria
583.81	Nephropathy, not specified
583.9	IgA nephropathy

ICD-10 Codes for Proteinuria	
R80.9	Proteinuria, unspecified
N08	Glomerular disorders in diseases classified elsewhere
N02.8	IgA nephropathy

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WAIVER GUIDE
Updated: Jul 2014
Supersedes Waiver Guide of Mar 2011
By: Dr Dan Van Syoc
Reviewed by LtCol Matthew Carroll, AF/SG consultant for Rheumatology and LtCol Patrick Ellison, AF/SG consultant for Dermatology

CONDITION:
Psoriasis and Psoriatic Arthritis (Jul 14)

I. Overview.

Psoriasis: Psoriasis affects about two percent of the population in the United States, with approximately 150,000 new cases diagnosed per year, and is equally common in males and females. Approximately 80% of all psoriasis patients have mild to moderate disease with the remainder having moderate to severe disease.[1] Onset is a lifelong threat as it has been documented at birth and up to age 108, with peak incidence at 22.5 years. An early onset (before age 15) predicts more severe disease relative to the percentage of body surface involved and response to therapy.[2] While looked at as a simple dermatological disease, recent research has demonstrated a far more complex immune-mediated disease process. Psoriasis is associated with arthritis and inflammatory bowel disease. It is also an independent risk factor for diabetes, hypertension, coronary artery calcification, myocardial infarction, lymphoma, and depression.[3-5] An important issue to consider is that the impact of psoriasis on quality of life of affected individuals is comparable to other disorders such as cancer, diabetes, heart disease, and depression.[6]

Psoriasis is a hyperproliferation and immune regulation disorder.[7] Hyperproliferation is seen with increased numbers of epidermal cells, increased number of cells undergoing DNA synthesis, and an increased turnover of epidermal cells.[8] A T-cell immune response is noted with increased T-cells seen in the skin.[9] TNF-alpha, gamma interferon, and various interleukins are overexpressed in psoriasis patients.[10] Dendritic cells play a key role in this immune response as they are activated by environmental factors and subsequently produce interferon alpha and stimulate T-cell differentiation in the dermal layers.[11, 12] Current psoriasis therapies attempt to address this complex interaction.

Morphologic appearance and distribution are keys to diagnosis, as well as the Auspitz phenomenon (after mechanical removal of a scale, small droplets of blood appear on the erythematous surface). Typical plaques are erythematous, dry, and scaling (silvery white scale). Presentation may vary from a few localized psoriatic plaques to generalized skin involvement, to a life-threatening pustular psoriasis. The course of psoriasis is chronic and unpredictable. Plaques are the most common form of the disease and most (65%) have mild disease. While genetics appear to play a variable role in the development of psoriasis, the most significant triggers include environmental and behavioral factors such as cold weather, physical trauma, infections, stress, and drugs (lithium, beta-adrenergic blockers, antimalarial agents, angiotensin-converting enzyme inhibitors, and corticosteroid withdrawal).[2, 7, 8, 9, 13]

Psoriasis distribution is usually symmetrical, and favors the elbows, knees, scalp, and sacrum. Palms, soles, nails and intertriginous (inverse psoriasis) areas can be involved. Guttate psoriasis is a form of psoriasis with typical lesions the size of water drops, 2 to 5 mm in diameter, that occur as

an abrupt eruption following an acute infection, such as streptococcal pharyngitis, and usually in patients under 30. Chief complaints of psoriasis include: disfigurement, lowered self-esteem, being socially ostracized, pruritus and pain (especially palms, soles, and intertriginous areas), excessive scale, heat loss (with generalized lesions), and arthralgias.

Dermatologists may grade the severity of psoriasis on body surface area (BSA); less than three percent is mild, three to 10 moderate, and greater than 10 percent severe.[14] The palm of the hand equals one percent of the skin. However, the severity of psoriasis is also measured by how psoriasis affects a person's quality of life. Psoriasis can have a serious impact even if it involves a small area, such as the palms of the hands or soles of the feet.

Treatment includes topical steroids, topical tar, topical vitamin D_3 (calcipotriene [Dovonex®]), topical retinoid (tazarotene [Tazorac®]), topical calcineurin inhibitors (pimecrolimus and tacrolimus), phototherapy, and systemic agents such as methotrexate, acitretin, or newer biologic immune response modifiers, such as etanercept and infliximab, for moderate to severe disease.[15] Newer immunosuppressive agents such as ustekinumab (Stelara®) may also be considered, but are not approved for use in aircrew. Goal of therapy is to decrease body surface area, decrease erythema, scaling and thickness of plaques, improve quality of life and avoid adverse effects.[16]

Approximately 70 to 80% of all patients with psoriasis can be treated adequately with use of topical therapy. In cases of moderate-to-severe psoriasis (e.g. affecting large surface areas), the use of phototherapy, systemic drugs or both are more likely to be required. Management of each case needs to be individualized and may involve combinations of modalities.[5]

Psoriatic Arthritis: Psoriatic arthritis is one of the seronegative spondyloarthritis disorders, and as such, it is associated with a negative rheumatoid factor. It may precede (in children only), accompany or more often, follow skin psoriasis. Estimates of the prevalence of psoriatic arthritis among individuals with psoriasis vary from 4 to 6 percent up to 30 percent; equal in female and male.[17] Nail involvement occurs in more than 80% of patients with psoriatic arthritis, compared with 30 % of patients with uncomplicated psoriasis.[13] Approximately 20% of individuals with psoriatic arthritis develop destructive and potentially disabling disease.[18]

As in psoriasis, proinflammatory cytokines and activated T-cells are found in the affected tissues; namely synovium and joints. Joint symptoms include stiffness, inflammation and swelling. The most common areas involved include the distal interphalangeal joints and the spine.[17] Pain is usually improved with physical activity. Over half of patients with psoriatic arthritis have radiographic abnormalities and nearly half of those recently diagnosed will have erosions within two years.[19] There are five recognized presentations of psoriatic arthritis:[13]

Table 1: Presentation of Psoriatic Arthritis

Type	Percentage of all psoriatic arthritis	Features
Asymmetric oligo-arthritis (involving DIPs, PIPs and MCPs)	60 -70	Joints of fingers and toes ("sausage finger")
Symmetric polyarthritis	15	Clinically resembles rheumatoid arthritis, rheumatoid factor negative
Distal interphalangeal joint disease only	5	Mild, chronic, associated with nail disease
Destructive poly arthritis (arthritis mutilans)	5	Osteolysis of small bones of hands and feet; gross deformity; joint subluxation
Ankylosing spondylitis	5	With or without peripheral joint disease

Treatment usually begins with nonsteroidal anti-inflammatory drugs (NSAIDs). Sulfasalazine, etanercept (Enbrel®), adalimumab (Humira®) and infliximab (Remicade®) are other waiverable medications used to treat psoriatic arthritis. Etanercept in one study resulted in 20% and 50% improvement in 59% and 37% of individuals, respectively.[20, 21] Although etanercept may be administered at a dose of 25 mg twice a week, a dosage schedule of 50 mg once a week has shown similar efficacy and simplifies the regimen, particularly with the autoinjector dosage form. The drug is given in rotating fashion over the subcutaneous tissue of the thighs. Etanercept must be kept refrigerated between 36° to 46°F, for it degrades rapidly even at room temperature. Adalimumab also has demonstrated efficacy in the treatment of psoriatic arthritis and is FDA-approved for this indication. Typical dosing is 40 mg injected subcutaneously every other week. Handling of the drug is similar to etanercept, and refrigeration is required.[22] Additional medications used for treatment such as methotrexate and cyclosporine are not waiverable.[16, 20]

II. Aeromedical Concerns.

The main concerns are interference with wear of protective aviation equipment; distraction by pruritus or pain; triggering or exacerbation of the disease through repeated occupational trauma to the skin (Köebner's phenomenon); use of treatment medications that are incompatible with flying duties; unavailability of treatment in a deployed setting (ultraviolet light therapy); frequency of follow-up requiring excessive time lost from flying duties; and psychological factors. Although psoriasis usually spares the face and may not affect wear of a mask, scalp involvement is possible and may interfere with helmet use. Involvement of palms and soles may interfere with use of flight controls. Discomfort from pruritus or pain can be significant and the resulting distraction may jeopardize flight safety. Köebner's phenomenon may be caused by repeated rubbing or pressure including wear of a helmet or prolonged sitting in the cockpit.

While most topical treatments are well tolerated with few side effects, some may cause an irritant skin reaction. Topical calcineurin inhibitors tacrolimus and pimecrolimus are not approved for the treatment for psoriasis in Air Force aviators due to subclinical neurotoxicity.[23] UVB phototherapy is well tolerated except for risk of burning and skin dryness. PUVA (oral photochemotherapy) short term side effects include nausea, dizziness, headache, pruritus, cutaneous and eye photosensitivity

and long term side effect of increased risk of skin cancer. Joint involvement may interfere with use of flight controls, be a distraction due to discomfort and limit egress ability. Some forms of therapy (e.g. ultraviolet light) may require several treatments per week, would usually not be available in a deployed setting, and may require excessive time lost from flying duty. It is important to maintain awareness of the psychological aspect of this potentially disfiguring disease and its effect on the aviator's social situation.

Systemic treatments may have a range of significant side effects that are incompatible with flying duties in addition to the disqualifying nature of the severe forms of psoriasis. Sulfasalazine toxicity consists of dose-related adverse effects, and a number of more serious hypersensitivity reactions primarily related to the sulfa moiety. Methotrexate, because of serious toxicity involving multiple organs (e.g., lung, central nervous system), is not waiverable. Of the toxicities associated with anti-TNF therapy, those related to immunosuppression have been of greatest concern. The increased risk of developing demyelinating disease appears to be well within aeromedical standards. The same is true of lymphoma, and the latter would be unlikely to be of particular aeromedical concern. There is inconclusive evidence of possible increased risk for congestive heart failure in anticytokine therapy. Individuals on anti-TNF therapy are at greater risk of infectious complications, to include bacterial and granulomatous infections. Anti-TNF therapy should never be initiated in the setting of an infection, and before anti-TNF therapy is begun, testing with intermediate strength PPD is required; tuberculin reactivity of 10 mm or more should be interpreted as a positive response, and antituberculous prophylaxis begun.[20, 22] Recommendations regarding duration of INH prophylaxis before beginning TNF-alpha inhibitors have been inconsistent.

III. Waiver Consideration.

For entry into the US Air Force, a current or past history of psoriasis is disqualifying; this would definitely impact those individuals applying for initial flying training as well. The diagnosis of psoriasis is disqualifying for flying duties. For ATC/GBC and MOD personnel, psoriasis is only disqualifying if not controlled by treatment, or controllable only with systemic medications or UV light therapy. Use of personal protective equipment is also going to be a big factor for all career fields for members with psoriasis. Psoriatic arthritis is not mentioned by name as disqualifying for aviation service, but "arthritis of any type of more than minimal degree, which interferes with the ability to follow a physically active lifestyle, or may reasonably be expected to preclude the satisfactory performance of duties" is disqualifying for all flying classes as well as for ATC/GBC and MOD duties. Also, a medical evaluation board (MEB) is required if the psoriasis is extensive and not controlled or controllable only with potent cytotoxic/systemic agents (methotrexate, cyclosporine, oral retinoids, PUVA and immune modulating drugs, to include TNF-alpha inhibitors).

Table 2: Waiver Potential for psoriasis and psoriatic arthritis

Flying Class (FC)	Condition/Treatment for Psoriasis	Treatment for Psoriatic Arthritis	Waiver Potential Waiver Authority
I/IA	History of psoriasis at any time whether or not under current therapy of any kind	History of psoriatic arthritis currently treated or not	No AETC
II/III*	Topical steroids, calcipotriene, topical retinoids (tazarotene),UVB	NSAIDS, sulfasalazine	Yes MAJCOM
	Etanercept, adalimumab, infliximab	Etanercept, adalimumab or infliximab	Yes[$] AFMSA
	Topical calcineurin inhibitors**, oral retinoids, methotrexate, cyclosporine, and other immunomodulators (except TNF-alpha inhibitors above), PUVA	Oral retinoids, methotrexate, cyclosporine, and other immunomodulators (except TNF-alpha inhibitors above)	No AFMSA
ATC/GBC MOD	Topical steroids, calcipotriene, topical retinoids (e.g. tazarotene), UVB	NSAIDS, sulfasalazine	Yes MAJCOM
	Etanercept, adalimumab, infliximab or pimecrolimus	Etanercept, adalimumab, infliximab or pimecrolimus	Yes[$] AFMSA
	Tacrolimus, oral retinoids, methotrexate, cyclosporine, and other immunomodulators (except TNF-alpha inhibitors above), PUVA	Oral retinoids, methotrexate, cyclosporine, and other immunomodulators (except TNF-alpha inhibitors above)	No AFMSA***

* All initial training applicants to be treated as FC I/IA

** e.g. tacrolimus, pimecrolimus (pimecrolimus is approved for atopic dermatitis but not psoriasis in aviators)[16]

*** Waiver authority for MOD personnel is AFGSC.

$ If on TNF-alpha inhibitor, waiver will be restricted (not worldwide qualified, TDY requires access to transport and refrigeration of etanercept/adalimumab). MEB is required. Observe for 3 to 6 months on therapy before consideration of waiver to allow for assessment of response, possible adverse effects. Forward to ACS for review.

AIMWITS search in Jun 2014 revealed a total of 330 members with an AMS diagnosis of psoriasis or psoriatic arthritis. Of this total, 54 were disqualified. Breakdown of the cases was as follows: 12 FC I/IA cases (6 disqualified), 143 FC II cases (7 disqualified), 166 FC III cases (39 disqualified), 7 ATC/GBC cases (1 disqualified), and 2 MOD cases (1 disqualified). In the FC III category, 15 of the DQ cases were for initial certification. Two cases were disqualified prior to approval of TNF-alpha inhibitor usage (1 FC II and 1 FC III). The remainder of the DQ cases was for other medical reasons.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial and renewal waivers must include:
A. History - to include extent of lesions, locations, symptoms, and a description of current therapy, all medications including dosage, and frequency, and comments addressing interference with use of aviation equipment or jeopardy to safe mission accomplishment. If arthritis, then in addition to joints involved should address any interference with flight controls and egress ability.
B. Physical - joints involved, surface area affected and description of lesions.
C. Copy of dermatology consultation.
D. All cases of psoriatic arthritis should be evaluated by a rheumatologist. These cases need to have results of radiographs for hands, feet, and any symptomatic joints.
E. Laboratory testing for initial waiver for psoriatic arthritis: complete blood count, sedimentation rate, C-reactive protein.
F. If topical vitamin D_3 (calcipotriene) is used, verify with the aviator the amount of topical vitamin D_3 cream use is less than 100 gm a week. Also baseline normal renal function should be confirmed prior to usage.
G. If on etanercept/adalimumab/infliximab, for initial waiver, results IPPD or Quantiferon releasing assay required.
H. If on etanercept/adalimumab/infliximab, then MEB required.

ICD-9 Codes for Psoriasis and Psoriatic arthritis	
696.0	Psoriatic arthropathy
696.1	Psoriasis

ICD-10 Codes for Psoriasis and Psoriatic arthritis	
L40.59	Other psoriatic arthropathy
L40.8	Other psoriasis

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WAIVER GUIDE
Updated: Jul 2014
Supersedes Waiver Guide of Apr 2010
By: LtCol Niraj Govil (RAM XV) and Dr Dan Van Syoc
Reviewed by Col Kent McDonald, psychiatrist and chief of the ACS Neuropsychiatry Branch

CONDITION:
Psychotic Disorders (Jul 14)

I. Overview.

Schizophrenia Spectrum and Other Psychotic Disorders are defined by one or more of the following: delusions, hallucinations, disorganized thinking (will be evident through speech), grossly disorganized behavior or abnormal motor movement (catatonia) and negative symptoms.[1]. Psychotic states are periods of high risk for agitation, aggression, impulsivity, and other forms of behavioral dysfunction.[2] They can occur as standalone psychiatric disorders or psychosis can be seen in conjunction with other psychiatric and medical disorders. Schizophrenia is probably the best-known psychotic disorder, but is extremely rare in aviators. Other recognized psychotic disorders include schizophreniform disorder, schizoaffective disorder, delusional disorders, and brief psychotic disorder. It is difficult to assess the prevalence of psychotic disorders in the population as these people often do not seek medical care**.** Some recent estimates of the lifetime prevalence of such disorders are as high as 3.0% of the US population.[3]

Due to the multiple screening processes involved in aircrew selection; it is unlikely that someone with a psychotic disorder would ever be selected for training. It is recognized that most serious psychotic conditions begin in adolescence with initial subtle symptoms that may be very hard to detect. This early period often consists of nonspecific symptoms in otherwise normal functioning people and detection can be very difficult.[4] As with all mental health conditions, there are various degrees of severity of psychotic disorders with some individuals leading a relatively normal life with rare to occasional symptomatic flares. Such episodes have occurred in military aircrew. The short lived psychotic symptoms that occur in aircrew usually are induced by severe stress and or sleep deprivation. Those that last greater than one day but less than 30 days, are usually classified as a brief psychotic disorder or psychotic disorder not otherwise specified (DSM IV).[5]

A form of psychotic disorder that may impact our aircrew members is that associated with alcohol use, substance abuse, prescribed medications, or as a reaction to a medical condition. Psychotic disorders can occur from intoxication from these commonly abused substances: alcohol, amphetamines, cannabis, cocaine, hallucinogens, inhalants, opioids (such as meperidine), phencyclidine, sedatives, hypnotics, and anxiolytics. Similar disorders can occur from withdrawal from these classes of substances: alcohol, sedatives, hypnotics, and anxiolytics.[1] Regarding substance abuse (to include alcohol), it may be difficult to separate primary psychotic disorders from those resulting from substance abuse. There are often some slight differences in the demographics of these two populations that may make it easier to discern the cause. Patients with a substance abuse etiology tend to occur at a later age, have greater antisocial personality disorder comorbidity, higher homelessness, and poorer family support.[6] A flyer's chances of returning to fly after a psychotic episode are far greater if it can be shown that a substance or medication was the cause. For this reason it is of paramount importance to get a good history, a broad laboratory

assessment, and a blood alcohol level and a toxicology screen in any aviator who has an episode of psychosis or bizarre behavior.

Treatment for patients with psychotic disorders can be difficult. It may take some time to make a correct diagnosis and these patients are frequently noncompliant with treatment modalities and follow up care. Many of these patients need to be evaluated and treated in a very structured environment with the use of neuroleptic medications. Most of the more serious psychotic disorders have a significant risk of suicide (and perhaps homicide as well), so this needs to be carefully assessed as well.[7]

II. Aeromedical Concerns.

Psychosis is disqualifying for aviation duties. Symptoms of aeromedical concern include poor reality testing, poor insight, eccentric and bizarre behavior, social withdrawal, hallucinations, delusions (sometimes of a persecutory or self-destructive nature), confusion, clouding of consciousness, illogical thought, and a risk of suicide. Because of concern about unpredictable recurrence (with potentially devastating effects upon flying safety, mission completion, and personal health), careful documentation, management, and monitoring are important to aeromedical prognosis. If and when psychosis occurs in an aviator, the flight surgeon must consider waiverable disorders. Potentially waiverable causes of psychosis include toxic (substance-induced psychotic disorder), metabolic, or infectious conditions (psychotic disorder due to a general medical condition), and brief psychotic disorder with marked stressor(s).[8] Thorough documentation during the illness is vital to maximize the probability of an aviator's return to flying status after psychosis. Acute, stress-related psychoses in aviators often resolve quickly with hospitalization and stress relief and without antipsychotic medication

III. Waiver Consideration.

Psychotic disorders, as well as delirium and other cognitive disorders are disqualifying for all flying classes to include ATC/GBC and MOD duties. Waiver may be considered after the patient has been free of psychotic symptoms and off all mental health treatment including psychotropic medications for one year. A psychotic episode caused by alcohol, and occurring during the course of alcohol abuse or alcohol dependence, is considered for waiver in accordance with the waiver requirements for an alcohol use disorder (DSM V). A psychotic episode caused by alcohol, but not in the setting of alcohol abuse or dependence, is considered for waiver according to the guidance in this waiver guide. When the inducing substance is illicit, a return to flying is unlikely. In all other cases of substance-induced psychotic disorders, there must be clear evidence (history, physical examination, and laboratory evaluation) that the substance (e.g. prescribed medication producing an idiosyncratic reaction or an unintentional overuse of an over-the-counter medication) caused the psychosis. In cases of a psychotic disorder due to a general medical condition waiver, may be considered once the psychosis and the medical condition have completely resolved and are unlikely to recur, if the medical condition itself is waiverable.

Schizophrenia, schizoaffective disorder, delusional disorder, brief psychotic disorder without marked stressor(s), and shared psychotic disorder are permanently disqualifying for flying and special operational duties. Antipsychotic medications and close psychiatric monitoring are incompatible with flying duties. An MEB is required for any psychotic episode that is not due to a

clearly identifiable and avoidable cause. Any psychotic episode other than those with a brief duration, good prognosis and clearly identifiable and reversible cause must meet MEB.

Before submitting the case for waiver consideration, the base-level flight surgeon must first discern whether the condition is unsuiting vs. unfitting for service. If the Airman requires a fit/unfit determination, the case needs MEB action; if the Airman requires suited/unsuited determination, the case then needs consideration of an administrative separation or discharge via the chain of command.

Table 1: Waiver potential for psychotic disorders

Flying Class (FC)	**Waiver Potential#** **Waiver Authority**	**ACS Evaluation/Review**
I/IA	No AETC	Only if requested by AETC
II/III	Yes* MAJCOM	Yes
ATC/GBC MOD	Yes* MAJCOM**	Yes

#No indefinite waivers.
*Untrained FC II, FC IIU, FC III, ATC/GBC, and MOD candidates should be considered similarly to FC I/IA personnel.
** Waiver authority for MOD personnel is AFGSC.

AIMWITS search in Jul 2014 revealed a total of 19 members with a submitted aeromedical summary containing a diagnosis of psychosis. Breakdown of the cases revealed: 1 FC I/IA cases (disqualified), 10 FC II cases (8 disqualified), 6 FC III cases (3 disqualified), and 1 ATC/GBC case (disqualified).

IV. Information Required for Waiver Submission.

Submitting a Mental Health Waiver Guide:

Step 1 - Is the aviator ready for waiver submission?

A. Waiver is submitted when 1) the member is asymptomatic and 2) medications/psychotherapy treatment have been completed, as applicable to diagnostic category, for the specified time-frame below (Note: psychotherapy "booster sessions", and sometimes SSRIs, are permissible and often advisable after initial symptom resolution):

- ☐ 1 Year—Psychotic Disorders & Somatoform Disorders
- ☐ 6 Months—Mood Disorders, Anxiety Disorders & Suicidal Behavior
- ☐ Discretion of Flight Surgeon—Adjustment Disorders & V-Codes requiring waiver
- ☐ For Traumatic Brain Injury cases, please refer to TBI Waiver Guide
- ☐ For aviators with any other psychiatric disorders, please refer to AFI 48-123 and ACS Waiver Guide

B. To be considered for an aeromedical waiver, any disqualifying condition must meet the following criteria per AFI 48-123 Section 6B, 6.2.1.1 through 6.2.1.6. (pg.31):

- ☐ Not pose a risk of sudden incapacitation
- ☐ Pose minimal potential for subtle performance decrement, particularly with regard to the higher senses
- ☐ Be resolved, or be stable, and be expected to remain so under the stresses of the aviation environment
- ☐ If the possibility of progression or recurrence exists, the first symptoms or signs must be easily detectable and not pose a risk to the individual or the safety of others
- ☐ Cannot require exotic tests, regular invasive procedures, or frequent absences to monitor for stability or progression
- ☐ Must be compatible with the performance of sustained flying operations

Step 2 - Before beginning the Aeromedical Summary (AMS), Flight Surgeon must obtain Mental Health consultation and ensure it contains items specified below:
Instructions for the Mental Health Provider
The mental health evaluation must include a **comprehensive written report** addressing:

- ☐ Consultation must address each criteria in Step 1B
- ☐ Clinical mental health history (description of symptoms, treatment modality, frequency and compliance with treatment, relevant personal and family history, and perceived impact on occupational duties)
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…) ***** for alcohol cases, please comment on Carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, input from line leadership, if possible, and please address current state of any triggers for the mental illness)
- ☐ Current and past aviation related duties and any history of current and past occupational performance difficulties (to include perceived impact of mental health condition on performance of duties)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)

- ☐ Summary and interpretation of psychological/neuropsychological testing results (recommend MMPI-2, NEO PI-R, or similar personality test). For neuropsychological cases, please contact ACS neuropsychologist (Dr. Gary Ford, DSN: 798-2704) for guidance on recommended neuropsychological tests.
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly or engage in special duty operations (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)
- ☐ Copies of all records (mental health/ADAPT/inpatient) and raw testing data should be on hand for shipment to ACS Neuropsychiatry Branch

Step 3 - Items for the Flight Surgeon to include in the AMS:

- ☐ AMS must clearly address each criteria in Step 1B and the risk to the member, mission, and safety
- ☐ Summarize Mental Health history and focus on occupational impact
  ***** If 2 or more months have passed since the comprehensive evaluation/report was completed, the flight surgeon should address how the member has done since and consult with the mental health provider if the member has been seen at mental health since the evaluation*****
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…)
  ***** for alcohol cases, please comment on Carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, if possible - please address current state of any triggers for the mental illness)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)

Step 4 - Items to complete the waiver package:

- ☐ Letter of support from command
- ☐ Comprehensive mental health written-report
- ☐ Confirm mental health has made copies of chart(s) and testing. When requested send to:

ACS Aerospace Medicine Branch, USAFSAM/FECA
c/o Neuropsychiatry Branch
2510 Fifth Street Bldg 840
Wright Patterson AFB, OH 45433-7913
Fax: (937) 904-6296 DSN: 674-9296

Please feel free to contact the ACS Neuropsychiatry Branch with questions:
TSgt Tonya Merriweather: DSN 798-2703, SSgt Krista Traut 798-2738, or Mr. John Heaton: 798-2766

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for <u>initial waiver</u> for psychotic disorders should include the following:
A. History – An aeromedical summary detailing history of the disorder and all treatments administered, the current status of any social, occupational, administrative or legal problems associated with the case, and an analysis of the aeromedical implications of this particular case history.
B. Treatment – medications and therapy used for the psychotic disorder and any other psychiatric conditions. Are there any side effects due to the medication? A good laboratory examination to

include a toxicology screen and blood alcohol level are vital to the waiver. Psychosis almost always results in an emergency room visit so ensure the records are attached.
C. Psychiatry/psychology consultation: Need all treatment notes from treating mental health professional as well as an MEB-type narrative summary of the mental health record.
D. Report of all psychological testing, if performed.
E. Letter of support from squadron commander.

The AMS for waiver renewal for psychotic disorders should include the following:
A. History – interim history since last waiver.
B. Treatment – current therapy for the condition, if any.
C. Psychiatry/psychology consultation report(s) if accomplished since last waiver request.

ICD-9 codes for psychotic disorders	
291.3	Alcohol-induced psychotic disorder
298.9	Unspecified psychosis
293.9	Unspecified Transient Organic Mental Disorder
298.8	Other and unspecified reactive psychosis
291.8	Other specified alcoholic psychosis
291.0	Alcohol withdrawal delirium

ICD-10 codes for psychotic disorders	
F10.951	Alcohol use, unspecified, with alcohol-induced psychotic disorder with hallucinations
F29	Unspecified psychosis not due to a substance or known physiological condition
F06.8	Other specified mental disorders due to known physiological condition
F23	Brief psychotic disorder
F10.159	Alcohol abuse with alcohol-induced psychotic disorder, unspecified
F10.231	Alcohol dependence with withdrawal delirium

V. References.

1. Schizophrenia Spectrum and Other Psychotic Disorders. In *Diagnostic and Statistical Manual of Mental Disorders*, Fifth edition, (DSM-V). American Psychiatric Association. Washington, DC, 2013; pp 87-122.

2. Jibson MD. Overview of psychosis. UpToDate, 1 Nov 2013.

3. Perälä J, Suvisaari J, Saarni SI, et al. Lifetime Prevalence of Psychotic and Bipolar I Disorders in a General Population. Arch Gen Psych, 2007; 64: 19-28.

4. Bhangoo RK and Carter CS. Very Early Interventions in Psychotic Disorders. Psychiatr Clin N Am, 2009; 32: 81-94.

5. Ordiway V and Rayman RB. Case Report of an In-Flight Incident Involving an Aircraft Commander with a Psychiatric Illness. Aerospace Med, 1974; 45: 316-17.

6. Caton CLM, Drake RE, Hasin DS, et al. Differences Between Early-Phase Primary Psychotic Disorders With Concurrent Substance Use and Substance-Induced Psychoses. Arch Gen Psych, 2005; 62: 137-45.

7. Merrin EL. Delusional and Other Psychotic Disorders. Ch. 19 in *Review of General Psychiatry*, 5th edition, 2000.

8. Rayman RB, et al. *Rayman's Clinical Aviation Medicine*, 5th ed. New York; Castle Connolly Medical Publishing, Ltd., 2013, pp. 316-17.

Radiofrequency Ablation (RFA) of Tachyarrhythmias (Jun 08)

See Catheter Ablation of Tachyarrhythmias and/or Pre-Excitation (WPW)

WAIVER GUIDE
Updated: Sep 2015
Supersedes Waiver Guide of Nov 2011
By: Lt Col Kevin D. Hettinger (RAM XVI) and Dr. Dan Van Syoc
Waiver Guide reviewed by Col Matthew Carroll, AF/SG consultant for Rheumatology

CONDITION:
Raynaud's Phenomenon (Sep 15)

I. Overview.

Raynaud's phenomenon (RP), first described by Maurice Raynaud in 1862, is an exaggerated vascular response to cold temperatures or emotional stress. Raynaud's phenomenon (RP) is an exaggerated vascular response of the digital arterial circulation triggered by cold ambient temperature and emotional stress. The diagnosis of RP is based on a history of excessive cold sensitivity and recurrent events of sharply demarcated pallor and/or cyanosis of the skin of the digits. During cold exposure (particularly during shifting temperatures and winter months), Raynaud's attacks increase in frequency and intensity.[1]

Typically, RP presents as episodic attacks that have two distinct phases, an ischemic phase followed by a hyperemic phase. The ischemic phase is noted by well demarcated pallor of the fingers or toes progressing to cyanosis, typically starting in one or several digits spreading symmetrically to all digits. On re-warming, the attack generally ends with rapid reperfusion resulting in erythema (reactive hyperemia). In addition to the vasospastic color changes, other symptoms due to ischemia include pain, paresthesias, numbness, clumsiness of the hand/foot, and potentially ulceration of the skin.[2]

Patients with RP are classified as primary (formerly known as Raynaud's disease) or secondary (formerly known as Raynaud's syndrome). Differentiation between primary RP and secondary RP does not reflect a diagnosis in the strict sense, but rather a description of the current findings in an ongoing screening process. Primary RP describes those RP patients without an underlying disease identified or suspected. Secondary RP describes those RP patients who have a definitively established underlying disease. A third category, suspected secondary RP, is mentioned in the literature and describes those patients with findings suggestive of an underlying disease, such as abnormal nailfold capillaroscopy (NC) or abnormal rheumatologic laboratory testing, but that disease cannot be firmly established at the time of exam.[3] Some underlying diseases associated with secondary RP include scleroderma, mixed connective tissue disease, systemic lupus erythematosus, vasculitis, hematologic abnormalities including cryoglobulinemia, and neurologic disorders including carpal tunnel syndrome. Certain medications (β-adrenergic receptor antagonists, ergot, and amphetamines), trauma, and vibration are also noted secondary RP triggers.[2]

The prevalence of RP estimated through population surveys has ranged between 5-20 percent for women and 4-14 percent for men with significant variation noted between populations studied. Additionally, colder climates have a higher RP burden.[4] A systematic literature review of primary RP found the overall prevalence for primary RP varied from 1.6% to 7.2% in six cross-sectional studies in the general population
(women: 2.1–15.8% and men: 0.8–6.5%), including only studies with clear definition of RP or clear exclusion criteria for secondary RP.[5] A meta-analysis of 10 studies with 640 patients diagnosed

with primary RP found that 13% eventually developed a connective tissue disorder (secondary RP).[2]

The diagnosis of the RP is based on the history since there are no simple office tests for cold or emotion induced vasospasm and provocative testing is not recommended.[2] Criteria for the diagnosis of primary RP include vasospastic attacks precipitated by cold or emotional stress, symmetric attacks involving both hands, absence of tissue necrosis or gangrene, no history or physical findings suggestive of a secondary cause, normal NC, normal ESR, and negative antinuclear antibody test.[4] The likelihood of secondary RP is increased with presence of any of the following features: age of onset > 40 years, male gender, painful severe events with ulceration, asymmetric attacks, RP associated with signs or symptoms of another disease, abnormal labs suggestive of an autoimmune disorder of vascular disease, RP affecting areas proximal to the digits (hand, foot), or abnormal NC with enlarged or distorted capillary loops.[2]

A growing body of literature supports the use of NC in the primary care setting in the workup of RP.[6, 7] The use of NC provides the clinician a tool to be used in conjunction with the history and physical exam in discriminating between primary and secondary RP. One study suggests that in patients with RP and negative serologic tests, the presence of giant capillaries (p=0.001), avascular fields (p=0.02), or irregular architecture (p=0.0001) in NC is predictive for the development of a connective tissue disease, mainly scleroderma, CREST, or mixed connective tissue disease.[7]

The technique for NC involves placing a drop of immersion oil on the base of the fingernails of fourth and fifth digits and examining with a handheld ophthalmoscope set at 40+ diopters. The ophthalmoscope is advanced in and out (not touching the oil) until the capillaries are in focus. The normal vascular pattern seen in primary RP and normal vascular control patients consists of a longitudinal linear array of delicate “hairpin” capillary loops while the pattern seen in secondary RP often includes enlarged capillary loops, architectural derangements, and areas of decreased vascularity.[8]

The laboratory evaluation for patients suspected of secondary RP varies based on source cited but generally includes: complete blood count, basic metabolic panel and liver function tests, urinalysis, erythrocyte sedimentation rate, rheumatoid factor, C-reactive protein, complement (C3 and C4), antinuclear antibody, and tests for disease-specific autoantibodies (such as anticentromere antibodies and SCL70 scleroderma antibodies).[2, 9] A rheumatology consultation is also appropriate for suspected secondary RP.

Management of RP is best accomplished by avoidance of cold temperatures and maintenance of total body warmth including the hands and feet. If emotional stress is a contributor, therapies aimed at stress reduction may be of benefit. Avoiding known RP triggers like sympathomimetic drugs, clonidine, and ergotamine is crucial as is avoiding smoking.[4] Pharmacologic management is reserved for poorly controlled/severe RP. Calcium channel blockers are first line therapy with 30 mg of sustained release nifedipine or 5 mg of amlodipine daily recommended. Other classes of medications found beneficial include alpha adrenergic receptor antagonists, topical nitroglycerin, angiotensin converting enzyme inhibitors (ACEi), angiotensin receptor antagonists (ARB), phosphodiesterase inhibitors and selective serotonin reuptake inhibitors. Surgical management focuses on thorascopic sympathectomy and less commonly digital sympathectomy. In each instance recurrence/complication rates were high (82% with the thorascopic sympathectomy and 37% with the digital sympathectomy).[10]

II. Aeromedical Concerns.

The major aeromedical concerns associated with a RP episode during flight include sudden subtle incapacitation, distraction and a reduced ability to manipulate cockpit switches. Secondary RP associated with an established underlying connective tissue disease is not compatible with flying. Unavoidable exposure to cold conditions may increase the frequency of episodes and interfere with the performance of flying duties. This may be a significant factor in determining if the member should be maintained in the aviator status.

Calcium channel antagonists (specifically coat-core and GITS [Adalat CC® and Procardia XL®, respectively] and amlodipine [Norvasc®]) are approved in aviators; they are restricted to non-high performance aviators.

III. Waiver Considerations.

Raynaud's or vasospastic disease is disqualifying for Flying Classes I/IA, II, and III. Waiver potential for primary Raynaud's is outlined in the table below. For ATC/GBC, MOD personnel and Operational Support Flyers, retention standards state that Raynaud's phenomenon, if frequent, severe, associated with systemic disease or would limit worldwide assignability is disqualifying. Waiver potential for secondary Raynaud's is based on the causal systemic illness or disease process and will be handled on a case by case basis.

Table 1: Waiver potential for primary Raynaud's

Flying Class (FC)	Condition/Treatment	Waiver Potential Waiver Authority***
I/IA	Primary Raynaud's of at least two years duration, infrequent, requiring no medications	Maybe AETC
	Primary Raynaud's requiring medication	No AETC
II/III	Primary Raynaud's, requiring no medications	Yes† MAJCOM
	Primary Raynaud's requiring medications	Yes†* IIA - AFMSA (e.g. calcium channel antagonist) II – MAJCOM (e.g. ACEi or ARB)
ATC/GBC/OSF MOD	Primary Raynaud's, requiring no medications	N/A
	Primary Raynaud's requiring medications	Yes MAJCOM**

† Initial waiver duration for primary RP will generally be 2 years. If stability is noted at time of waver renewal, then a 3-year waiver duration is generally appropriate.
* Specifically, coat-core and GITS [Adalat CC® and Procardia XL®, respectively] and amlodipine [Norvasc®]) are the only calcium channel antagonists approved in aviators; they are restricted to non-high performance aviators (FC IIA).
** Waiver authority for MOD personnel is AFGSC.
*** If member does not meet retention standards, waiver authority becomes AFMSA.

A review of AIMWTS in Sep 2015 revealed 35 cases with a diagnosis of Raynaud's. All of the aeromedical summaries were reviewed. Twenty-four cases had primary Raynaud's, 2 cases had secondary Raynaud's, 1 case had Raynaud's secondary to chemotherapy, and 8 cases did not contain enough information to determine if they were secondary versus primary. Thirty of the waiver requests were approved and were either asymptomatic or had very infrequent exacerbations. Five of the 35 cases were disqualified due to uncontrolled RP and other disqualifying diagnoses. Breakdown was as follows: 3 FC I/IA cases (1 disqualified), 15 FC II cases (2 disqualified), 14 FC III cases (2 disqualified), 2 ATC/GBC cases and 1 MOD case.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver for RP should include the following:
A. A detailed RP history with attention to inciting factors, frequency, severity and duration of attacks; treatments tried and responses; smoking history; family history of RP and connective tissue diseases. The history should identify factors increasing suspicion for secondary RP as listed above. Pertinent positives as well as negatives should be included. The following three questions should be addressed:

1. Are the patient's fingers unusually sensitive to cold?
2. Do the patient's fingers change color when they are exposed to cold temperatures?
3. Do they turn white, blue, or both?

B. Thorough physical exam looking for evidence of peripheral vascular disease, peripheral nerve entrapment syndromes, and evidence of diseases associated with secondary RP. A NC should be performed.
C. Laboratory studies should include: complete blood count, ESR and ANA.
D. If physical exam or laboratory findings are suggestive of a secondary cause of RP, Rheumatology consultation must be obtained. Additional laboratory studies should include: basic metabolic panel and liver function tests, urinalysis, erythrocyte sedimentation rate, rheumatoid factor, c-reactive protein, complement (C3 and C4), and tests for disease-specific autoantibodies (such as anticentromere antibodies, SCL70 scleroderma and anti-topoisomerase I. Additional waiver criteria for secondary Raynaud's is based on the causal systemic illness or disease process.
E. MEB results if required for cases that are frequent, severe, associated with systemic disease or would limit worldwide assignability.

The aeromedical summary for waiver renewal for RP should include the following:
A. History – frequency and severity of attacks; treatment and response; identify factors increasing suspicion for secondary RP.
B. Physical – looking for evidence of peripheral vascular disease, peripheral nerve entrapment syndromes, and evidence of diseases associated with secondary RP. A NC should be performed.
C. Laboratories – not required unless evidence exists for auto-immune related secondary cause of RP.
D. Rheumatology consult – if evidence exists for auto-immune related secondary cause of RP.

ICD-9 Code for Raynaud's phenomenon	
443.0	Raynaud's syndrome/disease
443.9	Peripheral vascular disease, unspecified

ICD-10 Code for Raynaud's phenomenon	
I73.00	Raynaud's syndrome without gangrene
I73.9	Peripheral vascular disease, unspecified

V. References.

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2. Wigley FM. Clinical manifestations and diagnosis of Raynaud phenomenon. UpToDate, 25 Mar 15.

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WAIVER GUIDE
Updated: Mar 2015
Supersedes Waiver Guide of Mar 2012
By: Dr Dan Van Syoc
Reviewed by Col Matthew Carroll, AF/SG consultant for Rheumatology

CONDITION:
Reactive Arthritis (Mar 15)

I. Overview.

Reactive arthritis is an aseptic arthritis that occurs subsequent to an extra-articular infection (within 4-8 weeks), most commonly involving the gastrointestinal or genitourinary tract.[1] A newer definition is that reactive arthritis is arthritis that follows infection and share features with other forms of spondyloarthritis.[9] Reiter's syndrome is a historic term, used when a reactive arthritis is accompanied by non-gonococcal urethritis and conjunctivitis or anterior uveitis, and reactive arthritis is now the preferred term in current literature.[2] The complete triad is only present, however, in a minority of cases and incomplete symptoms occur frequently.[1] Reactive arthritis affects males 5:1 over females.[3] It has been linked to several infective agents including Chlamydial or Ureaplasma urethritis, Shigella, Salmonella, Campylobacter, or Yersinia enteritis.[1] It is hypothesized that infection with an organism or unknown antigen, combined with environmental factors in a genetically predisposed individual (HLA-B27 histocompatability antigen), results in the syndrome.[1, 4, 5, 6] Reactive arthritis does have microbial and immunologic features that suggest it may be a *forme fruste* of septic arthritis.[13]

The classic arthropathy is usually an asymmetrical extra-articular manifestation, a local enthesopathy, affecting tendon insertions rather than synovia as in rheumatoid arthritis. It usually occurs rapidly, over a few days, and asymmetrically, in 2 to 4 lower extremity joints. Dactylitis with distinctive sausage-digits, Achilles tendonitis, plantar fasciitis and sacroiliitis are common.[1] Reactive arthritis is usually self-limited, resolving in 3-12 months but 15% may have symptoms lasting over a year.[3] Recurrence of joint pain and swelling is noted in up to 50% and 15 – 30% develop a chronic arthritis or sacroiliitis.[3, 5] Chronic heel pain gives a poorer prognosis and up to 26% of these eventually develop spondylitis.[7] Common, and helpful, radiologic features include reactive new bone and periosteal spur formation at sites of enthesitis, rather than the bony erosions seen in rheumatoid arthritis.[2]

Extra-articular manifestations are many and varied. Nonpurulent urethritis is often related to Chlamydia or Ureaplasma and may be associated with circinate balanitis, a painless erythematous or vesicular lesion of the glans penis or cervix in up to 20-26% of cases.[1, 3] The triad of Reiter's syndrome is actually classified under an ICD code that is actually listed as "other venereal diseases." Conjunctivitis or anterior uveitis/iritis in one or both eyes occurs in up to 50%, especially when spondyloarthropathy presents as sacroiliitis.[3, 5] Keratoderma blenorrhagicum (in up to 20% of cases) is a characteristic hyperkeratotic skin lesions on the soles or palms; indistinguishable from pustular psoriasis.[1, 8, 9] Painless lingual or oral ulcers affect the oral mucosa and oncholytic nail changes may occur.[1, 3, 8] Cardiac complications are more concerning. An abnormal ECG occurs in 5-13% of patients with prolonged disease, with conduction defects in up to 4%. Rarely, aortic regurgitation, myocarditis, pericarditis, aortitis, peripheral neuropathy, meningoencephalitis and transient hemiplegia can occur.[1]

The diagnosis is primarily clinical, based on the history and physical findings. The differential diagnosis includes septic joint, Lyme disease, bacterial endocarditis, mycobacterial and fungal arthritis, HIV, inflammatory bowel disease or Whipple's disease.[3, 5] Uncertain diagnosis may prompt synovial fluid and biopsy analysis. The absence of rheumatoid factor, elevation of sedimentation rate, or C-reactive protein and the presence of anemia of chronic disease are common but nonspecific.[5] The human leukocyte antigen, HLA-B27, is present in 80% of reactive arthritis cases (usually those cases including sacroileitis), but varies widely among populations and has a low predictive value.[3]

First line treatment of reactive arthritis is nonsteroidal anti-inflammatory drugs (NSAIDs). Sulfasalazine has been effective, primarily on peripheral arthritis but not axial disease, with toxicities consisting of dose-related adverse effects, and a number of more serious hypersensitivity reactions primarily related to the sulfa moiety. Antibiotic therapy, such as doxycycline, though commonly used, has not been found effective in several trials except in those cases of disease in which evidence of recent or recurring chlamydial infection is found.[5, 9] Intra-articular steroids have been used. In patients who were refractory to NSAIDs and intra-articular steroids, have chronic ocular inflammation uncontrolled by steroids, or who do not respond to sulfasalazine, a trial of anti-TNF agents, such as etanercept, has been suggested.[4, 5, 10] These drugs have received approval for use treating ankylosing spondylitis and psoriatic arthritis but, no large studies have assessed the usefulness of these agents for reactive arthritis. Small studies of undifferentiated spondyloarthritis patients and patients with refractory uveitis have shown improvement with etanercept therapy and it has been used for these indications. (Standard practice prior to starting therapy with any TNF inhibitor is to screen for HBV or HCV).[5] If treatment is expanded to include disease modifying anti-rheumatic drugs or corticosteroids, it is imperative that HIV serology be assessed.

II. Aeromedical Concerns.

The common course of the disease includes remissions and exacerbations of lumbosacral, large joint and/or heel/ankle involvement which could limit mobility and egress capability. Fortunately the onset and recurrence is not associated with sudden incapacitation. Aeromedical concerns in patients with prolonged disease include the occurrence, in up to 10%, of early cardiac complications including the conduction abnormalities, arrhythmias, myocarditis, pericarditis and aortic insufficiency as well as peripheral nervous system involvement. Conjunctivitis, iritis and/or uveitis can interfere with vision thus impacting flying safety and mission completion. In addition, topical ophthalmic steroids commonly used to treat these conditions require at minimum temporary grounding.

NSAIDs, the first line of treatment, are compatible with flying (e.g. ibuprofen, naproxen). As with rheumatoid arthritis the treatment of reactive arthritis with sulfasalazine probably requires the sulfa moiety of sulfasalazine as opposed to the 5-ASA base. Although sulfasalazine is waiverable, the sulfa moiety may cause side effects which can impact flight safety, such as nausea, flatulence, headache, anemia, leucopenia and hepatotoxicity. More recently, anti-tumor necrosis factor such as infliximab (Remicade®) and a human monoclonal antibody (adalimumab) have been effective for more severe disease, and these drugs have been approved for aeromedical waiver with limitations.[4, 10] Of the toxicities associated with anti-TNF therapy, those related to immunosuppression have been of greatest concern.[11, 12] Before anti-TNF therapy is begun, chest radiography and testing with intermediate strength PPD are required; tuberculin reactivity of 10 mm or more should be

interpreted as a positive response, and antituberculous prophylaxis begun. Anti-TNF therapy is not compatible with deployment, due to the need for expedited work-up of infectious symptoms and for rapid treatment of suspected infections. It is also incompatible with live attenuated vaccines (such as smallpox, yellow fever, or intranasal influenza). Etanercept and adalimumab must be kept refrigerated at 36° to 46°F. These medications degrade rapidly even at room temperature, thus the instability of the drug not only affects deployment, but largely rules out any TDY of longer than a week's duration.

III. Waiver Consideration.

History of Reiter's syndrome/reactive arthritis is not mentioned specifically in our medical standards, but arthritis of any type of more than minimal degree, which interferes with the ability to follow a physically active lifestyle, or may reasonably be expected to preclude the satisfactory performance of duties is disqualifying for all classes and for retention. Therefore, a medical evaluation board is required when reactive arthritis interferes with a physically active lifestyle or with the satisfactory performance of military duties. In addition, use of medications to control symptoms is disqualifying for all flying classes. In those few cases where control can be achieved with infliximab, etanercept or adalimumab, a restricted waiver (not worldwide qualified, TDY requires access to transport and refrigeration of etanercept/adalimumab) can be favorably considered. Initial waiver for anti-TNF therapy will only be for one year, thereafter usually three years consistent with guidance for the drug in rheumatoid arthritis. ACS case review is required for initial waiver and for waiver renewal for these individuals. If disease activity is such that another anticytokine or methotrexate therapy is required, disqualification will be recommended.

Table 1 – Waiver potential depending on medication required for control of Reiter's Syndrome

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	Required ACS Review/Evaluation
I/IA	History of reactive arthritis; reactive arthritis requiring NSAIDs, sulfasalazine or immunomodulators for control	No AETC	No
II/III	History of reactive arthritis, reactive arthritis requiring NSAIDs and/or sulfasalazine	Yes, FC II* MAJCOM	No
	Etanercept/infliximab/adalimumab‡	Yes, FC IIC*$# AFMSA	Yes
	Other immunomodulators (other anticytokines, methotrexate, etc.)	No AFMSA	Yes
ATC/GBC MOD	History of reactive arthritis, reactive arthritis requiring NSAIDs and/or sulfasalazine	Yes MAJCOM**	No
	Etanercept/infliximab/adalimumab‡	Yes# MAJCOM**	Yes
	Other immunomodulators (other anticytokines, methotrexate, etc.)	No MAJCOM**	Yes

* Waiver will not be granted for untrained FC II and III.
‡ Observe for 3 to 6 months on therapy before consideration of waiver to allow for assessment of response and possible adverse effects. MEB is required for individuals on TNF-alpha inhibitors. Initial waiver will be granted for only one year, thereafter usually three years.
$ FC IIC (not worldwide qualified, TDY requires access to transport and refrigeration of etanercept/adalimumab).
# Waiver restricted for all individuals on TNF-alpha inhibitors (not worldwide qualified, TDY requires access to transport and refrigeration of etanercept/adalimumab).
** Waiver authority for MOD personnel is AFGSC.

AIMWITS search in Feb 2015 revealed a total of 17 members with a waiver disposition for the diagnosis of reactive arthritis. Of that total, 4 were disqualified. Breakdown of the total revealed: 1 FC I case (disqualified), 11 FC II cases (0 disqualified), 3 FC III cases (2 disqualified), 2 ATC cases (1 disqualified), and 0 MOD cases.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for Reiter's syndrome should include:
A. Detailed history: onset, time course, joints and/or extra-articular involvement, extra-articular manifestations, medication and side effects and activity level.
B. Physical exam: joints/extra-articular tissues involved, eyes, and skin.
C. Rheumatology consult.
D. Ophthalmology/optometry consult if eye symptoms present.
E. Laboratory: complete blood count (CBC), HLA B27 serology, HIV serology, estimated sedimentation rate (ESR)/C-reactive protein (CRP), bacterial antibody titers if prior enteric symptoms, or gram stain and Chlamydial assay results if venereal symptoms.
F. Radiographs: baseline of involved joints.
G. Current ECG.
H. If on etanercept or adalimumab, results of chest x-ray and IPPD.
I. Medical evaluation board results, if required.

The AMS for waiver renewal for Reiter's syndrome should include:
A. History: brief summary of onset, time course, joints/ligaments involved, and extra-articular involvement. Place special emphasis on symptoms, objective evidence of control or progression, and treatment side effects and changes since last waiver submission.
B. Physical exam: thorough exam and details of strength and enthesitis for joints involved, extra-articular manifestations including iritis.
C. Internal Medicine/Rheumatology consult if continued or recurrent symptoms.
D. CBC if on Enbrel®.

ICD-9 codes for Reiter's syndrome	
099.3	Reiter's disease (syndrome) [venereal disease]
372.33	Conjunctivitis in mucocutaneous disease
711	Arthropathy associated with infections

ICD-10 codes for Reiter's syndrome	
M02.30	Reiter's disease, unspecified site
H10.89	Other conjunctivitis
M02.9	Reactive arthropathy, unspecified

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WAIVER GUIDE
Updated: Dec 2015
Supersedes Waiver Guide of May 2012
By: Capt Joanna Nelms (RAM 16), Dr. Steven Wright, and Dr. Dan Van Syoc
Reviewed by Maj Jonathan Ellis, Chief of ACS Ophthalmology Branch

CONDITION:
Refractive Error, Excessive (Myopia, Hyperopia and Astigmatism) snd Anisometropia (Dec 15)

I. Overview.

Refractive errors are present when the optical power of the eye produces an image that is not focused on the retina. Myopia occurs when either the anterior-posterior diameter of the eye (axial length) is too long relative to the refractive power of the cornea and lens or the cornea is too steep relative to an eye with a normal axial length. The focal point of the image then exists anterior to the retina. Hyperopia is present when the axial length is too short relative to the refractive power of the cornea and lens or when the cornea is too flat relative to an eye with normal axial length. The focal point of the image then occurs posterior to the retina. Myopia and hyperopia are spherical refractive errors and the optical components act with equal power in all meridians. Astigmatism is present when there is variability in the optical powers of the eye in different meridians, or axes, thus creating more than one focal point. Anisometropia is present when there is a difference in the refractive power between the two eyes.

Myopia has been divided into pathologic (also known as malignant, progressive, or degenerative) and physiologic. Pathologic myopia is caused by excessive and progressive growth in the axial length of the eye while the rest of eye demonstrates normal growth. These individuals show marked choroidal and retinal degenerative changes, high incidence of retinal detachment, glaucoma, and increased occurrence of staphyloma (ectasia) development. Pathologic myopia occurs primarily in myopes with a refractive error over -6.00 diopters (D). Physiologic myopia is associated with normal growth of each of the refractive components of the eye, the combination of which results in mild to moderate myopia. Physiologic myopia will usually progress during the adolescent years and stabilize in the early 20s.

A 2010 prevalence study of corrective lens use based on aircrew spectacle orders in the Spectacle Request Transmission System (SRTS) among USAF pilots showed 41% of active duty (AD) pilots required corrective lenses to meet vision standards for flight versus 39.4% in1995 and 19.6% in 1980. The majority of AD pilots, 87.8%, utilized single vision lenses of relatively low power. The average power in pilot spectacle orders was -1.01 D and 83% of the lenses were between +2.00 and -2.00 D. One-third of all AD pilot spectacle orders contained 0.75 D or more astigmatism correction. High astigmatism correction (over 2.00 D) was rare, occurring only 2% of the time in pilots and 4% of the time in non-pilots. Corrective lens use was relatively constant across aircraft platforms (e.g. fighter vs. bomber) and the prevalence of corrective lenses from ages 25 to 45 gradually increased as a function of age. Above age 45, lens use was more frequent due to the onset of presbyopia and the need for multifocal (i.e. bifocal) lenses.

Severe (high) myopia (greater than 6.00 D) is more prevalent among FC III aviators and FC II flight surgeons since entry standards for pilot and navigator aircrew positions have been more stringent

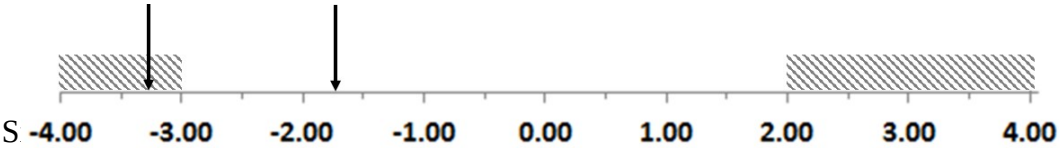
and have excluded those with higher risk due to higher levels of refractive error. As the degree of myopia increases, the risk of retinal detachment also increases. The risk of retinal detachment in normals is 0.06% over a 60 year time span compared to 2.5% in myopes with > -5.00 D refractive error. Beyond -9.75 D, the risk increases to 24%. However, the risk for retinal detachment dramatically increases in the presence of associated peripheral retinal lattice degeneration. The lifetime risk for retinal detachment in myopes > -5.00 D with lattice is 35.9%. Likewise, the prevalence of lattice degeneration rises as the level of myopia rises.

Aeromedical refractive error is based on the cycloplegic refraction for all initial flying class exams. The authorized cycloplegic exam technique uses 1% cyclopentolate (Cyclogyl), 2 drops each eye, 5 to 15 minutes apart, with examination performed no sooner than one hour and no later than two hours after the second drop. The cycloplegic refractive error is the minimum refractive power needed to achieve 20/20 visual acuity in each eye. The refractive error standard for aeromedical purposes is that produced following transposition. The rules of transposing are: (1) Algebraically add the cylinder power to the sphere power to determine the transposed power of the sphere (2) Change the sign of the cylinder (3) Change the axis by 90 degrees (do not use degrees greater than 180 or less than 0). Note: 180 degrees is used in place of 0 degrees.

	Sphere	Cylinder		Axis
Example 1:	-1.75	-1.50	X	179
Transposed	-3.25	+1.50	X	089
Example 2:	+1.50	+1.00	X	068
Transposed	+2.50	-1.00	X	158

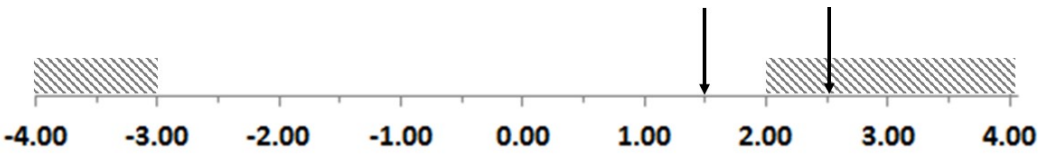
By transposing a refractive error, the most plus and most minus meridians can easily be determined. In example 1, -1.75 is the most plus meridian and -3.25 is the most minus meridian. When applying aeromedical standards and waiver criteria, both of these values must fall within the allotted range based on the flying class. If the candidate in example 1 was applying for IFC I, Table One of the Medical Standards Directory (MSD) would show that the most plus meridian can be no greater than +2.00 and the most minus meridian can be no less than -3.00. Graphically, this would be represented as shown below, and it is apparent that this refraction would exceed the standard for myopia.

Example 1:



S dent that the individual would exceed the limit for hyperopia as shown below.

Example 2:



Astigmatism may be represented by either a positive or negative cylinder value depending on the axis referenced. When applying aeromedical standards and waiver criteria, the sign of the value is irrelevant as the physical meaning of astigmatism is simply a difference between two points.

II. Aeromedical Concerns.

Improper or unbalanced correction with spectacles or contact lens can degrade stereopsis and contrast sensitivity as well as induce generalized ocular pain and fatigue (asthenopia). Myopia is more likely to progress, with respect to the degree of myopia, regardless of age, while hyperopia tends to remain static over time. In addition, myopes may see halos or flares around bright lights at night and are also at risk for worsening vision under dim illumination and with pupil enlargement, a phenomena known as "night myopia." Myopes also have an increased risk of retinal detachment, open angle glaucoma and retinal degenerations, such as lattice.

Hyperopes, especially those with greater than +3.00 D of correction, will experience greater problems with visual acuity after treatment with atropine or topical cycloplegic agents. They have a greater predisposition for tropias, microstrabismus, and phorias that can decompensate under the rigors of flight. They also have a higher prevalence for amblyopia due to the accommodative esotropia and anisometropia. Moreover, hyperopes have more problems with visual aids, such as night vision goggles, as they develop presbyopia at earlier ages compared to myopes. Lastly, hyperopes are more likely to develop angle closure glaucoma than myopes.

Higher levels of astigmatism or progressive astigmatism can be associated with potentially progressive corneal conditions, such as keratoconus, that can degrade image quality and visual performance during productive years of flying career. Anisometropias have greater association with diplopia, fusional discrepancies (e.g. defective stereopsis), and amblyopia, especially when greater than 2.00 D refractive error difference between the two eyes.

In general, corrective measures presently available to correct refractive errors include spectacles, contact lenses, and corneal refractive surgical techniques such as PRK and LASIK. Spectacles impose an additional optical interface between the aircrew's eyes and the outside world. This increases the risk of internal reflections, fogging, as well as reduction in the light reaching the retina leading to visual distortion. These phenomenon are especially more common in high myopes and in higher levels of astigmatism. Finally, spectacle frames interfere with the visual field, cause potential hot spots, and displace under G forces. Depending on nature and magnitude of the refractive error, the lenses themselves can induce optical blind spots (scotomas), optical image size changes, and can create unacceptable effects on other visual performance parameters, such as stereopsis. Contact lenses share some of these same problems, but reduce some of the drawbacks of spectacles, such as changes in image size, peripheral vision interference, hot spots from frames, fogging, and blind spots. However, contact lenses introduce their own unique aeromedical problems particularly related to maintenance and wear. In addition, further concern exists with the risk of acutely having to perform without the corrective lenses, such as after spontaneous lens loss, e.g. after ejection or during a deployment without adequate backups. See corneal Refractive Surgery Waiver Guide for further discussion on advantages and risks of refractive surgery.

III. Waiver Considerations.

Refractive errors standards are listed in Section C, Table One of the Medical Standards Directory for all flying classes. Excessive refractive error is not listed specifically as disqualifying for ATC/GBC and MOD duties, but ATC/GBC personnel must be able to correct to 20/20 near and far in each eye and MOD personnel only need for the better eye to meet 20/20 standards.

The following tables cover the different flying classes, waiver potential and ACS review/evaluation for myopia, hyperopia, astigmatism and anisometropia. If refractive errors are greater than those listed in the tables for FC I/IA (i.e. more minus), no waiver will be granted.

Table 1: Myopia

Flying Class	**Refractive error**	**Waiver Potential** **Waiver Authority**	**ACS review/evaluation**
I	> -3.00	No AETC	No
IA	> -4.50	No AETC	No
II pilot	> -4.00	Yes MAJCOM	No
RPA Pilot	> -5.50	Yes AFMSA	No
II/III (non-pilot)	> -5.50	Yes* MAJCOM	No

* Initial FCII/III waivers are approved by AETC and depend on AFSC job requirements if waivered or not (e.g. combat controller, pararescue uncorrected visual acuity of 20/70).

Table 2: Hyperopia

Flying Class	Refractive error	Waiver Potential Waiver Authority	ACS Review/evaluation
I	> +2.00 but ≤ +3.00 if waiverable degradation or no degradation in stereopsis** > +3.00 but ≤ +4.00 if no degradation in stereopsis	Yes AETC Yes AETC	Yes Yes
IA	> +3.00 but ≤ +4.00 if waiverable degradation in stereopsis** > +4.00 but ≤ +5.50 if no degradation in stereopsis	Yes AETC Yes AETC	Yes Yes
II pilot	> +3.50 if waiverable or no degradation in stereopsis**	Yes MAJCOM	No
RPA Pilot	> +5.50	Yes AFMSA	No
II/III (non-pilot)	> +5.50 if waiverable or no degradation in stereopsis**	Yes* MAJCOM	Maybe***

* Initial FC II/III waivers are approved by AETC and depend on AFSC job requirements if waivered or not. Jobs that require stereopsis may be waived if degradation meets waiver standards.
** Waiverable degradation of stereopsis means meets waiver criteria for defective depth perception (see waiver guide on subject)
*** Hyperopes with defective depth perception may be referred to the ACS at the discretion of the waiver authority.

Table 3: Astigmatism

Flying Class	Refractive Error	Waiver Potential Waiver Authority	ACS review/evaluation
I	>1.50 but ≤3.00	Yes AETC	Yes*
IA	>2.00 but ≤3.00	Yes AETC	Yes
II pilot	>2.00	Yes MAJCOM	Yes, initial waiver
RPA Pilot	>3.00	Yes AFMSA	Yes
II/III (non-pilot)	>3.00	Yes MAJCOM**	At the discretion of the waiver authority

*If waivered then individual is member of ACS Excessive Astigmatism Management Group and will require ACS re-evaluation after UPT.
** Refer cases requiring corneal topography to the ACS at the discretion of the waiver authority.

Table 4: Anisometropia

Flying Class	Refractive error	Waiver Potential Waiver Authority	ACS review/evaluation
I	> 2.00 and if normal stereopsis or waiverable degradation in stereopsis* and no asthenopic symptoms or diplopia	Yes AETC	Yes
IA	> 2.50 and if normal stereopsis or waiverable degradation in stereopsis* and no asthenopic symptoms or diplopia	Yes AETC	Yes
II pilot	> 2.50 and if normal stereopsis or waiverable degradation in stereopsis* and no asthenopic symptoms or diplopia	Yes MAJCOM	No
RPA Pilot	>3.50 if no asthenopic symptoms or diplopia	Yes AFMSA	No
II/III (non-pilot)	> 3.50 and if normal stereopsis or waiverable degradation in stereopsis* and no asthenopic symptoms or diplopia	Yes MAJCOM	No

* Waiverable degradation of stereopsis means meets waiver criteria for defective depth perception (see waiver guide on subject).

Individuals that were waivered for FC I for excessive astigmatism are members of the Excessive Astigmatism Management Group and will require ACS re-evaluation after UPT.

Review of AIMWTS (ICD 9 code 367.1) in Apr 2015 showed 8420 individuals with a diagnosis of myopia; there were a total of 837 disqualifications. The breakdown of the cases was as follows: 2282 FC I/IA cases with 299 disqualifications; 2498 FC II cases with 74 disqualifications; 3360 FC III cases with 413 disqualifications; 192 ATC/GBC cases with 34 disqualifications; and 88 MOD cases with 17 disqualifications.

Review of AIMWTS (ICD 9 code 367.0) in Mar 2015 showed 496 individuals with a diagnosis of hyperopia; there were a total of 124 disqualifications. Breakdown of the cases was as follows: 242 FC I/IA cases with 71 disqualifications; 102 FC II cases with 8 disqualifications; 121 FC III cases with 35 disqualifications; 28 ATC/GBC cases with 10 disqualifications; and 3 MOD cases with no disqualifications.

Review of AIMWTS (ICD 9 code 367.2) in Mar 2015 showed 2079 individuals with a diagnosis of astigmatism; there were a total of 296 disqualifications. Breakdown of the cases was as follows: 415 FC I/IA cases with 106 disqualifications; 750 FC II cases with 26 disqualifications; 814 FC III

cases with 145 disqualifications; 76 ATC/GBC cases with 13 disqualifications; and 17 MOD cases with 6 disqualifications.

Review of AIMWTS (ICD 9 code 367.31) in Mar 2015 showed 153 individuals with a diagnosis of anisometropia; there were a total of 34 disqualifications. Breakdown of the cases was as follows: 49 FC I/IA cases with 17 disqualifications; 56 FC II cases with 5 disqualifications; 44 FC III cases with 11 disqualifications; 4 ATC/GBC cases with 1 disqualification; and there were no MOD cases.

There were multiple duplicates in each of these four categories so the total number of individuals identified in these four AIMWTS searches is not a sum of the four totals.

IV. Information Required For Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

For initial waiver for excessive myopia the AMS should include:
A. Cycloplegic refraction (initial FC II/III) to 20/20 each eye and manifest refraction to best corrected visual acuity each eye.
B. Optometry/ophthalmology exam to include a dilated peripheral retina exam of each eye.

For renewal waiver for excessive myopia (if the member did not get an indefinite initial waiver), the AMS should include:
A. Manifest refraction to best corrected visual acuity each eye.
B. Optometry/ophthalmology exam to include a dilated peripheral retina exam of each eye.

For initial and renewal of waiver for excessive hyperopia the AMS should include:
A. Cycloplegic refraction (FC I/IA and initial FC II/III) to 20/20 each eye and manifest refraction to best corrected visual acuity each eye.
B. Stereopsis testing (OVT).
C. Optometry/ophthalmology exam to include:
1. Ductions, versions, cover test and alternate cover test in primary and 6 cardinal positions of gaze.
2. If OVT DP is failed:
    a. AO Vectograph stereopsis test at 6 meters
    b. AO suppression test at 6 meters.
    c. Randot or Titmus stereopsis test (near stereopsis tests).
    d. Red lens test.
    e. Four-diopter base-out prism test at 6 meters.

D. History of asthenopic (eye pain/fatigue) symptoms, diplopia.

For initial and renewal of waiver for excessive astigmatism the AMS should include:
A. Cycloplegic refraction (FC I/IA and initial FC II/III) to 20/20 each eye and manifest refraction to best corrected visual acuity each eye.
B. Corneal topography imaging. All corneal topography (CT) submissions should be formatted in **Axial** view using a standard dioptric scale (39.0 to 50.0 Diopter range, 0.50 Diopter increments) and

standard color palette. The **OD/OS Display** with an **Axial Map** and an **Axial Numeric View** is preferred. All ATLAS topographies should display the **Axial I-S** value.
C. Pentacam, preferably Holladay and Belin-Ambrosio reports (if available).
D. Corrected visual acuity with spectacles, and contact lenses if applicable, each eye.
E. Corrected low contrast acuity (PV 5% chart) with spectacles, and contact lenses if applicable, each eye.
F. Stereopsis testing (OVT).
G. Optometry/ophthalmology exam to include slit lamp and fundus exam.

For initial waiver for anisometropia the AMS should include:
A. Cycloplegic refraction (FC I/IA and initial FC II/III) to 20/20 each eye and manifest refraction to best corrected visual acuity each eye.
B. Stereopsis testing (OVT).
C. Optometry/ophthalmology exam to include:
1. Ductions, versions, cover test and alternate cover test in primary and 6 cardinal positions of gaze.
2. If OVT DP is failed:
    a. AO Vectograph stereopsis test at 6 meters
    b. AO suppression test at 6 meters.
    c. Randot or Titmus stereopsis test (near stereopsis tests).
    d. Red lens test.
    e. Four-diopter base-out prism test at 6 meters.

D. History of asthenopic (eye pain/fatigue) symptoms, diplopia or fusional problems, to include negative responses.

Note: For all FC I/IA applicants, confirmation that individual has discontinued wear of soft contacts for at least 30 days or hard/rigid gas permeable contact lenses for at least 90 days at the time of exam is required.

ICD-9 Codes for Refractive Errors	
367.0	Hyperopia
367.1	Myopia
367.2	Astigmatism
367.31	Anisometropia

ICD-10 Codes for Refractive Errors	
H52.0 1, 2, 3	Hypermetropia, right, left, both
H52.1 1, 2, 3	Myopia, right, left, both
H52.20 1, 2, 3, 9	Unspecified astigmatism, right, left, both, unspecified
H52.31	Anisometropia
H52.7	Unspecified disorder of refraction

V. References.

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WAIVER GUIDE
Updated: Jun 2013
Supersedes Waiver Guide of Mar 2011
By: Col John Gooch (Chief, ACS Aerospace Ophthalmology), LtCol Bridget Fath (Chief, Aerospace Vision Section), and Dr. Dan Van Syoc
Waiver guide reviewed by the AF/SG Consultant for Ophthalmology, Refractive Surgery, Maj Vasudha Panday.

CONDITION:
Refractive Surgery (RS) (Jun 13)

I. Overview.

Vision correction with spectacles and contact lenses poses some operational disadvantages, such as fogging, displacement, and potential equipment incompatibility. The AF approved RS to reduce dependence on traditional optical correction. This led to implementation of the USAF Refractive Surgery (USAF-RS) program. The USAF-RS program has three management groups: (1) Trained aviation and aviation-related special duty (AASD) personnel, (2) Applicants to AASD, and (3) Warfighter personnel. This waiver guide provides program management directions for the first two groups.

The USAF-RS program authorizes two primary categories of corneal refractive surgery (CRS) for eligible AF active duty and AF Reserve Component (ARC) members; Advanced Surface Ablation (ASA) and Intra-Stromal Ablation (ISA) procedures.

Approved ASA procedures include: photorefractive keratectomy (PRK), epithelial-laser in-situ keratomileusis (epi-LASIK), and laser in-situ epithelial keratomileusis (LASEK). Approved ISA procedures include: standard laser in-situ keratomileusis (LASIK), All Laser LASIK (using a femtosecond laser for flap creation).
Wave-Front-Guided (WFG) technology combined with ASA and ISA procedures are also approved and include WFG-PRK and WFG-LASIK.

Some CRS techniques, such as radial keratotomy, thermokeratoplasty, and intra-corneal rings, are associated with less predictable outcomes and more post-treatment complications and are **Not** authorized. Intra-ocular RS techniques, such as clear lens extraction and phakic lens implantation, are **Not** authorized.

RS treatment plans designed to create a monovision outcome (one eye corrected for distance and the other eye corrected for near) are not authorized for AASD and AASD applicants. Monovision treatments result in reduced depth perception and a failure to meet aeromedical flight standards.

Refractive surgery techniques correct refractive errors by modifying the corneal shape. Myopic eyes tend to have a corneal profile with a steep contour (steeper centrally, flatter peripherally); hyperopic eyes have a relatively flat contour. Astigmatism is the result of a non-spherical contour. ASA and ISA procedures use a computer guided ultraviolet (UV) excimer laser to ablate (remove) corneal stroma, permanently altering corneal contour, effectively reducing the refractive error and, ideally, result in unaided visual acuity of 20/20 or better. The central corneal is flattened for

treatment of myopia. Hyperopic treatments remove para-central corneal tissue to create a steeper corneal contour. Differential application of laser ablation is used to treat astigmatism.

In ASA procedures, the cornea epithelial tissue is first removed or displaced (PRK – mechanical abrasion, LASEK – alcohol solution, epi-LASIK – mechanized blade). The underlying stromal tissue is then ablated to a pre-programmed contour and the eye is allowed to heal (re-epithelialize). A bandage soft contact lens covers the treated area until epithelialization closes the wound. For ISA procedures, a partial thickness corneal stroma flap is first created. Using a laser or mechanical microkeratome, a lamellar cut is made into the outer corneal stroma creating a flap that is typically hinged on either the nasal or superior edge. The corneal epithelium is left intact on the surface of the flap. The flap is lifted and folded out of the way of the excimer laser. The underlying stromal bed is ablated, altering the corneal contour. The flap is repositioned over the treated area. Topical steroid eye drops are used about 1-2 weeks following ISA and up to 4 months following ASA to reduce corneal haze and promote stabilization.

ISA offers some advantages over ASA including a quicker recovery of vision, less associated discomfort, shorter duration of steroid eye drop use, and potentially faster return to flight duties. However, the ISA flap never completely heals and presents a risk of incidental traumatic flap dislocations for years following treatment. ASA procedures avoid flap complications and potential flap displacement. Dry eye symptoms are a common post-RS complaint for both ASA and ISA.

The following clinical criteria must be met before permission to proceed and waivers are granted for CRS treatment in AASD personnel:

A. Age 21 or older.

B. Refractive error limits do not exceed those listed in Table 1.

C. Show demonstrated refractive stability with no more than 0.50 diopter shift in manifest sphere or cylinder power between two or more refractions (one refraction current with application data and the other at least one year older).

D. Normal corneal topography (CT) – no evidence of abnormal corneal surface topography (including but not limited to): corneal irregularity, abnormal videokeratography, keratoconus, and/or “topographical pattern suggestive of keratoconus” (TPSK) in either eye.

E. No history or evidence of (including but not limited to): active ophthalmic disease, corneal neovascularization within 1 mm of intended ablation zone, central crystalline lens opacifications (i.e. post subcapsular cataracts), severe dry eyes, keratoconjunctivitis sicca, uveitis, keratitis, excessive pupil enlargement, glaucoma, predisposing disorder to glaucoma development (i.e. pigment dispersion syndrome with IOP greater than 21 mm Hg) or retinal pathology.

F. Not currently pregnant or actively nursing--must be greater than 6 months post-partum or greater than 6 months after discontinuing nursing.

G. Not using concurrent topical or systemic medication which may impair healing (including but not limited to): corticosteroids, antimetabolites, isotretinoin (Accutane®), amiodarone hydrochloride (Cordarone®), and/or sumatriptan (Imitrex®).

H. No history of medical conditions which, in the judgment of the treating corneal refractive surgeon may impair healing (including but not limited to): collagen vascular disease, autoimmune disease, immunodeficiency disease, active or history of ocular herpes zoster or simplex, endocrine disorders (e.g. thyroid disorders and diabetes).

Table 1 contains the pre-RS cycloplegic refraction values allowed for possible waiver for ALL flying classes (FC I/IA, II, IIU, and III).

Table 1: Pre-RS Cycloplegic Refractive Error Limits

Myopia (Most myopic meridian)	≤ –8.00 Diopters
Hyperopia (Most hyperopic meridian)	≤ +3.00 Diopters
Astigmatism	≤ 3.00 Diopters

Aeromedical refractive error limits are based on the cycloplegic refraction. The authorized cycloplegic exam technique uses one percent cyclopentolate (Cyclogyl®), 2 drops each eye, 5 to 15 minutes apart, with examination performed no sooner than one hour after the last drop and within two hours of the last drop of cyclopentolate. The cycloplegic refractive error is the minimum refractive power needed to achieve 20/20 vision each eye separately. The refractive error standard for aeromedical purposes is that produced "in any meridian" following transposition. The rules of transposing are: (1) Algebraically add the cylinder power to the sphere power to determine the transposed power of the sphere (2) Change the sign of the cylinder (3) Change the axis by 90 degrees (do not use degrees greater than 180 or less than 001). Note: 180 degrees is on the same axis as 0 degrees.

	Sphere		Cylinder		Axis	
Example 1:	+2.25		-1.50	X	158	(minus cyl form)
Transposed	+0.75		+1.50	X	068	(plus cyl form)
Example 2:	-5.50		-2.75	X	090	(minus cyl form)
Transposed	-8.25		+2.75	X	180	(plus cyl form)

Aeromedical standards and waiver requirements are based upon the magnitude of sphere power in the meridian (plane) that gives the largest value (most minus or most plus). Myopia is represented by a negative diopter value in the sphere and hyperopia by a positive diopter value. Cylinder power represents the difference in power between the two major meridians and may be represented by either a positive or negative cylinder value. Astigmatism is the absolute value of the cylinder power (i.e. -1.50 cylinder power and +1.50 cylinder power represents the same degree of astigmatism which is their absolute value of 1.50)

In example 1, +2.25 is the largest hyperopic sphere power with its meridian value aligned at axis 158. This represents the most hyperopic meridian. Comparing this value to the waiver limit table above, this pre-RS prescription is eligible for waiver consideration.

In example 2, -8.25 is the largest myopic sphere power with its meridian value aligned at axis 180. This represents the most myopic meridian. Comparing this value to the waiver limit table above, this pre-RS prescription is Not eligible for waiver consideration.

The Aviation Program Manager (APM) located at Wright-Patterson AFB reviews AASD RS applications and provides program management and oversight in accordance with AF/SG policy. ASA outcomes have been excellent with nearly 100% of aircrew returned to full operational duty. About 1% of pilots and 5% of other aircrew required spectacles to meet flight standards (20/20

visual acuity). Approximately 14% to 16% of aircrew attaining uncorrected 20/20 vision achieved their best level of visual performance with supplemental spectacle correction. Only 1% of aircrew did not achieve the same level visual acuity as measured prior to surgery. Aircrew returned to flight duties on average 13 weeks after ASA. Similar statistics are evolving with ISA resulting in an average DNIF of 13 weeks; however, the number of trained aircrew selecting this treatment procedure remains relatively small (ISA was authorized in May 2007).

The AASD RS program is locally managed by the flight surgeon with close assistance of the local eye care professionals. Extensive screening of potential RS candidates is performed. Permission to proceed with RS is contingent upon signature approval of the candidate's squadron commander as well as the candidate, local eye care professional, and the local FS. The application for RS is then forwarded to the APM for review. This typically takes about 2 weeks; however, if the application is not completed fully or accurately, significant delays in processing can occur. The APM determines if the documented clinical information recorded on the application meets all pre-op RS policy criteria. When the application review is complete, the APM contacts the local FS, aircrew member, center selected by applicant (if DOD), and co-managing eyecare provider with their recommendation—either "permission to proceed" or "permission to proceed denied."

Pilots and boom operators requesting LASIK or who have refractive errors >-5.50 diopters, but ≤ -8.00, will no longer require a pre-surgical baseline evaluation or 1 year waiver exam at the ACS. Follow-up examinations will continue locally including the 12 month post-surgical appointment. However, the 12 month exam is not required for indefinite waiver in the absence of surgical complications among trained aircrew.

After receiving permission to proceed, **Tri-Care eligible pilots and boom operators** with hyperopic treatments (up to +3.00 diopters) treatment will continue to require follow-up examinations locally except for the 12 month post-surgical appointment which is completed at the ACS in conjunction with waiver renewal. Additional ACS evaluations may be required at subsequent waiver renewals if abnormalities are present.

All eligible active duty AASD personnel who are approved for RS can have their pre-surgical evaluation and briefings completed at any Department of Defense (DOD) Refractive Surgery Center. Their surgery is completed at this facility and follow-up examinations are performed locally.

ARC personnel, not eligible for military medical benefits must first be approved for RS by the APM, then must pursue RS at their own expense, and be followed-up by civilian providers. All post-operative data, regardless if AD or ARC, must be transmitted to the APM (documentation attached in AIMWTS meets this requirement).

For an applicant to AASD, the individual must meet pre-RS clinical criteria and documentation of such must be provided. All pre-operative, intra-operative and post-operative documentation must be forwarded to the APM (documentation attached in AIMWTS meets this requirement). At minimum AASD applicants must be 6 months post-RS for waiver consideration. US Air Force Academy (USAFA) cadets must be treated at the USAFA Laser Center for either PRK (ASA) or LASIK (ISA). Non-active duty pilot applicants (civilians, ROTC) must pursue RS at their own expense with follow-up by civilian providers. They will be evaluated at the ACS at the time of medical flight screening (MFS) to determine if they meet waiver criteria. Active duty pilot

applicants will also be evaluated at the ACS during their Medical Flight Screening (MFS) appointment.

For trained AASD refractive surgery applicants with anisometropia, appropriate waiver action and approval will be required prior to RS application approval in following scenarios: FC I pilot training applicants with greater than 2.00D of anisometropia; FC II pilots and FC IA navigator applicants with greater than 2.50D of anisometropia; FC II non-pilots and FC III aviators with greater than 3.50 of anisometropia. See the excessive refractive error (anisometropia, Table 4) and defective depth perception waiver guides for details.

For complete program information, please review the following web sites managed by the APM: https://kx.afms.mil/USAF-RS **(dot mil) or** http://www.wpafb.af.mil/library/factsheets/factsheet.asp?id=20427 **(public access).** If unable to access, contact the APM at USAFSAMAircrewProgramManager@wpafb.af.mil

II. Aeromedical Concerns.

These elective surgical procedures although highly successful in general are not risk free and represent an investment by the patient and his/her squadron initially. Topical steroids are required following RS to control the healing response and reduce the risk of corneal haze and scarring. However, topical steroids may increase the risk of infection, produce elevated intraocular pressure in some individuals and may cause development of cataracts. To date, two aircrew members have sustained permanent visual field defects and vision loss as a result of topical steroid related complications. Therefore, frequent monitoring of intraocular pressure and close follow-up is required.

AASD personnel are restricted from deployment as long as steroid eye drops are in use; however, the aircrew member may be waived by the MAJCOM waiver authority to return to local flight duties in order to maintain qualifications. Participation in flight simulator and altitude chamber training while on steroid eye drops is permissible after initial waiver is granted by the waiver authority. An aeromedical summary submitted to MAJCOM waiver authority must provide evidence that all applicable vision standards are met, no post-operative complications exist, and the refraction is stable (two refractions separated by at least two weeks with no more than 0.50D change.) When the aviator has been directed to discontinue steroid eye drop use, the member may be returned to world-wide-qualified status for deployment purposes.

Degradation in the quality of vision following RS can affect operational visual performance, despite a finding of high contrast visual acuity (standard vision charts) that meets flight standards. Significant complications include dry eye symptoms, corneal haze, glare, halos, diplopia, reduced low contrast sensitivity, unaided night vision, and night vision goggles (NVG) performance. Recovery from RS complications may require extended recuperation time extending to a year or more. Under- and over-corrections of refractive errors can result from both ASA and ISA treatments. Refractive surgery enhancement (secondary treatment) or requirement to wear traditional correction (spectacles or contact lenses) may be required. UV protection is required post-RS to reduce UV-induced phototoxic damage than can potentiate corneal haze.

ISA procedures uniquely present flap complication risks. Intra-operative complications include: thin flap, incomplete flap, buttonhole flap or free flap. In addition, flap striae (wrinkles) can

develop intra-operatively or at any time during the convalescent period. Surgical intervention is usually required to address striae complications. The risk of corneal flap displacement by high Gz forces or ejection sequences is believed to be low, although this has not been thoroughly studied. The effect of chronic, low grade hypoxia on visual performance following ISA has also not been completely studied. A single study at sea level (normobaria) with simulated hypoxic environment equivalent to 25K feet revealed no reduction in vision.[6] The effects of altitude up to 35K feet following both ASA and ISA has been thoroughly studied with no adverse effects noted.[9, 10] Infectious keratitis can occur during the immediate postoperative period which can be vision-threatening. Best corrected visual acuity may decrease by two or more lines in up to 3.6% of patients if keratitis occurs.[2]

Flight surgeons should encourage post-RS aircrew to prepare for long duration flights and pending deployments. A bottle of sterile lubricating eye drops assists aviators in managing dry eye symptoms (a common post-RS complication) and thus minimizes rubbing of the eyes which can precipitate corneal abrasions or ISA flap dislocation. Post-operatively, aircrew must continue to be alert and vigilant in the use of eye protection in both operational and recreational environments, especially after ISA.

Hyperopia: Air Force aeromedical policy now authorizes hyperopic RS treatment for eligible aircrew to decrease eye strain and reduce accommodative effort at near and distance. Flight surgeons and optometrists need to understand that the visual recovery following hyperopic RS treatment is slower and may take up to six months to reach aeromedical standards in some cases. Although hyperopic RS is FDA approved and is deemed "safe and effective," more quality of vision issues are reported compared to myopic RS. Therefore, hyperopic RS is being closely monitored under an ACS Management Group. Once the hyperopic pilot or boom operator is off all medications and meets post-op stability and vision criteria, an initial waiver may be granted by the waiver authority that expires at the 1 year post-op point. Waiver renewal exam is required at the ACS for all trained pilots and boom operators at 1 year post-op. If the exam findings are stable at 1 year, an indefinite waiver may be granted.

An indefinite waiver may be granted by the waiver authority at initial waiver following **all other uncomplicated approved refractive surgery (except pilot and boom operator hyperopia treatments)** once the aircrew member is off all medications and meets post-op stability and vision criteria.

III. Waiver Considerations.

RS is disqualifying for all classes of flying duties; waiver is required. **Return to flight status before waiver approval is not authorized.** All LASIK flap dislocations need to be evaluated in person at the ACS even if treated promptly and deemed healed by the treating ophthalmologist. There is a risk in such cases of quality of vision deficits.

For ATC/GBC and MOD personnel, a history of refractive surgery is only disqualifying if the surgical outcome results in the member's inability to meet visual standards for the career field.

Table 2: Waiverable Examination Results

Examination	Waiverable Results
Best corrected visual acuity (OVT)	20/20 or better each eye*
Precision Vision 5% low contrast chart	20/50 or better each eye*
Slit lamp exam	LASIK – no striae or flap complications* PRK – no more than trace corneal haze*
Refractive error	Stable, no more than 0.50 diopter shift in **manifest** sphere or cylinder refractive power between two readings at least 2 weeks apart*
Intraocular pressure (IOP)	Normal – ≤ 21 mmHg*
Fundus exam	No new or previously unrecognized retinal pathology†
Depth perception (OVT-DP)	Line D, E or F. If fails and previously waived for depth perception using AO Vectograph then waived limits of that test. See defective depth perception/stereopsis waiver guide.

* If outside these limits, refer to local eye care provider and/or treating refractive surgery center. If condition is unable to be resolved refer case to ACS.

† Work-up and submit waiver request for new diagnosis.

Table 3: RS Requirements Summary Table

		PRK[8, 9]	**LASIK[7, 9]**	**Hyperopia[6]**
		Plano to ≤ -8.00	**Plano to ≤ -8.00**	**Plano to ≤ +3.00**
Pilots/ In-flight Refuelers	Surgery	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]
	1-year post-op exam	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]	ACS
	Waiver Authority[5]	MAJCOM	MAJCOM	MAJCOM
Other Trained Flyers and Aircrew Applicants	Surgery	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]
	1-year post-op exam	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]
	Waiver Authority[5]	MAJCOM	MAJCOM	MAJCOM
Pilot Applicants[2]	Surgery	USAFA/Civilian & Any DoD RS Center[1]	USAFA/Civilian & Any DoD RS Center[1]	USAFA/Civilian & Any DoD RS Center[1]
	Exam requirement for initial waiver[3]	USAFA/ACS at time of MFS	USAFA/ACS at time of MFS	ACS[4]/ACS at time of MFS
	Waiver Authority	AETC	AETC	AETC[4]
RPA Pilot Applicants	Surgery	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]
	Initial follow-up for waiver	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]	USAFA/ACS at time of MFS

1. If not eligible for TRICARE medical benefit (e.g. civilian, ROTC & most ANG/AFRC), will go to civilian provider.
2. AD pilot applicants are considered Warfighters until selected for training [they must have a qualified physical exam (pending MFS) before selection]. They must meet the AASD waiver criteria.
3. Post-op exam for initial FC I application must be at least six months after date of surgery (e.g. history of PRK or LASIK no sooner than six months ago).
4. For USAFA cadets, ACS review/evaluation is required prior to waiver (no "contingent on MFS" waivers).
5. Waiver authority for initial and renewal.
6. For both PRK and LASIK
7. Minimum DNIF of 1 month is required following LASIK. Initial waiver can be requested once applicable vision standards are met and refractive stability is established.
8. No minimum DNIF period is established following PRK, however, 2-3 months is generally required for enough corneal healing to occur to meet applicable vision standards and for refractive stability to occur.

9. All initial waivers are **indefinite** except for hyperopic pilots and boom operators (see section IV below).

AIMWTS review in Apr 2013 revealed 9024 total cases with a waiver disposition. This is a difficult condition to search for in AIMWTS as it relates to three different refractive states that have been treated with an "operation". Therefore the precision with the result is not as good, and due to the large number of cases, it is much more difficult to do a quality check afterwards. There were a total of 1027 cases resulting in a disposition of disqualify, most were for non-vision diagnoses. Breakdown of the cases was as follows: FC I/IA: 2473; FC II: 2471; FC III: 3768; ATC/GBC: 217; and MOD: 95.

IV. Information Required for Waiver Submission.

If the **trained aircrew member** has an uncomplicated postoperative course and meets applicable vision standards at the initial waiver point postoperatively, an **indefinite waiver may be granted**, except for pilots and boom operators with pre-operative hyperopia. For pilots and boom operators with uncomplicated hyperopia, **an indefinite waiver may be granted at the one year waiver renewal point**. While in many cases the initial waiver may be granted prior to the 12-month post-RS point, all follow-up appointments, including the 12-month post op evaluation should still be accomplished to meet RS standard of care requirements. Annual routine PHA vision exams will be required after this point. Complicated cases, or cases not meeting vision standards, should be referred to the ACS for review.

Required items in the aeromedical summary for initial waiver for **trained** AASD members:
A. History:
1. Pre-op cycloplegic refraction.
2. Surgical procedure, date and location.
3. Assessment (negative and positive) of post-op symptoms of glare, halos, reduced night vision and diplopia.
4. Eye medications usage, past and current, include discontinuation date.
B. Physical (Current):
1. Uncorrected visual acuity high contrast (OVT) and Precision Vision 5% low contrast.
2. Best corrected visual acuity high contrast (OVT) and Precision Vision 5% low contrast.
3. Cycloplegic refraction and dilated fundus exam.
4. Two post-op refractions at least 2 weeks apart that shows stability (no more than 0.50 diopter shift in **manifest** sphere or cylinder power).
5. Slit lamp exam which must include grading of haze.
6. Intraocular pressures (IOPs).
7. Depth perception (OVT-DP). (If fails and previously waived for defective depth perception using AO Vectograph, then include AO Vectograph).
C. Attach copy of "Permission to Proceed" letter.
D. Attach copy of the operative report for each eye treated, post-RS evaluations (1, 3, 6, 12 months post-op and annually, and any other additional follow-ups) and any RS-related incidents (this will meet the requirement to send this info to the USAF-RS APM). The following is a link to the post-RS evaluation form to be utilized: https://kx.afms.mil/USAF-RS **(dot mil) or** http://www.wpafb.af.mil/library/factsheets/factsheet.asp?id=20427

While on anti-inflammatory (steroid) eye drops, the aviator will be placed on non-mobility status, restricting the individual from deployment via AF Form 469. For LASIK, the aircrew member will similarly be placed on non-mobility status, restricting the individual from deployment via AF Form 469 for a minimum of one month after surgery, even if no longer on steroid eye drops.

If re-treatment is required or desired, it is considered new treatment and requirements are the same for initial waiver.

Any complications that arise after initial waiver will void the waiver and a new waiver request will be required after the complication is successfully managed.

Required items in the aeromedical summary for initial waiver for **applicants** for AASD:
A. History:
1. Address whether all clinical criteria prior to RS were met. If not, describe exceptions in detail.
2. Pre-op cycloplegic refraction.
3. Surgical procedure, date and location.
4. Assessment (negative and positive) of post-op symptoms of glare, halos, reduced night vision and diplopia.
5. Eye medications usage, past and current.
6. Presence of other surgical or post-operative complications (e.g. corneal haze, flap striae, ocular hypertension, etc.)
7. Must be 6 months post-RS, at minimum, for waiver consideration.
B. Physical (Current):
1. Uncorrected visual acuity high contrast (OVT) and Precision Vision 5% low contrast.
2. Best corrected visual acuity high contrast (OVT) and Precision Vision 5% low contrast.
3. Cycloplegic refraction and dilated fundus exam.
4. Two post-op refractions that shows stability (no more than 0.50 diopter shift in **manifest** sphere or cylinder power).
5. Slit lamp exam which must include grading of haze.
6. Intraocular pressures (IOPs).
7. Depth perception (OVT-DP).
C. Attach copy of the operative report for each eye treated, post-RS evaluations and any RS-related incidents (this will meet the requirement to send this info to the APM. The following is a link to the post-RS evaluation form which should be used: https://kx.afms.mil/USAF-RS **(dot mil) or** http://www.wpafb.af.mil/library/factsheets/factsheet.asp?id=20427

D. Initial waiver term of validity may be indefinite for uncomplicated cases at the waiver authority's discretion; however, AASD applicants are not eligible for waiver until at least six months following uncomplicated surgery. Post-RS evaluations are desired at 1, 2 (if ASA), 3, 6, and 12 months post-op. All examination documentation obtained to date is required for submission at the initial waiver point.

The first waiver renewal is no longer required at 12 months post surgery if no complications are detected during the post-operative course or on the required annual refractive surgery follow-up exam.

Required items in the aeromedical summary for waiver renewals:
A. History:

1. Pre-op cycloplegic refraction.
2. Surgical procedure, date and location.

3. Assessment (negative and positive) of post-op symptoms of glare, halos, reduced night vision and diplopia.

4. Eye medications usage, past and current.

B. Physical (Current):

1. Uncorrected visual acuity high contrast (OVT) and Precision Vision 5% low contrast.
2. Best corrected visual acuity high contrast (OVT) and Precision Vision 5% low contrast.
3. Manifest refraction
4. Slit lamp exam which must include grading of haze.
5. Intraocular pressures (IOPs)
6. Depth perception (OVT-DP). (If fails and previously waived for defective depth perception using AO Vectograph, then include AO Vectograph).

C. Attach copy of post-RS evaluations (1, 3, 6, 12 months post-op, and annually if applicable) not previously sent and any RS-related incidents (this will meet the requirement to send this info to the USAF-RS APM). If no complications are detected during the post-op exams, an indefinite waiver may be requested and granted at the waiver authority's discretion.

The following is a link to the post-RS evaluation form to be utilized: https://kx.afms.mil/USAF-RS **(dot mil) or** http://www.wpafb.af.mil/library/factsheets/factsheet.asp?id=20427

ICD-9 Codes for Corneal Refractive Surgery	
367.0	Hypermetropia treated with operations on cornea
367.1	Myopia treated with operations on cornea
367.2	Astigmatism treated with operations on cornea
11.71	Keratomileusis (LASIK, WFG-LASIK)
11.79	Other operations on cornea (PRK, LASEK, epi-LASIK, WFG-PRK)

ICD-10 Codes for Corneal Refractive Surgery	
H52.0 1, 2, 3	Hypermetropia, right, left, both
H52.1 1, 2, 3	Myopia, right, left, both
H52.20 1, 2, 3, 9	Unspecified astigmatism, right, left, both, unspecified
08Q8XZZ	Repair right cornea, external approach
08Q9XZZ	Repair left cornea, external approach

V. References.

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WAIVER GUIDE
Updated: Jul 2014
Supersedes Waiver Guide of Jun 2010
By: LT Ajiri Ikede (RAM XV), Maj Amy Gammill (ACS Internal Medicine Branch) and Dr. Dan Van Syoc
Reviewed by LtCol Timothy Phillips, AF/SG consultant for Urology

CONDITION:
Renal and Ureteral Stones (Nephrolithiasis) (Jul 14)

I. Overview.

Urinary stone disease is the third most frequent urinary tract disorder, exceeded in frequency only by infections and prostatic disease.[1] Men are affected more frequently than women, with a ratio of 2:1. Incident rates are highest in non-Hispanic Caucasians, followed by Hispanics, then African-Americans and other racial/ethnic groups.[2] Initial presentation most commonly occurs in the third and fourth decades. The incidence of urolithiasis is increasing for both men and women, such that 13% of men and 7% of women will be diagnosed with a kidney stone during their lifetime.[3] Diet and fluid intake are important factors in the development of urinary stones. Persons with diets high in protein and/or sodium may have higher rates of stone disease, and persons in sedentary occupations have a higher incidence of stones than manual laborers. Genetic factors also contribute to urinary stone formation, such as for patients with cystinuria and renal tubular acidosis.

The disease's clinical course is usually that of a gradual onset of flank, abdominal or back pain over an hour or more before acute colic pain onset. Pain (renal colic) usually is described as sharp, severe and localized to the flank and may be associated with nausea and/or vomiting. It may occur episodically and radiate anteriorly over the abdomen or be referred to the ipsilateral testis or labium. If the stone becomes lodged at the ureterovesical junction the patient may complain of marked urinary urgency and frequency. Stone size does not correlate well with severity of symptoms. Urinalysis usually reveals microscopic or gross hematuria.

<u>EVALUATION OF NEPHROLITHIASIS</u>

In initial evaluation, the first radiograph usually obtained is the plain kidney-ureter-bladder (KUB) film. Unenhanced helical computed tomography (CT) is the most sensitive imaging method to confirm (99% diagnostic accuracy) the diagnosis of a urinary stone in a patient with acute flank pain; it also helps with the measurement of stone density and may guide treatment—stones with density > 1000 Hounsfield units do not respond as well to lithotripsy. Due to potential hazards of increased radiation exposure, CT scans should be used sparingly and judiciously. If a KUB is sufficient for performing follow-up, then it should be used instead of CT. Intravenous pyelogram (IVP) is used very infrequently now but can also be helpful in diagnosis and treatment planning. Ultrasound is a noninvasive method for demonstrating both the urinary stone and the resultant hydronephrosis and has a high specificity, but low sensitivity.[4]

Urinary calculi are polycrystalline aggregates composed of varying amounts of crystalloid and a small amount of organic matrix. There are five major types of urinary stones: calcium oxalate, calcium phosphate, struvite, uric acid, and cystine. The following requirements are needed for urinary stone formation: (1) formation of a crystal nidus through nucleation, (2) retention of the

nidus within the urinary tract, and (3) growth of the nidus to a size sufficient to cause symptoms or be visible on imaging. For crystals to occur, the urine needs to be supersaturated with the salt in question. Intermittent supersaturation, as seen during periods of dehydration or after meals, is sufficient. As a group, stone formers excrete larger crystals and crystal aggregates than non-stone formers and have lower levels of stone inhibitors.[5]

Approximately 75% of renal stones are composed of calcium oxalate. Furthermore, approximately 50-75% of patients with calcium oxalate stones have hypercalciuria, the most common urinary abnormality predisposing to this type of stone disease. Etiologies of hypercalciuria include metabolic acidosis (RTA), hyperthyroidism, malignancies with bone metastases, corticosteroid treatment, vitamin D excess (exogenous or diseases such as sarcoidosis), and hyperparathyroidism. Approximately 5% of individuals with hypercalciuria have primary hyperparathyroidism. A significant number of hypercalciuric patients are classified with "idiopathic hypercalciuria," which is a diagnosis of exclusion made when the particular etiology of the hypercalciuria cannot be identified. Hypercalciuria is diagnosed with the help of a 24-hour urinary calcium excretion; the upper limit of normal is 4 mg (0.1 mmol)/kg body weight.

Hyperoxaluria may predispose to the formation of calcium oxalate stones and hyperuricosuria may predispose to the formation of uric acid stones, calcium stones, or a combination of both.[6] Hyperoxaluria will result in an elevated urinary oxalate level. Normal level for both males and females is about 45 mg/day. If due to dietary excess (spinach, rhubarb, Swiss chard, cocoa, beets, peppers, wheat germ, pecans, peanuts, okra, chocolate and lime peel) the maximum would be 50-60 mg/day. A level above 60 mg/day should be considered abnormal. Hyperuricosuria will display an elevated urinary uric acid level. Levels greater than 800 mg (4.8 mmol)/day in men and 750 mg (4.5 mmol) in women may predispose to calcium oxalate stone formation via heterogeneous nucleation or reduction of naturally occurring urinary inhibitors.

Struvite stones, also called infection stones, represent 10-20% of renal stones. They consist of magnesium, ammonium and phosphate, mixed with carbonate. Two conditions must exist for the crystallization of struvite: urine pH of $\geq$7.2 and ammonia in the urine. This is caused by urea-splitting bacteria with the generation of ammonia. The usual causative bacteria include Proteus, Klebsiella, Pseudomonas species and Enterococci (excluding E. coli). Those who produce only struvite stones may present with large stones that cause bleeding, obstruction, or infection without stone passage. Struvite stones require complete surgical removal and possibly long-term antibiotics.

Calcium phosphate stones represent around 5% of all stones; these can be caused by renal tubular acidosis or hyperparathyroidism. The laboratory tests for this stone type are blood pH and serum bicarbonate level. If metabolic acidosis is present, along with 24-hour urinary pH > 6.5, hypercalciuria and hypocitraturia treatment is indicated. Therapy is initiated with potassium alkali and close monitoring of urinary pH, citrate and calcium. Uric acid stones also account for 5% of all stones. These usually occur in the presence of low urinary pH (5.1-5.9) and urinary uric acid levels $\geq$ 1200 mg (7.1 mmol) excreted daily. Treatment is accomplished by raising the urinary pH to 6.0-6.5 with potassium citrate and treating with allopurinol.

Cystine stones represent less than 1% of all stones. This etiology is secondary to a hereditary defect of amino acid transport. Cystine stones are often multiple, large and may form staghorns. The peak clinical expression is in the third and fourth decade. Cystine stones form because cystine is poorly

soluble in the range of normal urinary pH. A level > 250 mg/24 hours is usually diagnostic of cystinuria. Hydration and alkalinization of the urine above pH of 7.5 is considered first-line treatment.[7] If volume plus pH adjustment are insufficient, treatment with penicillamine or tiopronin is utilized (these are not aeromedically acceptable medications).

Observational studies describe the natural history of asymptomatic renal calculi. The risks for development of pain or need for intervention depend in part on stone size and location, with larger stones more likely to require intervention. In a 2004 review of 300 patients, the risk for progression of stones was followed for a mean of 3.26 years. In this report, 77% experienced disease progression, which was defined as the need for surgical intervention, development of pain, or stone growth on serial imaging. These investigators identified that renal pelvic stones (which are free-floating) incurred the greatest risk of surgical intervention.[8] An earlier report describes a similar rate of symptomatic events, with 32% of 107 patients with asymptomatic stones developing symptoms over a mean follow up of 31.6 months and 17% requiring surgical intervention.[9] A 2010 study demonstrated that approximately 1 in 5 adults with asymptomatic urolithiasis will experience symptoms during a 10-year period. This equates to an approximate 2% risk/year of symptomatic stone disease.[10]

While some have advocated observation for lower pole calculi based on the theory that gravity will prevent them from migrating, the above 2004 study did not find a significant difference in need for intervention based on stone location in upper, interpolar or lower pole calyces. A newer study in 2007 described 24 patients with asymptomatic lower pole stones who were followed for an average of 53 months and found that 33% experienced stone growth and 11% required intervention due to pain, obstruction or persistent gross hematuria. The rate of stone growth correlated positively with initial size of stone.[11]

Many have raised the question of whether there is a stone size threshold below which the risk for symptoms and progression is negligible, or at least less than the risks of a stone treatment intervention. This issue has been investigated through observational studies of residual fragments after various stone procedures, including extracorporeal shock wave lithotripsy (ESWL), percutaneous nephrolithotomy (PN) and ureteroscopy. Some have designated small residual calculi with the term “clinically insignificant residual fragments” (CIRF), and various authors have attempted to identify a size below which intervention should be discouraged. The size threshold for CIRFs has been reported variously, from less than 2 mm to 4 mm. There is a tendency to observe these small fragments for a number of reasons. Many settle in lower pole calyces and are held stationary by gravity. It can be difficult to eradicate smaller stones, especially when they are 2 mm or less, because they are harder to localize on fluoroscopy and harder to engage with ureteroscopic baskets. The majority of stones 4 mm or less will pass spontaneously, so the cost and risk of surgical intervention are felt to exceed the benefits of treating these smaller stones for many patients.

Stone clearance and stone-free rates after ESWL vary considerably, ranging from 30-60% (depending on the ESWL machine and imaging used to detect fragments), and it is likely that residual retained fragments contribute to a persistent risk for growing stones in those treated with ESWL alone. Much higher stone-free rates can be achieved with physical extraction of stones via ureteroscopy or PN, but to date there has not been a randomized prospective trial investigating ureteroscopy vs. observation for asymptomatic renal stones.[12]

There have been several studies in the past decade looking at the natural history of residual fragments after ESWL. Most have shown that a significant number of such patients develop stone growth and a symptomatic episode requiring intervention.[13-17] Many urologists continue to advocate observation with close follow-up for patients with residual stones $\leq$ 4 mm after an intervention due to the high rate of spontaneous passage of such stones. Despite consequential rates of stone growth, development of symptoms, and need for intervention, this is a safe and cost-effective management plan when patients have ready access to emergency medical and urology care. It is important to note that, while these smaller stones frequently pass spontaneously, they do not pass painlessly.

TREATMENT OF NEPHROLITHIASIS

In most cases, stones < 5 mm in diameter will pass spontaneously but will take variable time to do so depending on their location at presentation. Hydration is helpful to facilitate passage of small stones.

Ureteral stones: Prediction of spontaneous stone passage is difficult. Stones less than 5 mm in diameter often pass spontaneously, especially in the distal ureter.[18] In such cases, conservative observation with pain medication is appropriate for the first four weeks, as long as no infection is present.[6] In a 1999 study of 75 subjects, 95% of stones < 4 mm passed spontaneously within 40 days, and 50% of subjects with stones $\geq$ 5 mm required intervention for refractory symptoms or failure of the stone to pass. Spontaneous passage of ureteral stones can be facilitated with hydration and oral alpha-1 adrenergic antagonists.[19-21]

Individuals with large stones (not likely to pass), evidence of infection, refractory symptoms or high-grade obstruction should be considered for intervention. Persistent ureteral obstruction for $\geq$ 4 weeks can increase the likelihood of renal damage in previously normal kidneys. If spontaneous stone passage has failed, therapeutic intervention is required. Ureteroscopic stone extraction or ESWL is used to extract or fragment stones from the proximal, mid or distal ureter. Complications during ureteroscopic extraction increase as the duration of conservative observation increases beyond six weeks. It should be noted that ESWL is not without its own complications. Patients that are at increased risk of bleeding (e.g. coagulopathy) or are obese may have poorer outcomes with ESWL, and these are two considerations that could influence the choice of initial intervention, in addition to other factors such as stone location and size.[22, 23] Percutaneous removal can be used for ureteral stones but is generally reserved for those too large to be treated effectively for ureteroscopy or when the ureter cannot be accessed from the lower urinary tract. Open surgery and blind basket extraction have fallen out of favor as ureteral and nephroscopes have improved in capability. Indications for earlier intervention include intractable pain, fever, or persistent nausea and vomiting.

Renal stones: Retained stones in the renal parenchyma, renal cyst, or calyceal diverticulum rarely migrate into the collecting system and therefore should be followed with serial abdominal radiographs and/or ultrasound. If calculi are growing or becoming symptomatic, intervention should be considered. Direct visualization with ureteroscopy may be required to determine if stones are free-floating in the collecting system or retained in parenchyma or other enclosed spaces. Renal stones in a papillary duct or more distal part of the collecting system, such as Randall's plaques are more likely to enter the collecting system. However, removal of these calculi may not be possible if they cannot be visualized. Renal stones < 2 cm in diameter can be treated successfully with

ureteroscopy, ESWL, or Percutaneous Nephrolithotomy (PN). Larger stones and those located in lower pole calyces may not respond well to ESWL but can be successfully treated with ureteroscopy or PN, depending on patient anatomy and other clinical considerations.

Prevention of recurrence: Those afflicted with stone disease are encouraged to remain well-hydrated (>2L/day) and maintain a diet restricted in sodium and animal protein intake.[24] Excess intake of oxalates and purines can increase the incidence of stones in predisposed individuals. Medical therapy is dictated by a metabolic evaluation that includes 24-hour urine collection for a variety of stone-forming metabolites, as well as an assessment of parathyroid function and calcium metabolism. Medical therapy is effective in reducing the risk for future nephrolithiasis, and can also reduce the growth and risk of existing stones becoming symptomatic.[25, 26] Treatment may include a thiazide diuretic for hypercalciuria, allopurinol or potassium citrate for hyperuricosuria and potassium citrate for hypocitraturia, depending on factors identified by a metabolic evaluation. In the absence of a defined metabolic abnormality, empiric therapy with potassium citrate has also been shown to reduce the risk of future symptomatic episodes.[27]

II. Aeromedical Concerns.

The pain of renal colic can be severe and is potentially incapacitating in flight. A few cases of some degree of in-flight incapacitation have been reported.[28] Missions have been curtailed due to renal colic in aircrew. The aviation environment can be conducive to renal calculi formation; conditions of dehydration, extremes of temperature, sedentary work and adverse dietary factors are commonly experienced by aircrew members. Each case must be determined individually after consultation with urology and radiology.[29]

III. Waiver Considerations.

Renal stones, or a history of renal stones, are disqualifying for all flying classes in the US Air Force (not including MOD and operations in support of flying duty). No waiver is required for a single episode in a trained aviator unless retained stones are present. However, a full metabolic workup is required after a single episode of nephrolithiasis. Following a recurrent episode, pilots need to be stone-free for waiver consideration unless they fly with another trained pilot; a restricted waiver (FC IIC) is considered for them if they are asymptomatic, particularly if they have 3 or less stones that are <4 mm in size. These aviators are typically followed every 6-12 months for a change in the size of the calculus, and if stable over a year, annual follow-up is deemed safe. The same protocol is followed for asymptomatic stones found incidentally on imaging studies. In all instances, metabolic risk factors for stone disease must be appropriately addressed before waiver will be considered.

Table 1: Waiver criteria for renal stones

Flying Class	Category	Waiver Potential Waiver Authority
I/IA	Single episode	No waiver required, but full workup required on FC I/IA physical.
	Recurrent, bilateral, or retained	No AETC
II**	Recurrent or bilateral#	Yes MAJCOM
	Retained*#	Yes MAJCOM
III**	Recurrent or bilateral	Yes MAJCOM
	Retained*	Maybe MAJCOM
ATC/GBC**	Recurrent or bilateral	Yes MAJCOM
	Retained*	Maybe MAJCOM
MOD**	Any evidence of stone disease	Yes AFGSC

* Stone in renal parenchyma or cyst, with no possibility of movement into collecting system, waiver likely for trained asset.
# If flyer is a pilot, and there are any retained stones, then FC IIC and AFMSA is waiver authority.
** Untrained FC II, III, ATC/GBC, and MOD personnel should be viewed is same manner as FC I/IA.

AIMWTS review from Jan 2011 through Jul 2014 revealed 505 submitted cases for stone disease; 45 resulted in a disqualification. Breakdown of the cases revealed: 10 FC I/IA cases (6 disqualified), 234 FC II/IIC cases (5 disqualified), 213 FC III cases (29 disqualified), 42 ATC/GBC cases (4 disqualified), and 6 MOD cases (1 disqualified). Rationale for disqualifications included frequency and severity of renal colic as well as the size and location of retained stones. In addition, disqualification decisions were made on the basis of the presence of other serious comorbidities that when taken together with the history of nephrolithiasis, would render the aeromedical risk to be intolerable.

IV. Information Required for Waiver Submission.

Information required for an initial waiver:
A. Complete history to include possible etiologic events; attempts to catch the stone, number and size of any stones, and complete work-up done at the time of the episode. Report any history of episodes prior to going on flying status. Is there family history of stones or personal history of gout, low fluid intake, high animal protein intake, high salt intake, low calcium intake or use of vitamin D supplements? History of all medications used, prescription and over-the-counter, is also necessary.
B. Labs: Stone analysis; urinalysis, including urine pH and urine culture; one complete 24-hour urine assessment should be done while on patient's usual diet for urine volume, calcium, oxalate, uric acid, citrate, magnesium, phosphorus, urine sodium, and creatinine excretion; serum electrolytes, blood urea nitrogen (BUN), serum creatinine, calcium, phosphate, and uric acid; and parathyroid hormone level. Urine creatinine is measured to determine the adequacy of urine collection.
C. Imaging studies: baseline KUB required. If non-contrast CT, IVP, or ultrasound obtained, these study reports must also be submitted with the AMS.
D. Urology consult addressing treatment and if retained stones present, addressing likelihood of stone entering the collecting system. Successful pursuit of a waiver may be expedited by referring the patient early to an Air Force MTF with urology services.

Information required for waiver renewal:
A. Brief summary of previous stone history, work-up and prevention steps.
B. If there is an interval history of additional kidney stone(s), detailed account of episode(s), treatment and prevention steps taken (Urology consult included).
C. Radiological evidence demonstrating no new stones and no growth or movement of retained stones. A KUB is recommended for routine follow-up in the absence of symptoms during the waiver period. A CT may be necessary if the patient has a history of radiolucent stones (such as uric acid stones) or if the patient has experienced symptoms.
D. If on prevention medication or initial 24-hour urine stone risk analysis was abnormal, then annual 24-hour urine to monitor impact of intervention.

ICD-9 codes for renal stones	
592	Calculus of kidney and ureter
788.0	Renal colic

ICD-10 codes for renal stones	
N20.0	Calculus of kidney
N20.1	Calculus of ureter
N20.9	Urinary calculus, unspecified
N23	Unspecified renal colic

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WAIVER GUIDE
Updated: Jun 2012
Supersedes Waiver Guide of Dec 2007
By: Dr Dan Van Syoc
Reviewed by LtCol Warren Kadrmas, AF/SG Consultant for Orthopedic Surgery

CONDITION:
Retained Orthopedic Hardware and Joint Replacement (Jun 12)

I. Overview.

Fractures requiring open reduction and internal fixation (ORIF) are fairly common among our active aircrew member population. Less common are degenerative joint diseases requiring prosthetic joint implants due to the relatively young population served. This waiver guide will discuss retained orthopedic hardware and total hip and knee replacements. Fixation devices in the spine and artificial intervertebral disks are considered separately in the herniated nucleus pulposus and spinal fusion waiver guide.

RETAINED ORTHOPEDIC HARDWARE:

Retained hardware devices, except in the case of joint replacement, consist primarily of screws, plates, wires and intramedullary rods (nails). These components are placed to stabilize the fracture and allow for adequate healing. Fracture healing time depends on the nature of the fracture (amount of energy involved in creating the fracture, disruption of soft tissue around the fracture, and the particular bone involved).[1] In the vast majority of fractures, medical standard of care no longer dictates removal of fixation devices. In some cases after adequate bone regeneration, implant removal may be indicated because of patient preference or to restore skeletal strength (usually in children). Additional removal may be required if the device causes pain (loose screw) or reduction in function.

For fractures with retained hardware, waiver is required when there is obstruction/limitation of motion or if the hardware is easily irritated/painful when hit or when pressure is applied in common activities. Usually to rectify these symptoms the hardware is removed, correcting the problem. Waiver is required in those cases when the device can't be removed or the individual declines removal.

JOINT REPLACEMENT:

Over 300,000 total knee arthroplasties (TKAs) are done in the US every year.[2] The knee joint is made up of three compartments; the lateral, medial and patellofemoral. Damage to the cartilage from osteoarthritis, inflammatory arthritis, avascular necrosis, tumors or congenital deformities are the causes for the need for TKA, with the majority due to osteoarthritis and rheumatoid arthritis. TKAs are indicated in individuals who have failed conservative [activity modification, weight reduction, physical therapy, shoe insoles, nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, glucosamine and chondroitin sulfate, and/or use of assistive device (cane)] or previous surgical treatment [osteotomy, lavage and surgical debridement, cartilage preserving or restoring] for a deteriorated knee joint and continue to have persistent, debilitating pain and significant curtailment in activities of daily living. Unicompartmental knee replacement as

treatment in unicompartmental, noninflammatory situations has been used as an alternative to TKA or osteotomy. TKA consist of a femoral, tibial and patella component. Designs can be either posterior cruciate ligament sparing or not; various metal and polyethylene component combinations. Fixation techniques include cemented (both femoral and tibia), cementless or hybrid (usually femoral cemented and tibia not). The cement serves as grout between the implant and bone. Cementless technique relies on bony ingrowth into or onto porous implant surface. There is a wide choice of implants and large variation between surgeons and nations. Approximately 90 to 95% of TKAs survive to the 10-year point.[2] Complications include thromboembolism, infection, patellofemoral disorders, prosthetic fractures, peroneal nerve palsy, polyethylene wear, and aseptic failure. Risk of intraoperative infection is less than 2% after knee replacement.[3]

Over 150,000 total hip arthroplasties (THAs) are performed in the US every year. The main reason for THA is osteoarthritis of the hip; less common is for advanced rheumatoid arthritis or avascular necrosis. Over 90% of THA are working successfully, pain-free and without complication 10 to 15 years postoperatively.[4] THAs are indicated in individuals who have failed conservative [weight reduction, physical therapy, nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, glucosamine and chondroitin sulfate, and/or use of assistive device (cane)] or previous surgical treatment [core decompression, intertrochanteric osteotomy, periacetabular osteotomy, surgical dislocation and debridement, resection arthroplasty, hip arthroscopy] for a deteriorated hip joint and continue to have persistent, debilitating pain and significant curtailment in activities of daily living. All THAs consist of three parts; femoral component, acetabular component and a bearing surface. Fixation of the components to the bone is either with cement or cementless. Cementless acetabulum is the most common implant and for the femoral implant cementless is used most often in younger individuals with good bone stock. For years the standard bearing surface has been a metallic femoral head which articulates with a polyethylene acetabular liner. Other bearing surfaces developed and used include ceramic on polyethylene, ceramic on ceramic and metal on metal. "Minimally invasive" replacement procedures, such as hip resurfacing where the femoral neck is preserved thus usually requiring more acetabular side bone removal or procedures that decrease the incision size to less than 10 cm (up to 15 cm) still have extensive soft tissue trauma and require experienced orthopedic surgeons. It should be noted also that recovery times for these procedures are not necessarily shorter.

Complications of THA include heterotopic ossification, dislocation, nerve damage, fracture, infection, loosening, leg length discrepancy and thromboembolism.[5] Dislocation remains a common and problematic complication after primary THA with rates of approximately 2% to 5%.[6, 7] Once dislocation has occurred, the risk of redislocation is high; incidence of 33%. Most dislocations occur within the first three months after surgery. Proximal femoral fracture is a relatively common intraoperative occurrence during total hip arthroplasty (THA) with a reported incidence of 2-6%. In one study the risk factors for fractures include anterolateral approach, uncemented femoral fixation and female sex.[8] Risk of intraoperative infection is less than 1% after hip replacement.[9] In one study of 63 consecutive episodes of infection associated with hip prostheses during a 16-year-period, 29% of cases were early (less than 3 months after surgery) infections, 41% were delayed (3 to 24 months after surgery) and 30% were late (more than 24 months after surgery) infections.[9] The risk for fracture-fixation device infections is approximately 2%.[10] Femoral and acetabular loosening is the most common long-term complication and most common indication for revision.

Guidelines for acceptable activity after hip and knee replacement are not well defined. The following is from a 2002 article summarizing the literature on exercise recommendations after total joint replacement and suggested a scientifically based guideline.[11] Physical activity is important for general health and also increases bone health which improves prosthesis fixation and decreases early loosening. Factors such as wear, joint load, intensity and the type of prosthesis must be taken into account when recommending activity after TKA and THA. There is evidence that the reduction in wear is one of the main factors in improving long-term results after total joint replacement. Wear is dependent on load, number of steps and material properties of the prosthesis. The most important question is, whether a specific activity is performed for exercise to obtain and maintain physical fitness or whether an activity is recreational only. To maintain physical fitness an endurance activity will be performed several times per week with high intensity. Since load will influence the amount of wear exponentially, only activities with low joint loads such as swimming, cycling or possibly power walking should be recommended. If an activity is carried out on a low intensity and therefore recreational base, activities with higher joint loads such as skiing or hiking can also be performed. It is unwise to start technically demanding activities after total joint replacement, as the joint loads and the risk for injuries are generally higher for these activities in unskilled individuals.

It is important to distinguish between suitable physical activities after TKA and THA. For TKA it is important to consider both the load and the knee flexion angle of the peak load, while for THA the flexion angle does not play an important role. During activities such as hiking or jogging, high joint loads occur between 40 to 60 degrees of knee flexion where many knee designs are not conforming and high polyethylene inlay stress will occur. Regular jogging or hiking produces high inlay stress with the danger of delamination and polyethylene destruction for most current total knee prostheses. Based on these design differences between hip and knee replacements it is prudent to be more conservative after TKA than after THA for activities that exhibit high joint loads in knee flexion. For THA, obesity and advancing age negatively impact walking activity after THA.[12]

II. Aeromedical Concerns.

The chief aeromedical concern of aircrew members with retained hardware is that the underlying orthopedic diagnoses (e.g. fracture, ligament damage) have healed. Once healed, other concerns are discomfort due to the hardware, adequacy of function, soft tissue inflammation, and increased risk of infection leading to osteomyelitis, all of which could lead to flight safety issues and compromise mission completion. Aeromedical concerns for THA and TKA include dislocation, fracture, leg length discrepancy and thromboembolism. History of dislocation of THA suggests that the individual's hip is unstable and will continue to be unstable or the individual is non-compliant with hip precautions; neither situation is conducive to flight safety or mission accomplishment. Parachute duty places a repeated trauma to a TKA and THA, with the risk of catastrophic failure. Ejection would be a one-time occurrence in an "emergency situation only." Finally, current generation joint prostheses have an expected life span of 10 to 20 years.

III. Waiver Consideration.

Individuals with fractures are grounded until evidence of bone healing and return of full function can be documented. For fractures with retained hardware, waiver is required when there is obstruction of motion or if easily irritated/painful when hit/pressure applied. Waiver is required for all joint replacements, even for ATC/GBC and SMOD personnel. For joint prosthetics an

unrestricted FC II and III waiver may be considered. Joint prosthetics are not considered waiverable for FC I/IA, untrained FC II and FC III, and for parachute duties (FC III). Joint replacements are disqualifying for retention, so all of these folks will also require and MEB.

Table 1: Summary of Clinical Conditions and Waiver Potential

Flying Class	**Condition**	**Waiver Potential Waiver Authority**
I/IA Untrained II/III	Retained orthopedic device with no pain or limitation of motion (able to lead physically active lifestyle)	No waiver required, medically qualified
	Retained orthopedic device with obstruction of motion or if easily irritated/painful when hit/pressure applied	Maybe AETC
	Joint replacement	No AETC
II/III ATC/GBC SMOD	Retained orthopedic device with no pain or limitation of motion (able to lead physically active lifestyle)	No waiver required, medically qualified
	Retained orthopedic device with obstruction of motion or if easily irritated/painful when hit/pressure applied	Maybe MAJCOM
	Joint replacement, minimum four months post-op.+	Yes† MAJCOM
Individuals with parachuting duties (not including emergency bailout)	Retained orthopedic device with no pain or limitation of motion (able to lead physically active lifestyle)	No waiver required, medically qualified
	Retained orthopedic device with obstruction of motion or if easily irritated/painful when hit/pressure applied	Maybe MAJCOM
	Joint replacement	No MAJCOM

† If dislocation has occurred ACS review of case is required. If THA dislocation occurred within first 6 weeks then waiver more likely and will require minimum 6 months post dislocation.
+ This includes "minimally invasive" hip replacement procedures.

Review of AIMWTS through Apr 2012 showed 33 cases of hip replacement with 1 disqualification (FC II). Breakdown of the cases was as follows: 23 FC II cases, 8 FC III cases and 2 ATC/GBC cases. The one disqualified case was due to another medical condition (diabetes mellitus). The

majority had hip replacements due to severe osteoarthritis, followed by avascular necrosis and one congenital hip dysplasia.

Review of AIMWTS through Apr 2012 showed 14 cases of knee replacement with 2 disqualifications (1 FC II and 1 FC III). There were 8 FC II cases and 6 FC III cases. One of the disqualified cases was due to CAD and the other for severe neck pain.

Review of AIMWTS through Apr 2012 showed 118 cases of retained orthopedic hardware with a total of 8 disqualifications (1 FC II and 7 FC III). Breakdown of the cases was as follows: 9 FC I/IA, 48 FC II, 60 FC III, and 1 ATC case. Of the 8 DQ cases, 4 were initial certifications and were related to the hardware and the other 4 were for other medical conditions.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

If the patient requires an initial waiver for retained orthopedic hardware, the AMS should include the following:
A. History - brief summary of trauma, surgery and recovery, complications, symptoms, current activity level, and medications.
B. Physical - addressing range of motion, muscle strength, point tenderness.
C. Operative reports.
D. X-ray documenting radiographic healing.
E. Orthopedic consult that addresses hardware, muscle strength, range of motion of proximal and distal joint, limitations in activities.
F. If functionality is reduced, include a statement of demonstrated ability (SODA) performing tasks in aircraft.

The AMS for waiver renewal for retained orthopedic hardware should include the following:
A. History – brief summary of trauma, surgery and recovery, complications, symptoms, current activity level, and medications.
B. Physical - addressing range of motion, muscle strength, point tenderness.
C. Orthopedic consult, if symptoms changed.

The AMS for initial waiver for prosthetic joint should include the following:
A. History of symptoms, limitations prior to surgery, summary of surgery and recovery, present level of activity, medications, and limitations.
B. Physical - addressing range of motion, muscle strength.
C. Orthopedic consult - range of motion, muscle strength, activity level, limitations.
D. Operative reports.
E. X-rays documenting radiographic healing.
F. Include a statement of demonstrated ability (SODA) performing tasks in aircraft.
G. Medical evaluation board (MEB) results.

The AMS for waiver renewal for prosthetic joint should include the following:
A. History and physical – to include summary of surgery and recovery, present level of activity, medications, and limitations.
B. Orthopedic consult
C. X-rays results.

ICD-9-CM for joint replacement
81.5 Joint replacement of lower extremity
81.51 Total hip replacement
81.52 Partial hip replacement
81.53 Revision of hip replacement, not otherwise specified
81.54 Total knee replacement
81.55 Revision of knee replacement, not otherwise specified

ICD-9-CM for retained orthopedic hardware
79.8 Open reduction of dislocation
79.9 Unspecified operation of bone injury

V. References.

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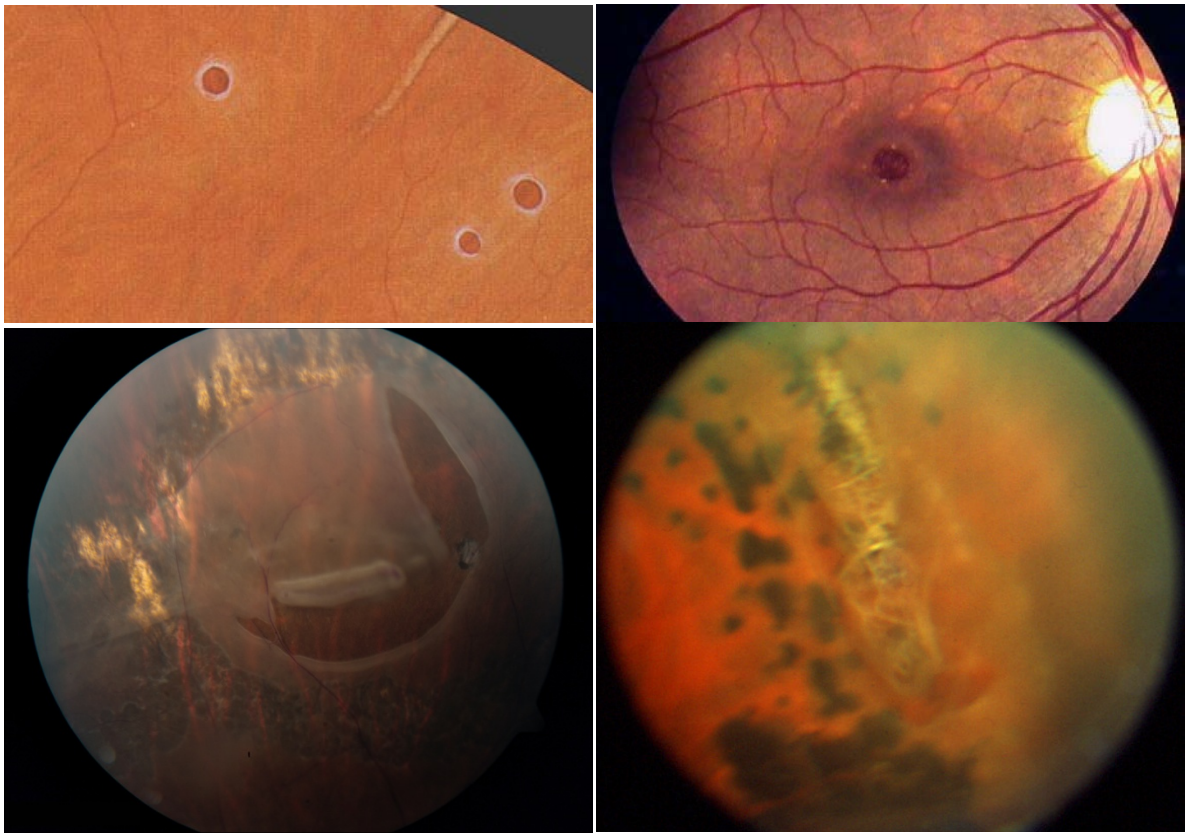
WAIVER GUIDE
Updated: Oct 2014
Supersedes Waiver Guide of Mar 2011
By: Capt Marion Powell (GMO), Maj Tighe Richardson (ACS Ophthalmologist), Dr. Steve Hadley (ACS Ophthalmology Branch Chief), and Dr. Dan Van Syoc

CONDITION:
Retinal Breaks, Peripheral (Holes & Tears), Retinal Detachment & Retinoschisis (Oct 14)

I. Overview.

A retinal break is any full thickness defect in the neurosensory retina.[1] Retinal breaks may be classified as holes (operculated, atrophic, macular), tears (horseshoe, giant, flap), or dialyses.[2] Most breaks tend to occur in the peripheral retina and do not cause loss of vision, but the associated conditions of hemorrhage and retinal detachment can lead to severe vision loss.[2] Classification aims to predict retinal breaks that are not likely to cause severe visual sequelae from those that are more likely to lead to visual loss and retinal detachment. Operculated holes are round defects in the neural retina with an overlying operculum of retinal tissue, caused by vitreous traction that has been relieved of its tension.[1-3] These defects are considered low risk retinal breaks and almost never require treatment. Atrophic holes occur due to retinal thinning and are often associated with lattice degeneration, a common condition that exists in 11% of the general population.[3] The incidence of lattice tends to be higher in myopic eyes, occurring in 15% of eyes with axial length of 30mm or more.[4] Atrophic holes or tears at the edge of the lattice that are associated with vitreo-retinal traction or sub-retinal fluid predispose to a relatively higher risk of retinal detachment. Macular hole is a term used to describe many different macular vitreo-retinal disturbances. Idiopathic macular holes typically occur in the sixth to eighth decades of life and are thought to be caused by tractional forces of perifoveal vitreous detachments.[1] Idiopathic macular holes have the potential to greatly affect central vision and often warrant posterior vitrectomy surgery. Their potential to cause retinal detachment is small but other sequelae such as epiretinal membrane formation are often a risk.

Tears in the peripheral retina are typically horseshoe shaped resulting from vitreo-retinal traction and represent the highest risk for progression to retinal detachment. The stimulus produced by active vitreo-retinal traction, often manifests as photopsias and may be exacerbated with eye rapid eye or head movements.[1] Horseshoe or flap tears with persistent traction often avulse the base of the tear to leave a small, round defect in the neural retina with an overlying operculum of retinal tissue.[4] Giant retinal tears are a full-thickness neurosensory retinal break extending circumferentially around the retina for three or more clock hours.[5] These types of retinal tears are rare but are associated with significant visual complications and higher rates of progression and recurrence despite intervention. Lastly, dialyses are linear retinal breaks that occur peripherally along the ora serrata. Although most dialyses are associated with blunt ocular trauma, they can also occur spontaneously. Dialyses also impart intermediate risk for retinal detachment and necessitate treatment.



Top Left: Peripheral retinal holes, Top right: idiopathic macular hole, Bottom Left: large retinal horseshoe tear, Bottom Right: peripheral lattice degeneration

Retinal detachment is a separation of the neurosensory retina from the underlying retinal pigment epithelium (RPE), resulting in loss of the corresponding visual field in the affected eye. If the detachment involves the macula, central visual acuity will be compromised. Visual field disturbance (veil in vision) and/or new onset of "flashes and floaters" are common presenting complaints. Retinal detachments are generally classified into one of three categories: rhegmatogenous, serous, or tractional. Of the three classifications for retinal detachments, *rhegmatogenous* is the most common variety. The essential conditions necessary for a rhegmatogenous retinal detachment are a full thickness retinal break and vitreous liquefaction (syneresis). Vitreous syneresis is the result of the natural history of vitreous liquification over time and initially results in the appearance of floaters. As the vitreous liquefies, it separates from areas of the retina where it is not firmly attached resulting in a posterior vitreous detachment (PVD) or what is commonly noted by patients as an acute onset of a new floater. Studies have demonstrated the rate of retinal tears after an acute, symptomatic PVD was between 8.2% and 21.7%.[6] Posterior vitreous detachments typically occur in patients between the ages of 50 and 75 years of age. Autopsy studies demonstrate PVD in less than 10% of patients under 50 years of age but were present in 63% of those over the age of 70 years.[1] Approximately 50% of patients who develop full thickness horseshoe retinal tears in the setting of a symptomatic PVD will develop a rhegmatogenous retinal detachment secondary to liquefied vitreous entering the tear and dissecting between the neurosensory retina and the RPE. Additionally, severe ocular trauma is believed to be responsible for 10-15% of retinal detachments. Risk of occurrence in the fellow eye is significantly increased, provided that additional acquired risk factors are comparable. The annual incidence of retinal detachment is approximately 1 in 10,000.[7] Advanced age, previous intra-ocular surgery, high myopia, lattice degeneration, and trauma increase the lifetime risk of developing retinal

detachment. Myopic patients with over -5.0 diopters of error have a lifetime risk of 2.2%.[8] In individuals that have myopia exceeding -5.0 diopters and associated lattice, the lifetime risk for retinal detachment increases to 35.9%.[9] Retinal detachment incidence tends to be bimodal, peaking in the third decade of life and then again in the 5th to 6th decades. The rate of progression of the retinal detachment depends on size of the retinal break, location of the break, and movements of the eye. Symptoms, such as loss of visual field in the form of a descending veil or curtain, increase as the detachment enlarges and may eventually affect central visual acuity, when the macula becomes involved. However, if high risk retinal breaks are detected before progression to retinal detachment, laser retinopexy or cryopexy therapy can be employed and are over 95% effective in preventing progression of a retinal tear to rhegmatogenous retinal detachment. Once a retinal detachment has developed, surgical reattachment of the retina requires relief of vitreoretinal traction, closing of retinal tears and holes, and removing subretinal fluid. Several options for repair include vitrectomy, scleral buckling, and pneumatic retinopexy. Reattachment may also be aided by additional procedures such as incisional drainage of subretinal fluid, the use of expansile gases, and/or the use of silicone oil to tamponade the retina in to appropriate anatomic position.[10] Although surgical treatment can result in 95% anatomical cure (permanent reattachment), visual outcomes can vary based on the etiology, length of time of detachment, and involvement of the macula. Normal visual acuity is often maintained if the macula is spared.[10]

Conversely, a *tractional* retinal detachment usually results from an ongoing or previous inflammatory, infectious, or surgical process, such as proliferative diabetic retinopathy, retinopathy of prematurity, sickle cell retinopathy, or penetrating trauma which causes the development of fibrous vitreo-retinal bands. Over time these bands contract, generating enough mechanical force to pull the retina away from the underlying RPE. Treatment requires surgical lysis of the intraocular fibrous tissue by vitrectomy. Visual outcomes are generally poor due to co-existing ocular pathologies.

Serous or *exudative* retinal detachment is typically the result of an associated systemic process (acute hypertension, inflammation, neoplasm, etc.) that damages either retinal blood vessels or the RPE allowing fluid to pass into the subretinal space. In exudative retinal detachment, patients do not have a full thickness retinal break. Exudative retinal detachments are gravity dependent and have a smooth border. The subretinal fluid will respond to the force of gravity and shift the location of the retinal detachment depending on the patient's position.[1] Traditional retinal reattachment surgeries are not effective. Treatment requires addressing the underlying disease process. If the underlying medical condition is successfully treated, visual outcomes can be very good.

Degenerative retinoschisis is a splitting of the layers of the retina that can lead to retinal detachment in a small percentage of cases. However, most cases remain asymptomatic and have little clinical significance. Depending on the severity and location of the schisis, patients may exhibit an absolute visual field defect when compared the relative (veil-like) defect commonly seen in retinal detachments. Studies have shown a linkage between retinal detachments and retinoschisis, with an incidence of 2.5% of degenerative retinoschisis in rhegmatogenous retinal detachments.[9] Treatment for retinoschisis should be limited to patients who develop symptomatic, progressive retinoschisis leading to retinal detachments.[9]

II. Aeromedical Concerns.

Retinal holes and tears can lead to retinal detachment. Retinal detachment can result in loss of visual acuity, loss of stereopsis, visual distortion, visual field loss, relative night blindness, reduced color vision, and lowered contrast sensitivity. The specific visual impact depends on the area and extent of the retina involved and the success of any reattachment surgery. In 90% of cases, eyes with no macular detachment present can be expected to have 20/40 vision or better following surgery.[3] Consideration must also be given to the risk of progression, recurrence or involvement of the fellow eye based on the mechanism of retinal pathology, or type of retinal detachment. Although routine exposure to G-forces has not been shown to increase the risk of retinal detachment, the risk is increased with pre-existing vitreoretinal abnormalities, especially in the case of tractional retinal detachment, and this should be considered in the case of unrestricted waivers. All patients with documented retinal holes or breaks should have their manifest refractions included in the Aeromedical Consultation Service (ACS) referrals (these should be pre-corneal refractive surgery measurements if applicable), as higher levels of myopia lend to a higher risk of retinal detachment as discussed above. All retinal breaks need careful examination to identify the types of holes present and to determine if active vitreo-retinal traction or other signs of impending retinal detachment are present. This is best accomplished by a vitreo-retinal subspecialist but should also be reviewed by the ACS once the underlying disease process has stabilized.

III. Waiver Consideration.

Bilateral retinal detachment is disqualifying for all classes and for retention. Unilateral retinal detachment from organic progressive disease or with persistent defects may be disqualifying for all classes and for retention. In addition, any bilateral retinal detachment or unilateral detachment resulting in visual dysfunction, or is the result of a disease process, is disqualifying for GBC/MOD duties. Retinal breaks and retinoschisis are only disqualifying for Flying Classes I/IA, II, and III.

Table 1: Waiver potential for retinal holes, retinal detachment, and retinoschisis

Flying Class	Retinal holes*	Retinal tears*	Retinal detachment	Retinoschisis	Required ACS evaluation/review Waiver Authority
I/IA	Yes, if low risk	Maybe if successful treatment and low risk	No	Maybe, if small and isolated in far peripheral retina and low risk*	ACS review/evaluation AETC
II**	Yes	Yes	Yes	Yes	ACS review/evaluation for initial waiver MAJCOM
III**	Yes	Yes	Yes	Yes	ACS review for initial waiver MAJCOM
ATC/ GBC	N/A^	N/A^	Yes#	N/A^	ACS review for initial waiver MAJCOM
MOD	N/A^	N/A^	Yes#	N/A^	ACS review at discretion of the waiver authority AFGSC

* Low risk features for retinal detachment are defined as absence of symptoms (flashes or floaters), no prior history of retinal detachment, no subretinal fluid, myopia less than or equal to -5.50 diopters, and no evidence of vitreo-retinal traction. In addition, there should be no retinal breaks at the edge or outside the area of lattice degeneration, except in the case of operculated peripheral retinal hole.

** Untrained FC II/III treated similar to FC I/IA

^ Not disqualifying if treated and/or determined to be stable by a vitreo-retina specialist

Bilateral, or unilateral resulting from organic progressive disease and/or associated with diplopia, field of view <20 degrees, or loss of acuity below standards

AIMWITS search in Sep 2014 revealed a total of 468 members with an AMS containing one of the above retinal diagnoses. There were a total of 64 disqualifications. Breakdown of the cases revealed: 54 FC I/IA cases (18 disqualified), 215 FC II cases (10 disqualified), 181 FC III cases (32 disqualified), 11 ATC/GBC cases (3 disqualified), and 7 MOD cases (1 disqualified).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations; MEB is required. For retinal holes, tears, retinal detachment and retinoschisis, initial waiver submission should be accompanied by a bilateral peripheral retina examination note by a retinal specialist. If the retinal specialist determines surgical treatment is required then waiver submission should occur after adequate recovery time without complications

(three month minimum). If the retinal specialist determines no treatment is required, then the 3 month waiting period prior to waiver submission is not required. All initial waivers (or recurrence of retinal tear or detachment) require an ACS evaluation/review.

The AMS for the initial waiver for retinal hole should include:

A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete aeromedical history to include pertinent negatives (trauma, myopia, lattice degeneration, etc.).
C. Optometric exam to include: manifest refraction (previous refraction if underwent CRS), visual acuity, any high-risk features, history of treatment
D. Ophthalmology consultation results

The AMS for the initial waiver for retinal detachment, retinal tear, and/or retinoschisis should include the following:

A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete aeromedical history to include pertinent negatives (trauma, myopia, lattice degeneration, etc.).
C. Optometric exam to include: manifest refraction (previous refraction if underwent CRS), visual acuity, Humphrey 30-2 visual field, Amsler grid, color vision (if macular involvement), discussion of any high-risk features, history of treatment.
D. Retinal specialist consultation to include: history, positive risk factors, exam findings, treatment(s), and surgical outcome.

The AMS for waiver renewal for retinal hole, retinal detachment, and retinoschisis should include the following:
A. Interval history to include presence or absence of current visual symptoms and operational impact of condition.
B. Results of interval ophthalmology exams.
C. Summary of any medical or surgical treatments.

ICD-9 codes for retinal hole, retinal detachment, and retinoschisis	
361.3 361.31	Retinal holes
361.0 361.2 361.8 361.9	Retinal detachment
361.1	Retinoschisis

ICD-10 codes for retinal hole, retinal detachment, and retinoschisis	
H33.309	Unspecified retinal break, unspecified eye
H33.329	Round hole, unspecified eye
H33.2 0, 1, 2, 3	Serous retinal detachment
H33.8	Other retinal detachments
H33.10 0, 1, 2, 3	Unspecified retinoschisis

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WAIVER GUIDE
Updated: Jul 2015
Supersedes Waiver Guide of Oct 2011
By: Dr Dan Van Syoc
Reviewed by Col Matthew Carroll, AF/SG consultant for Rheumatology

CONDITION:
Rheumatoid Arthritis (Jul 15)

I. Overview.

Rheumatoid arthritis (RA) is a systemic disease that characteristically manifests in the joints as articular inflammation and destruction. The typical untreated presentation is one of progressive, symmetric arthritis beginning in peripheral joints with subsequent proximal spread. RA leads to erosion of cartilage and bone; if uncontrolled, such destruction is usually apparent radiographically within a matter of months, and may result in physical disability within a decade.[1]

RA is a common disease. Prevalence is about 1% in Caucasians, with a lower risk in Africans, but much higher (~5%) in certain Native American populations. Females are affected 2-3 times as frequently as males.[1] Peak age of onset is 30-55 years.

While RA may present in several ways, the classic pattern consists of pain, swelling, and stiffness of small peripheral joints in a symmetric pattern, beginning insidiously, and associated with morning stiffness lasting over one hour.[1] The onset of disease may occasionally be one of episodic and migratory involvement of one or several joints, lasting from hours to days, interspersed with symptom-free periods of days to months.[2] Such "palindromic rheumatism" is not specific to RA; however, in some studies progression to rheumatic disease was 35%.[3, 4] Occasionally, RA may be heralded by monoarticular involvement of a large joint, with polyarthritis developing days to weeks later. Rarely, extra-articular disease is the initial manifestation.

Axial and central joints are eventually involved in up to 50% of patients. Discovertebral disease with osteochondral destruction may lead to atlanto-axial and/or subaxial subluxation. Abnormal anterior movement of the atlas on the axis is the most common type of subluxation. Clinical myelopathy is uncommon, but asymptomatic subluxation is not. Radiographic evaluation of the cervical spine in patients with disease present for 20 years has found evidence of anterior subluxation in 23 %.[5, 6, 7] Individuals with severe asymptomatic subluxation are at risk of serious cord injury from trivial insults, such as minor whiplash and even endotracheal intubation. Serious spinal cord injury at the C1-2 level is commonly fatal. Whether more aggressive disease-modifying therapy reduces the incidence of this complication is unclear. However, two studies over 2-5 years showed significant reduction in cervical subluxation in RA patients treated with multiple disease-modifying agents as opposed to placebo.[8, 9]

Extra-articular features of RA may be due to elaboration of inflammatory mediators, commonly resulting in fatigue, anemia, and osteopenia.[10] Other organs may be directly involved by the disease process, including skin (rheumatoid nodules), eye (scleritis, episcleritis), lung (pleuritis, interstitial fibrosis, bronchiolitis), heart (pericarditis, myocarditis), blood vessels (vasculitis, peripheral artery disease), exocrine glands (Sjögren's syndrome), and peripheral nervous system (peripheral neuropathy).[11-16]

The diagnosis of RA is based on a constellation of symptoms and abnormalities, and may be difficult to confirm, especially early in the course of disease. Symmetric arthritis involving the metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints is the most characteristic feature of early disease, and while not pathognomonic, such a finding strongly supports the diagnosis.[17] (Note that while symmetric, the arthritis need not involve joints in mirror-image fashion; thus, if one or more MCP joints are involved on one side, then it is likely that there will be involvement of some MCP joints on the other side.) Joint stiffness typically follows any prolonged period of inactivity, especially sleep. While stiffness is common to all arthropathies, prolonged stiffness suggests an inflammatory arthropathy, and morning stiffness of over an hour strongly suggests RA. Radiographic detection of typical cartilaginous and periarticular bony erosions is relatively specific for RA, but since that process is what disease-modifying therapy is designed to prevent, it can hardly be considered an early finding. Erosions in the MCP and PIP joints occur in 15-30% in the first year of disease activity. With disease duration exceeding two years, 90% will show such erosions.[18, 19] Magnetic resonance imaging (MRI) is more sensitive for detecting early erosions, but the specificity of such MRI-detected lesions is unknown.[20] The finding of rheumatoid nodules is highly specific for RA, but of little diagnostic utility; only about a third of RA patients will develop nodules, and when they do develop it is usually late enough in the course of the disease that the diagnosis is well established.[11]

A number of biologic markers are employed in the evaluation of RA, both for purposes of diagnosis and monitoring. Rheumatoid factors (RF) are autoantibodies directed against IgG. About 70-80% of RA patients will have a positive RF titer at some point in their disease. Except for high-titer IgM RF, specificity of a positive RF in a patient with arthritis is relatively weak. In addition to being found frequently in systemic lupus erythematous and primary Sjögren's syndrome, a positive RF may be found in 5-10% of normal (usually elderly) individuals.[21] The primary value of RF seems to be prognostic, since persistently positive assays have been associated with more aggressive disease.[22, 23] For diagnostic purposes, the presence of antibodies to cyclic citrullinated peptide (anti-CCP) appears to have greater specificity than RF. In several studies, specificity of anti-CCP ranged from 90-96%, with sensitivity ranging from 47-76%. Like RF, the presence of anti-CCP has been associated with a greater risk of disease progression.[23] Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) are inflammatory markers of little diagnostic specificity, though they may help to sort out individuals with non-inflammatory arthralgias such as from degenerative osteoarthritis and pain syndromes. They are primarily useful as markers of disease activity.[24-26] Of the two assays, CRP is less affected by confounding factors, such as anemia.

Treatment of RA is based on identifying active disease at an early stage and intervening to suppress the inflammatory process. Joint damage begins early in the course of the disease, with the majority of patients developing radiographic erosions in the second year. Before the availability of effective disease-modifying therapy, morbidity was high; in one study of long-term outcome published in 1987, after twenty years' follow-up about 80% of patients were severely disabled.[19] Since joint destruction is essentially irreversible, it is important to identify those individuals with early disease and intervene to prevent serious morbidity.[27-30] On the other hand, treatment is in most cases life long, and is also associated with significant potential morbidity, and thus the diagnosis of RA needs to be firm before committing the patient to a disease-modifying regimen.

The choice of therapy is determined in large part by disease severity.[30] Mild disease typically consists of 3-5 inflamed joints, with negative plain radiographs and no extra-articular disease.

Moderate disease is characterized by 6-20 inflamed joints, evidence of early changes on plain radiographs, and usually no extra-articular disease. Severe disease consists of those with >20 inflamed joints, rapid progression of erosions and loss of cartilage on plain radiographs, and typically extra-articular disease. The last group usually demonstrates systemic signs of inflammation, including anemia and hypoalbuminemia. Laboratory evaluation is not particularly helpful in categorizing disease severity. ESR and CRP are usually elevated in all patients; although determining the degree of elevation may be useful. The presence of RF and/or anti-CCP doesn't correlate well with severity, though patients with negative titers often have milder disease, while a high-titer RF is typical of more severe disease and poorer prognosis.[23, 26]

Treatment of most patients includes maximal doses of nonsteroidal anti-inflammatory drugs (NSAIDs). Representative daily regimens would include 3200 mg of ibuprofen or 1000 mg of naproxen, both in divided doses. These drugs are useful for pain control, and do suppress some features of inflammation. However, in the great majority (~90%) of patients on NSAIDs alone, disease activity continues, and without additional therapy leads to joint erosion. For mild disease, the addition of disease-modifying antirheumatic drugs (DMARDs) with minor risk of serious toxicity is usually enough to control disease. Studies have indicated significant improvement in morbidity in patients with early rheumatoid arthritis who are initiated on disease-modifying antirheumatic drugs (DMARD) therapy within 3 months.[31] Evidence is such that some experts recommend DMARD therapy be initiated on all patients diagnosed with Rheumatoid Arthritis, regardless of disease severity.[30, 31] Hydroxychloroquine (Plaquenil®) at a dose of 200 mg b.i.d. (for a body weight over 61 kg) has been standard therapy for decades. Onset of action is relatively slow, with maximum clinical improvement requiring up to 4-6 months. Salicylazosulfapyridine or sulfasalazine (Azulfidine®), at a dose of 1000 mg b.i.d. or t.i.d. shows a faster response, with maximum benefit in 1-2 months. Minocycline has shown minor benefit, but is not considered standard therapy.[32]

For moderate disease, in addition to full-dose NSAIDs, DMARD therapy is mandatory, and patients are rarely brought under control without the use of methotrexate or an anticytokine.[1, 30] Treatment with either drug should be considered to be of indefinite duration; cessation of methotrexate usually results in a flare within 3-6 weeks, and while there is much less clinical experience with anticytokine therapy, in most clinical series cessation of therapy has resulted in return of disease activity. In addition, low-dose glucocorticoids may also be used for the first six months to gain rapid control of inflammation pending a clinical response to a DMARD agent.[33] This is particularly true of methotrexate, which has a slow onset of action; one advantage of anticytokine therapy is that clinical response is relatively brisk.

Tumor necrosis factor alpha (TNF-α) is considered to be a pivotal cytokine in the pathogenesis of RA. Described as a "fire alarm," TNF-α calls in more inflammatory cells and induces the release of other inflammatory cytokines, such as interleukins and interferon. TNF-α has been shown to be elevated in the synovial fluid of RA individuals and higher synovial fluid concentrations have been shown to correlate to bony erosions. Etanercept (Enbrel®) is a dimeric fusion protein with two copies of the TNF receptor protein fused to an immunoglobulin base. It shows a high affinity for TNF-α, competitively binding the cytokine and preventing its interaction with the cell surface receptor. Etanercept induces a quicker response than methotrexate, as well as somewhat greater efficacy and lower toxicity; still, on average, treatment only results in 50% improvement in 50% of individuals.[34, 35] Although etanercept may be administered at a dose of 25 mg twice a week, a dosage schedule of 50 mg once a week has shown similar efficacy and simplifies the regimen,

particularly with the autoinjector dosage form. The drug is given in rotating fashion over the subcutaneous tissue of the thighs. Etanercept must be kept refrigerated between 36° to 46°F, for it degrades rapidly even at room temperature. It is given to some patients with early disease resulting is sustained remission but without demonstrable radiographic improvement.[36] A recent article discussed the successful treatment and return to fly in a military aviator utilizing etanercept.[37]

Adalimumab (Humira®), another commonly used TNF agent, was also recently approved for use in Air Force aircrew. Adalimumab is FDA-approved for treatment of moderate to severe rheumatoid arthritis.[39] The American College of Rheumatology recommends anti-TNF therapy with or without methotrexate in early rheumatoid arthritis with features of poor prognosis, and adding or switching to anti-TNF therapy in established rheumatoid arthritis where DMARD monotherapy or DMARDs in combination have failed to achieve disease control.[40] Standard practice is to initiate anti-TNF treatment with concomitant methotrexate since data support the improved efficacy of this regimen. The waiver potential of anti-TNF biologics as monotherapy for rheumatoid arthritis is therefore limited and must be considered on a case-by-case basis.[39]

In summary, early aggressive disease control is in the best interest of the patient to minimize morbidity and possibly mortality. Patients should be referred to a rheumatologist early to start DMARDs as soon as possible (within 12 weeks of symptom onset). Another advantage of early referral is to (1) correctly identify RA early and (2) provide a window when use of methotrexate and biologics may actually arrest the disease, opening a window down the road where the patient may be able to stop DMARDs/biologics for periods of time.

II. Aeromedical Concerns.

RA must be controlled to reduce chronic morbidity and perhaps mortality. (While there is little argument about the increased mortality associated with RA, evidence that treatment reduces mortality is slim.) With the exception of etanercept, the agents required to control moderate disease are incompatible with Air Force aviation. While patients may certainly refuse medical treatment, uncontrolled or poorly controlled RA is also disqualifying, so flying considerations should not enter into such treatment decisions.

With active synovitis, joint pain is both distracting and impairing. While morning stiffness represents the classic “gel phenomenon”, stiffness tends to occur after any period of immobility, such as in the cockpit. While clinical myelopathy is uncommon in RA, discovertebral disease is common. Though there is a dearth of direct data, relatively minor degrees of cervical subluxation are likely to pose a risk in the event of severe cervical motion, such as that seen with sustained acceleration or ejection.

NSAID therapy is waiverable. Of available DMARD agents, hydroxychloroquine, sulfasalazine and etanercept are potentially waiverable. The principal toxicity of concern with hydroxychloroquine is retinopathy, which is related to cumulative dose; while of obvious aeromedical concern, it is possible to monitor for the development of this complication. Sulfasalazine toxicity consists of dose-related adverse effects, and a number of more serious hypersensitivity reactions primarily related to the sulfa moiety. (Unlike in inflammatory bowel disease, where 5-ASA is the active agent, it appears that the utility of the drug in RA is related to the sulfapyridine component, and thus the potential for sulfa-related adverse effects is unavoidable.) Methotrexate, while considered a gold standard for the treatment of RA, because of serious toxicity

involving multiple organs (e.g., lung and liver), is not waiverable. Of the toxicities associated with anticytokine therapy, those related to immunosuppression have been of greatest concern. The increased risk of developing demyelinating disease appears to be well within aeromedical standards. The same is true of lymphoma, and the latter would be unlikely to be of particular aeromedical concern. There is inconclusive evidence of possible increased risk for congestive heart failure in anticytokine therapy. Etanercept-treated RA is associated with a significant risk of serious infections at about 4% per year. These infections have been primarily bacterial infections of the joint, bone, and soft tissue, and re-activation of latent pulmonary infections. While clinically serious, these are very unlikely to result in an aeromedical complication that involves flight safety. Individuals on anti-TNF therapy appear to be at greater risk of granulomatous infections, although etanercept has been associated with less risk than infliximab.[38] Before etanercept therapy is begun, chest radiography and testing with intermediate strength PPD are required; tuberculin reactivity of 10 mm or more should be interpreted as a positive response, and antituberculous prophylaxis begun.[39] Recommendations regarding duration of INH prophylaxis before beginning etanercept have been inconsistent. Anticytokine therapy is incompatible with deployment, due to the need for expedited work-up of infectious symptoms and for rapid treatment of suspected infections; it is also incompatible with live attenuated vaccines (such as smallpox, yellow fever, or intranasal influenza). Also, etanercept must be kept at 36° to 46° F, thus the instability of the drug not only affects deployment, but largely rules out any TDY of longer than a week's duration. Systemic steroid therapy is occasionally employed to obtain symptomatic relief while waiting for a longer-acting DMARD to control the disease process. Waiver is not recommended while on steroids. If the individual is controllable on waiverable medications after the course of steroids is finished, waiver could be considered after the pituitary axis has returned to normal function (based on Cortrosyn® stimulation testing; see waiver guide – systemic glucocorticoid (steroid) treatment).

III. Waiver Consideration.

Rheumatoid arthritis is disqualifying for all flying classes to include ATC/GBC and MOD personnel, and in addition, a diagnosis of RA requires a medical evaluation board (MEB). All aviators with RA or suspected RA should be referred to the ACS, initially and at time of renewal. ACS evaluation will be performed in conjunction with rheumatology consultation at Wright Patterson AFB (or at the nearest military treatment facility) to confirm the diagnosis, to assess disease severity, and to determine the degree of therapy necessary to suppress disease activity. In those cases where control can be achieved with NSAIDs and hydroxychloroquine or sulfasalazine, FC IIB and FC IIU waiver can be favorably considered (for pilots). In those cases where control can be achieved with NSAIDs and etanercept, FC IIC (no deployment and no ejection aircraft) and FC IIU waiver can be favorably considered. Waiver initially for etanercept will only be for one year, thereafter usually three years. Individuals granted waivers will be required to follow-up with the ACS for waiver renewal. If disease activity is such that another anticytokine or methotrexate therapy is required, disqualification will be recommended. The aviator may elect to forego such therapy, but disqualification would nonetheless be recommended for inadequately controlled disease.

Table 1: Waiver potential for Rheumatoid Arthritis

Flying Class (FC)	Medication Required for Control of RA	Waiver Potential Waiver Authority&
I/IA	Any medication	No AETC
II	NSAIDs, hydroxychloroquine, and/or sulfasalazine	Yes FCIIB* AFMSA
	Etanercept^	Yes, FCIIC*! $ & AFMSA
	Other immunomodulators (other anticytokines, methotrexate, etc.)	No AFMSA
III	NSAIDs, hydroxychloroquine and/or sulfasalazine	Yes*+ MAJCOM
	Etanercept^	Yes*! # & MAJCOM
	Other immunomodulators (other anticytokines, methotrexate, etc.)	No MAJCOM
ATC/GBC MOD	NSAIDs, hydroxychloroquine and/or sulfasalazine	Yes* MAJCOM**
	Etanercept^	Yes*& MAJCOM**
	Other immunomodulators (other anticytokines, methotrexate, etc.)	No MAJCOM**

* Waiver will not be granted for untrained FC II and III.
^ If individual started on etanercept and responds, then after two months submit waiver (needs to be on therapy three months before seen at ACS).
! Initial waiver will be granted for only one year, thereafter usually three years.
+ FC III needs to be restricted from ejection seat aircraft. If FCIIIC waiver is required, AFMSA retains waiver authority.
# FC III needs to be restricted from ejection seat aircraft, deployment, and TDY requires access to transport and refrigeration of etanercept. If FCIIIC waiver is required, AFMSA retains waiver authority.
$ FC IIC (limited to non-ejection aircraft, TDY requires access to transport and refrigeration of etanercept, not worldwide qualified).
& Needs to be restricted from deployments and TDY requires access to transport and refrigeration of etanercept.
** Waiver authority for MOD is AFGSC.
& For initial waivers for conditions not meeting retention standards (such as RA), the initial waiver authority is AFMSA; renewal is MAJCOM.

AIMWTS search in Jun 2015 revealed a total of 56 aviators with the diagnosis of RA; there were a total of 21 cases resulting in a disqualification. One pilot received an ETP for multi-place aircraft. Breakdown of the cases revealed: 1 FC I case (approved due to remote history of JRA), 25 FC II cases (9 disqualified), 19 FC III cases (8 disqualified), 8 ATC/GBC cases (3 disqualified), and 3 MOD cases (1 disqualified). Almost all of the disqualified cases were strongly related to the diagnosis of RA.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for rheumatoid arthritis should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of rheumatoid arthritis to include onset, time course, joints involved, gel phenomenon, and extra-articular involvement.
C. Physical exam: thorough exam with specific details of deformity, strength, range of motion, and synovitis for joints involved.
D. Pharmacologic treatment: subjective and objective disease response.
E. Consultation from Rheumatology.
F. Labs: RF, anti-CCP, ESR, C-Reactive Protein, CBC, Renal and Hepatic Panels.
G. Imaging: Baseline hand and foot plain films, C-spine films in flexion and extension to assess subluxation, plain films of all other involved joints, and CXR results **(**if on Etanercept**).**
H. IPPD (if on Etanercept).
I. Medical Evaluation Board results.

The aeromedical summary for waiver renewal for rheumatoid arthritis should include the following:
A. Interval history with updates on joints involved, gel phenomenon, extra-articular involvement, subjective and objective evidence of progression, and treatment side effects/changes since last waiver submission.
B. Physical exam: thorough exam with specific details of deformity, strength and synovitis for joints involved.
C. All applicable labs as in the initial aeromedical summary.
D. All applicable imaging as in the initial aeromedical summary.
E. Consultation from Rheumatology.

ICD-9 codes for rheumatoid arthritis	
714.0	Rheumatoid arthritis (RA)
714.1	Felty's syndrome (RA with splenomegaly and leukopenia)
714.2	Other rheumatoid arthritis with visceral or systemic involvement
714.3	Juvenile chronic polyarthritis

ICD-10 codes for rheumatoid arthritis	
M06.9	Rheumatoid arthritis, unspecified
M05.00	Felty's syndrome, unspecified site
M05.60	Rheumatoid arthritis of unspecified site with involvement of other organs and systems
M08.00	Unspecified juvenile rheumatoid arthritis of unspecified site

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WAIVER GUIDE
Updated: Aug 2016
Supersedes: Waiver Guide of Jun 2012
By: LtCol Bryant Martin (RAM 17) and Dr. Dan Van Syoc
Reviewed by Col Lakeisha R. Henry, AF/SG Otolaryngology consultant

CONDITION:
Salivary Gland Disorders (Aug 16)

I. Overview.

Three major paired salivary glands exist: the parotid, submandibular and sublingual. They collectively serve to secrete saliva, through a ductal system, for the purpose of moistening food for chewing and swallowing. Saliva from the parotid is released adjacent to the maxillary molars through Stensen's duct. Saliva from the submandibular gland (and portions of the sublingual gland) empties into the floor of the mouth via Wharton's duct, whose orifice lies adjacent to the lingual frenulum. There are also numerous minor salivary glands scattered throughout the oral cavity and generally named based on co-location to various anatomic structures (e.g. labial, buccal, etc.). The saliva released from these salivary structures is a protein-rich hypotonic fluid controlled by sympathetic and parasympathetic stimulation.[1] Pharmacologic agents with positive muscarinic activity (agonists) will result in increased saliva production. Any condition or treatment which diminishes salivary production can lead to xerostomia (dry mouth). This in turn can contribute to a variety of oral conditions such as candidiasis and tooth decay from dental carries. The leading cause of xerostomia is pharmacological agents such as anticholinergics, tricyclic antidepressants, neuroleptics, and monoamine oxidase inhibitors.[2] Previous exposure to radiation of the head and neck as well as systemic diseases such as Sjögren's syndrome, sarcoidosis and amyloidosis can also cause xerostomia. Individuals with xerostomia complain of dry mouth and throat and can have associated difficulty with mastication and swallowing. More severe cases may experience difficulty with speech.

A. Salivary Gland Disorders - Non-Tumor

Non-tumor salivary gland disorders can be divided into either an inflammatory or traumatic etiology. Although uncommon, traumatic enlargement of salivary glands can result from either penetrating or blunt trauma or from iatrogenic causes such as radiation therapy. Penetrating trauma is the primary cause of salivary gland injuries and is best managed with surgical exploration and repair as indicated; these patients need to be seen ASAP by an ENT surgeon. Blunt trauma resulting in the formation of hematomas or seromas can be managed by observation, compression and/or needle aspiration or drainage as necessary. Injuries that cause disruption to the submandibular and parotid glands have a higher likelihood of associated vascular and skeletal injury and facial nerve injury. Mucoceles (known as ranulas if they involve the floor of the mouth) usually result from trauma to minor salivary gland excretory ducts and are caused by the accumulation of saliva into the surrounding tissue. They frequently present as painless smooth swellings with a bluish hue and their treatment of choice is surgical marsupialization (occasionally the associated salivary gland is removed to prevent recurrence). Ranulas in the floor of the mouth are more commonly associated with the sublingual gland. They can enlarge and result from obstruction of the associated gland. Ranulas may have non-traumatic etiologies and often require excision including the associated gland to prevent recurrence. Necrotizing sialometaplasia is a

benign condition which typically affects the palate and other sites containing salivary glands. The etiology is believed to be secondary to local trauma or focal vascular compromise which results in necrosis. This condition should be observed, and usually heals spontaneously in 6-10 weeks.[3] The challenge, however, is that it tends to mimic malignancy both in appearance and microscopically; potentially leading to an erroneous diagnosis and subsequent unnecessary surgical and radiation therapy. Therefore a prompt referral to ENT or an oral surgeon is indicated.

Inflammatory disorders include viral and bacterial infections, granulomatous and other noninfectious disorders. Viral infections (e.g. mumps, HIV, and cytomegalovirus) are generally managed with supportive and symptomatic care. Acute suppurative sialadenitis is a bacterial infection with involvement of the parotid gland being the most common. It is usually associated with post-surgical and medically debilitated individuals. Less frequently it can occur in patients who are chronically dehydrated without immune deficiency. It is caused by retrograde bacterial contamination of the salivary gland due to stasis of saliva as a result of dehydration or significant hemorrhage. All of the bacterial conditions require anti-microbial therapy, hydration, sialogogues, warm compresses, culture from ductal secretions and rarely incision and drainage if there is abscess formation.[4] Parotid abscess often has overlying cellulitic skin appearance with associated pitting edema.

Sialolithiasis, the presence of stones or calculi in the salivary glands or ducts, is a relatively common condition which typically presents with a painful and swollen major salivary gland.[5] The pain is usually proportional to the degree of ductal obstruction. Acute episodes are often precipitated by eating or even just the anticipation of eating. Entrapment of salivary fluid within the encapsulated gland generates the pain. The involved gland is typically enlarged and tender to palpation. Complications from sialoliths include fistula formation, acute sialadenitis, stricture, mucus retention cyst (obstructive sialadenitis) and ductal dilatation. The submandibular gland is the most common site where 80-90% of all sialoliths occur. The parotid gland account 5-15% and the remaining 2-5% occur in the sublingual gland.[5] The high frequency of submandibular involvement is believed to be secondary to the torturous course of Wharton's duct, higher levels of calcium and phosphate, and the relative dependent position of the gland, thus facilitating stasis and stone formation. The actual etiology of sialolith formation remains a mystery despite many suspected contributing factors; such as inflammation, irregular duct system, irritants, medications, and salivary organic material acting as a nidus for subsequent calcification. Recurrence rate is approximately 20%.[5] Stones are primarily crystalline in nature composed of mostly hydroxyapatite (calcium phosphate and carbon, with trace amounts of magnesium, potassium chloride and ammonium). Approximately half of parotid gland stones, and roughly 20% of submandibular stones are poorly calcified and therefore radiolucent. Gout and nephrolithiasis have been associated with sialolithiasis.[5] CT is used most commonly in the diagnostic workup, although ultrasound use is on the rise. CT is approximately ten-fold more sensitive in the detection of sialoliths than is plain-film imaging.[6] Acute management is generally supportive such as remain well hydrated, suck on tart candy (e.g. lemon drops) to promote salivary flow, moist heat to gland, massage the gland, pain control, and antibiotics, if infection suspected.[5] Surgical intervention is required in pronounced cases. Sialoendoscopy (endoscopic evaluation and salivary duct cannulation with 1.0 mm optical fibers) is increasing in popularity and associated with diagnostic and therapeutic options.

Siladenosis occurs when one or both parotid glands are diffusely enlarged, soft and nontender, and are not associated with salivary hypofunction. This occurs in both males and females equally at 20-60 years of age. Biopsy shows enlarged (twice normal) laminar cells with granules-packed

cytoplasm. The exact cause is unknown, but inappropriate autonomic nervous system stimuli is thought; about half the individuals with this disorder have endocrine disorders such as diabetes, nutritional disorders or have taken drugs such as guanethidine, thioridazine or isoprenaline. No treatment is usually necessary.

Granulomatous disease is managed according to etiology, such as anti-tuberculin medications for mycobacterium or surgical excision for atypical mycobacterium. Other infectious granulomatous etiologies include actinomycosis, cat scratch disease, and toxoplasmosis. Sarcoid is generally managed symptomatically.

Autoimmune/noninfectious conditions include benign lymphoepithelial disease and Sjögren's syndrome; both of which are managed medically and symptomatically. Sjögren's syndrome is a chronic inflammatory disorder characterized by diminished lacrimal and salivary gland function and includes a vast constellation of symptoms including xerostomia, dry eyes (sicca), dry nasal or vaginal mucosa.[7] Miscellaneous chronic salivary gland conditions include systemic diagnoses of cystic fibrosis, chronic allergies and can also be drug induced. Tissue samples are often required for definitive diagnosis, particularly when a systemic condition such as Sjögren's syndrome or amyloidosis is suspected; in which case a minor salivary gland (e.g. labial) is sampled for histologic examination. When tissue is required from a major salivary gland, fine-needle aspiration is the method of choice.[8] Certain serologic studies (e.g., ANA, RF, ESR, immunoglobulins, etc.) are helpful in the diagnosis of many systemic conditions (Sjögren's syndrome), as is the elevation of amylase isoenzymes in order to differentiate between pancreatic and salivary sources.[7] Benign parotid cysts can be present in the parotid gland and are often a centimeter or smaller in size, numerous and often bilateral. They can be associated with autoimmune disorders. Testing for HIV should be considered in the setting of multiple benign or bilateral benign appearing parotid cysts. CT of the neck with contrast is helpful in delineating extend and confirming cyst characteristics. They may be incidental in the absence of autoimmune disease and are often observed. Aspiration generally is not helpful. Parotidectomy is rarely indicated.

B. Salivary Gland Tumors

Tumors of the salivary glands typically present as asymptomatic masses. Salivary gland tumors are rare, making up 6-8% of head and neck tumors.[9] Benign salivary gland tumors include the following: 1) mixed tumor (pleomorphic adenoma), monomorphic adenomas (basal cell adenomas, canalicular adenomas, myoepithelioma, oncocytic tumors, and sebaceous adenomas), and 2) ductal papillomas (inverted ductal papillomas, sialadenoma papilliferum, and intraductal papilloma). These tumors may arise from any of the major or minor salivary glands, with the vast majority arising from epithelial originated tissue. The frequency of gland involvement/percent malignant is as follows: 65% parotid/25% malignant, 10% submandibular/40% malignant, <1 % sublingual/90% malignant and 25% minor salivary gland/50% malignant.[10] Generally, the smaller the salivary gland of origin, the more likely it is to be malignant.[11] There are two major classification systems for salivary gland pathology, one from the World Health Organization and the other from Joint Pathology Center. Both of these systems are very detailed and differ somewhat in their malignant tumor classifications.

The mixed tumor (pleomorphic adenoma) is the most common tumor of the salivary glands; the vast majority (85%) arising in the parotid gland. Submandibular involvement accounts for approximately 8% of cases and the remaining 7% are distributed amongst the minor salivary glands. Mixed tumors tend to present between the fourth and sixth decades, with a slight predilection for males. Those involving minor salivary glands may be located on the palate, followed by upper lip and buccal mucosa. Treatment is through surgical excision, by means of excision of the involved salivary gland such as a parotidectomy with facial nerve preservation or submandibular gland excision. Lesions involving the palate may require adjacent bone removal. Failure to completely remove mixed tumors in major salivary glands frequently results in recurrence. Additionally, 10% of these lesions undergo malignant transformation over a period of many years.[12]

Most monomorphic adenomas are rare and exhibit benign growth characteristics. Approximately 70% of basal cell adenomas occur within the parotid gland. Canalicular adenomas, however, occur almost exclusively within the oral cavity, frequently on the upper lip. Again, treatment consists of surgical excision with narrow clear margins to preserve functionality. Myoepitheliomas most commonly arise from the parotid gland, and while epithelial in origin, they appear more as smooth muscle. Treatment is the same as for mixed tumors. Oncocytomas are rare lesions which typically arise from the parotid gland, with superficial parotidectomy being the treatment of choice. Warthin's tumor (papillary cystadenoma lymphomatosum) arises mostly from the parotid gland and has been linked to tobacco use. In older patients especially smokers, they may be bilateral. Sebaceous adenomas are rare lesions, occurring most commonly in the submandibular and parotid glands. Parotidectomy or local excision is the treatment of choice. Ductal papillomas are rare lesions which arise from the ductal structures of the salivary gland involved.

Malignant neoplasms of the salivary glands typically exhibit rapid growth, ulceration, lack of encapsulation, are usually fixed and may have associated facial palsy and potential for metastasis. Approximately 10-15% of salivary malignancies present with pain. As opposed to the benign lesions discussed above, which are generally cured with excision of the involved gland or simple local excision for minor salivary gland tumors, these lesions require wider resection and are frequently followed up with radiation therapy. Some malignant salivary neoplasms are associated with ipsilateral neck dissection (removal of lymph nodes in various anterior, anterio-lateral, and/or posterior neck compartments). In general, salivary gland neoplasms respond poorly to

chemotherapy as sole treatment and chemotherapy has often been considered for palliation. However, newer chemoradiotherapy protocols show promise in treatment of some salivary malignancies. Chemotherapy may also be considered for unresectable or recurrent cases. A malignancy which presents with pain often indicates nerve involvement, and as such, a poorer prognosis. Documenting facial nerve function is particularly important, as associated facial paralysis is a harbinger of malignancy; as are multiple palpable masses, fixed mass, and the presence of cervical lymphadenopathy.

Malignant salivary gland tumors are a heterogeneous group of tumors with a great diversity in histologic appearance and biologic behavior.[13] The American Joint Committee on Cancer (AJCC) TNM staging system is used for parotid, submandibular and sublingual glands. Tumors arising from the smaller salivary glands are classified and staged based on site of origin. T categories are based on size and extension of the tumor; N categories are based on lymph node involvement; and M is based on presence or absence of distant metastasis. The following tumors may present as low-grade lesions: mucoepidermoid carcinoma, polymorphous low-grade adenocarcinoma, acinic cell carcinoma, clear cell carcinoma, malignant mixed tumor, carcinoma ex-pleomorphic adenoma, myoepithelial carcinoma, and basal cell adenocarcinoma. Low-grade lesions typically may have a good to excellent prognosis. Mucoepidermoid carcinoma is unique in that it is the most common salivary gland malignancy with growth properties ranging from low-grade to very high-grade. They are also the most common salivary gland malignancy in children. Most arise from the parotid gland. The most common intraoral site is the palate. The following tumors demonstrate intermediate-grade malignancy: mucoepidermoid carcinoma, myoepithelial carcinoma, and adenocarcinoma. High-grade malignancies include mucoepidermoid carcinoma, adenoid cystic carcinoma, carcinoma ex-mixed tumor, malignant mixed tumor, salivary duct carcinoma, squamous cell carcinoma, myoepithelial carcinoma, epidermoid carcinoma, salivary sarcoma, and oncocytic adenocarcinoma.[7] There is controversy regarding use of a two versus three tiered grading system (low/high grade versus low/intermediate/high grade) for some of the rare salivary malignancy such as myoepithelial, malignant mixed carcinoma and other epithelioid subtypes. Five-year survival rate for various malignant tumors range from mucoepidermoid (75-95%); adenoid cystic (40-80%); adenocarcinoma (20-75%); malignant mixed tumor (35-75%); and squamous cell carcinoma (25-60%).[10]

A variety of imaging techniques are utilized to diagnose salivary gland disorders, including plain-film radiography, sialography, ultrasonography (U/S), radionucleotide imaging, magnetic resonance imaging (MRI), and computed tomography (CT).[3, 10] Standard dental imaging is often sufficient in the initial evaluation of local pain and swelling of the salivary gland, particularly those associated with larger radiopaque sialoliths. Contrasted CT scanning is the imaging modality of choice of many ENT surgeons and provides a clear image of the ductal system and will readily identify obstructions from stones and strictures; and is the imaging modality of choice in the initial evaluation of acute pain and swelling of a single salivary gland. Sialography can be performed for the evaluation of submandibular and parotid glands, but should not be performed if infection is suspected due to increased risk of additional irritation and the potential for gland and/or duct rupture (However, ultrasonography or CT imaging of the salivary gland is performed as is in sialolith evaluation as sialography may not be as quickly or readily available). Neoplastic lesions are best imaged with CT or MRI. Adjacent bony destruction, often associated with malignant lesions, may be evident on initial plain films in some cases. Furthermore, CT and MRI most accurately detail gland pathology, surrounding structures, and the proximity to, or actual involvement of the facial nerve. U/S is particularly useful in the identification of more superficial lesions in the

submandibular and parotid glands, and is especially useful in differentiating between intra- and extra-glandular masses and determining whether the lesion is solid or cystic in nature; with benign lesions typically appearing as solid and well-circumscribed hypoechoic intraglandular masses. U/S is also well suited for identifying abscess formations and sialoliths. Radionucleotide imaging typically involves scintigraphy with technetium 99m (Tc99m) pertechnetate, and is the only modality capable of providing information regarding the salivary glands' functional capability as evidenced by abnormal gland uptake and/or excretion.

II. Aeromedical Concerns.

Most salivary gland disorders would generally not be considered to pose an immediate risk to flight; at least relative to the risk for sudden incapacitation in flight from a known or yet to be diagnosed condition. Certainly a salivary stone may cause pain during flight (especially following a meal) but this does not generally produce incapacitating levels of discomfort such as those frequently associated with renal stones. As such, most aeromedical concerns relate to the identification of conditions which might interfere with clear speech, wear of the oxygen mask, or require acute medical intervention such as antibiotic or anti-inflammatory medication use.

III. Waiver Considerations.

Recurrent obstructive calculi of the salivary glands or ducts, and salivary fistulas are disqualifying for flying classes I/IA, II, and III. Furthermore, any anatomic or functional anomaly of head or neck structures, which interfere with normal speech, ventilation of the middle ear, breathing, mastication, swallowing or wear of aviation or other military equipment is disqualifying for all flying classes, including RPA Pilot. Specifically, xerostomia (dry mouth) from whatever cause, if significant enough to interfere with mastication and swallowing would be grounds for disqualification, as would any condition which interferes with the wearing of the aviator oxygen mask as might occur with certain conditions involving swelling of the parotid and/or submandibular glands. The low humidity cockpit environment can also exacerbate xerostomia. Of course, malignancies of any sort are disqualifying for flying duty as well as retention. Benign tumors are considered disqualifying only if they interfere with the function or ability to wear required life support equipment or if they are likely to enlarge or be subjected to trauma during routine military service or have high malignant transformation potential. Benign tumors may require an MEB if the condition in not remediable or ongoing specialty care is required more than annually. Chronic systemic conditions which may involve salivary gland structures or function are addressed under the specific condition identified (e.g., Sjögren's syndrome, diabetes mellitus, and sarcoidosis).

Due to the relative infrequency of salivary gland disorders in the flying population and wide variability, a case-by-case approach to waiver consideration is used. The summary below should serve as a general guide for waiver submission, keeping in mind that any salivary gland disorder presenting in a younger population such as with any initial FC I/IA physical are in and of themselves quite unusual cases.

Table 1. Waiver Considerations for Salivary Gland Disorders

Flying Class (FC)	Disqualifying Condition	Waiver Potential Waiver Authority	ACS Review/Eval
FC I/IA Initial II/III	Recurrent salivary stones	Maybe+ AETC	No
	Salivary fistula	Maybe+ AETC	No
	Impaired speech or mastication or condition which precludes wear of life support equipment	No AETC	No
	Benign tumor	Maybe+# AETC	Yes
	Malignant tumor	Maybe$ AETC	At the discretion of the waiver authority
FC II/III RPA Pilot	Recurrent salivary stones	Yes# MAJCOM	No
	Salivary fistula	Yes# MAJCOM	No
	Impaired speech or mastication or condition which precludes wear of life support equipment	No MAJCOM	No
	Benign tumor	Yes+# MAJCOM	Yes
	Malignant tumor	Maybe† AFMSA	Yes
GBC/MOD*	Recurrent salivary stones	N/A	N/A
	Salivary fistula	N/A	N/A
	Impaired speech or mastication or condition which precludes wear of life support equipment	No MAJCOM	Yes
	Benign tumor	Yes+# MAJCOM	Yes
	Malignant tumor	Maybe† AFMSA	Yes

* Waiver authority for MOD personnel is AFGSC.

+ Consideration for waiver is dependent upon severity of presentation, and any associated complications and/or frequency of recurrence.

#Waiver authority for benign tumors is AFMSA if the individual does not meet retention standards as defined in the MSD.
† Waiver consideration requires at least six months has elapsed from completion of treatment (three months if excision only required) and is dependent on tumor type, staging, complications, and likelihood of recurrence.
$ May consider waiver for certain cured tumors that have a very good prognosis – case-by-case basis.

A query of the AIMWTS through April of 2016 revealed a total of 11 dispositions for salivary gland disorders. All but one received a waiver; the DQ was for a FC III member with a malignant adenoid cystic carcinoma of the parotid gland complicated by perineural invasion despite surgical resection and further complicated by peripheral nerve radiation myelopathy. Breakdown of the cases revealed 7 FC II cases and 4 FC III cases.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for waiver of **recurrent salivary stones or fistula** should include:
A. History, physical (thorough head and neck examination), medical evaluation and treatment for all episodes; to include complete description of presenting symptoms.
B. Reference to all laboratory and imaging studies obtained.
C. Otolaryngology/oral-maxillary consultation; with specific reference to likelihood of recurrence.
D. Statement regarding ability to speak clearly and to adequately fit aviator oxygen mask and other required life support equipment.

The AMS for an initial waiver for **impaired speech or mastication or other condition which precludes wear of life support equipment** should include:

A. History, physical, medical evaluation and treatment; to include complete description of presenting symptoms.
B. Reference to all laboratory and imaging studies obtained.
C. Operative notes, if applicable.
D. Histology report, if applicable.
E. Otolaryngology/oral-maxillary consultation; with specific reference to likelihood of recurrence and/or malignant transformation and need for on-going surveillance.
F. Statement regarding ability to speak clearly and to adequately fit aviator oxygen mask and other required life support equipment.

The AMS for a waiver for a **benign tumor** should include:
A. History, physical, medical evaluation and treatment; to include complete description of presenting symptoms and any residual symptoms after treatment.
B. Reference to all laboratory and imaging studies obtained.
C. Operative notes (initial waiver only).
D. Histology report (initial waiver only). (For rare cell types, a Joint Pathology Center report required.)

E. Otolaryngology/oral-maxillary consultation; with specific reference to likelihood of recurrence and/or malignant transformation and need for on-going surveillance.
F. Statement regarding ability to speak clearly and to adequately fit aviator oxygen mask and other required life support equipment.
G. MEB results if applicable.

The AMS for a waiver for a **malignant tumor** should include:
A. History, physical, medical evaluation and treatment; to include complete description of presenting symptoms any residual symptoms after treatment.
B. Reference to all laboratory and imaging studies obtained.
C. Operative notes (initial waiver only).
D. Histology report (to include AFIP report) (initial waiver only).
E. Medical evaluation board summary recommendations (initial waiver only).
F. Otolaryngology and oncology consultation; with specific reference to likelihood of local recurrence or metastasis and detailed description of recommended surveillance regimen.
G. Statement regarding ability to speak clearly and to adequately fit aviator oxygen mask and other required life support equipment

ICD-9 Code	**Non-neoplasm Salivary Gland Conditions**
527.5	Sialolithiasis
527.6	Mucucoele
527.7	Disturbance of salivary secretion, to include hyposecretion, ptyalism, sialorrhea, and xerostomia
527.8	Other specified diseases of the salivary glands (benign lymphoepithelial lesions, sialectasia, sialosis, stenosis of the salivary duct, stricture of the salivary duct)
710.2	Sicca syndrome (Sjögren's syndrome, keratoconjunctivitis sicca)
750.23	Atresia, salivary gland
750.24	Congenital fistula of the salivary gland

ICD-9 Code	**Salivary Gland Neoplasms**
142.0	Parotid gland, malignant neoplasms
142.1	Submandibular gland, malignant neoplasms
142.2	Sublingual gland, malignant neoplasms
142.8	Other major salivary glands, malignant neoplasms
142.9	Salivary gland, unspecified, malignant neoplasms
210.2	Major salivary glands, benign neoplasm
230.0	Lip, oral cavity, and pharynx, carcinoma in situ
235.0	Major salivary gland, neoplasm of uncertain behavior

ICD-10 Code	Non-neoplasm Salivary Gland Conditions
K11.5	Sialolithiasis
K11.6	Mucucoele of salivary gland
K11.7	Disturbance of salivary secretion
R68.2	Dry mouth
K11.8	Other diseases of the salivary glands
M35.00	Sicca syndrome, unspecified
Q38.4	Congenital malformations of salivary glands and ducts

ICD-10 Code	Salivary Gland Neoplasms
C07	Malignant neoplasm of parotid gland
C08.0	Malignant neoplasm of submandibular gland
C08.1	Malignant neoplasms of sublingual gland
C08.9	Malignant neoplasm of major salivary gland, unspecified
D11.9	Benign neoplasm of major salivary gland, unspecified
D00.0	Carcinoma in situ of lip, oral cavity, and pharynx
235.0	Neoplasm of uncertain behavior of major salivary glands, unspecified

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WAIVER GUIDE
Updated: Sep 2015
Supersedes Waiver Guide of Nov 2011
By: LtCol John M. Hatfield (RAM 16) and Dr. Dan Van Syoc
Reviewed by Dr. Joshua Sill, ACS Pulmonologist

CONDITION:
Sarcoidosis (Sep 15)

I. Overview.

Sarcoidosis is a multisystem disorder characterized by the presence of discrete, compact, noncaseating epithelioid granulomata. The typical sarcoid granuloma is found in the lung, distributed along lymphatic chains, but can be found in virtually any organ. Though the precise etiology is unknown, recent evidence demonstrating T-cell lymphocytes layering around the granuloma suggests an immunological reaction in genetically susceptible individuals who are exposed to specific environmental agents.[1-4] There is also newer evidence that there may be an infectious etiology to the condition.[5] The true incidence is unknown; in view of the large proportion of cases that are discovered serendipitously on chest radiographs, it is estimated that only around 20% of sarcoidosis cases are ever found.[2, 6, 7] Sarcoidosis was once thought to be rare in North America, but beginning in the 1940s increasingly large numbers of cases were identified by chest x-ray (CXR) screening, particularly by the military.[7, 8] The disease most often arises in the third to fourth decades of life, and shows an increased predilection for those of African-American, Caribbean, Japanese, Scandinavian, and Irish descent. The condition tends to wax and wane in its course, with marked variability in the pattern of organ involvement.[2, 3, 6, 9, 10] There also appear to be geographic differences in the prevalence of sarcoidosis, even among populations with similar genetic backgrounds. It has been theorized that this regional variability may be related to environmental exposures.[2]

Most commonly, sarcoidosis presents in one of three ways: as an asymptomatic finding on CXR; with nonspecific constitutional symptoms; or with organ-specific complaints.[2] In various series, 30% to 60% of clinical presentations are asymptomatic and incidentally found, typically with radiographic findings of bilateral hilar adenopathy (BHA), with or without parenchymal opacities.[10] Nonspecific symptoms may include fever, weight loss, fatigue, or muscle weakness. Organ-specific presentations are protean, and may manifest with dermatologic lesions, dyspnea on exertion, cough, vision changes or eye pain, cranial or peripheral nerve palsies, seizures, arthralgia, cardiac conduction blocks or even sudden cardiac death. Due to the variability of symptoms, delay in diagnosis is not uncommon.

The onset of symptoms may be acute. This type of presentation is more common in Caucasians than in African-Americans or Japanese, and may present as Löfgren's syndrome with BHA, ankle arthritis, erythema nodosum (EN) or generalized constitutional symptoms. An acute presentation portends the best prognosis, often resulting in spontaneous remission within two years.

Chronic sarcoidosis, common in African-Americans, often presents with pulmonary symptoms. Constitutional symptoms are less common with the chronic form. This type is often relapsing, with a protracted course and a less favorable prognosis.[2]

Pulmonary involvement: Pulmonary sarcoidosis is a predominantly interstitial lung disease, with symptoms and radiographic findings similar to other fibrotic lung diseases.[11] Prominent symptoms are dyspnea, dry persistent cough, and chest pain. Significant interstitial disease may lead to abnormal pulmonary function and oxygen diffusion capacity.[12] However, in contrast with other interstitial lung diseases such as idiopathic pulmonary fibrosis, profuse radiographic changes are often associated with minimal physiologic alterations in lung function. The granulomatous inflammation, which favors the upper lung fields, tends toward a peribronchial distribution, which helps explain two additional clinical phenomena that are unusual with other interstitial lung diseases: transbronchial biopsy is usually successful in establishing a histologic diagnosis, and some patients (roughly 15%) experience bronchospasm as a complication of the disease.[1] Sarcoidosis has rarely presented with tracheal or laryngeal involvement, hemoptysis, unilateral involvement, pleural effusion, pneumothorax, pleural thickening, cavity formation, calcification of lymph nodes, or clubbing.[13, 14]

Even when patients initially present with extrapulmonary manifestations, over 90% have radiographically evident pulmonary involvement.[10] Because pulmonary involvement is nearly ubiquitous, and is the most common cause of sarcoid-related morbidity, staging of sarcoidosis is based on radiological characteristics of the CXR.[11] It is important to note that sarcoidosis normally does not progress though each of the 5 stages in a predictable fashion. Patients with sarcoidosis can present with any stage of disease; and while their disease may go on to progress to another stage, it may also remit or remain stable. The following are the various stages and remission rates:[1, 2, 15]

- Stage 0 disease has a normal CXR (which implies extrapulmonary disease is the presenting manifestation or that the disease has remitted).
- Stage I disease is defined by the presence of BHA, which is often accompanied by right paratracheal node enlargement. 50% of affected patients exhibit BHA as the first expression of sarcoidosis. Regression of hilar nodes within one to three years occurs in 75% of such patients, while 10% develop chronic enlargement that can persist for 10 years or more. When BHA is associated with EN, migratory polyarthralgias, and fever, the diagnosis of Löfgren's syndrome is highly likely. Patients with stage 1 disease are most often asymptomatic.
- Stage II disease consists of BHA and reticular opacities (the latter occurring in the upper more than the lower lung zones). These findings are present at initial diagnosis in 25% of patients. Two-thirds of such patients undergo spontaneous resolution, while the remainder either have progressive disease or display little change over time. Patients with stage II disease usually have mild to moderate symptoms, most commonly cough, dyspnea, fever, and/or fatigue.
- Stage III disease consists of reticular opacities with shrinking or absent hilar nodes. Reticular opacities are predominantly distributed in the upper lung zones. This form typically remits in 10-20% of cases.
- Stage IV disease is characterized by fibrotic, reticular opacities with evidence of volume loss, predominantly distributed in the upper lung zones. Conglomerated masses with marked traction bronchiectasis may also occur. Extensive calcification and cavitation or cyst formation may also be seen. Remission occurs in 0-5% of individuals with this stage.

Cardiac involvement: Roughly 5% develop clinically evident cardiac involvement, though autopsy studies of sarcoid patients have reported granulomatous infiltration of the myocardium in 13 to 30% of patients. (It should be borne in mind that, with the exception of cardiac and severe pulmonary

disease, sarcoidosis is rarely fatal, and thus myocardial sarcoidosis is almost certainly over-represented in autopsy series.)[16-18] The left ventricle and interventricular septum are most often involved.[19] In a well-known study of 250 patients with cardiac sarcoidosis who were followed for several years, the following complications were noted: complete heart block (49), premature ventricular contractions and ventricular tachycardia (48), myocardial disease (43), sudden death (37), bundle branch block (33), supraventricular arrhythmia (23), valvular lesions (21), and pericarditis (6).[20] Other subtle findings may be premature atrial and ventricular contractions, and QT dispersion by ECG.[21] Heart block is most likely due to disease of the AV node or the bundle of HIS.[17] Since healed myocardial granulomata may become foci for abnormal automaticity leading to arrhythmias, patients in remission who have had myocardial involvement remain at risk for sudden death. Before the advent of implantable cardiac defibrillators, several studies of cardiac sarcoid reported a risk of sudden death of 33-67%.[16, 20, 22, 23, 24] Routine ECG, holter monitoring, and transthoracic echocardiogram are routinely used to screen for cardiac sarcoidosis. However, if the diagnosis is suspected, cardiac MRI is the most sensitive imaging modality.

Dermatologic involvement: Cutaneous manifestations of sarcoidosis involve approximately one-third of patients, and can be variable. The classic panniculitis of EN is a common presentation of acute sarcoidosis in Caucasian, Puerto Rican, and Mexican patients and is the least beneficial lesion to biopsy.[2, 11] Other dermatologic lesions include small purplish papules, plaques, or subcutaneous nodules. While these are less distinctive on physical examination, biopsy will often yield a histologic diagnosis of noncaseating granulomata. Small, pink, maculopapular eruptions may wax and wane, may present as scarring sarcoidosis, and may cause alopecia. Sarcoid lesions may invade old scars. On blanching with a glass slide, dermal sarcoid lesions often reveal an “apple jelly” yellowish brown color.[25] As a rule, sarcoid lesions do not itch, ulcerate, or cause pain.[1]

Ocular involvement: In most series, ocular involvement occurs in 25-33% of individuals. As with other granulomatous disorders, sarcoidosis can affect any part of the eye and involvement may or may not be symptomatic. Anterior uveitis is the most common manifestation, often presenting with ocular pain, redness or changes in vision. Posterior chronic uveitis may be occult and may, over time, lead to secondary glaucoma, cataracts, or blindness.[2] Other eye lesions include conjunctival follicles, dacryocystitis, and retinal vasculitis.[1]

Nervous system involvement: Neurological manifestations can occur in up to 5 to 10% of cases, though one series found neural involvement in 26% of sarcoid patients.[26] Neurosarcoidosis favors the base of the brain, and may present as a cranial nerve palsy (especially facial nerve palsy), panhypopituitarism, fulminant delirium, hydrocephalus or chronic meningitis.[27-29] Seizures have been reported in 5%-22% of neurosarcoidosis patients, but are rarely the presenting symptom.[30] Granulomatous involvement of the hypothalamus may result in defective release of vasopressin, adrenocorticotropic hormone, and glucagon; in particular the defect in vasopressin may lead to diabetes insipidus.[27] These lesions are typically early findings and respond well to treatment.[1] On the other hand, space occupying lesions, seizures, peripheral nerve lesions, and neuromuscular involvement tend to occur as a late manifestation, and most likely indicate chronic disease.[2] MRI imaging often reveals the presence of leptomeningeal enhancement. Cerebrospinal fluid (CSF) findings are nonspecific, and may include lymphocytosis, increased protein, and/or elevated angiotensin-converting enzyme (ACE) levels, lysozymes, increased CD4/CD8 ratios and β-2 macroglobulins. The triad of facial nerve palsy, parotiditis, and anterior uveitis is called the Heerfordt syndrome and, unlike most neural involvement, suggests a favorable prognosis.[1]

Musculoskeletal involvement: It has been estimated that joint pains occur in 25-39% of sarcoid patients, although deforming arthritis is rare. Acute polyarthritis (especially in the ankles) usually occurs in the presence of anterior uveitis or EN. Chronic arthritis may mimic rheumatologic disease, even to the extent of causing a false positive test for rheumatoid factor.[15] Muscular involvement may affect up to 10% of sarcoidosis patients. Proximal muscle weakness, muscle wasting, diaphragmatic weakness, and quadriceps weakness have been described in the literature.[31] Respiratory muscle involvement has very rarely led to respiratory failure.[32, 33]

Lymphatic involvement: Extrathoracic lymphadenopathy is commonly found in the cervical, axillary, epitrochlear, and inguinal chains. Such nodes are typically non-tender and patients are usually unaware of them; their importance is primarily as an easy site for diagnostic biopsy.[1] At the time of autopsy the spleen is involved in 40-80%, but clinically important manifestations of hypersplenism such as anemia or spontaneous rupture are rare.[2]

Gastrointestinal involvement: Although liver biopsy will show sarcoid granulomata in 70% of cases, altered liver function due to granulomatous hepatitis or portal hypertension is rare.[2, 9] (Due to the lack of specificity of hepatic granulomata, the liver is not generally recommended as a biopsy site.) Clinically symptomatic gastrointestinal involvement, which may mimic infectious gastroenteritis, inflammatory bowel disease, tuberculosis, fungal infection or pancreatic neoplasm, affects less than 1% of patients.[1]

Osseous involvement: Lytic or sclerotic bone lesions are present in 10% of cases and are almost always accompanied by chronic skin findings.[2] Bone resorption secondary to endocrine abnormalities with vitamin D, noted below, is integral to the pathogenesis of hypercalciuria.

Endocrine/renal involvement: Disordered calcium metabolism, due to conversion of vitamin D to the active form within granulomata, often results in hypercalciuria with the attendant risk of nephrolithiasis; hypercalcemia is much less common (2-10%).

Quality of life/Emotional implications: One study of 111 sarcoid individuals revealed up to 66% had experienced depression (worse while on steroid treatment) and 55% had increased stress when compared to the average study population without sarcoidosis. These levels are comparable to patients with symptomatic AIDS, end-stage renal disease, and moderate to severe COPD.[34]

The pulmonary literature has vacillated about the need for histologic confirmation of sarcoidosis in the most typical presentation, that of an individual with asymptomatic BHA found on CXR. Since this is a relatively uncommon presentation for lymphoma, some have argued in favor of clinical follow-up rather than proceeding to biopsy. However, current consensus is that histologic confirmation is advisable to confirm sarcoidosis, and to rule out lymphoma and infections such as tuberculosis. For aviators, “watchful waiting” is even more problematic, since it would require grounding for up to twelve months. And regardless of flight status, most patients are anxious to have confirmation of the diagnosis. If physical examination demonstrates involvement of superficial lymph nodes, skin (except EN), conjunctivae, or salivary glands, then biopsy should be directed toward that site. CT scan may prove to be useful for extent of involvement, particularly to delineate mediastinal adenopathy. Transbronchial biopsy has a high yield in Stage 1 and higher disease; even when the disease process appears to be limited to hilar nodes, biopsy of lung tissue is usually positive for non-caseating granulomata. The use of endobronchial ultrasound allows direct sampling of enlarged hilar and mediastinal lymph nodes, further increasing the diagnostic yield of

bronchoscopy. Bronchoalveolar lavage, on the other hand, is of limited prognostic value, other than to exclude alternative diagnoses. When flow cytometry analysis is done on the lavage fluid, an elevated CD4/CD8 ratio can suggest sarcoidosis. However, this finding is non-specific and is insufficient to make a definitive diagnosis.[2] As noted earlier, liver biopsy is not recommended. The Kveim test and blind scalene lymph node or fat pad biopsies are obsolete. The ACE level is elevated in 40-90% of individuals with active sarcoidosis; however, a high ACE level is not specific for sarcoidosis, and the magnitude of an initial elevation has no prognostic significance.[8] As cardiac involvement typically has a patchy distribution, cardiac biopsy has low sensitivity (about 20% in one study) and is not recommended, even when there is a high suspicion for myocardial involvement.[17, 35] In general, disease which is isolated to the heart, brain, or eye is not biopsied. The diagnosis is normally based on clinical presentation and characteristic radiographic findings. In the first two cases, such involvement is rarely waiverable anyway. Idiopathic granulomatous uveitis must be evaluated at the ACS, and is generally waiverable only when quiescent (see Uveitis Waiver Guide.)

Only a minority of sarcoidosis patients will actually require therapy. When treatment is necessary, the standard regimen is a prolonged course of oral prednisone, but recommended dosages vary widely. Corticosteroids accelerate clearance of symptoms, physiologic disturbances, and x-ray changes, but it is not clear that long-term prognosis is altered by such therapy. Treatment is indicated for patients with progressive pulmonary disease, cardiac involvement, CNS disease, uveitis, or hypercalcemia. For the 10% who fail to respond to corticosteroids, chlorambucil, leflunomide, azathioprine, hydroxychloroquine, TNF-inhibitors and methotrexate are possible alternative medications.

More than 85% of remissions occur within the first two years. Failure to regress spontaneously within 2 years forebodes a chronic or persistent course.[1, 2] Only about 2-8% of those individuals who spontaneously remit or stabilize will relapse at a later date.[3, 8] Corticosteroid-induced remissions, on the other hand, have a high rate of relapse, ranging from 14-74%, although one study showed no relapses if individuals remained asymptomatic for three years after prednisone withdrawal.[1, 2]

A recent British study has developed a prognostic tool that utilizes a composite physiologic index (CPI) along with high-resolution CT (HRCT) staging system. This is an early tool that offers hope for more successful management decision making.[36]

II. Aeromedical Concerns.

The most common aeromedical concerns are typically cardiac and pulmonary, though ophthalmologic and neurologic involvement may also prove to be a hindrance to flight crew duties. Myocardial involvement may present as arrhythmias, conduction block, and syncope leading to sudden incapacitation during flight. Restrictive pulmonary disease is itself an aeromedical concern, particularly if blood gases are affected or airway hyper-reactivity is present. A crewmember with stage II or III sarcoidosis may have altered oxygen diffusion, thus exacerbating or accelerating symptoms of hypoxia and reduced decision making abilities at altitude.[12] Reductions in FVC and FEV1 may accompany sarcoidosis even with optimized medical management.[3]

CNS disease (e.g., cranial nerve palsies, encephalopathy, seizures), depression, ocular complications (e.g., uveitis, iritis, chorioretinitis), and renal calculi all have direct aeromedical

implications. Neuromuscular involvement, especially of proximal muscle groups (and the predilection towards quadriceps muscle group involvement), have important implications for rudder control and anti G-straining maneuvers.

No individual should fly while undergoing treatment. Steroid treatment itself has a variety of metabolic, psychiatric, and CNS effects which may make flying hazardous.[10]

III. Waiver Consideration.

Sarcoidosis is disqualifying for all flying classes (FC I/IA, II, and III), ATC/GBC, and MOD personnel, as well as retention. Therefore, a waiver and MEB are necessary for these personnel.

History of cardiac or CNS involvement is typically not waiverable. Also sarcoidosis causing hypercalcemia is not compatible with a waiver. Please consult Uveitis Waiver Guide if ophthalmologic sarcoidosis is present.

Table 1: Waiver potential for sarcoidosis

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	History of sarcoidosis (asymptomatic or symptomatic) with disease resolution.	Maybe*† AETC	Yes
II/III ATC/GBC MOD Trained	Sarcoidosis that is asymptomatic, stable, no treatment required, and no functional impairment.	Yes#† AFMSA	Yes, initial waiver or if relapse
	Sarcoidosis previously treated with steroids and now asymptomatic, stable and no functional impairment.‡	Yes‡† AFMSA	Yes, initial waiver or if relapse
II/III ATC/GBC MOD Untrained	History of sarcoidosis (asymptomatic or symptomatic) with disease resolution. ‡	Maybe*† AFMSA	Yes

† History of cardiac or CNS involvement is typically not waiverable.
* Waiver considered only if asymptomatic, no functional impairment and remission without treatment for at least 3 years duration.
# Waiver for trained aviators requires three-month follow-up to assure stability of newly diagnosed (histologically proven) disease prior to waiver submission.
‡ If systemic corticosteroid therapy results in remission, then waiver may be submitted after six months off medication if asymptomatic, no evidence of recrudescence and pituitary-adrenal axis has returned to normal function (see Systemic Glucocorticoid (Steroid) Treatment Waiver Guide).

AIMWTS search in Sep 2015 revealed a total of 42 cases with the diagnosis of sarcoidosis. Eight (19.5%) were disqualified. There were no FC I/IA cases, 19 FC II cases (1 disqualification), 22 FC III cases (7 disqualifications), 1 ATC case (not disqualified), and no MOD cases.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for sarcoidosis for <u>initial waiver or waiver for recurrent</u> (relapsed) sarcoidosis should include the following:
A. History – occupational (silicates, beryllium) and environmental (moldy hay, birds, TB, coccidioidomycosis, histoplasmosis) exposures, signs, and symptoms (including negative, covering all organ systems), activity level, medications/treatment (if treated with corticosteroids within the

year then Cosyntropin® stimulation test [see Systemic Glucocorticoid (Steroid) Treatment Waiver Guide]).
B. Complete physical with emphasis on lung, skin, eye, liver and heart, and *thorough* neurologic examination.
C. Internal medicine or pulmonologist consultation.
D. Testing: CXR, biopsy results, full pulmonary function testing with spirometry pre/post bronchodilator, lung volumes, and DLCO, 12-lead ECG and 24-hour Holter monitor test.
E. Laboratories – complete blood count (CBC), calcium, liver function tests, creatinine, blood urea nitrogen (BUN), urinalysis, 24 hour urine creatinine, and 24 hr urine calcium.
F. TB skin test.
G. Ophthalmology/optometry exam, to include slit lamp.
H. Neurology consultation if symptoms or signs indicate possible involvement.
I. MEB results.

The AMS for waiver renewal of individuals in continued remission should include the following:
A. History – brief summary of previous signs, symptoms, and treatment, current signs or symptoms (include negative), activity level, and medications.
B. Physical – complete physical, addressing lung, skin, eye, liver, heart, and CNS.
C. Testing: CXR, full pulmonary function testing with spirometry pre/post bronchodilator, lung volumes, and DLCO.
D. Laboratories – complete blood count (CBC), calcium, liver function tests, creatinine, blood urea nitrogen (BUN), and urinalysis. 24 hour urine calcium and creatinine should also be submitted if previous symptoms or current findings indicate systemic involvement.
E. Ophthalmology/optometry exam, to include slit lamp.
F. Neurologic or cardiac evaluation if current findings indicate involvement

ICD-9 code for Sarcoidosis	
135	Sarcoidosis

ICD-10 code for Sarcoidosis	
D86.9	Sarcoidosis, unspecified

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WAIVER GUIDE
Updated: Jul 2016
Supersedes Waiver Guide of Sep 2012
By: Lt Col Anthony L. Mitchell (RAM 17) and Dr Dan Van Syoc
Reviewed by Col Roger Hesselbrock, ACS Neurologist

CONDITION:
Seizures/Epilepsy/Abnormal EEG (Jul 16)

I. Overview.

A seizure is a brief disturbance of cerebral function that lasts from seconds to a few minutes and is caused by an abnormal electrical discharge. Epilepsy is defined as recurrent (two or more) seizures not caused by a temporary condition (therefore, unprovoked).[1] Less than one-half of epilepsy cases have a clearly identifiable cause.[2] Epilepsy is unequivocally disqualifying for all flying duties. A single unprovoked convulsion will be as damaging to an aviator's flying career as is the diagnosis of a seizure disorder.

An initial, isolated convulsive and/or altered consciousness event may be due to a number of causes – some of these causes may lend themselves to a recurrence (especially if unprovoked), while others may not (especially if provoked). Those causes that do not tend to create recurrent events may be eligible for waiver. Common examples of isolated events of transient loss of consciousness that may not be epilepsy include those associated with fever as a child (simple febrile seizure), vasovagal syncope (convulsive syncope), head trauma, and acceleration induced (G-LOC).[3] Complex febrile seizures however are associated with an increased risk of epilepsy.[4]

Of paramount importance to the flight surgeon is the risk of seizure recurrence after a first unprovoked seizure. This risk is noted to be increased in certain clinical circumstance such as prior brain lesion or insult causing the seizure, an EEG with epileptiform abnormalities, a significant brain imaging abnormality and a nocturnal seizure.[5] About 35% of patients with a first seizure can be expected to have a second seizure within 3-5 years; with variations depending on the clinical characteristics of the specific cases. More recent guidelines have noted the greatest risk of recurrence is within the first 2 years with recurrent second seizure occurring, with roughly 21-45% of recurrent seizures occurring during this timeframe.[5] For patients who go on to have a second seizure, their risk of yet another seizure is greater than 70%.[2] The statistics are slightly different for children. Children with a nonfebrile unprovoked seizure and a normal EEG have a five year recurrence rate of about 21% and recurrences after that time frame are not common.[6, 7] Absence seizures have a repeat seizure rate of 42% over the next 25 years (to include other types of seizures) and are therefore permanently disqualifying.[8]

The two main seizure types are generalized and partial seizures. Generalized seizures affect both sides of the brain simultaneously and include absence and generalized tonic-clonic seizures. Generalized seizures are not usually associated with cerebral pathology. Partial seizures, by comparison, arise from a localized area of the cerebral cortex and are more commonly associated with an underlying lesion.
Diagnosis is based on thorough clinical evaluation, with detailed history, examination, diagnosis, treatment, and prognosis. The history is crucial and the provider needs to first establish that a seizure actually occurred. Details of the patient's behavior during the event, history of trauma or

symptoms of infection can be very helpful as is medication, illicit drug and alcohol use history. Work-up during the initial evaluation often involves laboratory tests and imaging studies. For adults presenting with an apparent unprovoked first seizure, the EEG is as crucial as brain imaging with some authors noting that an EEG obtained within 24 hours of the seizure will have a higher sensitivity.[2, 5] Glucose testing and serum electrolytes are commonly ordered as hypoglycemia and hyponatremia can lead to seizure-like activity. Some recent studies are recommending serum prolactin assays if the test can be drawn acutely (within 20-30 minutes after the event) and can help differentiate generalized seizures from psychogenic nonepileptic events. The overall utility of this methodology has not been finalized.[9] Imaging may be considered to rule out life-threatening conditions such as hemorrhage, brain swelling or mass effect, and in those cases, an unenhanced CT scan would be the preferable test. An MRI scan will better show intracerebral structures such as the mesial temporal lobes, and will most likely be ordered on a less urgent basis.

The EEG does not prove or disprove the diagnosis of epilepsy although an unequivocally abnormal EEG with a good history of seizure does support the diagnosis. However, the EEG can be completely normal in someone with frank epilepsy. Here it would be important to reiterate the importance of the history, physical exam along with analysis of all appropriate studies because patients are frequently misdiagnosed with seizures that have other causes, with some epilepsy centers reporting misdiagnosis rates as high as 40%.[3] Until about thirty years ago, most applicants to UPT in the Air Force had an EEG performed as part of their initial flight physical. This was done in an effort to eliminate those with a recognizable seizure focus on testing from the pool of future pilots. What was determined is that the prognostic significance of spike wave patterns in a population without a history of epilepsy is not known. Statistically, an EEG in such a population has a low positive predictive value and a high false positive value, so it was eliminated from the testing protocol. A 1968 review of non-epileptic patients with epileptiform changes on EEG showed that the vast majority of adult patients who developed seizures did so within 12 months of discovery of the EEG abnormalities.[10] The US Navy kept the test for a few years longer than did the USAF, but also stopped it by the late 1980s. At this time, only the Netherlands, France and Germany continue to use the EEG as a screening tool for pilot training applicants.[11-14] A study from the German Air Force Institute of Aviation Medicine demonstrated that screening and repeat EEG testing is useful for detecting those with an increased risk of future seizure activity.[15] However, a Canadian study has confirmed that there is no evidence that EEG screening leads to any significant risk reduction.[16]

The overall management of epilepsy patients focuses on controlling seizures, avoiding treatment side effects, and maintaining or restoring the quality of life.[17] Management in many cases after a first unprovoked seizure may just be observation given that only 1 in 3 will go on to have a second seizure within 3-5 years. If medication is indicated, particularly if subsequent seizures occur, there are many choices. There are more than 20 antiepileptic drugs (AED) available for the treatment of epilepsy, with several newer-generation AEDs demonstrating efficacy equal to and tolerability at least equal to or better than older AEDs. Many AEDs also have additional efficacy in the treatment of comorbidities such as essential tremor, sleep disorders migraine or bipolar disorder.[18] Studies have demonstrated that no single AED is most effective or best tolerated. Their use, combinations and dosages are dependent on the nature of the seizure and other medical conditions of the patients.[18] It should be noted that no AEDs are aeromedically-approved for use in USAF aviators for management of seizures, although gabapentin and topirimate are approved for use in MOD personnel for non-epilepsy conditions such as pain and migraine.

II. Aeromedical Concerns.

The risk of seizure in flight is obvious; it causes sudden incapacitation. The incapacitation is in most cases unpredictable, unavoidable, and potentially more frequent in the stressful flying environment. Seizures constitute a direct threat to the health and safety of self, others, and the success of the mission. Medication therapy for seizure prevention is also not compatible with aviation duty due to numerous side effects of these drugs and the fact that patients can still have a seizure while on therapeutic doses of their AED.

Some specific types of seizures such as concussive convulsion, febrile seizure, or convulsive syncope may be considered for a waiver after a thorough neurological evaluation and review by the ACS.

III. Waiver Consideration.

Air Force standards address seizure disorders in several places. Medical standards for appointment, enlistment and induction state that epilepsy occurring beyond the 6th birthday, unless the applicant has been free of seizures for a period of 5 years while taking no medication for seizure control, and has a normal electroencephalogram (EEG) is disqualifying. All such applicants shall have a current neurology consultation with current EEG results. Concerning aviation duties and a history of post-traumatic seizures, our standards state that post-traumatic seizures are disqualifying, but that seizures at the time of injury are not necessarily disqualifying. Childhood seizures are addressed by stating that "seizures associated with febrile illness before 5 years of age may be acceptable with waiver if recent neurological evaluation, MRI, and EEG including awake and sleep samples are normal." Additionally, childhood seizures with prolonged remission may be amenable to waiver and can be considered on a case-by-case basis. Such cases require an ACS review at request of the waiver authority. For more information on post-traumatic seizures, please consult the Waiver Guide chapter on traumatic brain injury. All seizures are disqualifying for retention, and therefore require a waiver if returned to duty by the MEB process.

Regarding EEG abnormalities, it needs to be noted that "truly epileptiform abnormalities to include generalized, lateralized, or focal spikes, sharp waves, spike-wave complexes, and sharp and slow wave complexes during alertness, drowsiness, or sleep are disqualifying. Benign transients such as Small Sharp Spikes (SSS) or Benign Epileptiform Transients of Sleep (BETS), wicket spikes, 6 Hertz (Hz) (phantom) spike and wave, rhythmic temporal theta of drowsiness (psychomotor variant), and 14 and 6 Hz positive spikes are not disqualifying." Furthermore, "generalized, lateralized, or focal continuous polymorphic delta activity or intermittent rhythmic delta activity (FIRDA or OIRDA) during the alert state is disqualifying, unless the etiology of the abnormality has been identified and determined not to be a disqualifying disorder." Only if the risk of recurrence of a seizure approaches that of the general population will a waiver be given serious consideration.[19] To date, only a few aviators with a documented remote history of non-febrile epilepsy have received a waiver.

For patients with isolated epileptiform EEG abnormalities with no history of seizure or epilepsy, clinical surveillance is indicated. Avoidance of potential seizure triggers such as excessive alcohol or stimulant intake and significant sleep deprivation should be advised. Categorical waiver for at least one year may be reasonable given data that most non-epileptic adult patients with isolated

epileptiform EEG abnormalities who do have seizures will do so within one year of EEG abnormality identification.[10]

Table 1: Waiver potential for Seizures and Epilepsy

Flying Class	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation[#]
All FC (trained and untrained) including: RPA, GBC, MOD and OSF	Febrile seizures prior to age 5	Yes AFMSA[@]	Yes
	Childhood seizures with prolonged remission	Maybe** AFMSA[@]	Yes
	Provoked Seizure	Yes* AFMSA[@]	Yes
	Other Unprovoked Seizure	No AFMSA[@]	Yes
All FC (trained and untrained) including: RPA, GBC, MOD – not OSF	Isolated epileptiform EEG abnormalities without seizure	Maybe** MAJCOM[$]	Yes

* If seizure provocation source clearly identified and avoidable.
** After careful review by epileptologist.
[#] ACS review can be requested by the waiver authority in questionable cases.
[@] Disqualification can occur at the MAJCOM level, but approval occurs only at AFMSA/SG3PF.
[$] Waiver authority for MOD personnel is AFGSC.

AIMWTS search in May 2016 revealed a total of 287 cases. Breakdown of the cases was as follows: 64 FC I/IA cases (23 disqualified); 78 FC II cases (49 disqualified); 107 FC III cases (57 disqualified); 19 ATC/GBC cases (17 disqualified); and 19 MOD cases (11 disqualified). The vast majority of the approved cases were for childhood febrile seizures with several provoked seizures as well.

IV. Information Required for Waiver Submission.

Every effort must be made to try and reconstruct what happened before and after a suspected seizure event. Special attention should be paid to the clinical notes made by anyone that had contact with the patient, for example; medical technicians, paramedics, nurses, emergency department personnel, and providers. The medical history should address the relevant period preceding and during the suspected event and include a review of travel, sleep, diet, work and all medications, whether prescription or over-the-counter. Accounts from witnesses must be included in the medical record, either as a written statement from the eyewitness, or as an account documented by a provider. If written accounts were not accomplished initially, then every effort should be made to identify possible witnesses and include their accounts. A witness's account should not be excluded because there are concerns about the reliability of that witness. Instead, include the account with a statement addressing why there are concerns about the reliability of the witness.

Neurological consultation is essential. Investigation is necessary to improve the certainty of diagnosis, to find a precipitating cause in case treatment is necessary, and to identify the seizure type so that appropriate maintenance therapy can be given. The investigation of a first seizure will usually include EEG and CT scan (to rule out stroke, intracranial bleeding, infection, or a mass lesion); further evaluation will likely include an MRI scan with attention to mesial temporal lobe structures ("seizure protocol"). An MEB is required for an unprovoked seizure, and should precede any ACS evaluation and waiver submission. In-person ACS evaluation may be necessary in some cases.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for seizures should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. For a simple febrile seizure, all that is required is the original medical records at the time of the event for review at the ACS. All other cases require the following:
C. Complete history to include all event chronologies and any possible triggers that led to the episode in question.
D. Exam: complete neurological exam by a neurologist.
E. Imaging results: CT scans and MRI scans – results and images of all studies.
F. Neurology consultation report. EEG report(s) –current and prior.
G. All medications; current treatment doses, formulations, and documentation of therapeutic effect (reminder that all anti-epileptic medications are disqualifying).
H. MEB results if completed.

The following information will be required for waiver renewal (if any abnormalities surface in the interim, they will need to be addressed appropriately):
A. Interim history.
B. Updated exam, EEG studies, and any imaging tests since last waiver.
C. Neurology consultation report.

ICD-9 codes for seizures	
345	Epilepsy
780.3	Convulsions
780.31	Simple febrile convulsions
780.32	Complex febrile convulsions
780.33	Post traumatic seizures
780.39	Other (unspecified) convulsions

ICD-10 codes for seizures	
G40.919	Epilepsy, unspecified, intractable, without status epilepticus
R56.00	Simple febrile convulsions
R56.01	Complex febrile convulsions
R56.1	Post traumatic seizures
R56.9	Unspecified convulsions
R94.01	Abnormal EEG

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WAIVER GUIDE
Updated: Jul 2014
Supersedes Waiver Guide of Nov 2010
By: LtCol Eneya H. Mulagha (RAM XV) and Dr. Dan Van Syoc
Reviewed by LtCol Roger Wood, AF/SG consultant for Hematology/Oncology

CONDITION:
Sickle Cell Disease/Trait (Jul 14)

I. Overview.

Sickle cell disease (SCD) and sickle cell trait (SCT) are two relatively infrequently encountered conditions which may cause pathophysiologic changes in-vivo due to altered hemoglobin structure and composition. In certain populations, these changes result in the formation of Hemoglobin S which is an abnormal form of hemoglobin which predominates in human blood in these two conditions. It results from the substitution of a valine for glutamic acid as the sixth amino acid of the beta globin chain, which produces a hemoglobin tetramer (alpha2/beta S2) that is poorly soluble when deoxygenated.[1, 2,3] Common varieties of sickle cell disease are inherited as homozygosity for beta S globin chain, called sickle cell anemia (Hb SS) or as compound heterozygosity of the beta S globin chain with another mutant beta globin: sickle cell – beta 0 thalassemia (Hb S-β° thal), sickle cell-Hb C disease (Hb SC disease) and sickle cell – beta + thalassemia (Hb S-β+ thal).[2] These changes in hemoglobin membrane structure result in altered red membrane function, disordered cell volume control, and increased adherence to vascular endothelium which play an important role in subsequent pathophysiology of SCD and SCT to a lesser extent in affected individuals.[3] Clinically disease manifestations are most severe in patients with sickle cell anemia, Hb SS versus Hb AS found in sickle cell trait.

Sickle cell anemia and Hb S-β° thal are characterized by a severe hemolytic anemia with intermittent painful vaso-occlusive crises. In these individuals the polymerization of deoxy hemoglobin (Hb S) is essential to vaso-occlusive phenomena.[3] Typical acute complications of sickle cell disease (SCD) include anemia, focal infarction of the spleen, kidneys, lungs, bone, retina, or brain, sudden extensive sequestration of blood in the spleen or liver, or overwhelming infection with encapsulated bacteria.[4] Hb S-β+ thal and Hb SC are also characterized by rare crises and aseptic necrosis. In most cases, red cell sickling is believed to occur when the PO_2 falls below 60 mmHg, similar to the PO_2 at standard cabin altitudes.[5] However hemoglobin S beta globin chain polymerization alone does not account for the pathophysiology of sickle cell disease. In addition a causal relationship has been documented between decreased hydration, hypoxia, and/or strenuous exercise and increased sickling episodes in individual with SCD and SCT.[6] Thus, sickle cell disease itself is almost always clearly incompatible with all military service particularly careers involving aviation.

In contrast, sickle cell trait (SCT) carried predominately (Hb AS) and normal Hb A components and is a relatively benign condition carrying a better clinical and prognostic course. In healthy individuals without either condition, blood consists of 96-98% Hb A, 2-3% Hb A2, and <1% Hb F while in most documented cases of SCT approximately 20-45% of hemoglobin exists as Hb S. Lower levels of abnormal hemoglobin in SCT result in less association with anemia, changes in red blood cell survival, or life expectancy alterations commonly seen in SCD. Although isolated cases of red cell sickling in patients with SCT have been reported at altitudes as low as 9,000 feet; the

majority of patients with SCT are unlikely to sickle below 21,000 feet.[7] SCT is generally regarded as clinically normal however there have been rare associations of sickle cell trait with acute medical issues. Acute conditions include splenic infarction at high altitude with exercise or hypoxemia, hematuria secondary to renal papillary necrosis, fatal exertional heat illness with exercise, sudden idiopathic death with exercise, glaucoma or recurrent hyphema following a first episode of hyphema, hyposthenuria (an inability to fully concentrate urine), bacteriuria in women, bacteriuria or pyelonephritis associated with pregnancy, renal medullary carcinoma in young people (ages 11 to 39 years), early onset of end stage renal disease from autosomal dominant polycystic kidney disease, and priapism.[8, 9]

Sickle cell disease/trait occurs often in sub-Saharan African populations and sporadically within these populations. Commonly between 7 and 9% of African Americans in the US have sickle cell trait (SCT). However it should be noted that the genetic defect that produces sickle cell also occurs in Caucasians and that, in Europe, carriers can be physically indistinguishable from normal non carriers in the general population. Until 1982, individuals with sickle cell trait were restricted from entering military flight training, aircrew duties, and barred from attendance at the US Air Force Academy due to the rare occurrences of sickle crises in stressed individuals with sickle cell trait. In 1985, the Secretary of Defense ordered that "all military occupational restrictions on sickle cell trait be removed." Studies amongst US Army recruits in 1988 have not shown increased risk of sickling crises among physically stressed new recruits and also show similar improvements in variables of physical conditioning such as peak power, VO_2 peak, O_2 pulse as compared to normal recruits.[6] This suggests that although the presence of HbS represents a theoretic potential hazard under stressful environmental conditions; a majority of individuals with SCT will remain asymptomatic in comparison to normal military members.

Currently the Army does not have a universal screening program. The Army does screen military occupational specialties (MOSs) that include aviation, diving and special operations, though being SCT+ is not disqualifying. In the other branches of the US Armed Services, all individuals are tested for sickle cell disease/trait prior to their accession into their respective service.[10] Positive results for sickle cell carriers are then submitted for hemoglobin electrophoresis to determine the percentage of Hb S and to evaluate for other co-existing hemoglobinopathies which may be present. Current Air Force guidance allows enlistment/commission with Hb S levels of up to 45%. Individuals with Hb S levels higher than 45% represent an increased risk for SCD and/or Sickle-beta thal variants and are barred from service due to the risk of adverse clinical outcomes. The following table summarizes common electrophoretic patterns in hemoglobinopathies.[11]

Table 1: Hemoglobinopathy patterns

Condition	Hb A	Hb S	Hb C	Hb F	Hb A2
Normal	95-98*	0	0	<1	<3.5
Sickle cell trait (HbAS)	50-60	35-45†	0	1-3	<3.5
Sickle-beta + thal (Hb S-β+ thal)	5-30	65-90	0	2-10	>3.5
Sickle-beta 0 thal (Hb S-β° thal)	0	80-92	0	2-15	>3.5
Sickle-Hb C disease (Hb SC)	0	45-50	45-80	1-8	<3.5
Homozygous sickle cell disease (Hb SS)	0	85-90	0	2-15	<3.5

* Numbers indicate the percent of total hemoglobin for an untransfused adult patient. Ranges are approximate and may vary depending upon the particular laboratory and method of determination.
† Percent Hb S can be as low as 21 percent in patients with sickle cell trait in conjunction with alpha thalassemia.

II. Aeromedical Concerns.

As previously noted, individuals with sickle cell disease have a severe risk of acute disease including splenic infarct and other vaso-occlusive episodes involving the abdomen, lungs or nervous system. Episodes can be precipitated by exposure to hypoxia, infection, dehydration, altitude or exposure to extremes of heat and cold and require acute and timely medical interventions to prevent death and/or disability. In the current operational environment especially, such settings can be expected to be routinely encountered by military personnel while performing duty in various environments worldwide. Thus sickle cell disease remains incompatible with aviation as well as normal military duties per AFI 48-123. Sickle cell trait except for rare occasions is not associated with increased events/crises and poses little aeromedical risk. There is still significant misinformation what it means to be a carrier and its health implications.[12] It is imperative for the flight surgeon to educate airmen on this condition and specifically point out the importance of hydration before rigorous activities to include flying.

III. Waiver Considerations.

SCD is disqualifying for all flying and special operational duties. Symptomatic SCT is disqualifying only for FC I/IA, FC II, FC III, and Operational Support flying duties. All initial flying class physicals require documented Sickledex™ results and if positive hemoglobin electrophoresis is required. Asymptomatic sickle cell trait (Hb AS) confirmed on hemoglobin electrophoresis does not require a waiver and Hb AS, with Hb S up to 45 % is acceptable for flying duties. Symptomatic sickle cell trait and sickle cell diseases (Hb SS and other heterozygous sickling disorders other than trait) are disqualifying. Anemia is not associated with sickle cell trait and therefore should not be attributed to the sickle cell trait

Table 2: Waiver potential for Sickle Cell Trait

Flying Class	Condition	Waiver Potential Waiver Authority
I/IA	Asymptomatic sickle cell trait Symptomatic sickle cell trait cell trait (Hb S ≤45%) Hb SS, Hb SC, Hb S +thal, Hb S 0thal	N/A* No AETC# No AETC#
II and III**	Asymptomatic sickle cell trait Symptomatic sickle cell trait cell trait (Hb S ≤45%) Hb SS, Hb SC, Hb S +thal, Hb S 0thal	N/A† No MAJCOM# No AFMSA/MAJCOM#
MOD ATC/GBC	Sickle cell trait	N/A-not disqualifying

*Positive test results are annotated on initial flying class (I/IA, II/ IIU and III) physicals via PEPP. A one-time initial certification, by the proper certification authority is required for all flying personnel and flying training applicants with sickle cell trait after evaluation as outlined in the aircrew waiver guide.
**Initial FC II and FC III exams are treated exactly like FC I/IA.
† Hemoglobin S levels of up to 44% as documented in AIMWTS have been waivered as long as there is no history of anemia or other sequelae.
#Symptomatic sickle cell trait and sickle cell diseases (Hb SS and other heterozygous sickling disorders other than trait) are disqualifying.

Review of the AIMWTS waiver file through Jul 2014 revealed 52 waiver requests for the diagnosis of SCT. Further breakdown and analysis revealed the following: 5 FC I/IA cases (0 disqualified), 8 FC II cases (1 disqualified), 32 FC III cases (7 disqualified), 5 ATC/GBC cases (1 disqualified), and 2 MOD cases (1 disqualified). A total of 9 cases were disqualified from flying duties after further review. Of those denied flying status, only one was disqualified due to a SCT-related condition, but none just for the diagnosis itself.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for sickle cell trait should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.

B. Complete history of symptoms with report of any symptomatic vaso-occlusive or negative episodes included.
C. Lab testing to include CBC, Sickledex™ testing, and hemoglobin electrophoresis.
D. Consultation report from a hematologist if the diagnosis is in question.

The AMS for waiver renewal for sickle cell trait should include the following:
A. Updated history and any changes in condition or treatment.
B. Lab testing to include CBC, Sickledex™ testing, and hemoglobin electrophoresis.
C. Consultation report from a hematologist or from the primary care provider.

ICD-9 codes Sickle Cell Disease	
282	Sickle cell
282.5	Sickle cell trait
282.6	Sickle cell disease

ICD-10 codes Sickle Cell Disease	
D57.1	Sickle-cell disease without crisis
D57.3	Sickle cell trait

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WAIVER GUIDE
Updated: Dec 2015
Supersedes Waiver Guide of Mar 2012
By: LtCol Michelle R. Brown (RAM 16) and Dr Dan Van Syoc
Reviewed by Col LaKeisha Henry, AF/SG Otolaryngology consultant and LtCol Erik Weitzel, AF ENT/Rhinologist

CONDITION:
Rhinosinusitis, Hypertrophic Sinus Tissue, And Nasal Polyps (Dec 15)

I. Overview.

There are four paired (paranasal) sinuses in the human skull: frontal, sphenoid, ethmoid (anterior and posterior), and maxillary, named for the region of the skull which they inhabit. The maxillary and ethmoid sinuses are present at birth, the sphenoid sinuses develop by the age of 5 or 6 years and the frontal sinuses are the last to develop by age 8-9 years. The presence of these sinuses decreases the weight of the skull and serves as the main source for nitric oxide production during respiration. Additionally they help to moisten the air entering the nasal cavity, and can act as a "crumple zone" in trauma to the skull like the bumper of an automobile. They also act to add resonance to the human voice.[1]

The paranasal sinuses are lined with ciliated respiratory epithelium and this epithelium is innervated and vascular. Mucus is moved by the ciliary component of the respiratory epithelium to the ostia or "windows" by which these paranasal sinuses communicate with the nasal cavity. These ostia interact and communicate with the nasal cavity through an important structure called the osteomeatal complex. Structural abnormalities, inflammation, or nasal polyps may interfere with proper nasal mucociliary clearance mechanisms at the osteomeatal complex and lead to the development of infection or rhinosinusitis. Air should flow freely between these paranasal sinuses and the nasal cavity. This is especially important in atmospheric pressure changes such as those generated in flying and diving situations.[1, 2, 3]

Inflammation of the nose and paranasal sinuses is called rhinosinusitis. The causes of rhinosinusitis are many and include viral, bacterial, fungal, allergic, chemical, trauma, anatomic abnormalities (e.g. foreign bodies, nasal polyps), and systemic diseases (e.g., immunologic deficiencies, cystic fibrosis). The most common variety of acute rhinosinusitis is viral associated with a URI or common cold and is seen at an extremely high rate. A bacterial cause in acute rhinosinusitis is prevalent in only 2-10% of cases but increases proportionately to the number of days a viral URI has been present.[4] Gastroesophageal reflux is also a cause of rhinosinusitis.[1, 3, 5]

Rhinosinusitis is a common condition in the U.S, with more than 30 million diagnoses annually. The direct cost of this one condition is in excess of $11 billion annually with an even greater cost in indirect costs such as loss of productivity, reduced job effectiveness and impacts on quality of life. Perhaps one of the greatest concerns is that greater than 20% of all antibiotic prescriptions are for this diagnosis.[6]

Rhinosinusitis is defined as acute if it lasts less than four weeks.[1] The most common etiologic agents of acute bacterial rhinosinusitis are *Streptococcus pneumoniae* and *Haemophilus influenza* in adults. Should acute bacterial rhinosinusitis (ABRS) last longer than four weeks, but less than 12

weeks, it is called subacute refractory rhinosinusitis.[1, 6] The term recurrent acute rhinosinusitis (RARS) is used for individuals experiencing at least four episodes a year with symptom free intervals.[1, 3] Infections lasting longer than three months are classified as chronic rhinosinusitis (CRS).[1, 3, 6] CRS may be further divided into polypoid and non-polypoid. Polypoid varieties imply a particularly poor prognosis for complete recovery are associated with excessive levels of inflammation. Symptomatically, CRS can behave in a chronic persistent pattern or an acute on chronic pattern.[1, 7, 8, 9]

Common CRS symptoms include nasal obstruction , facial congestion-pressure-fullness , discolored nasal discharge and hyposmia .[1, 5] The symptoms of CRS and acute rhinosinusitis are similar, distinction is based on duration. The presence of two or more symptoms persisting beyond 12 weeks is highly sensitive for CRS but relatively nonspecific. Definitive diagnosis requires identifying a sign of sinusitis (in addition to two or more symptoms) which can include purulence in the middle meatus, nasal polyps, or a CT scan correlating symptoms to radiologic evidence of inflammation. Both aerobes and anaerobes have been implicated in CRS. CRS requires that inflammation be documented in addition to persistent symptoms.[6] Computerized tomography of the paranasal sinuses is the radiography of choice and should be obtained in diagnosing or evaluating CRS or recurrent acute rhinosinusitis. The prevalence of allergic rhinitis is 40-84% in adults with CRS and 25-31% in young adults with acute maxillary sinustitis.[1, 3, 5]

The “gold standard” for diagnosis of ABRS is the sinus puncture with aerobic and anaerobic cultures. This procedure is costly, not available in most offices, painful, and thus is not practical.[9] Plain film-radiography (Water’s, Caldwell, and lateral views) has a sensitivity and specificity of 76% and 79% respectively, but the false negative rate can be upwards of 40%. Computed tomography (CT) has even higher sensitivity but may cause a large false positive rate in diagnosing rhinosinusitis.[5, 10, 11] Recent studies show that abnormalities of the maxillary sinuses can be found on imaging including plain radiographs, CT, and MRI in cases of viral rhinosinusitis suggesting, but the American Academy of Otolaryngology states the CTs are not indicated for acute sinusitis.[4, 12]

Nasal polyps or hypertrophic tissues are commonly associated with chronic rhinosinusitis, asthma, and aspirin sensitivity. In addition some individuals have concomitant allergic rhinitis or allergic fungal sinusitis. In children nasal polyps are often associated with cystic fibrosis. It is thought that chronic inflammation causes the pathogenesis of nasal polyps by causing exvagination of the normal nasal or sinus mucosa. Nasal polyps can obstruct the normal flow of air and mucus through the osteomeatal complex and thus lead to post-obstructive development of rhinosinusitis.[13] Other symptoms of nasal polyps are nasal congestion, thick discharge and anosmia.

Treatment: The predominant cause is, as previously mentioned, viral in nature.[1, 12] Despite this, the vast majority of patients have historically received an antibiotic prescription from a well-meaning physician in an attempt to “cure” what is most likely acute viral rhinosinusitis (AVRS).[8] This has been, for the vast majority of patients, useless, enormously expensive, and has caused an ever-increasing amount of antibiotic resistance in the commensal bacteria that inhabit the paranasal sinuses.[3, 8]

It may be difficult distinguishing AVRS from ABRS in the first week to ten days of illness. Both conditions may resolve spontaneously in the first ten days and thereby antibiotics may not be necessary. The vast majority of AVRS can be managed using decongestants such as topical oxymetazoline or systemic medications such as pseudoephedrine (alpha constrictors) which act to

shrink the nasal mucosa thus aiding in mucociliary clearance. Mucolytic agents such as guaifenesin or saline nasal irrigations act to decrease the viscosity of sinus secretions and likewise aid, by this different mechanism, to help proper mucociliary clearance occur. Analgesic medications, such as acetaminophen help with the discomfort confronted by individuals with this disorder. The Infectious Diseases Society of America released Clinical Practice Guidelines for ABRS in Children and Adults in March 2012 and included strength of evidence recommendations. Patients who meet any of three criteria should be treated for bacterial rhinosinusitis. The criteria include persistent signs or symptoms of acute rhinosinusitis lasting greater than 10 days without improvement (strong, low moderate), severe symptoms or fever > 102^{o} F and purulent nasal drainage or facial pain lasting at least 3-4 days (strong, low moderate), or recurring symptoms after initial URI symptoms began improving also known as a "double-worsening" (strong, low moderate).[4] The 2015 ENT Clinical Practice Guidelines recommends watchful waiting as an initial management strategy for all patients with uncomplicated ARBS regardless of severity.[6] Amoxicillin-clavulanate is the drug of choice for empiric therapy of bacterial rhinosinusitis (weak, low). Macrolides are not recommended given the high rates of *S. pneumoniae* resistance (strong, moderate). TMP-SMX is not recommended due to the high rate of resistance seen in both *S. pneumoniae* and *H. influenzae*.[4] Studies show the number needed to treat with antibiotics is 13. Recommended length of treatment in adults is 5-7 days (weak, low-moderate). Intranasal saline irrigation and intranasal corticosteroids are recommended treatment adjuncts (weak, low-moderate).[4] Antihistamines, while helpful for seasonal allergic rhinitis, can actually worsen acute rhinosinusitis by causing thickening of sinus secretions leading to inspissation of the secretions behind the osteomeatal complex and are not recommended for use by IDSA guidelines (strong, low-moderate).[4, 11, 14]

Chronic rhinosinusitis (CRS) is a multi-factorial inflammatory disorder rather than a persistent bacterial infection. Local inflammation and swelling impairs sinus drainage and may be the consequence of chronic exposure to irritants, allergens, chronic infection or impaired mucociliary function. Two different varieties of CRS have been described: CRS with nasal polyposis, and CRS without nasal polyposis. Management goals for CRS should include mucosal swelling control, drainage promotion and eradication of infection.[10, 11]

Topical nasal steroids may decrease inflammation in CRS or recurrent acute rhinosinusitis individuals with allergic rhinitis. If allergic rhinitis appears to be involved then referral to allergist may be indicated.[10, 11]

In CRS, the microbiology may evolve to include aerobes such as *Staphylococcus aureus* including *MRSA, Pseudomonas or Klebsiella.* Anaerobes such as *Fusobacterium nucleatum, Prevotella and Peptostreptococcus* have been described after cultures in some patients. Fungi may be involved causing allergic fungal rhinosinusitis (AFRS) or invasive fungal sinusitis. Typically this involves an immunocompromised host. Another cause is odontogenic sinusitis: this is believed to be a factor in 10-12% of all cases of maxillary sinusitis. The organisms may be polymicrobial.[3, 11]

Should this medical management fail, a CT scan should be performed as well as the consultation of an otolaryngologist. The otolaryngologist will determine if surgery is indicated (most commonly in cases of CRS and recurrent acute rhinosinusitis), usually due to abnormalities in the osteomeatal complex (OMC) or other sinus anatomic variations leading to sinus obstruction and disease.[15] If indicated, the most common surgical procedure is functional endoscopic sinus surgery (FESS), where sinus abnormalities such as OMC obstruction can be corrected leading to proper mucociliary

clearance. In aviators, over 98% have returned to flying following FESS surgery and 92% have continued flying duties without recurrent barosinusitis symptoms.[13, 16, 17]
Aviators should be sent to ENT surgeons with specific training in the management of high performance pilots with barotrauma. A fellowship trained rhinologist is the definitive surgical consultant that should be engaged for all failed FESS in aircrew. Published series show rhinologists are capable of achieving 100% return to duty after FESS for recurrent sinus barotrauma. For patients whose complaints are bilateral and diffuse during descent related barotrauma, the surgery of choice is a complete FESS that opens all 10 sinuses completely. Return to duty can occur as early as 6 weeks after FESS if the ENT can endoscopically verify patent ostia, a CT also verifies aerated sinuses, and the pilot passes an altitude chamber ride appropriate to their duties.

Tumors may also cause sinus dysfunction. Intranasal topical corticosteroids have minimal side effects and can sometimes suppress polypoid disease or prevent further polyps. Surgery for hypertrophic sinus tissue or nasal polyps is often beneficial but recurrence is fairly common.[13, 17]

II. Aeromedical Concerns.

Acute and chronic sinusitis and nasal polyps may only be minimally symptomatic at ground level. However, these conditions can block the air flow in and out of the sinus cavities and changes in atmospheric pressure, as seen in the aviator or scuba diver may cause barotraumatic sinusitis, sinus "block" or "squeeze," resulting in sudden, incapacitating pain. These symptoms in aviators normally occur on descent but rarely have been described on ascent. Should that event occur immediately prior to or during landing procedures, it could lead to sudden incapacitation and an aircraft mishap. There is no quick test to ensure the OMC is patent; being able to Valsalva does not ensure aeration of the sinus cavities. One method of ensuring patency after treatment is to expose the aviator to an altitude chamber ride up to 8-10,000 feet. Another is if the operating surgeon can visualize the ostia of the affected sinuses or a recent post-op CT shows them to be patent. Our Air Force consultants strongly encourage doing both tests, rather than to choose one over the other. A literature review showed that only 2 of 26 aviators failed the chamber test after surgery; one had it too soon after surgery and the other was an aviator who had incomplete surgery due to excessive bleeding.[13, 17] Oral steroids may be used in the peri-operative period in setting of sinonasal polyposis. Medications used for management may not be compatible with aviation duties: refer to the latest edition of the approved aircrew medication list.

III. Waiver Consideration.

A viral URI or episode of acute bacterial rhinosinusitis requires no waiver but is grounding for flyers until resolution. However, chronic rhinosinusitis and nasal polyps resulting in clinical symptoms are disqualifying and require a waiver for FC I/IA, II, III, and RPA pilot duties. Also any surgical procedure for sinusitis, polyposis or hyperplastic tissue is disqualifying for FC I/IA. For retention purposes, sinusitis that is severe and chronic, either causing frequent missed duty or requiring ongoing ENT follow-up more than annually is disqualifying.

Table 1: Waiver potential for chronic sinusitis, nasal polyps and/or surgery for same

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA/untrained II/III	Nasal polyps controlled with nasal steroids and/or approved oral antihistamines.	Yes* AETC
	Chronic sinusitis controlled with nasal steroids and/or approved oral antihistamines.	Maybe* AETC
	Chronic sinusitis, nasal polyps	Maybe# AETC
II/III	Nasal polyps controlled with or without nasal steroids and/or approved oral antihistamines.	Yes* MAJCOM
	Chronic sinusitis controlled with nasal steroids and/or approved oral antihistamines.	Yes*+ MAJCOM
	Chronic sinusitis, nasal polyps	Yes*+ MAJCOM
RPA Pilot	Nasal polyps resulting in clinical symptoms incompatible with flight/chamber.	Yes MAJCOM
	Severe and chronic, either causing frequent missed duty or requiring ongoing ENT follow-up more than annually.	Yes MAJCOM
ATC/GBC MOD	Disease severe enough to interfere with enunciation or clear voice communication, or disease that is not responsive to therapy	No MAJCOM$

Waiver may be considered if at least 12 months after surgery and symptoms entirely resolved.
* Waiver in any untrained candidate requires at least 12 months of symptoms controlled on medication before waiver.
+ Altitude chamber ride up to 8-10,000ft with rapid decompression is required. If treated with surgery altitude chamber ride no earlier than 6 weeks after surgery or when cleared by ENT physician (whichever is later). Exception: a chamber ride is not necessary if the ENT can visualize the ostia of the affected sinuses or a recent CT shows them to be patent
$ Waiver authority for MOD personnel is AFGSC.

AIMWTS search in Dec 2015 revealed 240 cases with the diagnosis of nasal polyps, chronic sinusitis and/or surgery for the same. Breakdown of cases were as follows: There were 36 FC I/IA

cases (5 disqualified), 125 FC II cases (5 disqualified), 75 FC III cases (19 disqualified), 3 ATC/GBC cases (1 disqualified), and 1 MOD case (0 disqualified). Of the 30 disqualified cases, 25 were disqualified for issues related to the sinus disease; some were disqualified primarily for another cause.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver for **nasal polyps** should include the following:
A. History - symptoms (flying and on ground), duration, and treatment.
B. Physical - HEENT.
C. ENT consult.

The aeromedical summary for initial waiver **for chronic sinusitis and/or surgery** should include the following:
A. History - symptoms (flying and on ground) with duration and frequency, exacerbating factors, and treatment.
B. Physical - HEENT.
C. ENT consult.
D. CT scan, showing sinus disease or obstructed anatomy.
E. Allergy consult, if symptoms indicate allergic rhinitis component not controlled with topical nasal steroids or approved oral antihistamines.
F. Altitude chamber flight, unless ENT can visualize the ostia of the affected sinuses or a recent CT shows them to be patent.
G. Results of MEB or worldwide duty evaluation (for ARC members), if required.

The aeromedical summary for waiver renewal of **chronic sinusitis, nasal polyps and/or surgery** should include the following:
A. History – symptoms (flying and on ground), treatment, exacerbations since last waiver.
B. Physical – HEENT.
C. ENT and/or allergy consultation (if symptoms have recurred).

ICD-9 Codes for Sinusitis, Nasal Polyps and Surgery	
473.9	Unspecified chronic sinusitis
471.9	Unspecified nasal polyps
22.5	Other nasal sinusotomy

ICD-10 Codes for Sinusitis, Nasal Polyps and Surgery	
J32.9	Chronic sinusitis, unspecified
J33.9	Nasal polyp, unspecified
09CP4ZZ	Extirpation of Matter from Accessory Sinus, Percutaneous Endoscopic Approach

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WAIVER GUIDE
Updated: Oct 2015
Supersedes Waiver Guide of Apr 2012
By: LtCol Kevin Hettinger (RAM 16), Dr. Chris Keirns, and Dr Dan Van Syoc
Reviewed by Dr Joshua Sill, ACS pulmonologist

CONDITION:
Sleep Disorders (Oct 15)

I. Overview.

The common thread running through most sleep disorders is insufficient quantity or quality of sleep, which leads to excessive daytime sleepiness and diurnal impairment of alertness and cognitive function. While pathologic sleep disorders command the greatest attention, the commonest causes of excessive sleepiness are actually physiologic, such as poor sleep hygiene and circadian shifting. Chronic sleep deprivation for physiologic reasons may cause as much debility as a pathologic disorder. While the definition of sufficient sleep varies, one should generally not work up a complaint of hypersomnolence unless the individual is attempting, on a reasonably regular schedule, to get six to eight hours of sleep per twenty-four hour period. Careful attention must also be paid to alcohol use, since heavy use may disrupt sleep patterns, and may induce or worsen sleep disorders.

In civilian practice, insomnia is the commonest sleep complaint. The pattern of disturbance is usually helpful for diagnosis; chronic difficulty initiating sleep is most often associated with anxiety or stress, while early morning awakenings suggest depression. Frequent brief awakenings throughout the night are more suggestive of pathologic sleep disorders, and are a feature of both sleep apnea and narcolepsy.

Narcolepsy
Narcolepsy was one of the earliest identified sleep disorders; the first description dating back to 1880. Although it is considered to be a common cause of pathologic hypersomnolence, it is considerably less common than obstructive sleep apnea. The typical age of onset is from late adolescence through the early twenties (because poor sleep hygiene is markedly common in this period of life, and because narcolepsy is permanently disqualifying, it is vital to rule out physiologic sleep disruptions in aviators thought to have narcolepsy). Narcoleptics commonly have a disrupted pattern of sleep, but the hypersomnolence is not simply related to sleep deprivation. Instead, narcolepsy is a neurologic disorder of sleep-state boundaries, characterized by the inability to keep sleep and its manifestations confined to the normal sleeping period. Researchers believe that low levels of a protein called hypocretin (also known as orexin) may be an underlying cause of narcolepsy. Hypocretin is released by neurons in the lateral hypothalamus. These neurons excite multiple monoaminergic and cholinergic wake-promoting neurons, including histaminergic cells of the tuberomammillary nucleus (TMN). Histamine levels in the CSF of animals were reported to be higher during wakefulness compared with rest. In humans, histaminergic transmission may also fluctuate according to sleep pressure and decrease in the presence of Excessive Daytime sleepiness (EDS). The pathophysiology of decreased histaminergic transmission in patients is unclear. In patients with narcolepsy, lower CSF histamine could reflect the loss of hypocretin neurons, which densely innervate and activate histaminergic neurons in the TMN.[1]

The intrusion of rapid eye movement (REM) patterns into different parts of the sleep-wake cycle may lead to manifestations such as hypnagogic (predormital) and hypnopompic (postdormital) hallucinations, sleep paralysis, and cataplexy, the last characterized by loss of postural control (e.g., head drooping, knees buckling, even falling) associated with strong emotional stimulus (e.g., laughter, anger, surprise). The hypersomnolence of narcolepsy typically manifests as sudden sleepiness requiring a brief nap; after a nap as short as 1-20 minutes, the individual usually awakens feeling refreshed. The combination of hypnogogic hallucinations, sleep paralysis, and cataplexy with excessive daytime sleepiness is classic for narcolepsy, but not all patients will have the complete tetrad. True cataplexy is an important symptom, as it is all but diagnostic for narcolepsy. The diagnosis of narcolepsy without cataplexy is somewhat more challenging. Narcoleptics may also experience episodic lapses of conscious awareness typified by automatic behavior and amnesia. It should be noted that such behavior may also be seen in any individual with sufficient sleep deprivation or certain types of seizures.

If the history suggests narcolepsy and the polysomnogram shows no evidence of an alternative diagnosis, such as sleep apnea, the patient should have 2 weeks of a sleep diary with actigraphy monitoring, followed by overnight polysomnography and a multiple sleep latency test (MSLT) the following day. MSLT measures the amount of time required to fall asleep, and is performed by having the individual lie down in a darkened room and instructed to try to fall asleep. This is repeated three or four more times at two hour intervals, with each trial lasting 20 minutes if sleep does not occur. Normal individuals usually show mean sleep latency (MSL) of at least 8 minutes, with no sleep onset REM periods (SOREMPs) evident during any trial. A MSL less than 8 minutes, with two or more SOREMPs is considered strong evidence of narcolepsy, if a physiologic sleep disorder has been ruled out.

Narcolepsy is usually treated with wake-promoting agents, REM-suppressing medications and prescribed napping periods, but there is no cure for narcolepsy.[2] Neither the disease nor the medications are waiverable for military aviation.

Obstructive sleep apnea

Obstructive sleep apnea (OSA) is the most common pathologic sleep disorder. Traditional estimates of prevalence suggested that, among American adults ages 30 to 60, 4% of males and 2% of females were affected.[3, 4] However, more recent data suggests that these numbers have increased substantially over the past 2 decades. Data from the Wisconsin Sleep Cohort Study collected from 2007 – 2010 estimated the overall prevalence of OSA in the U.S. for persons age 30 – 70 years of age to be 26%.[5] Prevalence among military aviators is unknown, but because obesity is less common in that population, the rate is likely to be lower. While the prevalence in military aviators may be lower than the general population, it should be noted that research from the USAF School of Aerospace Medicine's Aeromedical Consult Service (ACS) has demonstrated an increasing prevalence of both obesity and obstructive sleep apnea in USAF aviators over the last decade. The key to OSA lies in the pattern of muscle activity that occurs in different stages of sleep. The sleep state is associated with a decrease in neuromotor output to pharyngeal muscles. When this occurs against the background of anatomic abnormalities of the upper airway, the pharyngeal airway can become severely narrowed or can close. Numerous factors including edema, obesity, and genetics can alter upper airway anatomy. There are many anatomic risk factors for sleep apnea including macroglossia, lateral peritonsillar narrowing, elongation of the uvula, narrowing of the hard palate, and retrognathia. Factors that reduce upper airway muscle tone (alcohol, sedatives, narcotics, hypnotics) also need to be considered in the evaluation of sleep apnea.[6]

The STOP-BANG (Snoring, Tiredness during daytime, Observed apnea, high blood Pressure, Body mass index, Age, Neck circumference, Gender) questionnaire was validated as a screening modality for OSA in the preoperative setting. This instrument is simple questionnaire that consists of 8 yes-or-no questions. Patients were classified as being at high risk for OSA if their STOP-BANG score was 3 or more and were classified as being at low risk if their score was less than 3. This study found that patients at high risk of OSA had a higher risk of pulmonary or cardiac complications, and had an increase length of stay in the hospital. The STOP-BANG questionnaire is concise and easy to administer. It has been validated in surgical patients and has a high sensitivity to identify most patients with OSA, especially moderate and severe OSA.[7]

The Epworth sleepiness scale (ESS) has been universally adopted as an effective screening method to monitor for clinical symptoms of sleep apnea. This questionnaire is used to help determine how likely the patient is to doze off in eight frequently encountered situations (e.g., as a passenger in a car, sitting quietly after lunch, etc.). A 2003 study showed that an ESS score of 12 or greater is considered abnormal and would warrant a more formal evaluation. However, the ESS is still a subjective self-assessment measure and may be inaccurate for a number of reasons. Therefore, if a patient has multiple risk factors for sleep apnea, the individual should be sent for further evaluation if there is a suspicion of sleep apnea despite a low ESS.[8]

The American Academy of Sleep Medicine (AASM) defines an apnea as a cessation in airflow lasting at least 10 seconds. Hypopnea is defined as a recognizable transient reduction (but not complete cessation) of breathing for at least 10 seconds. This differs from apnea in that there remains some flow of air. In the context of sleep disorders, a hypopnea event is only considered to be clinically significant if it lasts for at least 10 seconds, there is at least a 30% reduction in flow, and it is associated with either an arousal or a 3% or greater desaturation in oxygen saturations. It should be noted that despite the AASM's recommendations, Medicare and many insurance companies only consider hypopneas to be significant if they are associated with a 4% or greater oxygen desaturation. Apneas and hypopneas can occur multiple times per hour and are both used to calculate the severity of a person's sleep disorder. The Apnea-Hypopnea Index (AHI) is defined as the number of apneas and hypopneas that occur per hour of sleep. This index is used to categorize the severity of sleep. In general, an individual is considered to have the OSA syndrome if they demonstrate an AHI of at least 5 events per hour, with the presence of daytime symptoms or an AHI of 15 or more, independent of symptoms. An AHI of 5-15 is classified as mild, 15-30 is considered moderate and greater than 30 is considered severe. Another measure that is often used is Respiratory Disturbance Index (RDI). Like the AHI, RDI measures respiratory events; however, it also included respiratory effort related arousals (RERAs). RERAs are arousals from sleep that result from reduced airflow, but do not technically meet the definitions of apneas or hypopneas.[8] Because the AASM's most recent guidelines consider reductions in airflow that are associated with a 30% reduction in airflow and an arousal to be a type of hypopnea, most RERAs are now included in the AHI. As a result, the use of RDI in clinical practice has diminished. However, some sleep centers may still use this term to demonstrate that they use the AASM's recommended definition of a hypopnea (rather than Medicare's mentioned above). Additionally, the RDI may also include RERAs that do not meet the definition of a hypopnea (i.e. RERAs that are associated with a reduction in airflow of less than 30%). The ACS and most military treatment facilities use the AASM's recommended definition of AHI (3% desaturation or an arousal) or the RDI, as opposed to Medicare's definition of the AHI (4% desaturation).

Individuals with OSA are rarely aware of their sleep disorder, even upon arousal. Sleep apnea is usually recognized as a problem by family members who witness the apneic episodes or by a primary care doctor because of the individual's risk factors and symptoms. Most commonly, patients present with vague complaints. Clinical symptoms can include excessive daytime sleepiness (EDS) that usually begins during quiet activities (e.g., reading, watching television), daytime fatigue, feeling tired despite a full night's sleep, morning headaches, personality and mood changes, dry or sore throat, gastroesophageal reflux, and sexual dysfunction. Snoring is a common finding in individuals with OSA. Although not everyone who snores is experiencing sleep apnea, snoring in combination with obesity has been found to be highly predictive of OSA risk. The volume of the snoring is not indicative of the severity of obstruction. However, snoring with witnessed apneas has a 94% specificity for OSA.[8]

In addition to obesity (body-mass index >30), large neck circumference (>17.5 inches) is associated with OSA. In fact, neck circumference is a better predictor of OSA than BMI.[9] Weight gain is often associated with the development or worsening of symptoms. Hypothyroidism may cause or exacerbate OSA, and thyroid stimulating hormone levels should be checked in any patients who exhibit other signs or symptoms of thyroid dysfunction. One should also pay particular attention to drug and alcohol history; heavy alcohol use and sedating medications can cause sleep-disordered breathing that will disappear if the individual is abstains prior to a polysomnogram.[10]

Obstructive sleep apnea (OSA) is a secondary cause of hypertension, with prevalence estimated to be between 38% and 82%.[11, 12, 13] This is double what would be expected in a population of middle-aged Caucasians, even when obesity is accounted for. Despite the high prevalence, evidence of target-organ damage, and increased markers of atherosclerosis, OSA remains largely underdiagnosed and, consequently, undertreated in clinical practice.[14, 15, 16, 17]

Epidemiologic studies support a causal role of OSA in systemic hypertension, independent of BMI, measures of fat distribution, age, sex, and other possible confounding factors. Randomized, double-blind, placebo controlled trials of patients with hypertension demonstrate that effective treatment of OSA with CPAP lowers blood pressure. A decrease in blood pressure is most pronounced in those with the most severe OSA and who are the most compliant. OSA is a cause of secondary pulmonary hypertension (PH). PH is usually mild, although it can be severe, particularly in the presence of comorbid disorders such as COPD. Treatment of OSA with CPAP may improve PH.[18]

Various neuropsychologic deficits are associated with OSA, mainly in the areas of memory, attention, and executive tasks that require planning, shifting or constructive abilities. Individuals with OSA have decreased ability to initiate new mental processes and to inhibit automatic ones, in conjunction with a tendency for preservative errors. They are also affected with deficits of verbal and visual learning abilities and reduced memory spans.[19] Neurocognitive deficits vary considerably from one individual to another. In the ACS experience, impairment is very rare with mild to moderate OSA, but is more common with severe sleep-disordered breathing. Depressive symptoms are common in OSA, with prevalence as high as 24-45%.[20]

In addition to the symptoms and morbidity associated with OSA, there is a growing body of evidence that sleep apnea is associated with an increased risk of mortality. A recently published study from Australia followed a cohort of individuals with OSA over a period of 14 years. The results demonstrated a four-fold increased risk of all-cause mortality in those with moderate to severe OSA.[21]

Diagnosis of OSA and most pathologic sleep disorders requires polysomnography (PSG) at a sleep disorders center. This involves monitoring at least one night's sleep with electroencephalography, submental electromyography, electro-oculography, measurements of airflow and thoracic/abdominal excursion, and oximetry. Usually electrocardiography and video monitoring are performed as well. While home sleep testing has also been gaining increasing acceptance and has the advantage of convenience and cost, it is not sufficiently sensitive for the purpose of aeromedical disposition.

One major problem with sleep laboratories is the huge degree of variability of results. Even accreditation with the AASM is no guarantee, because standards for interpretation have been difficult to establish. As mentioned earlier, nocturnal polysomnography is the gold standard for the diagnosis of OSA.[19] Unlike the waiver evaluation, USAF policy does not require that an initial work-up to establish or rule out a sleep disorder in an aviator must occur at a particular site. However, if at all feasible, it is strongly recommended that the initial diagnostic evaluation be arranged at a sleep laboratory in an academic facility (defined as an institution with a sleep fellowship program) to ensure consistency.

The maintenance of wakefulness test (MWT) is a measure of the volitional ability to stay awake. The individual is seated in a quiet, dimly lit room and instructed to remain awake; a total of four 40-minute trials are conducted at 2-hour intervals. Based on statistical analysis of normative data, a MSL of less than 8 minutes on the 40-minute MWT is abnormal.[22] A MSL of 40 is considered normal, while MSL values between 8 and 40 minutes are considered equivocal. However, it is important to note than in several studies of patients with OSA, performance on driving simulators improved significantly in patients with MSLs greater than 30-34.[23, 24] The MWT is not routinely performed during an initial, local evaluation of OSA, but may be employed by the ACS for the purposes of aeromedical disposition.

While multiple treatment options usually exist for sleep apnea, not all are compatible with unrestricted worldwide duty. In the majority of patients, OSA pathology develops as weight increases, the typical history revealing a progression of heroic snoring, observed apneas, and hypersomnolence as mass has progressively increased. Weight loss is the preferred approach in obese patients, with health benefits extending well beyond OSA treatment. The relationship between weight loss and decrease in number of apnea and hypopneas is not linear; 10% weight loss can decrease apneas events by 50%.[25] Flying status can be a powerful motivator for weight loss. However, it should be noted that it is rare for those with moderate or severe sleep apnea to lose enough weight to achieve a normal AHI (less than 5 events per hour). Additionally, even in highly motivated populations, weight loss can be difficult to achieve and maintain. Positional therapy is likely to be helpful when a significant positional component is identified during the sleep study. Medications have largely been ineffective for OSA, and those that have been tried are not approved for flight.

Oral appliances, which attach to the teeth to advance the mandible, are frequently effective in reducing sleep-disordered breathing, are generally well tolerated, and are waiverable without restriction. They are especially effective in those with mild to moderate sleep apnea and in those with a positional component to their disease. Nasal continuous positive airway pressure (CPAP), which acts as a pneumatic stent to maintain airway patency, is usually effective for any degree of sleep apnea. While compliance can be a problem, most of the newer CPAP machines have the

ability to record and store usage (compliance) data, making it very easy for practitioners to determine how compliant their patients have been. For active duty personnel, the use of CPAP may restrict worldwide qualification. Current policy only requires Medical Evaluation Boards (MEB) for moderate, severe, or incompletely treated OSA, and usually results in an assignment limitation code C-1 designation. Regardless of whether or not a MEB is required, the need for a continuous power supply, and a reasonably dust-free environment to avoid overwhelming the filtering system usually requires theater clearance for CPAP use during deployment.

Several surgical options are available for OSA, including such procedures as uvulopalatopharyngoplasty (UPPP) and maxillary-mandibular advancement (MMA). UPPP is popular, and as a treatment for heroic snoring, it has a high degree of success, at least in the short term. However, for OSA it is only modestly effective, with success in only about 45% of patients, with success defined as a 50% reduction in sleep-disordered breathing, rather than abolition of apneas or control of the clinical manifestations. MMA, a technically more complicated operation, is effective in 90-95% of patients.[9]

Sleepwalking (Somnambulism)

A sleepwalking episode occurs at least once in 10-30% of children, and 2-3% sleepwalk often. The prevalence of an active sleepwalking disorder is much lower, at 1-5%. Episodes first occur most commonly between 4 to 8 years, with the incidence peaking at age 12, and usually disappear spontaneously by age 15. A family history of sleepwalking is seen in up to 80% of sleepwalking individuals. The risk of sleepwalking increases to up to 60% in children if both parents have a history of sleepwalking disorder. Sleepwalking disorder typically occurs during stages 3 and 4 of non-REM sleep, during the first 1-2 hours of sleep, and is seldom remembered by the individual. During the episode the individual has reduced alertness, unresponsiveness, and a blank stare. They can be quite difficult to arouse during an event. If awakened during a sleepwalking episode the individual is usually confused for several minutes before exhibiting normal wakefulness.[26]

Central Sleep Apnea

Central sleep apnea is far less common than obstructive sleep apnea. It is characterized by repetitive periods of apnea caused, not from an obstructed airway, but due to a periodic decrease in the central respiratory drive. The diagnosis of central sleep apnea syndrome requires that five or more apneic episodes per hour of sleep be seen on polysomnography. Normal individuals often have occasional central apneas at the onset of sleep, either at the beginning of the sleep period, or after an arousal. These are considered physiologic and only require further investigation if they appear to be causing desaturations or arousals. Another frequently encountered form of central sleep apnea occurs when OSA patients first start to use CPAP therapy. This form of central sleep apnea, known as complex sleep apnea, will usually resolve spontaneously within 6 weeks of starting CPAP therapy. It only requires further work-up and treatment if it persists after 6 weeks. Another common form of central sleep apnea is periodic breathing of altitude. The prevalence increases with altitude. At the altitude of the USAF Academy, nearly one third of patients will demonstrate evidence of central sleep apnea. Other common causes of central apneas include opiate use, congestive heart failure, neurological conditions, and renal dysfunction.[27] Primary or idiopathic central sleep apnea is a rare form of central sleep apnea of unknown cause.. Most forms of central sleep apnea typically cause excessive daytime sleepiness, insomnia, or difficulty breathing during sleep.

Periodic Limb Movements Disorder and Restless Leg Syndrome

Periodic limb movements in sleep are a common finding on polysomnography. They are defined as repetitive limb movements that last between 0.5 and 5 seconds and occur at intervals of 4 to 90 seconds. Periodic limb movements are very common, and there is a debate in the sleep medicine community as to whether the condition should be considered a disorder or a normal physiologic phenomenon. The number of periodic limb movements per hour is referred to as the periodic limb movement index (PLMI). The number of times per hour that one of these movements causes an arousal is called the periodic limb movement arousal index (PLMAI). Periodic limb movement disorder is defined as a PLMI greater than 15 events per hour. Generally speaking treatment is only indicated if the condition is symptomatic or if the PLMAI is greater than 5 events per hour.

In contrast to periodic limb movement disorder, restless leg syndrome (RLS), is a clinical diagnosis. It is characterized by an uncomfortable sensation in the legs (i.e. pain, cramping, creeping/crawling sensation) that is worse just before bed, is accompanied by a strong urge to move or stretch, improves with movement, and then quickly returns afterward.

Both periodic limb movement disorder and RLS are often idiopathic, though they have been associated with low ferritin levels. It is recommended that ferritin levels be checked and iron supplementation be initiated for ferritin levels below 50 mcg/L. Elimination of alcohol, tobacco, and caffeine can have positive effects. Pharmacotherapy is available, but should only be initiated if the individual is symptomatic. Medications for the treatment of periodic limb movement disorder and RLS are not waiverable due to significant side effect profiles.

II. Aeromedical Concerns.

With the exception of somnambulism, any of the sleep disorders above may result in excessive daytime sleepiness and an inability to maintain the alertness necessary for safety while flying. Cognitive function and neuromuscular coordination may both be affected by the sleep disorder and/or the treatment modalities used. When called upon to perform in operational situations with less than optimal sleep, those with OSA are already sleep deprived. Furthermore, when faced with sleep deprivation, normal individuals typically respond by altering sleep patterns, e.g., longer periods of REM sleep. This is likely a physiologic response and serves to increase sleep efficiency in normal individuals. However, OSA tends to be most severe in REM. The result is that individuals with OSA may have more than the usual difficulty in adjusting to sleep deprivation or the circadian rhythm disruption which occurs with travel across time zones. This would present an additional hazard to a flyer who may deploy several time zones away and would still be expected to perform flying duties.

Individuals can injure themselves during sleepwalking, by bumping into objects, walking on stairs, going outside, and even walking out of windows. The risks from somnambulism in a combat environment are obvious, and constitute a danger to the member and to others.

If an aviator is diagnosed with OSA, they should be made DNIF, and treatment should be initiated as soon as possible. All aviators who are obese or overweight should be treated with weight loss. Most patients will also require treatment with an adjunctive therapy such as an oral appliance, positional therapy, or CPAP. After weight loss is achieved, the adjunctive therapy should only be discontinued if the patient has demonstrated a normal AHI (less than 5 events per hour) on PSG and

resolution of symptoms off of therapy. Surgery may also be considered as an adjunctive therapy, though given the morbidity and variable efficacy, it is difficult to recommend surgery as a first-line therapy. If the aviator does not have symptoms clearly associated with the diagnosis, the ACS recommends that the disorder be confirmed at an academic sleep center such as Wilford Hall Ambulatory Surgical Center, Walter Reed National Military Medical Center or the 88th Medical Group at Wright-Patterson AFB before considering a surgical procedure. The neurocognitive deficits associated with OSA can, for the most part, be mitigated with treatment, such as CPAP therapy.[28, 29] However, it is important to note that in one study of patients with sleep apnea and neurocognitive deficits, nearly all the improvement seen with CPAP use was lost after just one night without therapy.[30]

If narcolepsy is diagnosed by an outside sleep laboratory, the aviator should be referred to the ACS for confirmation of the diagnosis. Although this diagnosis, if confirmed, will result in permanent disqualification, the ACS has seen multiple instances of aviators who were improperly diagnosed as narcoleptic.

III. Waiver Consideration.

Narcolepsy, obstructive sleep apnea and other sleeping disorders are disqualifying for all flying classes (FC I/IA, II, III, and GBC) as well as retention. Current or history of sleepwalking is disqualifying for all flying classes (primarily an accession issue), and is unsuiting rather than unfitting for continued military service. Of note, moderate or severe sleep apnea requiring CPAP and OSA incompletely treated with other modalities are considered disqualifying for retention standards, which means that ATC/GBC and MOD personnel in this category will require a waiver and I-RILO as well.

As noted earlier, the initial diagnostic workup need not be performed at Wilford Hall or the 88th MDG, although this is certainly encouraged where geographically practical. If at all feasible, the initial polysomnogram should be performed at an academic laboratory. In a recent review of ACS experience with OSA, academic laboratory values were concordant with our reference laboratory in 89% of cases, whereas non-academic laboratories were concordant in only 24% of cases. Any FC II aviator other than flight surgeons, with a documented sleep disorder will require an ACS evaluation prior to returning to flying status. FC III individuals and flight surgeons will be seen on a case-by-case basis at the ACS at MAJCOM request (this pertains almost exclusively to Air Battle Managers).

For a waiver to be recommended, the patient must 1) be using a form of therapy that has been documented to be effective on polysomnography testing (repeat PSG showing RDI of <5 with dental orthotic, weight loss, or CPAP), 2) have resolution of sleep-related symptoms, and 3) demonstrate excellent compliance (CPAP usage on 90% of nights for at least 5 hours per night, on average). Generally speaking, all those utilizing CPAP therapy MUST demonstrate a pattern of excellent compliance for at least 3 months, prior to being granted a waiver. If available, usage data from the preceding 90 days should be submitted along with their waiver package. In order to reduce the time required to RTFS, FC II individuals who will require ACS evaluation may submit waiver packages after 30 days of excellent compliance has been documented. However, the patients will be required to demonstrate a pattern of ongoing usage and continued excellent compliance at the time of their ACS evaluation. The last 3 months of usage data will be downloaded during their ACS evaluation. At the ACS, maintenance of wakefulness testing will be performed on all cases,

while neuropsychological testing will be performed only on those with severe sleep apnea. Neither of these tests need to be performed locally prior to waiver submission.

Table 1: Waiver potential for various sleep disorders.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Sleep walking	Maybe+ AETC	No
	Narcolepsy, obstructive sleep apnea and other sleep disorders	No AETC	No
II (other than FS)	Sleep walking	Maybe+ MAJCOM	No
	Narcolepsy	No MAJCOM	Yes#
	Obstructive sleep apnea controlled on CPAP	Yes*† AFMSA	Yes#
	Obstructive sleep apnea not on CPAP	Yes*† MAJCOM%	Yes#
	Other sleep disorders	Maybe MAJCOM%	Yes#
III and FS	Sleep walking	Maybe+ MAJCOM	No
	Narcolepsy	No MAJCOM	Yes, probable review only
	Obstructive sleep apnea	Yes*†& MAJCOM	Maybe
	Other sleep Disorders	Maybe MAJCOM	Yes, probable review only
ATC/GBC MOD**	Sleep walking	Maybe+ MAJCOM	No
	Narcolepsy	No MAJCOM	No
	Obstructive sleep apnea	Yes& MAJCOM	No
	Other sleep Disorders	Maybe MAJCOM	No

+ Last episode of sleepwalking must be at least three years prior to application with normal psych evaluation. I-RILO may be required if not administratively separated for all sleepwalking cases.

* Mild or moderate OSA documented at ACS with resolved symptoms, good compliance, and normal MWT is waiverable. Severe OSA may also be waiverable, but must also demonstrate normal neuropsych testing.
** Waiver authority for MOD personnel is AFGSC or AFMSA if I-RILO/MEB is required.
# ACS evaluation includes polysomnography, actigraphy and multiple sleep latency testing (for narcolepsy) or maintenance of wakefulness testing (for OSA) at Wright-Patterson Medical Center Sleep Disorders Laboratory, and may include neuropsychologic testing to evaluate cognitive function.
& The only FC III cases seen routinely at the ACS will be Air Battle Managers for the evaluation of possible obstructive sleep apnea. Other FC III aviators and flight surgeons do not require ACS review unless requested by the waiver authority.
† Indefinite waivers will not be granted for OSA.
% AFMSA is waiver authority for moderate or greater OSA and if clinical sleep disorders result in excessive daytime somnolence or interfere with duty performance

Review of AIMWTS in Jul 2015 showed 16 cases of Narcolepsy, all disqualified. The breakdown of cases was as follows: 1 FC I case, 1 FC II case, 7 FC III cases, 3 ATC/GBC cases, and 4 MOD cases.

Review of AIMWTS showed 41 cases of Sleep Walking. Breakdown was as follows: 21 FC I cases (5 disqualifications), 10 FC II cases (1 disqualification), 8 FC III cases (7 disqualifications), and 2 MOD case (2 disqualifications).

Review of AIMWTS for OSA showed 1132 cases. Breakdown was as follows: 7 FC I/A case (7 disqualification), 438 FC II cases (88 disqualifications), 478 FC III cases (128 disqualifications), 121 ATC/GBC cases (20 disqualifications), and 88 MOD cases (19 disqualifications).

Review of AIMWTS for Other Sleep Disorders (not including sleep walking, narcolepsy and OSA) showed 9 cases. Breakdown was as follows: 3 FC II cases (1 disqualification), 4 FC III cases (3 disqualifications), 1 ATC/GBC cases (1 disqualification), and 1 MOD cases (0 disqualifications).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. Include I-RILO or MEB if required per current MSD.

The aeromedical summary <u>for initial waiver</u> for sleep disorders other than sleep walking should include the following:
A. History – history of weight since reaching adulthood, symptoms (including pertinent negatives), treatment and effectiveness, documentation of resolution of symptoms, if applicable.
B. Physical – height and weight, blood pressure, neck circumference, and ear, nose and throat, cardiovascular, and pulmonary exam.
C. Polysomnography results, including repeat polysomnogram on therapy.
D. Medical evaluation board results, if completed.
E. CPAP usage (compliance) data from last 3 months.

The aeromedical summary for waiver renewal for sleep disorders other than sleepwalking should include the following:
A. History – brief summary of initial symptoms, weight and findings at ACS evaluation, current symptoms, current treatment, and weight history since previous waiver granted.
B. Physical – weight, blood pressure, neck circumference, and ear, nose and throat, cardiovascular, and pulmonary exam.
C. Polysomnography results. Note: Polysomnography does not need to be accomplished if ACS evaluation is required, will be done during ACS evaluation.
D. CPAP usage (compliance) data from last 3 months.

The aeromedical summary for waiver for history of sleepwalking should include the following:
A. History – age on onset, frequency, last episode, activities during sleepwalking, family history.
B. Psychology/psychiatric consult.

ICD-9 codes for sleep disorders	
307.4	Specific disorders of sleep of non-organic origin (including Sleepwalking)
327.42	Primary insomnia
347	Narcolepsy (with or without cataplexy)
780.57	Unspecified sleep apnea
327.51	Periodic limb movement disorder
333.94	Restless leg syndrome

ICD-10 codes for sleep disorders	
F51.9	Sleep disorder not due to a substance or known physiologic condition, unspecified
G47.52	REM sleep behavior disorder
G47.411	Narcolepsy (with cataplexy)
G47.419	Narcolepsy (without cataplexy)
G47.30	Sleep apnea, unspecified
G25.8	Restless leg syndrome

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WAIVER GUIDE
Updated: Jul 2014
Supersedes Waiver Guide of Apr 2010
By: Maj John E. Miles (RAM XV) and Dr. Dan Van Syoc
Reviewed by Dr. Terry Correll, ACS staff psychiatrist

CONDITION:
Somatic Symptom and Related Disorders (Formerly Somatoform and Factitious Disorders/Malingering) (Jul 14)

I. Overview.

Five diagnoses are grouped within the category of somatic symptom and related disorders: somatic symptom disorder, illness anxiety disorder, conversion disorder, psychological factors affecting other medical conditions, and factitious disorder.[1] These conditions were previously classified in the Fourth Edition of the Diagnostic and Statistical Manual of Mental Health Disorders (DSM-IV) as either somatoform disorders (somatization disorder, conversion disorder, pain disorder, hypochondriasis, body dysmorphic disorder, undifferentiated somatoform disorder, and somatoform disorder NOS) or factitious disorders. With the publication of DSM-5 in May 2013, the conditions were reclassified in an effort to simplify diagnosis in the primary care setting by focusing on the conditions' distressing somatic symptoms and the accompanying abnormal thoughts, feelings, and behaviors. The new classification removed the requirement that the somatic symptoms be medically unexplained. Although often similar to these disorders in presentation, malingering is not considered a mental illness even when it impacts the diagnosis, prognosis, or treatment of a medical condition.

The following discussion will focus on somatic symptom disorder, conversion disorder, and factitious disorder. In general, these conditions are more common among females, ethnic minorities, those with fewer years of education, and those of lower socioeconomic status. The 12-month prevalence rate for any somatic symptom or related disorder is about 6 percent of the general population. In women, these disorders have been associated with childhood sexual abuse and recent exposure to physical or sexual violence. These conditions are also strongly associated with other psychiatric disorders, especially anxiety and depression.[2]

Somatic symptom disorder is a new diagnosis which includes many conditions previously classified as somatization disorders or hypochondriasis. Diagnosis requires the persistence of one or more somatic symptoms that are very distressing or significantly interfere with normal functioning. The condition is marked by excessive thoughts, feelings, or behaviors regarding the symptoms. The symptoms may or may not be medically explained.[1]

Conversion disorders are characterized by neurologic symptoms (e.g. weakness, paralysis, seizures, blindness) that are incompatible with recognized neurologic or medical conditions but still cause distress and/or psychosocial impairment.[1] Diagnosis depends upon clinical findings that reveal a symptom to be incongruent with anatomy, physiology, or known diseases, or inconsistent at different times.[2] Conversion disorders seldom occur for the first time after the age of 35, and symptoms are markedly more common among women than men. In fact, the disorder was originally known as hysteria, a name derived from the Greek word for uterus (of the ancients' belief that the symptoms arose from a physical displacement of this organ. Studies

have found that over a quarter of normal post-partum and medically ill women report having had conversion symptoms at some point during their lives. Although the prognosis for conversion disorder is initially good with symptoms frequently resolving relatively quickly, up to 25% of patients relapse within one year. Cases with an acute onset, a clearly identifiable provoking stressor, and a short interval between onset and treatment tend to do best. Cases manifesting as blindness, aphonia, or paralysis tend to do better than those involving seizures or tremors.[3]

In both somatic symptom disorder and conversion disorder, symptoms are not seen as intentional, voluntary, or consciously produced.[2] In factitious disorders and malingering, on the other hand, an individual intentionally produces or feigns physical or psychological symptoms, presenting himself or herself to others as ill, impaired, or injured. In factitious disorders, the deceptive behavior is evident even in the absence of obvious external rewards. The factitious disorder patient's primary goals are to assume the sick role and to receive medical, surgical, or psychiatric care (i.e., to feel "cared for"). In malingering, symptoms are consciously produced or feigned because of a clear external incentive, e.g., to avoid an undesirable deployment, to be discharged from the military, or to obtain monetary compensation.[2]

Factitious disorder may be suspected when a patient presents with a dramatic but inconsistent medical history. Symptoms may be unclear and changing and may become more severe after treatment has begun. New symptoms may appear following negative lab results and predictable relapses may follow improvements. The patient may display extensive knowledge of hospitals and medical jargon, as well as a textbook presentation of his or her illness. The patient may display an unusual willingness or eagerness to undergo medical tests, operations, or other procedures and may have a history of seeking treatment from multiple providers. The patient may be reluctant to allow health care professionals to talk to family members, friends, and previous providers.[4] A particularly severe and chronic form of factitious disorder is Münchausen syndrome which is marked by the following three components: recurrent hospitalizations, travel from hospital to hospital (peregrination), and pathological lying (pseudologia fantastica). While the majority of cases of factitious disorder involve physical symptoms, some patients primarily feign psychological symptoms. Psychological complaints (like physical ones) encompass a broad spectrum of symptoms, including depression, anxiety, psychosis, bereavement, dissociation, posttraumatic stress, and even homicidal ideation.[5-7]

There are two significant negative consequences to somatic symptom and related disorders. First is the excess health care cost resulting from frequent medical visits, diagnostic testing, invasive procedures, and hospitalizations. Second is the adverse impact on the doctor-patient relationship that is common in this setting.[8] Management of these disorders frequently requires that patients spend an extended time away from their duties. Even when present for duty, patients are often preoccupied with their physical symptoms and less devoted to mission-oriented tasks. Their symptoms may lead to medical recommendations for multiple duty limiting restrictions.

Among aviators, somatic symptom and related disorders may represent a difficult manifestation of fear of flying. As detailed in DeHart's *Fundamentals of Aerospace Medicine*, chronic physical or physiologic symptoms may be presented by a flier (sometimes preceded by the words, "I'd like to fly, but…") as incompatible with continuing to fly. This attitude presents a striking contrast to that of most fliers who insist on flying in spite of their symptoms. A reluctant flier's symptoms can arise from an unconscious conflict between anxiety about flying and a greater anxiety about giving up the role of the aviator. "Involuntary" grounding for physical reasons beyond the flier's

conscious control offers an acceptable way out of the conflict. As an example, with an unconscious conflict presenting as a conversion disorder, the aviator has no conscious anxiety about flying, and therefore responds to any question concerning apprehension in flight with denial because the question represents a challenge to their defense that the symptoms offer against the intolerable but unconscious underlying anxiety. The flier may have little concern about any disease the symptoms represent, concentrating instead on being removed from flying duties in order to avoid the distress. The entire presentation of the case differs from that of the usual aviator who does not want to be grounded. Three clinical observations may help identify the unconscious aspect of the conversion symptoms. First, the flier tends to describe the symptoms in terms of their effect on flying. Second, the flier may express no particular anxiety about being significantly ill, and have little interest in specific treatment. Third, if asked, "Will you go back to flying when you are well?" the flier may equivocate or signal reluctance. Identifying the somatoform nature of the problem may allow the physician to avoid unnecessary, expensive, or invasive diagnostic procedures. Even if the psychologic nature of the problem is established, the flier is unlikely to agree with the formulation and to cooperate in necessary psychotherapy. The nature of the symptoms (headaches, various pains, sensory deficits, autonomic disturbances of the gastrointestinal tract) may preclude safe return to flying duties.[9] All the somatic symptom and related disorders may be a defense against fear of flying so it is important to evaluate for recent stressors surrounding flying duty in any of the somatoform presentations.

There is no specific therapy for somatic symptom and related disorders. Management of these conditions requires a good clinician-patient relationship. Attempts should be made to limit a patient's routine care to a single primary clinician and hospital, although in all aeromedical cases, care should also be closely coordinated with psychiatric consultation. Cognitive Behavioral Therapy (CBT) has been found to be an effective treatment for these disorders in some settings. Any underlying medical illnesses must be fully treated while also protecting patients from self-harm and harmful medical procedures. Excessive, repetitive, and unnecessary diagnostic testing should be avoided, especially invasive medical and surgical workups. The doctor needs to be supportive, yet realistic in his or her treatment course. Once firmly established, somatic presentations of fear of flying may be quite resistant to therapy.[2, 6, 9, 10]

II. Aeromedical Concerns.

These disorders have a chronic course with patients making repeated visits to physicians due to multiple physical or somatic complaints. The attendant somatic concerns and behaviors interfere with flying availability and reliability. Because of the chronic and recurrent nature of these disorders, treatment offers only a weak hope of returning to flying status; motivation to fly, or lack thereof, significantly influences the aviator's prognosis. These individuals are frequently not motivated for psychotherapy, and may attempt to change physicians when confronted. Therefore, consider conservative medical management and reassurance after ruling out possible organic causes for complaints.

III. Waiver Consideration.

Somatic symptom disorders including, but not limited to illness anxiety disorder or conversion disorder are disqualifying for all classes of flying in the US Air Force.[11] Consideration for a waiver will only be entertained if the aviator is successfully treated and remains off all psychotropic medication for 12 months. Factitious disorders are disqualifying for all flying classes to include

retention on active duty; however, for retention, factitious disorders are handled administratively as unsuiting conditions in accordance with DoDI 1332.38 E5.1.3.9.7.[12, 13]

Malingering is not considered a mental illness. In DSM-5, malingering receives a V-code as one of several presenting problems that may become a focus of clinical attention or that may exacerbate or otherwise affect the diagnosis, course, prognosis, or treatment of a patient's mental disorder.[1] As such, it too is considered unsuiting rather than unfitting for continued military service and any patient exhibiting such behavior should be referred to the chain of command. As specified in Article 115 of the Uniformed Code of Military Justice (UCMJ), any person who for the purpose of avoiding work, duty, or service feigns illness, physical disablement, mental lapse or derangement; or intentionally inflicts self-injury; shall be punished as a court-martial may direct.[14]

Thus, before submitting a case for waiver consideration, the base-level flight surgeon must first discern whether the condition is unsuiting vs. unfitting for service. If the Airman requires a fit/unfit determination, the case needs MEB action; if the airman requires a suited/unsuited determination, the case needs consideration of an administrative separation or discharge via the chain of command.

Table 1: Waiver potential for Somatic Symptoms and Related Disorders

Flying Class (FC)	**Condition**	**Waiver Potential#** **Waiver Authority**
I/IA	Somatic Symptoms and Related Disorders	No AETC
II	Somatic Symptoms and Related Disorders	Yes* MAJCOM
III	Somatic Symptoms and Related Disorders	Yes* MAJCOM
GBC	Somatic Symptoms and Related Disorders	Yes* MAJCOM
MOD	Somatic Symptoms and Related Disorders	Yes* MAJCOM

*Applicants for initial training should be handled in same fashion as FC I/IA.
No indefinite waivers.

AIMWTS search in Apr 2014 revealed 23 cases; 4 had the diagnosis of conversion disorder, 1 had the diagnosis of pain disorder, 1 had the diagnosis of hypochondriasis, 7 had the diagnosis of somatization disorder, and 10 had the diagnosis of undifferentiated somatoform disorder. Breakdown of the cases revealed: 0 FC I/IA cases, 9 FC II cases (5 disqualified), 8 FC III cases (5 disqualified), 2 MOD cases (2 disqualified), 4 ATC/GBC cases (3 disqualified).

IV. Information Required for Waiver Submission.

Submitting a Mental Health Waiver Guide:

AFI 48-123 –MSD, 6 FEB 2014, Q1 and the Aeromedical Consultation Service (ACS) Waiver Guide addresses waiver evaluations

Step 1 - Is the aviator ready for waiver submission?

A. Waiver is submitted when 1) the member is asymptomatic and 2) medications/psychotherapy treatment have been completed, as applicable to diagnostic category, for the specified time-frame below (Note: psychotherapy "booster sessions", and sometimes antidepressants, are permissible and often advisable after initial symptom resolution):

- ☐ 1 Year—Psychotic Disorders & Somatic Symptom and Related Disorders
- ☐ 6 Months—Mood Disorders, Anxiety Disorders & Suicidal Behavior
- ☐ Discretion of Flight Surgeon—Adjustment Disorders & "Other Conditions"(V-Codes) requiring waiver
- ☐ For Traumatic Brain Injury cases, please refer to TBI Waiver Guide
- ☐ For aviators with any other psychiatric disorders, please refer to AFI 48-123 and ACS Waiver Guide

B. To be considered for an aeromedical waiver, any disqualifying condition must meet the following criteria per AFI 48-123 Section 6B, 6.2.1.1 through 6.2.1.6. (pg.31):

- ☐ Not pose a risk of sudden incapacitation
- ☐ Pose minimal potential for subtle performance decrement, particularly with regard to the higher senses
- ☐ Be resolved, or be stable, and be expected to remain so under the stresses of the aviation environment
- ☐ If the possibility of progression or recurrence exists, the first symptoms or signs must be easily detectable and not pose a risk to the individual or the safety of others
- ☐ Cannot require exotic tests, regular invasive procedures, or frequent absences to monitor for stability or progression
- ☐ Must be compatible with the performance of sustained flying operations

Step 2 - Before beginning the Aeromedical Summary (AMS), Flight Surgeon must obtain Mental Health consultation and ensure it contains items specified below:
Instructions for the Mental Health Provider
The mental health evaluation must include a **comprehensive written report** addressing:

- ☐ Consultation must address each criteria in Step 1B
- ☐ Clinical mental health history (description of symptoms, treatment modality, frequency and compliance with treatment, relevant personal and family history, and perceived impact on occupational duties)
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…) ***** for alcohol cases, please comment on carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, input from line leadership, if possible, and please address current state of any triggers for the mental illness)
- ☐ Current and past aviation related duties and any history of current and past occupational performance difficulties (to include perceived impact of mental health condition on performance of duties)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)

- ☐ Summary and interpretation of psychological/neuropsychological testing results (recommend MMPI-2, NEO PI-R, or similar personality test). For neuropsychological cases, please contact ACS neuropsychologist (Dr. Gary Ford, DSN: 798-2704) for guidance on recommended neuropsychological tests.
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly or engage in special duty operations (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)
- ☐ Copies of all records (mental health/ADAPT/inpatient) and raw testing data should be on hand for shipment to ACS Neuropsychiatry Branch

Step 3 - Items for the Flight Surgeon to include in the AMS:

- ☐ AMS must clearly address each criteria in Step 1B and the risk to the member, mission, and safety
- ☐ Summarize Mental Health history and focus on occupational impact
  ***** If 2 or more months have passed since the comprehensive evaluation/report was completed, the flight surgeon should address how the member has done since and consult with the mental health provider if the member has been seen at mental health since the evaluation*****
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…)
  ***** for alcohol cases, please comment on carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, if possible - please address current state of any triggers for the mental illness)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)

Step 4 - Items to complete the waiver package:

- ☐ Letter of support from command
- ☐ Comprehensive mental health written-report
- ☐ Confirm mental health has made copies of chart(s) and testing. When requested send to:

ACS Aerospace Medicine Branch, USAFSAM/FECA
c/o Neuropsychiatry Branch
2510 Fifth Street Bldg 840
Wright Patterson AFB, OH 45433-7913
Fax: (937) 904-6296 DSN: 674-9296

Please feel free to contact the ACS Neuropsychiatry Branch with questions:

SSgt Krista Traut 798-2653, or Mr. John Heaton: 798-2766

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for somatic symptom and related disorders should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of the disorder and all treatments administered, the current status of any social, occupational, administrative or legal problems associated with the case, and an analysis of the aeromedical implications of this particular case history.
C. Consultation from a psychiatrist or psychologist. All treatment notes from the treating mental health professional as well as an MEB-type narrative summary of the mental health record are required.
D. Report of all psychological testing, if performed.
E. Letter of support from the aviator's supervisor.

The AMS for waiver renewal should include the following:
A. Interval history
B. Treatment – current therapy for the condition, if any.
C. Consultation from psychiatry/psychology if accomplished since the last waiver request.

ICD-9 codes for somatic symptom and related disorders	
300.11	Conversion disorder
300.7	Hypochondriasis
300.81	Somatization disorder
300.82	Undifferentiated somatoform disorder
300.16	Factitious disorder with predominantly psychological signs and symptoms
300.19	Other and unspecified factitious illness
301.51	Chronic factitious illness with physical symptoms
307.89	Other pain disorders related to psychological factors
V65.2	Person feigning illness

ICD-10 codes for somatic symptom and related disorders	
F44.4	Conversion disorder with motor symptoms or deficit
F44.6	Conversion disorder with sensory symptoms or deficit
F45.21	Hypochondriasis
F45.0	Somatization disorder
F45.1	Undifferentiated somatoform disorder
F68.11	Factitious disorder with predominantly psychological signs and symptoms
F68.8	Other specified disorders of adult personality behavior
F68.12	Factitious disorder with predominantly physical signs and symptoms
F45.42	Pain disorder with related psychological factors
Z76.5	Malingerer (conscious simulation)

V. References.

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11. AFI 48-123, 5 Nov 2013.

12. DoD Instruction 1332.38, 14 Nov 1996.

13. Medical Standards Directory (MSD), 6 FEB 2014.

14. UCMJ art. 115 (2002).

WAIVER GUIDE
Updated: Aug 2015
Supersedes Waiver Guide of Nov 2011
By: Col Elizabeth Anderson-Doze (RAM 16) and Dr Van Syoc
Reviewed by LtCol Joseph Gower, AF/SG consultant for Orthopedic Surgery

CONDITION:
Spinal Curvature, Abnormal (Kyphosis, Scoliosis, and Lordosis) (Aug 15)

I. Overview.

Abnormal spinal curvature includes kyphosis (increased convexity of the thoracic spine), scoliosis (lateral/rotational curvature of the spine) which is further divided into region of spine, e.g. thoracic or lumbar, and lordosis (anterior concavity in cervical and lumbar spine). Scoliosis is defined as a spinal curvature of three dimensions, exceeding 10º on a plain AP x-ray film. This is determined by using Cobb's method which is a measurement of angle deviation calculated by taking the two most markedly tilted vertebral bodies (or end vertebrae) and comparing them to the horizontal.[1] The prevalence of scoliosis is ranges from 9% to 13% among individuals over the age of 40 and is dependent on such variables as age, race and BMI.[2, 3] The prevalence among children up to the age of 15 is 1% to 2% and then increases from 8% in adults older than 25 to as high as 68% in those age 60 to 90 years. With increasing age from infancy the prevalence among girls for scoliosis also increases. By the time puberty is reached the ratio of girls to boys, particularly with curvatures of greater than 30º is 10:1.[1, 4]

Scoliosis itself may be further classified as idiopathic (when no definite cause can be determined), congenital (vertebral malformation), neuromuscular from muscular imbalance, secondary to trauma or tumor.[1, 4] Sub-categories of idiopathic scoliosis include infantile, juvenile or adolescent which may progress to adult scoliosis. Another form of adult scoliosis is known as de novo due to degenerative changes of the spine. De novo scoliosis is thought to be the main reason for the dramatic rise in the prevalence of this disease in individuals over the age of 60 years.[1] There appears to be a genetic component to the development of idiopathic scoliosis.[1, 5]

In adolescents with a Cobb angle less than or equal to 20°, the likelihood of progression is between 10 and 20%. In adolescents with immature bone status and a Cobb angle exceeding 20°, the likelihood of progression may exceed 70%.[1] The highest rate of scoliosis progression appears to be the 50-75° category, where about 30° of progression was noted in 40-year follow-up.[1, 6] This finding is consistent with reported curve progression of adult idiopathic scoliosis approximating 10° per decade and stature reduction of about 1.5 cm per decade. Scoliosis of less than 30º is considered stable in individuals who have stopped growing but if the angle measures greater than 30º it can be expected to progress at a rate of about 1º per year.[4] Advancing age has been associated with increasing rigidity, increasing likelihood of pain, and reduced pulmonary function.[7] While back pain is the most frequent problem of adult scoliosis, there is no clear evidence that the incidence of back pain in scoliosis patients exceeds age-matched controls.[4, 8, 9, 10] Severe scoliosis (>100°) has been associated with reduced vital capacity which could produce lower arterial oxygen content, predisposing to pulmonary hypertension or cor pulmonale.[4, 7]

Non-surgical treatment options include basic conservative measures (physical therapy, core strengthening, stretching etc) and, in adolescents, bracing may be indicated for certain scoliotic curves. Current recommendations for bracing in the adolescent population are initiation of bracing before termination of bone growth for Cobb angles between 30° and 45°and for Cobb angles between 20° and 30° that progresses by more than 5° in 6 months. For Cobb angles exceeding 45° in adolescent patients, surgical correction and stabilization of the affected spine segment is recommended.[1] Surgical options employ current techniques of instrumented anterior, posterior or combined spinal fusions. All treatment options are designed to stop progression of the curvature and improve the deformity, thereby promoting better sagittal and coronal balance as well as potentially improving pre-operative back and/or leg pain. Treatment is usually considered during adolescence when curve progression is more likely due to skeletal immaturity (growth remaining). In adulthood, surgical indications include sagittal and coronal imbalance, progression of the deformity, instability, radicular and/or neurogenic claudication symptoms and occasionally chronic pain.

Biomechanics of spinal curvature may predispose to an increased risk of spine fracture or other injuries during high-G exposures such as those associated with the use of ejection seats or hard landings in rotary wing aircraft.[11] Vertebral fractures frequently occur at loads exceeding the set ejection seat exposure limit of 20G, but can occur with forces as low as 10-12Gs when the spine is not entirely vertical.[11] The upper body center of gravity lies anterior to the spine and increasing kyphoscoliosis shifts the center of gravity further forward or out of vertical alignment. This deviation increases the potential for flexion compression fracture.[12] Historically, entrance exam restrictions for aircrew previously proposed have ranged from a thoracic scoliosis curve maximum of 10° in 1971, to the USAF standard of 20°, which increased to 25° in 1993.[13, 14, 15]

Clinical suspicion of abnormal spinal curvature should be evaluated with plain film (AP and lateral standing 3-foot scoliosis series) radiographs to document thoracic kyphosis, lordosis, and thoracic and/or lumbar scoliosis curves by the Cobb method.[13] Referral to orthopedic specialist is indicated if any of the following criteria are present: 1) Cobb measurements exceed 20° for the lumbar curve, 25° for the thoracic curve, and/or 55° for thoracic kyphosis or lordosis; 2) the patient has excessive back pain uncontrollable with conservative measures; 3) any neurologic abnormality noted. Since kyphoscoliosis-related pulmonary hypertension or cor pulmonale is unlikely to occur with scoliosis curves <100° (well above the maximum acceptable limits for military entrance, military continuation, or aircrew standards), ECG or cardiology consultation will not likely be required in these populations.[4, 16]

II. Aeromedical Concerns.

Primary aeromedical concerns relative to kyphosis, scoliosis and lordosis involve the increased risk of fracture or other spinal injuries with increasing deviation of the spinal axis from the vertical position. Additional risks of sudden incapacitation, critically distracting symptoms, or functional limitations during flight may accompany clinically significant or progressive spinal curvatures. Finally, physical exam cannot accurately establish severity of curvature – spinal asymmetry needs radiologic curve measurement with the Cobb method.

III. Waiver Considerations.

For flying class (FC) I/IA, II and III, lumbar scoliosis >20°, thoracic scoliosis >25° and kyphosis or lordosis >55° (Kyphosis/lordosis exceeding 55^{o} requires an MEB) by Cobb method and any abnormal curvature producing noticeable deformity when dressed, pain, interference with function, or which is progressive is disqualifying. For ATC/GBC or MOD, scoliosis exceeding 30° lumbar or thoracic, and kyphosis/lordosis exceeding 55°, or spinal deviation interfering with function, vocation or wear of the uniform is also disqualifying, as it is for retention.

Table 1: Waiver potential for flying class and degree of scoliosis, kyphosis and lordosis.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority+
I/IA	Lumbar scoliosis >20°, thoracic scoliosis >25°, kyphosis or lordosis >55° or any abnormal curvature producing noticeable deformity when dressed, pain, interference with function, or which is progressive.	No AETC
II	Lumbar scoliosis >20° and <30° or thoracic scoliosis >25° and <45° and asymptomatic	Yes# MAJCOM
	Lumbar scoliosis ≥30°, thoracic scoliosis ≥45°, kyphosis or lordosis >55° and asymptomatic.	Yes, IIB# AFMSA
	Any abnormal curvature producing noticeable deformity when dressed, pain, interference with function, or which is progressive.	No+ MAJCOM
III	Lumbar scoliosis >20° and <30° or thoracic scoliosis >25° and <45° and asymptomatic	Yes# MAJCOM
	Lumbar scoliosis ≥30°, thoracic scoliosis ≥45°, kyphosis or lordosis >55° and asymptomatic.	Yes, limited to non-ejection aircraft# AFMSA
	Any abnormal curvature producing noticeable deformity when dressed, pain, interference with function, or which is progressive.	No MAJCOM

No waiver for untrained FC II and FC III.
+ If MEB required, waiver authority is AFMSA.

Review of AIMWTS through Jul 2015 revealed 160 submitted waivers for abnormal spinal curvature. Breakdown of the cases revealed: 30 FC I/IA cases (18 disqualified), 29 FC II cases, 96 FC III (27 disqualified), 3 MOD cases, and 2 ATC/GBC cases. All disqualified waivers were of untrained assets except for one. The most common abnormality was for a Cobb angle measurement exceeding allowed limits.

IV. Information Required for Waiver Submission.

The aeromedical summary for initial waiver should include the following:
A. History – age when deformity first noticed, who discovered, symptoms, treatment.
B. Physical – gait, range of motion, motor and sensory testing of lower extremity, reflexes.
C. X-ray results of the spine by the Cobb method.
D. Orthopedic consult.
E. MEB/RILO is required if abnormal spinal curvature is interfering with function or causing unmilitary appearance.

The aeromedical summary for waiver renewal should include the following:
A. History – symptoms, activity level.
B. Physical – gait, range of motion, motor and sensory testing of lower extremity, reflexes.
C. Orthopedic consult – if evidence of progression or symptoms.
D. X-ray results – if symptoms (back pain, neurologic, etc) develop.

ICD-9 codes for abnormal spinal curvature	
737.20	Lordosis (acquired) postural
737.29	Other Lordosis acquired
737.30	Scoliosis (& Kyphoscoliosis)
737.34	Thoracogenic scoliosis
737.39	Other Kyphoscoliosis & scoliosis
737.42	Lordosis associated with other conditions
737.43	Scoliosis associated with other conditions

ICD-10 codes for abnormal spinal curvature	
M40.40	Postural lordosis, site unspecified
M40.50	Lordosis, unspecified, site unspecified
M41.9	Scoliosis, unspecified
M41.30	Thoracogenic scoliosis, site unspecified
M41.80	Other forms of scoliosis, site unspecified
M41.50	Other secondary scoliosis, site unspecified

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WAIVER GUIDE
Updated: Mar 2016
Supersedes Waiver Guide of Feb 2013
By: LtCol Paul DeFlorio (RAM 17) and Dr. Dan Van Syoc
Reviewed by: LtCol Joseph Gower, AF/SG consultant for Orthopedic Surgery

CONDITION:
Spinal Fracture (Mar 16)

I. Overview.

In the aviator population, spinal fractures are almost always a result of trauma, as pathologic fractures are rare in this cohort. Similarly, osteoporosis is uncommon in military fliers, and is not considered in this waiver guide. There are a wide variety of injury mechanisms, fracture patterns, neurologic deficits, and treatment modalities associated with trauma to the spinal column, but waiver considerations center around the patient's recovery and functional status.

Injuries to the cervical spine can occur from a blow to the head, or from rapid head deceleration. Fracture patterns depend on the vertebral alignment at the time of injury, the force vector, and the patient's physical characteristics.[1] Many upper cervical spine injuries are severe and/or lethal.[2] Spinous process fractures tend to be stable and are seen with direct trauma and after motor vehicle accidents involving sudden deceleration resulting in forced neck flexion.[3] Unless there is evidence of spinal cord injury or instability, most cervical fractures can be managed in a closed fashion.[2]

In the thoracic and lumbar spine, wedge or anterior compression fractures are by far the most common, accounting for 50-70% of all fractures.[3] Burst fractures are the second most common, and are far worse. Spinal cord injury from retropulsion of bony fragments into the spinal cord can occur.[4] These fractures can be complicated by ligamentous instability and disc injury.[5] Fractures to the lower lumbar spine can be more problematic due the anatomic complexity of that area and to the increased normal mobility of the lumbosacral junction.[5]

Aviation-unique injuries, while comparatively rare, are most often associated with aircraft ejection, helicopter hard landings, and parachuting accidents.[6] Ejection frequently results in spinal injury, most commonly anterior wedge compression fractures around the thoracolumbar junction. A review of rates of post-ejection compression fractures from various air forces ranged from 6-29.4%. A 2014 Serbian study reported a post-ejection fracture rate of 9.6%,[7] while a same-year French paper found a rate of 42%.[8] Many of these fractures are subtle and may not be detected on plain films, so the RAFhas now mandated that pilots undergo MRI of their entire spine post-ejection.[9]

Management of spinal fractures is based on type and location of injury, number of vertebrae involved, and the presence of disc injury, neurologic compromise, or disability. For stable injuries, many spine experts advocate non-operative treatment. Most compression fractures, for example, do not require fixation or fusion, while decompression and spinal fusion is recommended for unstable fractures. One study of US Army aviators found no correlation between type of treatment and disqualification from aviation duties.[10]

Vertebroplasty (VP) and balloon kyphoplasty (BKP) are procedures designed for the treatment of painful vertebral compression fractures, particularly in patients with osteoporosis.[11] Vertebroplasty

is the injection of bone cement into a vertebral body and kyphoplasty is the placement of a balloon into the vertebral body, followed by an inflation/deflation sequence to create a cavity prior to cement injection. While these procedures are promising, large meta-analyses are difficult to apply to an aviator population. One review comparing VP to BKP had an average age in the 70's, with the majority of patients presumably suffering from osteoporosis.[12]

II. Aeromedical Concerns.

Even after healing, ejection or high Gz loading may predispose to repeat fracture and, more ominously, spinal cord damage. Limited mobility after cervical fracture healing, fusion, or fixation can limit lookout from the cockpit and performance under Gz loading while the neck is turned. Thoracolumbar fractures can also limit mobility or distract due to pain, but are generally not as limiting for aviation duties. A fully healed uncomplicated spinal fracture should tolerate the traumatic forces in military parachuting.

III. Waiver Considerations.

Fractures or dislocations of the vertebrae are disqualifying for US Air Force FCI, II and III aircrew, with the exception of transverse processes fractures, which are not disqualifying if asymptomatic. Fractures or dislocations of the vertebrae are not disqualifying for RPA Pilots, ATC/GBC or MOD personnel. For waiver consideration, patients must be asymptomatic, have a normal musculoskeletal and neurological exam, and be cleared by the treating surgeon.

Aviators with medically treated compression fractures of any level tend to do well. If the compression is less than or equal to 25%, an unrestricted waiver is appropriate. For greater than 25% compression, pilots and navigators may be considered for categorical FCIIB waiver; FCI/IA applicants will not be considered for a waiver. If, after adequate healing time, the compression fracture is associated with chronic pain, decreased mobility, neurological injury, or other medical disease, disqualification may be appropriate. If it results in chronic back or neck pain, which requires ongoing duty or deployment restrictions for over a year, or ongoing specialist follow-up more than annually, or frequent duty absences, or chronic/recurrent use of narcotics, then an MEB is required.

Similarly, surgically treated compression fractures normally heal well and are usually granted a categorical waiver. Thoracolumbar compression fractures treated with BKP may be considered for unrestricted waiver after six months if not due to osteoporosis.

While burst fractures are at a higher risk of neurological injury, those that are managed nonoperatively can be medically managed as a compression fracture and may be waived. However, return to flight duty is not appropriate if, after adequate healing time, significant deficits persist. Waived burst fractures should have annual films with the interim evaluation to ensure no progression of kyphosis until they are demonstrated to be stable.

Ejection/high Gz waiver limitation is based on severity of fracture, time since injury, treatment, and functional status of the aviator. Waivers should be submitted after clearance from the treating orthopedic surgeon or neurosurgeon, but not before six months of healing time.
Parachutists who have fully healed from an uncomplicated and non-surgical spinal fracture should not be restricted after one year of recovery.

If the fracture is associated with a herniated nucleus pulposus, review the waiver guide for Herniated Nucleus Pulposus and Spinal Fusion, and then apply the more restrictive waiver criteria.

Table 1. Waiver potential for Spinal Fractures

Fracture Pattern & Level	Flying Class	Waiver Potential Waiver Authority	Waiting Period	Required Studies
Compression* # Cervical and Thoracolumbar >25% of vertebral body height	FC I	No AETC	N/A	
	FC II/IIB	Yes AFMSA	3 months	Dynamic x-rays
	FC III	Yes MAJCOM	3 months	Dynamic x-rays
	Parachute+	Yes MAJCOM	1 year	Dynamic x-rays
	GBC**	Yes AFMSA	3 months	Dynamic x-rays
	MOD	Yes AFMSA	3 months	Dynamic x-rays
Burst Cervical or Thoracolumbar	FC I	No AETC	N/A	
	FC II	Yes AFMSA (ACS)	6 months	Plain Film and CT if indicated
	FC IIB	Yes AFMSA	6 months	Plain Film and CT if indicated
	FC III	Yes MAJCOM	6 months	Plain Film and CT if indicated
	Parachute+	Yes MAJCOM	1 year	Plain Film and CT if indicated
	GBC**	Yes AFMSA	6 months	Plain Film and CT if indicated
	MOD**	Yes AFMSA	6 months	Plain Film and CT if indicated

* Compression fracture implies not surgically treated; <25% may not require a restricted waiver, and >25% needs a FC IIB waiver.

** Not disqualifying unless it leads to chronic neck or back pain requiring ongoing duty or deployment restrictions for over a year, or ongoing specialist follow-up for more than annually, or frequent duty absences, or chronic/recurrent use of narcotics.
# Thoracolumbar compression fractures treated with BKP may be considered for unrestricted waiver at the six-month point.
+ Any spinal fracture requiring hardware in a parachutist is disqualifying for continued parachute duties.

Review of AIMWTS through Mar 2016 revealed a total of 363 cases submitted with a diagnosis of spinal fracture. Of this total, 45 were FC I/IA (14 disqualified), 154 were FC II (14 disqualified), 154 were FC III (32 disqualified), 8 were ATC/GBC (3 disqualified), and 2 were MOD (0 disqualified).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. Full orthopedic/neurosurgical evaluation is required and should include being released to full unrestricted activity. Documentation of normal spinal and neurologic exam is required. Spinal exam includes inspection for deformity, percussion for pain, range of motion (flexion, extension, bending, twisting), and strength testing. The aviator should not have a duty-limiting condition secondary to the spinal injury.

The AMS for <u>initial waiver</u> should include the following:
A. History of injury, immediate exam results, and treatment.
B. All imaging results as outlined in Table 1.
C. Consult from orthopedic surgery or neurosurgery with specific activity recommendation.
D. Current activity level.
E. MEB reports, if applicable.

The AMS for <u>waiver renewal</u> should include the following:
A. History of injury and interim history.
B. All imaging results since last waiver, if performed. All burst fractures require annual films until stability is demonstrated.
C. Updated orthopedic surgery or neurosurgery report, if indicated.

ICD-9 Codes for Spinal Fractures	
805	Fracture of vertebra without mention of cord injury
806	Fracture of vertebra with spinal cord injury

ICD-10 Codes for Spinal Fractures	
S12.0 – S12.9	Fracture cervical vertebra
S22.0	Fracture of thoracic vertebra
S32	Fracture of the lumbar spine

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WAIVER GUIDE
Updated: Aug 2014
Supersedes Waiver Guide of Jun 2010
By: Lt Col David Andrus (RAM XV) and Dr. Dan Van Syoc
Reviewed by LtCol Thomas Stamp, AF/SG consultant for General Surgery and LtCol Roger Wood, AF/SG consultant for Hematology/Oncology

CONDITION:
Splenectomy (Aug 14)

I. Overview.

Splenic Function

The spleen is the body's largest lymphoid organ and processes six percent of the cardiac output. The macrophage-lined sinuses of the red pulp function as filters for senescent and abnormal red blood cells and the repair or polishing of normal red blood cells. The filtering function prevents intravascular hemolysis and release of hemoglobin into the plasma. Circulating hemoglobin due to intravascular hemolysis is also filtered by splenic macrophages. Splenic macrophages process hemoglobin and iron and serve as a store for iron. The white pulp of the spleen consists of germinal centers similar to lymph nodes, but the macrophages are uniquely designed to recognize, trap and process carbohydrate antigens found on blood-borne pathogens without surface opsonins. In addition, the spleen is the major producer of antigen-specific IgM antibody which is important in the early response to infection.[1] The spleen also serves as a large reservoir for platelets, containing up to 30% of the platelet volume. Absence of these important blood and immune monitoring functions places asplenic individuals at risk for life-long infectious and thrombotic complications.[2]

Indications for Splenectomy

Approximately 22,000 total splenectomies are performed annually in the U.S.[3] Common reasons for splenectomy include trauma, hematologic disorders and malignancy. Appreciation for the immunologic and blood monitoring functions of the spleen has resulted in a trend toward splenic preservation in both trauma and hematologic disorders.[4] Up to 70-90% of children and 40-50% of adults with splenic injury are successfully managed non-operatively.[5] Less common conditions requiring splenectomy include splenic cysts due to parasites (hydatid disease) and splenic abscess.

Hematologic disorders

The following hematologic conditions have commonly led to splenomegaly and/or hypersplenism and a potential splenectomy: idiopathic thrombocytopenic purpura (ITP), thrombotic thrombocytopenic purpura (TTP), idiopathic autoimmune hemolytic anemia (AIHA), hereditary spherocytosis, hemoglobinopathies such as sickle cell disease and thalassemia, myelofibrosis and myeloid metaplasia, and myeloproliferative disorders such as polycythemia vera and essential thrombocythemia. The last category of patients is considered high risk for thrombotic complications (see Vascular Complications below).[5, 6]

Malignancy

The malignancies which commonly lead to splenectomy include Hodgkin's disease, non-Hodgkin's lymphoma, chronic myelogenous leukemia, chronic lymphocytic leukemia and pancreatic cancer. The latter is the most common malignancy resulting in splenectomy.[5] There are also epidemiologic studies which show an association between splenectomy and an increased risk of developing cancer.[3]

Complications of Splenectomy

Acute complications occur in the initial postoperative period and include hemorrhage, subphrenic abscess, pancreatic injury or fistula, and portal or mesenteric vein thrombosis. Late complications include overwhelming postsplenectomy sepsis (OPSS) and thrombosis. Other alterations in blood content and viscosity can also occur and include leukocytosis, thrombocytosis, increased lipid levels, intravascular hemolysis and endothelial dysfunction. The full effect these vascular changes on late vascular complications has not been completely studied or measured.

Overwhelming Post Splenectomy Sepsis (OPSS)

The absence of the specialized phagocytic immune functions of the spleen places asplenic patients at risk for infection and overwhelming sepsis. The most serious and most common pathogen is *S. pneumonia* which accounts for over half all infections and deaths. Other bacterial pathogens include *H. influenza*, *N. meningitides*, along with the less common bacteria *Capnocytophagia canimorsus* (dog and cat saliva) and *Bordetella homesii*. Severe forms of parasitic infections with malaria and babesiosis, ehrlichiosis and cytomegalovirus have also been documented. OPSS presents with fever and a short prodrome that rapidly progresses to septic shock and diffuse intravascular coagulation. Mortality can be as high as 50-80% and occur within 48 hours of hospital admission.[7, 8]

The risk for OPSS applies to all asplenic patients and extends through their lifetime. The risk is higher in children because they lack pre-existing immunity and is estimated at one per 175 patient-years. The risk for adults is highest in the first two years following splenectomy and is estimated at one per 400-500 patient-years.[7] Risk for OPSS also varies by underlying disorder and the reason for splenectomy. Cumulative risk for OPSS after traumatic splenectomy is the lowest at 1.5%; hematologic disorders are next at 3.4% and sickle cell disease and thalassemia are the highest at 15% and 25%, respectively.[1]

The risk for OPSS can be decreased by a three tiered approach of vaccination, prophylactic antibiotics and education.[8, 9] Vaccinations should be given for pneumococcus, *H. influenza* type b, meningococcus, and annual viral influenza. Booster is recommended for pneumococcal vaccine after five years. Meningococcal booster with the conjugate vaccine is recommended if the polysaccharide vaccine was received 3-5 years in the past. Vaccinations should be given at least fourteen days before surgery or fourteen days after surgery when not elective.[10]

Prophylactic antibiotics are given in a daily regimen or empirically for fever. A daily regimen of oral penicillin VK or amoxicillin is recommended for children until age 5 or at least one year following splenectomy. Daily regimens are not recommended in adults except for those who have experienced OPSS as the risk for recurrence is increased six-fold as well as highly immunocompromised adults. Empiric antibiotic therapy for fever is recommended for all asplenic patients. Adult patients should have at least one dose of an anti-pneumococcal antibiotic immediately available if fever and rigors develop and proceed for emergency care without delay. Antibiotic recommendations include amoxicillin-clavulanate (875 mg BID), cefuroxime axetil (500 mg BID), levofloxacin (750 mg QD), moxifloxicin (400 mg) or gemifloxicin (320 mg QD). Prophylactic antibiotics have been shown to decrease the incidence of infection by 47% and the mortality by 88%.[7, 10]

Education is the third arm of OPSS prevention. Studies have shown an alarming lack of unawareness among asplenic patients marked by failure to comply with vaccine and antibiotic recommendations. Patients should be counseled before and after splenectomy and be encouraged to wear a medical alert bracelet. Registries for asplenic patients may increase compliance and improve outcomes.[8, 9]

Vascular Complications

Over the past 30 years, the medical literature has steadily accumulated evidence of a life-long increased risk of vascular complications after splenectomy. Vascular complications include thrombosis, thromboembolism, vascular smooth muscle remodeling, vasospasm or atherosclerosis and occur on the arterial and venous sides of the circulation. The risk appears to vary by cause for splenectomy and underlying disease states, but none are without increased risk. The highest risk is in those with underlying myeloproliferative disorders or in hematologic disorders with on-going intravascular hemolysis. Venous thromboembolism appears to be more common than arterial. Currently, there are no clear guidelines for prophylactic anti-platelet or anticoagulation medications in splenectomized patients.[3]

The pathophysiologic mechanisms for vascular complications are multifactorial and include hypercoagulability, platelet activation, endothelial activation, vascular remodeling, and increased lipid levels.[3] Reactive thrombocytosis may occur in up to 75% of splenectomized patients but is not consistently associated with thrombosis.[11-13] Chronic platelet activation is more likely and has been shown to be increased in splenectomized patients with pulmonary hypertension.[14] Hypercoagulability may also be related to increased cellular microparticles and damaged red blood cells that activate the vascular endothelium.[3, 15] In addition, plasma levels of hemoglobin may be increased due to intravascular hemolysis and loss of splenic hemoglobin uptake. Increased free hemoglobin has direct inflammatory and cytotoxic effects on endothelium and scavenges nitric oxide needed for vascular smooth muscle relaxation.[4, 16] Finally, splenectomy may increase lipid levels as evidenced by animal studies.[17]

Venous thromboembolism (VTE)

Portal and mesenteric vein thrombosis most commonly occurs within the first few weeks after splenectomy. The incidence may be as high as 50%, but symptomatic thrombosis occurs in approximately 5-10% of cases.[12, 18] Predisposing factors include thrombocytosis (platelet count > 650 x 10^3/µl), greater spleen weight, myeloproliferative disease and possibly laparoscopic technique.[10, 18] Most patients respond to systemic anticoagulation with recannulation in 90% (18), but death can occur in 5% of cases.[11] Survivors are at risk for portal hypertension.[12] Prophylactic postoperative anticoagulation should be considered in patients with hematologic disorders, but intensity and duration has not been determined.[19]

Late venous thromboembolic events include deep venous thrombosis and pulmonary embolus. In two mortality studies, splenectomized patients for all reasons had increased mortality due to venous thromboembolic events (VTE). In 1996 Linet et al reported a rate of 0.31% (4/1297) and Standardized Mortality Ratios of 4.8 (1.3-12.3) in trauma patients who died more than one year after the splenectomy.[20] In 1989 Pimpl et al reported an increased mortality related to pulmonary embolus in 35.6% of splenectomized patients compared to 9.7% of controls ($p<0.001$).[21] In 2008 Schilling et al demonstrated an increased lifetime risk of venous thromboembolic events (VTE) in splenectomized HS patients as compared to unaffected controls and spleen-in HS patients (see Table 1). The incidence did not increase above controls until after 30 years of age, then increased

incrementally: 3-6% at age 30, 5-7% at age 40, 10-13% at age 50 and 19-20% at age 70.[22] Lastly, in 2005 Jaïs et al reported that 54% of splenectomized patients with pulmonary hypertension had a history of VTE at least one year after splenectomy.[13]

Arteriothrombosis

The first suggestion of increased arterial thrombotic complications was reported by Robinette and Fraumeni in 1977 who evaluated the causes of mortality in WWII veterans following traumatic splenectomy.[23] They reported an excess mortality due to ischemic heart disease compared to controls (RR 1.857, $p<0.05$). Schilling confirmed this increased risk in splenectomized HS patients in 1997 and 2008.[24] By age 70, the cumulative incidence of first arterial events (MI, stroke, coronary artery surgery, carotid artery surgery) was 32% in males and 22% in females with a hazard ratio of 7.15 (2.81-17.2, $p<0.0001$). The incidence rate did not increase above controls until after 50 years of age. Other reported arterial events in this population included acute ischemic optic neuropathy and pulmonary hypertension.[22] Linet also showed an association of older age with increased cerebrovascular events (3.7%, SMR 1.7).[20] ITP patients treated with splenectomy were found to have increased platelet activation associated with accelerated small vessel cerebrovascular disease and vascular dementia.[25]

Pulmonary hypertension

The most compelling evidence for thrombotic complications after splenectomy is the association of splenectomy with pulmonary hypertension. Splenectomy is now considered an independent risk factor for the development of chronic thromboembolic pulmonary hypertension (CTEPH).[24] Although splenectomy has been associated with CTEPH, the incidence of CTEPH after splenectomy for all causes has not been determined by prospective studies. A case-control study by Jaïs showed that CTEPH developed in a mean of 16 years after splenectomy (range 3-35 years) and another study by Hoeper showed a range of 4 to 34 years after splenectomy. CTEPH developed in patients for all causes of splenectomy. The series by Jaïs included a majority of trauma splenectomies (12/22) with a mean age of 34 years at the time of surgery. Other causes of splenectomy included ITP and HS. Selective series in thalassemia and Gaucher's disease have also showed an association of splenectomy with pulmonary hypertension. Lastly, splenectomized patients who develop CTEPH have higher surgical mortality, persistent pulmonary hypertension, and show recurrent disease after transplantation.[13, 26, 27]

II. Aeromedical Concerns.

Aeromedical concerns stem from the underlying condition for which the splenectomy was performed and the lifelong risk of overwhelming sepsis and vascular complications. Aeromedical concerns of the underlying medical conditions are discussed in the appropriate waiver guide for that particular condition. The lifelong risk of overwhelming sepsis and vascular complications apply to all splenectomized patients regardless of cause.

OPSS can present acutely and progress rapidly even within a few hours of onset which may result in incapacitation or the need to divert the flight. The splenectomized aviator should not delay treatment with antibiotics and care in an appropriate medical facility. Aviators should carry at least one dose of prophylactic antibiotics to take if symptoms occur while in flight. The incidence of OPSS ranges from 1.5% for trauma splenectomies to 25% in hematologic disorders and is highest in the first three years after splenectomy. Vaccination, antibiotics and education is imperative to reduce the risk of OPSS in aviators to acceptably low levels.

The aeromedical impact of the lifelong risk of vascular complications is more difficult to determine not only because the risk has not been well-defined but also because there are no clear recommendations for anti-platelet or anticoagulation prophylaxis. Any venous or arterial thromboembolic event could result in sudden incapacitation such as deep venous thrombosis and pulmonary embolus (DVT/PE). Restricted movement in the cockpit on long flights could increase the risk of developing DVT/PE. The incidence of venous thromboembolic events is greatest in the early postoperative period and remains below 10% for several years but appears to increase as the patient gets older. The incidence of arterial events appears to increase after 50 years of age.[22]

Splenectomy has been strongly associated with pulmonary hypertension. Unfortunately, the overall incidence of pulmonary hypertension in splenectomized patients has not been reported, but is likely very low. It can develop as early as two years or as late as 34 years after splenectomy and may be more frequent in those patients with a history of VTE.[13, 24] By the time of presentation, damage to the pulmonary vasculature is already extensive.[28] Common symptoms include exertional dyspnea, fatigue, weakness, anginal chest pain and syncope. These symptoms are due to impaired oxygen transport and reduced cardiac output which is not compatible with aviation duties. In addition, hypoxia as may be present in the aviation environment is a potent stimulant of pulmonary vasoconstriction and may worsen the development of disease.[29] Pulmonary artery endarterectomy may be curative, but splenectomy patients tend to have distal disease not amenable to surgery.[27] Aviators with splenectomy should be evaluated regularly for any signs or symptoms of pulmonary hypertension and have further testing if pulmonary hypertension is suspected.

III. Waiver Consideration.

A history of splenectomy for any cause is disqualifying for FC I/II/III and ATC/GBC, and requires a waiver. Splenectomy is not disqualifying for MOD duties. Issuance of a waiver requiring renewal insures that aviators are properly educated, vaccinated and receive prophylactic antibiotics for OPSS throughout their lifetime. Flight surgeons must routinely and emphatically educate their asplenic flyers about OPSS. Creating a waiver in AIMWTS serves as a means to track these patients. This practice assists in preventing severe complications, as studies have shown that registries for splenectomy patients are effective in the prevention of OPSS.[30]

Table 1: Waiver potential for flyers status post splenectomy

Flying Class (FC)	**Condition**	**Waiver Potential[#]** **Waiver Authority**
I/IA	Splenectomy for any cause	Yes AETC
II/III ATC/GBC	Splenectomy for any cause	Yes MAJCOM
MOD	Splenectomy for any reason[*]	N/A-not disqualifying

*If the medical condition is also disqualifying, refer to the applicable AFI or waiver guide for guidance.
No indefinite waivers.

AIMWTS review in Aug 2014 revealed total of 21 waivers submitted for total splenectomy. There were 2 FC I/IA cases, 11 FC II cases, 7 FC III cases, and 1 ATC/GBC cases. The causes for splenectomy were rupture due to mononucleosis, trauma, ITP, splenomegaly, spherocytosis, MEN type 1, Hodgkin lymphoma, and splenic artery torsion. A patient with non-Hodgkin lymphoma (FCII) and a patient with malignant melanoma with splenic metastases to the spleen (FC III) were disqualified; and one member was disqualified for anthropometric reasons.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for splenectomy should include the following:
A. A complete history describing the cause of splenectomy, the age at splenectomy and response to splenectomy. The history also needs discussion of the postoperative course and must include any reports of DVT, mesenteric venous thrombosis (MVT) or proximal venous thrombosis (PVT).
B. Documentation of vaccination for pneumococcus, meningococcus, *H. influenza* and viral influenza, prescription of prophylactic antibiotics, type and dose for use in the case of fever and education about the risks of OPSS must be included.
C. Labs: CBC and lipid panel.
D. Copies of all operative reports and a statement from treating physician.

The AMS for waiver renewal for splenectomy should include the following:
A. Interval history specifically noting any changes in disease course and treatments since the last waiver submission. Included should be a complete review of systems, and specifically include any signs or symptoms of VTE or pulmonary hypertension
B. Documentation of vaccination status and booster vaccinations given, renewal prescriptions for prophylactic antibiotics and refresher education on the risks of OPSS must be included. Physical examination for VTE and pulmonary hypertension should be done.
C. Labs: CBC and lipid panel.
D. Statement of patient condition from treating physician.

ICD-9 codes for splenectomy	
41.5	Operations on bone marrow and spleen; total splenectomy
41.43	Operations on bone marrow and spleen; excision or destruction of lesion or tissue of spleen; partial splenectomy

ICD-10 codes for splenectomy	
07TP0ZZ	Resection of spleen, open approach
07TP4ZZ	Resection of spleen, percutaneous endoscopic approach
07BP0ZZ	Excision of spleen, open approach
07BP0ZZ	Excision of spleen, percutaneous approach
07BP0ZZ	Excision of spleen, percutaneous endoscopic approach

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WAIVER GUIDE
Updated: Mar 2016
Supersedes Waiver Guide of May 2012
By: Dr Dan Van Syoc
Reviewed by: LtCol Joseph Gower, AF/SG consultant for Orthopedic Surgery

CONDITION:
Spondylolysis and Spondylolisthesis (Mar 16)

I. Overview.

Spondylolysis refers to a defect in the pars interarticularis (isthmus between the superior and inferior facets) within the posterior elements of a vertebra, which enables the body of the vertebra to be displaced anteriorly. It is an acquired condition; it has never been identified in a newborn.[1] The prevalence of spondylolysis in the general population is estimated at 5%, and up to 8% in the elite athlete population.[2] Up to 6% of adults have spondylolysis, and L5 (85%-95%) is the most common site.[3] Spondylolysis can be unilateral but is often bilateral. Stress or fatigue fractures of the pars interarticularis (isthmus) can result from repetitive extension of the lower back that occurs especially with athletic activities in childhood and adolescence. The presence of spondylolysis is known to accelerate intervertebral disc and facet degeneration with age.

Spondylolisthesis is the anterior displacement (slippage) of a vertebral body in relation to the vertebral body below. A defect in the posterior elements of the vertebra (spondylolysis) enables the displacement. The degree of displacement determines the grade: low-grade (grade I – up to 25%, grade II – 26 to 50%), and high-grade (grade III - 51 to 75%, grade IV - greater than 75%). This displacement occurs primarily in the lumbar region; it is extremely rare in cervical and thoracic regions. There are five types of etiologies: dysplastic, pathologic, traumatic, degenerative, and isthmic. Dysplastic spondylolisthesis is a congenital condition that is relatively uncommon, as is pathologic spondylolisthesis. Traumatic spondylolisthesis can occur when blunt trauma is applied transversely to vertebral posterior elements other than the pars interarticularis. Degenerative spondylolisthesis, the most common cause of spondylolisthesis, is associated with degeneration of the facet joints and intervertebral discs and is rarely seen before the age of 40.[4] Degenerative spondylolisthesis is most common at L4-L5, rarely is high-grade, is roughly six times more common in females, and is more prevalent with increased age.[5] In the adult, it is rare for spondylolysis to progress to spondylolisthesis or for spondylolisthesis to progress.[6] If spondylolisthesis progresses, the risk of spinal stenosis and neuroforaminal stenosis increases, which usually causes aggravation of symptoms. One study found that progressive slipping occurred in 30% of patients after 5 to 15 years, but did not have any significant effects on clinical outcome.[4] Isthmic spondylolisthesis results from spondylolysis, and gymnasts, weight lifters, and football players are at particular risk. Isthmic spondylolisthesis is the most common type in the younger population with a peak age of onset at 20 years and a 2:1 predilection for males. A 26% incidence in first-degree relatives of patients with isthmic spondylolisthesis has been reported.[1] Isthmic spondylolisthesis is most common at L5-S1 and to a lesser extent at L4-L5.

Most people with either condition are asymptomatic.[1] For those with pain, there is no typical discernable feature in their presentation of low back pain that suggests the presence of spondylolisthesis or spondylolysis. Range of motion about the lower back is commonly restricted

due to pain and hamstring tightness is common. The diagnosis can often be aided by the finding of pain with lumbar spinous process palpation.[7] Initial treatment provided should follow acute nonspecific low back pain clinical guidelines. Spondylolisthesis and spondylolysis are conditions often discovered after x-rays are taken during the management of low back pain patients who fail to improve as anticipated. Both conditions show a significant association with low back pain in community studies, but spondylolisthesis showed a higher association in occupational populations than in community populations.[8] The classic break in the "Scotty dog's neck," seen on 45-degree oblique radiographs that represents the defect in the pars interarticularis, is diagnostic of spondylolysis. Lateral radiographs are used to diagnose spondylolisthesis.[1] A computed tomography (CT) scan can serve to validate the presence of spondylolysis if there is uncertainty on the radiographs. Neuroforaminal stenosis, disc herniation, spina bifida, and central spinal stenosis are all potential comorbidities; therefore, an MRI or CT may be useful in cases in which radicular findings are present or suspected. A bone scan, standard or single-photon emission CT (SPECT), can be helpful in determining acuity if recent trauma is reported.[2]

Treatment of flyers with spondylolisthesis and/or spondylolysis follows that for nonspecific low back pain, i.e., exercise, analgesics, and education. Hyperextension should be avoided until pain symptoms resolve. Use of a low back brace that retards lumbar lordosis for 1 to 3 months may augment treatment, particularly in cases when a new onset spondylolysis has occurred. Bracing is commonly prescribed for youth and adolescent cases. For individuals with associated foraminal stenosis, selective nerve root blocks may help. Facet blocks may be useful over the area of spondylolysis.[1] In individuals who develop neurological symptoms or who fail to improve despite conservative treatment, operative intervention should be considered.[4] Surgery is not typically indicated and is usually a final effort to resolve pain attributed to spondylolysis and/or spondylolisthesis that persists after one year of aggressive conservative management. Surgery may also be indicated if any of the above comorbidities present warrant such intervention. Grade IV spondylolisthesis warrants surgical consideration. A study of over 10,000 surgically treated cases of spondylolisthesis revealed a complication rate of 7.9% and demonstrated that the highest complication rate was in patients with high-grade disease, evidence of degenerative spondylolisthesis, and in the older patients.[9]

The clinical course for low-grade (I, II) spondylolisthesis is much different than high-grades (III, IV) in that grades I to II rarely progress while high-grade spondylolisthesis often leads to disabling back pain, neurogenic claudication, and/or nerve root impingement. The recommended treatment in athletes for grades I and II is conservative care while surgical intervention is significantly more likely with high-grade spondylolisthesis.[3, 10] For symptomatic low-grade spondylolisthesis, conservative management is successful in 75%-80% of cases. However, such management is efficacious in only about 10% of high-grade spondylolisthesis cases.[2] A 2-year outcome randomized cohort study of 304 patients with image confirmed spinal stenosis and degenerative spondylolisthesis found no significant advantage for surgery over nonsurgical care, even though reanalysis that allowed for patient crossover (non-randomized) later showed surgical benefit.[5] A 2015 study comparing surgical treatment with conservative treatment in patient with spondylolysis showed no difference in pain intensity in the lower back at final follow-up.[11] There is no long-term outcome study in athletes regarding return to sports after fusion.[3]

II. Aeromedical Concerns.

Spondylolisthesis and spondylolysis represent structural abnormalities of the lumbar spine and may be manifested by low back pain. Such pain is unlikely to cause sudden incapacitation but can cause distraction during flight operations. Additionally, it has long been hypothesized that spondylolisthesis may reduce the ability of the spine to withstand high Gz forces and as such could cause severe problems on ejection. However, in a study of 138 ejection cases with or without spinal fractures, no difference in deviations of the vertebral arc (spondylolysis and spondylolisthesis) was found, and in fact the percentage of such deviations (7%) approximated the percentage deviations in non-ejected pilots with an otherwise healthy spine (6 – 7%).[12] Furthermore, an AF Aerospace Medical Research Laboratory report on spinal column considerations for flight physical standards noted that there were no proven demonstrations in which the aggravation of spondylolisthesis was shown in the course of time.[13] These findings are not inconsistent with the theory that spondylolysis and spondylolisthesis occur and are exacerbated by, the excessive force on the pars interarticularis that is produced when the lower back is hyperextended while forced backwards.[14] This resultant force is a shearing (angulated) force rather than an axial force such as that experienced during ejection. Hence, the historical concern that spondylolysis or spondylolisthesis predisposes a flyer to severe injury in the event of an ejection appears to have been overestimated and not supported by available outcome data.

III. Waiver Consideration.

Spondylosis or spondylolisthesis that is symptomatic such that it requires repeated hospitalizations, duty restrictions, or frequent absences from duty is disqualifying for all flying classes, ATC/GBC and MOD duties, as well as for retention. Spondylolysis and spondylolisthesis are often associated with other spinal pathology (e.g. spina bifida, disc protrusion, spinal stenosis, disc disease) that is also disqualifying. If spondylolysis or spondylolisthesis is treated with surgery, please refer to the waiver guide on herniated nucleus pulposus (HNP) and spinal fusion for additional waiver considerations.

Table 1: Waiver potential for spondylolysis and/or spondylolisthesis

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	Symptomatic spondylolysis and/or Symptomatic grade I/II spondylolisthesis	Yes AETC
	Symptomatic spondylolysis and/or symptomatic spondylolisthesis, or asymptomatic spondylolisthesis grade III or higher (treated or not)	No AETC
II/RPA Pilot/III ATC/GBC MOD**	Asymptomatic spondylolysis and/or asymptomatic spondylolisthesis	Yes# MAJCOM
	Symptomatic spondylolysis and/or symptomatic spondylolisthesis controlled only with exercise or NSAIDs	Yes* MAJCOM
	Spondylolysis and/or spondylolisthesis treated with surgery	Maybe* AFMSA/MAJCOM†
	Spondylolysis or spondylolisthesis, when symptoms and associated objective findings require repeated hospitalization, duty restrictions or frequent absences from duty	Maybe AFMSA

If spondylolisthesis is grade III or greater waiver unlikely for untrained FC II and FC III individuals.
* Waiver unlikely for untrained FC II and FC III personnel.
† See HNP and spinal fusion waiver guide.
** Waiver authority for MOD personnel is AFGSC.

AIMWTS search in Jan 2016 revealed a total of 148 members with a waiver disposition for spondylolysis or spondylolisthesis. Of this total, 24 were disqualified. Breakdown of the cases revealed: 6 FC I/IA cases (3 disqualified), 77 FC II cases (5 disqualified), 58 FC III cases (14 disqualified), 5 ATC/GBC cases (2 disqualified), and 3 MOD cases (0 disqualified). The vast majority of the disqualified cases were due to vertebral concerns.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS <u>for initial waiver</u> should include the following:
A. History – Provide a history of how diagnosis was made along with a thorough back history that includes any adolescent sports injuries and vehicular accidents. If individual had past or present symptoms, document nature of pain and treatment received. State current activity level.

B. Physical – back (range of motion), extremities (range of motion, strength, sensation, and reflexes).
C. Radiological –X-ray (AP, LAT, obliques). If CT accomplished, provide results.
D. Spine/Orthopedic consult.
E. MEB result, if required.

The AMS for waiver renewal should include the following:
A. Interval history – Describe circumstances of any back pain, severity, limitations, treatment, duration of symptoms, and DNIF period; current activity level.
B. Physical – back (range of motion), extremities (range of motion, strength, sensation, and reflexes).
C. Radiological – X-ray (AP, LAT, obliques) results if recurrent symptoms.
D. Spine/Orthopedic consult – if recurrent symptoms.
E. MEB updates, if applicable.

ICD-9 Codes for Spondylolysis and Spondylolisthesis	
738.4	Acquired spondylolisthesis/spondylolysis
756.11	Spondylolysis (congenital)
756.12	Spondylolisthesis (congenital)

ICD-10 Codes for Spondylolysis and Spondylolisthesis	
M43.10	Spondylolisthesis site unspecified
M43.00	Spondylolysis, site unspecified
Q76.2	Congenital spondylolisthesis

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WAIVER GUIDE
Updated: Apr 2014
Supersedes Waiver Guide of Jul 2010
By: Dr Dan Van Syoc and Col Roger Hesselbrock, ACS Neurology Consultant

CONDITION:
Subarachnoid Hemorrhage, Non-Traumatic (Apr 14)

I. Overview.

Subarachnoid hemorrhage (SAH), which is defined as the presence of blood in the space between the arachnoid membrane and the pial covering of the brain or spinal cord, is a significant life-threatening neurological event. It results from the rupture of blood vessels on or near the surface of the brain or ventricles, usually from cerebral aneurysms or arteriovenous malformations (AVMs). These hemorrhagic strokes release blood into the cerebrospinal fluid (CSF) space with significant consequences. Morbidity may be as high as 50%.[1] The most significant neurological complications of SAH include rebleeding, vasospasm, hydrocephalus, and seizures.[2] Among those that survive, up to 30% may have significant neurologic deficits. Incidence rates of SAH may approach 16 per 100,000, with about 30,000 new cases in the United States each year (with a slight predominance in women); the peak incidence is in the sixth decade of life.[3] Risk factors include hypertension, heavy drinking, and smoking.[4] More rare causes of SAH include hematologic disorders (thrombocytopenic purpura, disseminated intravascular coagulopathy, and hemophilia), central nervous system neoplasm, and vasculitis.

The classic presentation is the acute onset of a diffuse severe headache (often noted as the "worst headache of my life") with vomiting, as well as possible loss of consciousness (for a variable period of time). Focal neurological signs, retinal hemorrhages, nuchal rigidity, photophobia, and signs of meningismus can possibly be seen as well. Diagnosis is usually made by non-contrast head CT (with a sensitivity of about 94%) which should be performed as soon as practicable. Those patients with suspected SAH with negative CT should undergo a lumbar puncture (LP) which might demonstrate xanthochromia on centrifuged CSF. The bilirubin of xanthochromia (from the breakdown of SAH-released RBCs) requires 12 hours to develop, so occult SAH patients outside of this time window will need cerebral angiography to confirm the diagnosis. Intra-arterial angiography is the gold standard to diagnose aneurysms. Timely diagnosis and localization of aneurysms can hasten surgical or endovascular intervention and prevent rebleeding.[2]

Initial management of SAH rests on the basics of circulatory, ventilation, and airway support in the intensive care setting. Transfer to a tertiary care center is recommended where endovascular, neurosurgical, and neurointensive care management can be provided.[3] Those with a Glasgow Coma Scale (GCS) < 8 should receive elective intubation to protect the airway from obstruction and aspiration pneumonia (even though spontaneous breathing is seldom compromised in SAH).[1] SAH patients are frequently volume depleted and require maintenance of euvolemia with normal saline. Hypotonic or dextrose-containing solutions could result in hyperglycemia or hyponatremia due to the release of large amounts of catecholamines and vasopressin. Up to 20% of SAH patients develop hydrocephalus, possibly within hours, due either to the acute bleed with possible intraventricular extension. This can cause either communicating hydrocephalus or obstructive hydrocephalus. Some cases require external ventricular drainage. Significant elevations of blood

pressure can be treated with alpha- or beta-receptor antagonists. Nitroglycerine and nitroprusside should be avoided as they are cerebral venodilators adversely effecting cerebral blood flow (CBF).

Cerebral vasospasm can occur in up to 75% of SAH patients. This can involve the vessels in the circle of Willis and their major branches (often different than the arteries responsible for the initial bleed) and can cause infarction distal to the location of spasm. Nimodipine is an oral calcium channel blocker that is one of the few medications found to be effective in the treatment of vasospasm. Transcranial Doppler (TCD) studies can be used to determine intracranial vascular flow (narrowed vessels in vasospasm have increased flow velocities heralding possible neurologic deterioration). In those SAH patients with vasospasm who develop symptoms of neurological deterioration, intervention is commonly initiated with hypervolemia, hypertension, and hemodilution ("triple H therapy") to enhance CBF. Vasopressor amines (dopamine, dobutamine, and phenylephrine) can be used to raise systemic blood pressure to achieve adequate CBF. Vasospasm refractory to medical treatment may be amenable to balloon angioplasty, at least in proximal vessels, though this has an attendant risk of rupture, rebleeding, and reperfusion syndrome.[2] Ischemic necrosis related to vasospasm, as well as cortical damage from bleeding into the neocortex, can result in seizure shortly after onset of SAH. Prophylactic anticonvulsants may be required. Massive release of catecholamines can result in additional non-neurologic medical conditions. This includes neurogenic pulmonary edema as well as electrocardiographic changes suggestive of acute myocardial infarction (deep inverted T-waves). Congestive heart failure may ensue. Swan-Ganz catheters and central venous pressures can be used to monitor compromised pulmonary or cardiac conditions that may compromise CBF.

Re-bleeding is a possibility in 30% of those experiencing aneurysmal SAH. An aneurysm may be amenable to corrective procedures to exclude it from the circulation or to relieve its pressure on adjacent neurological tissue. Surgical obliteration, achieved through clipping the base of the aneurysm, is the most commonly used treatment option. Alternatively, up to a third have been treated using an endovascular approach. A detachable platinum coil threaded into the aneurysm through percutaneous access and angiographic guidance is heated with electric current. This causes clotting of the blood within the aneurysm and elimination of the lesion as a site of potential re-bleeding. Timing of treatment is based on stability of the patient, more severely affected patients being treated conservatively until their status improves to a point where they may better tolerate the intervention.

Up to 15% of patients with acute SAH will have no detectable lesion (aneurysm or otherwise) on cerebral angiography. This group has a much better prognosis than patients with pathological vascular findings on angiography.[5] The most common idiopathic source of angiogram-negative SAH is perimesencephalic SAH (PM-SAH) at 68% of cases, which has a good clinical outcome with minimal risk of re-bleeding. PM-SAH has a distinct radiographic pattern of hemorrhage centered anterior to the pons and midbrain, without extension of bleeding into the region of the brainstem or into the proximal sylvian fissure, or into the suprasellar cistern.[6] The exact cause of PM-SAH has yet to be determined; it is felt to be from a venous source.[7] Good clinical outcomes have been seen in close to 100% of PM-SAH patients.[5] Such patients have neither reduced quality of life nor any risk of re-bleeding in the first years after the initial bleeding.[8] There is no excess in mortality compared to the normal population. It has been noted that perhaps no restrictions should be imposed on PM-SAH patients (whether by physicians or life/health insurance companies.

II. Aeromedical Concerns.

The high mortality rate of aneurysmal SAH (from 32-67%) indicates the severity of the diagnosis. Survivors are left with a high rate of disabling sequelae (20-30%). A quarter of survivors will have continuing neurologic deficits.[9] Memory and executive deficits are some of the better-known neuropsychological consequences among aneurysmal SAH survivors.[2] Those with aneurysmal SAH will have a 30% risk of rebleed during the first month. Thereafter, survivors will have a 2-3% annual risk of a rebleed.[9] Only a third of surviving aneurysmal SAH patients resume their previous life style and occupation. There is a 7-12% risk of seizures from aneurysmal SAH, highest during the first year post-event. There is less risk of seizures following treatment with coiling as opposed to surgical clipping.[2]

PM-SAH is a non-aneurysmal variant that has uncommon neurological complications and carries a good prognosis.[10] Though the exact etiology of PM-SAH is uncertain, there is minimal risk of re-bleeding. Therefore it is possible to consider waiver for trained assets to return to flying status. There is no waiting period requirements or any time restrictions. In contrast to this, untrained FC I/IA candidates may be considered for waiver with a history of PM-SAH if the evaluation by a neurologist or neurosurgeon is absolutely normal.

Aneurysms or other cerebrovascular malformations are not uncommonly discovered incidentally on brain MRI studies. Aeromedical concerns in these patients include impact of any residual effects of treatment on operational safety and mission effectiveness, future risk of hemorrhage, and adverse effects of flight stressors such as high +Gz exposure on treated lesions. Asymptomatic patients with cerebral aneurysms or arteriovenous malformations may be eligible for aeromedical waiver consideration after successful treatment of the vascular lesion. Venous or capillary hemangiomas are often incidentally seen on brain MRI studies; these lesions generally have no future risk for significant hemorrhagic complications, usually require no specific treatment, and may be considered for aeromedical waiver on a case-by-case basis.

III. Waiver Consideration.

The history of any SAH event is disqualifying for all classes of flying in the US Air Force, including ATC/GBC and MOD personnel. SAH is disqualifying for retention standards, therefore all active duty personnel with that condition require and initial RILO. SAH secondary to head trauma is covered in the Head Injury waiver guide. Aneurysmal SAH is generally not aeromedically waiverable due to the very high rate of associated problems and rebleed risk in the future. Incidentally-discovered intracranial aneurysms or arteriovenous malformations that are successfully corrected or obliterated without neurologic complications may be considered for aeromedical waiver on a case-by-case basis. Other incidentally-discovered cerebrovascular abnormalities may also be considered for aeromedical waiver on a case-by-case basis.

Table 1 – Waiver criteria for non-traumatic subarachnoid hemorrhage

Flying Class	Category	Waiver Potential! Waiver Authority
I/IA	Any history of SAH	Yes** AETC#
II@ III@	Aneurysmal SAH PM-SAH*	No AFMSA Yes# AFMSA
GBC/ATC@	Aneurysmal SAH PM-SAH*	No AFMSA Yes# AFMSA
MOD	Aneurysmal SAH PM-SAH*	No AFGS Yes# AFGSC

* See Section IV for requirements for waiver consideration.
** FC I/IA waiver can be considered for PM-SAH if evaluation is totally normal.
# Waiver cases will be forwarded to the ACS for review.
@ AETC is waiver authority for initial training; thereafter it is MAJCOM.
! No indefinite waivers

AIMWITS search in Feb 2014 revealed a total of 5 members with an AMS containing the diagnosis of non-traumatic subarachnoid hemorrhage; there were a total of 3 disqualifications. There was 1 FC I/IA case which was disqualified and 4 FC II cases with 2 disqualified, one for SAH and the other for depression.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for SAH should include the following:
A. Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history of the event to include any known risk factors.
C. Complete neurosurgical and/or neurological consultation.
D. All reports from any CT, MRI, angiographic imaging and EEG testing.
E. Images from radiographic studies; these may be uploaded to the USAFSAM ECG Library PACS server or CD images can be sent to ACS for review and reference.

F. Report of any neuropsychological testing performed.

The aeromedical summary for waiver renewal for SAH should include the following:
A. Pertinent interval history.
B. Neurosurgical and/or neurological consultation if indicated.
C. Any appropriate EEG, imaging, or angiographic studies (reports and radiographic images) obtained since the previous waiver submission.

ICD-9 code for SAH	
430.0	Subarachnoid hemorrhage

ICD-10 code for SAH	
I60.9	Nontraumatic subarachnoid hemorrhage, unspecified

V. References.

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WAIVER GUIDE
Updated: Jul 2013
Supercedes Waiver Guide of Jun 2009
By: LtCol Henry Klein (RAM 13) and Dr. Dan Van Syoc
Reviewed by Col Kent McDonald, Chief ACS Neuropsychiatry Branch

CONDITION:
Suicide Attempt (Jul 13)

I. Overview.

Suicide results from unendurable emotional pain with the belief that cessation of pain is the only option. Elements of despair, distress and loss of control are common.[1] Suicide attempt (parasuicide) is a somewhat different phenomenon from completed suicide; attempters report less precipitating pain and the desired outcome is more likely to be a cry for help rather than death.[2] However, the National Institute of Mental Health states empathically that most suicide attempts are expressions of extreme distress, not harmless bids for attention and that a person who appears suicidal should not be left alone and needs immediate mental-health treatment. Some suicide attempts are miscalculations of intended death by suicide. Attempters most often use medication overdose while completers more often use a weapon, carbon monoxide or hanging.[3] That being said, military and civilian psychiatrists have treated "survivors" of self-inflicted gunshot wounds to the cranium, carbon monoxide inhalations that resulted in coma, and self-hanging attempters who were discovered and rescued.

Demographic analyses of non-military populations indicate that women are three times more likely to attempt suicide than men, but men are three times more likely to complete suicide. The overall rate for suicide within the general U.S. population is 12.4 per 100,000 people and is the tenth leading cause for death. An estimated 8 to 25 attempted suicides occur per every suicide death.[3]

The increase in suicides among members of the military has raised concern among policymakers, military leaders, and the population at large. While DoD and the military services have had a number of efforts under way to deal with the increase in suicides, these rates are increasing at a record pace. During 2012, there were 179 suicides among active-duty members of the Army, 60 in the Navy, 59 in the Air Force and 48 in the Marine Corps. Throughout the U.S. military, suicides increased by nearly 16 percent from 2011 to 2012. The overall rate for officers is lower than for enlisted members.

In 1996, the Air Force implemented a population based prevention program, involving community agencies inside and outside the healthcare sector. The Air Force established an Integrated Product Team (IPT) in 1996, to evaluate the problem of suicides and recommend prevention-based strategies. The IPT recommended actions to combat AF suicides on three fronts.

First, they worked to mitigate risk factors, including legal, mental health, substance abuse, and relationship problems. Second, they worked to strengthen protective factors, such as social support, coping skills, and establishing a culture that encourages help-seeking behavior. The majority of subjects on recovery from the suicide attempt perceived that their suicide attempt could have been prevented by family members, near and dear ones and society.[4] Emphasis was placed on institutionalizing community-wide training efforts to heighten awareness of a range of risk factors

that confer vulnerability for various behavioral and physical adverse events or problems, foremost of which was suicide.

In addition, on an ongoing basis, the entire community received education about policy changes regarding the availability of resources to those in need. Finally, senior leaders in the Air Force strongly endorsed a radical change in social norms to decrease stigma around help-seeking behaviors for all members of the community, and subsequently worked to sustain these newly stated values. The product of this effort was a multi-layered intervention targeted at reducing risk factors and enhancing factors considered protective. The intervention consisted of attempting to reduce the stigma of seeking help for a mental health or psychosocial problem, enhancing understanding of mental health, and changing policies and social norms. As a result of this program and attitudinal changes, there has been an estimated 33% relative risk reduction in suicide attempts between 1996 and 2002.[5]

Contributors to suicidal ideation include distressing life circumstances, recent significant losses, a history of suicide in a family member or close associate, feelings of hopelessness or helplessness, substance abuse, or the presence of almost any psychiatric disorder.[6] The study of aviator suicide or suicide attempt is an emerging field in psychiatry and flight medicine. The Air Force has looked at this issue utilizing a number of databases. In the samples studied (USAFSAM Coversheet file-attempters for years 1970-1988, USAF Surgeon General data repository-mortality data base for years 1974-1984, USAFOSI data-suicides for years 1981-1986, USAF MPC data mortality data base/cause of death for years 1950-1986), a failed or failing intimate relationship was the prominent trigger for suicide or suicide attempt followed by administrative/legal problems, psychiatric disorder, death of a spouse and job conflicts; substance abuse, most often alcohol, was involved in 54% of the attempts and 79% of the completions. Most attempts were impulsive (77%) whereas most completions were well-planned (93%). People contemplating suicide variously signal their intentions.[6] However, since aviators are known for their use of denial, rationalization, and compartmentalization, aviator suicidal intentions may be subtle and may not be perceived by aviator colleagues who are similarly psychologically defended. Given the nature of flying high-performance aircraft, self-destructive motivation should be considered in individuals who begin or persist in flying in a reckless or dangerous manner: this may be a manifestation of subintentional or overt suicidal behavior.[7, 8]

From the current known information about aviator suicide, the incidence is small, and probably much less than most other military or civilian occupational groups. Between 1993 and 2002 there were 3648 fatal aviation accidents. The NTSB determined that sixteen were aircraft assisted suicides. All pilots involved were male with a median age of 40 years. Seven of the fourteen pilots for whom specimens were available were positive for disqualifying substances. Specifically, four pilots tested positive for alcohol while one had evidence of marijuana, one for cocaine, two for benzodiazepines and one for venlafaxine. Ten of the sixteen airmen had thought of suicide, talked of suicide, attempted suicide before and/or left a note. Additionally, 46% had experienced domestic problems, 46 % had criminal issues and 31% suffered from depression.[8, 9] Within the United States Air Force there have been zero proven suicides by aircraft in the period of 1988-2007.

II. Aeromedical Concerns.

Suicidal ideation must always be taken seriously in any airman, for the protection of the member and because of the availability of aircraft as a means of self-destruction. Not only is the individual

aviator at risk, but the safety of others in the air and on the ground must be considered, as well as the conservation of valuable national assets, and the implications of access to nuclear and other weapons.

Perhaps ultimate concern is the high performance required of military aviators for readiness and mission completion. While suicide/suicide attempt is a single act, it represents a distinct, overt behavior in a very long, debilitating process.[10] The ability, if not necessity, of aviators to deny, suppress and otherwise defend against emotional turmoil highlights the need for peers, commanders and flight surgeons to carefully monitor aircrew for the early signs of emotional conflict, despair, and intimate relationship deterioration.[11, 12]

A history of attempted suicide or suicidal behavior is disqualifying. All suicidal ideation, self-destructive actions or overt suicidal attempts by aviators require immediate DNIF action and mental health evaluation, including voluntary or involuntary hospitalization if psychiatrically indicated. Such decisions are based on many factors besides the specific diagnosis, including the patient's intent to die, the lethality of the method chosen, availability of means, the energy put into the attempt, the role of possible substance abuse, the circumstances of the rescue (i.e., found by accident vs. found after hints, phone call, presentation to ER, etc.), and the emotional support systems available to the aviator. Of great concern in aviators with suicidal ideation is the possibility of suicide by aircraft, which is rare, but has occurred in civilian and military settings.[13] Appropriate action should be taken in regard to the Personnel Reliability Program, if applicable. If the precipitating event involved acute or chronic alcohol abuse or dependence, additionally waiver will be managed IAW AFI 48-123 and AFI 44-121, *Alcohol and Drug Abuse Prevention and Treatment (ADAPT) Program*.

III. Waiver Considerations.

For aviators, a history of attempted suicide or suicidal behavior is disqualifying for all classes of flyers, to include ATC/GBC and MOD personnel.

Table 1 – Waiver potential for aviators with history of suicide attempt

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Maybe*# AETC	Maybe**
II/III ATC/GBC	Maybe*# MAJCOM	Yes**
MOD	Maybe*# AFSSC	Yes**

* Underlying condition that exacerbated suicide attempt must be treated successfully and the aviator or aviator candidate must not have a higher risk of suicidal behavior than does the general military population.
**ACS review/evaluation if requested by AETC for initial FC I/IA, FC II, FC IIU and FC III, ATC/GBC, and MOD applicants.
No indefinite waivers.

AIMWTS review in Jun 2013 revealed a total of 83 cases submitted with a diagnosis of suicide attempt/behavior/ideation. There was a disposition of disqualified in 47 of the cases. Breakdown of the cases revealed: 7 FC I/IA (4 disqualified), 8 FC II (4 disqualified), 52 FC III (30 disqualified), 10 ATC/GBC (6 disqualified), and 6 MOD, 3 (3 disqualified).

IV. Information Required for Waiver Submission.

Submitting a Mental Health Waiver Guide:

AFI 48-123 –Chapter 6 (pg. 55) and the Aeromedical Consultation Service (ACS) Waiver Guide addresses waiver evaluations

Step 1 - Is the aviator ready for waiver submission?

A. Waiver is submitted when 1) the member is asymptomatic and 2) medications/psychotherapy treatment have been completed, as applicable to diagnostic category, for the specified time-frame below (Note: psychotherapy "booster sessions", and sometimes SSRIs, are permissible and often advisable after initial symptom resolution):

- ☐ 1 Year—Psychotic Disorders & Somatoform Disorders
- ☐ 6 Months—Mood Disorders, Anxiety Disorders & Suicidal Behavior
- ☐ Discretion of Flight Surgeon—Adjustment Disorders & V-Codes requiring waiver
- ☐ For Traumatic Brain Injury cases, please refer to TBI Waiver Guide
- ☐ For aviators with any other psychiatric disorders, please refer to AFI 48-123 and ACS Waiver Guide

B. To be considered for an aeromedical waiver, any disqualifying condition must meet the following criteria per AFI 48-123 Section 6B, 6.2.1.1 through 6.2.1.6. (pg. 57-58):

- ☐ Not pose a risk of sudden incapacitation
- ☐ Pose minimal potential for subtle performance decrement, particularly with regard to the higher senses
- ☐ Be resolved, or be stable, and be expected to remain so under the stresses of the aviation environment

- ☐ If the possibility of progression or recurrence exists, the first symptoms or signs must be easily detectable and not pose a risk to the individual or the safety of others
- ☐ Cannot require exotic tests, regular invasive procedures, or frequent absences to monitor for stability or progression
- ☐ Must be compatible with the performance of sustained flying operations

Step 2 - Before beginning the Aeromedical Summary (AMS), Flight Surgeon must obtain Mental Health consultation and ensure it contains items specified below:

Instructions for the Mental Health Provider

The mental health evaluation must include a **comprehensive written report** addressing:

- ☐ Consultation must address each criteria in Step 1B
- ☐ Clinical mental health history (description of symptoms, treatment modality, frequency and compliance with treatment, relevant personal and family history, and perceived impact on occupational duties)
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…) ***** for alcohol cases, please comment on Carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, input from line leadership, if possible, and please address current state of any triggers for the mental illness)
- ☐ Current and past aviation related duties and any history of current and past occupational performance difficulties (to include perceived impact of mental health condition on performance of duties)
- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Summary and interpretation of psychological/neuropsychological testing results (recommend MMPI-2, NEO PI-R, or similar personality test). For neuropsychological cases, please contact ACS neuropsychologist (Dr. Gary Ford, DSN: 798-2704) for guidance on recommended neuropsychological tests.
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly or engage in special duty operations (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)
- ☐ Copies of all records (mental health/ADAPT/inpatient) and raw testing data should be on hand for shipment to ACS Neuropsychiatry Branch

Step 3 - Items for the Flight Surgeon to include in the AMS:

- ☐ AMS must clearly address each criteria in Step 1B and the risk to the member, mission, and safety
- ☐ Summarize Mental Health history and focus on occupational impact ***** If 2 or more months have passed since the comprehensive evaluation/report was completed, the flight surgeon should address how the member has done since and consult with the mental health provider if the member has been seen at mental health since the evaluation*****
- ☐ Medication history (dates of initial prescription and termination, reason for termination, dosage, compliance, response, clinical course since termination)
- ☐ Laboratory results (i.e., thyroid, liver function tests, drug screen, CDT, CBC, chemical profile…) ***** for alcohol cases, please comment on Carbohydrate-deficient transferrin (CDT) results*****
- ☐ Current psychosocial situation (marital and occupational, interview with spouse/supervisor, if possible - please address current state of any triggers for the mental illness)

- ☐ Habits (exercise, diet, medications, supplements, alcohol, tobacco, caffeine, energy drinks, sleep)
- ☐ Current mental status
- ☐ Diagnosis
- ☐ Motivation to fly (past and current)
- ☐ Recommendation for future psychological and medical treatment
- ☐ Prognosis (estimate of symptom recurrence, potential impact on future aviation related duties)

Step 4 - Items to complete the waiver package:

- ☐ Letter of support from command
- ☐ Comprehensive mental health written-report
- ☐ Confirm mental health has made copies of chart(s) and testing. When requested send to:

ACS Aerospace Medicine Branch, USAFSAM/FECA
c/o Neuropsychiatry Branch
2510 Fifth Street Bldg 840
Wright Patterson AFB, OH 45433-7913
Fax: (937) 904-6296 DSN: 674-9296

Please feel free to contact the ACS Neuropsychiatry Branch with questions:
TSgt Tonya Merriweather: DSN 798-2703 or Mr. John Heaton: 798-2766

Waivers are based in part on the psychiatric diagnosis of which the suicidal factors are a manifestation. Additionally, waivers are based upon the effectiveness of the remediation of the precipitating causes for the attempt, quality and duration of stability, reports from supervisors, local flight surgeon and mental health as well as ACS evaluation. However, *recurrent* suicidal ideation, actions or attempts are the basis for permanent disqualification. The aviator should receive the indicated psychiatric or psychological treatment and follow-up evaluations; in addition to the criteria for waiver mentioned above, the aviator should be symptom-free and treatment should be completed for <u>at least six months</u> before waiver will be considered.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the <u>initial waiver</u> for suicide attempt should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history to include all event chronologies leading up to the suicide attempt(s) and all subsequent care given to member. Evidence that the underlying problem precipitating the suicide attempt has resolved must be provided.
C. History, if any, of alcohol-related incidents/problems and treatment. ADAPT history if applicable must be included.
D. Exam: complete exam with emphasis on mental health portion.
E. Psychiatry consultation report.
F. MEB results if completed.

The AMS for waiver renewal for suicide attempt should include the following:
A. Interim history.
B. Updated exam.
C. Psychiatry consultation report.

ICD-9 codes for suicide attempt	
E950	Suicide attempt
300.9	Unspecified neurotic disorder

ICD-10 codes for suicide attempt	
T14.91	Suicide attempt
F48.9	Nonpsychotic mental disorder, unspecified
F99	Mental disorder, not otherwise specified

V. References.

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WAIVER GUIDE
Updated: Dec 2013
Supersedes Waiver Guide of Jan 2011
By: Maj Matt Ramage (RAM XV) and Dr Dan Van Syoc
Reviewed by Maj Eddie Davenport, ACS chief cardiologist

CONDITION:
Supraventricular Tachycardia (Dec 13)

I. Overview.

Supraventricular tachycardia (SVT) is defined as 3 or more consecutive supraventricular premature beats at a heart rate of 100 beats per minute (bpm) or faster. The term supraventricular usually refers to a narrow QRS complex (<120ms) however there are cases of delayed ventricular activation (referred to as aberrancy) that can lead to a widened QRS complex. The spectrum of SVT ranges from an asymptomatic three-beat run that is unnoticed by the individual to a sustained arrhythmia with hemodynamic symptoms or sudden cardiac death. Approximately 60% of SVTs are due to a reentry mechanism within the AV node termed an AV node reentrant tachycardia (AVNRT), while 30% of SVTs are associated with a bypass tract. The other 10% of SVTs are a variety of mechanisms, including automatic foci in the atria.[1] SVT associated with bypass tract is addressed in a separate waiver guide "Wolff-Parkinson-White (WPW) and Other Pre-Excitation Syndromes." Ablation of all SVT mechanisms is addressed in the "Radiofrequency Ablation (RFA) of Tachyarrhythmias" guide. This waiver guide addresses SVT caused by mechanisms other than bypass tracts and includes symptomatic, asymptomatic, sustained (over 30 seconds or with symptoms) and paroxysmal (intermittent with abrupt onset and offset).

In a 1992 Aeromedical Consultation Service (ACS) review of 430 military aviators evaluated for nonsustained or sustained SVT there were no deaths caused by or related to SVT. Forty-two (10%) had symptoms of hemodynamic compromise with syncope, presyncope, light-headedness, chest discomfort, dyspnea or visual changes and an additional 21 (5%) had recurrent sustained SVT without hemodynamic symptoms.[2] Palpitations are not considered to be a hemodynamic symptom. Recurrent is defined as any recurrence, i.e. more than one run of SVT. For this review, sustained SVT was defined aeromedically for the Air Force as SVT lasting greater than 10 minutes. Neither frequent PACs, PAC pairing, nor nonsustained SVT was predictive of hemodynamically symptomatic SVT or of recurrent sustained SVT.[2, 3] The study thus documented that most individuals with asymptomatic SVT remained healthy and symptom free for many years. In those with symptomatic SVT, 90% initially presented with these symptoms. The remaining 10% who later developed symptoms presented with either sustained or recurrent sustained episodes of SVT. Of the multiple factors examined, only presentation with recurrent sustained SVT, hemodynamic symptoms or WPW ECG pattern were at higher risk for future events.

Furthermore, in the above ACS review, of those initially presenting with asymptomatic nonsustained SVT, only 0.9% experienced sustained SVT during the follow-up period, none with associated hemodynamic symptoms. Of those presenting with one or more episodes of sustained SVT, recurrence of sustained SVT was 1-2% per year. Civilian population-based studies report recurrence up to 10% per year.[3]

A recent meta-analysis of the efficacy and safety of ablation for the treatment of supraventricular tachycardia shows that this is a safe and effective procedure for our aviators who truly have symptomatic episodes of SVT. There is a greater than 90% success rate with the first ablation treatment for SVT with a rate of adverse events of less than 3%.[4]

II. Aeromedical Concerns.

The aeromedical concerns associated with SVT include hemodynamic symptoms associated with any degree of sustained or nonsustained SVT, recurrent episodes of sustained SVT and associated cardiac disease.

Various antiarrhythmic medications may be used clinically to attempt suppression of SVT. Medication concerns include side effect and safety profiles of the medications, proarrhythmic effects and patient compliance in taking the medication every day. Acceptable control with medication is often not achieved with tolerable side effects, and one must accept that the arrhythmia may "break through" and recur on medication. SVT that is otherwise disqualifying would thus still be disqualifying on antiarrhythmic medication. Many antiarrhythmics have a proarrhythmic effect, meaning that they also precipitate tachyarrhythmias, usually ventricular tachyarrhythmias. Given the current high success and low complication rates of ablation, SVT that previously required suppression will now preferentially be referred for ablation.

III. Waiver Considerations.

SVT is disqualifying for all classes of flying duties and for retention in the Air Force (this covers those individuals in the ATC/GBC, and MOD programs) unless successfully ablated, and not associated with structural heart disease. For FC I/II/III any history of SVT requires a waiver. ACS evaluation may be required, depending on the aviation duty, SVT characteristics or specific concerns in an individual case. SVT associated with hemodynamic symptoms will typically not be considered for waiver, unless successful ablation has been performed. Palpitations are not considered to be a hemodynamic symptom. A single episode of asymptomatic nonsustained SVT of 3-10 beats duration will typically be recommended for indefinite waiver for all aviation classes after ACS review. For recurrent episodes of asymptomatic nonsustained SVT or a nonsustained SVT episode longer than 10-beats duration, ACS evaluation will be required, with anticipation of waiver for FC II/III. Waiver for FC I/IA and untrained FC II/III will be considered on a case-by-case basis depending primarily on characteristics of the nonsustained SVT. A single episode of sustained SVT without hemodynamic symptoms may be considered for FC II/III waiver without ablation, on a case-by-case basis. Recurrent sustained SVT is disqualifying without waiver unless successful ablation is performed. SVT treated with antiarrhythmic medication for suppression is disqualifying without waiver. Table 1 is a summary of the clinical manifestations and most common requirements for the separate flying class (FC) duties. Most cases of SVT for FC IIU, ATC/GBC, and MOD personnel will most likely be recommended for a waiver unless there is significant hemodynamic compromise.

Table 1. Summary of Supraventricular Tachycardia (SVT) and ACS Requirements.

SVT (symptoms refers to hemodynamic symptoms)	Flying Class	Waiver Potential/ Waiver Authority**	Required ACS Review and/or ACS Evaluation
Asymptomatic, single episode of 3-10 beats duration	FC I/IA/initial FC II/IIU, & ATC/GBC, indefinite	Yes AETC	ACS review
	FC II/III, & ATC/GBC indefinite	Yes MAJCOM	ACS review
	FC IIU	Yes AFMSA	ACS review
	MOD	Yes AFGSC	ACS review
Asymptomatic, recurrent nonsustained SVT or single episode nonsustained SVT >10 beats duration	FC I/IA/initial FC II/ IIU, & ATC/GBC	Maybe AETC	ACS evaluation
	FC II/III & ATC/GBC	Yes* MAJCOM	ACS evaluation
	FC IIU	Yes* AFMSA	ACS evaluation
	MOD	Yes AFGSC	ACS Review
Asymptomatic sustained SVT (>10 minutes duration), single episode, no ablation†	FC I/IA/initial FC II/ GBC	No AETC	ACS review
	FC II/III & ATC/GBC	Maybe MAJCOM	ACS evaluation
	FC IIU	Maybe AFMSA	ACS evaluation
	MOD	Maybe AFGSC	ACS review

Table . Summary of Supraventricular Tachycardia (SVT) and ACS Requirements. (con't)

SVT (symptoms refers to hemodynamic symptoms)	Flying Class	Waiver Potential/ Waiver Authority	Required ACS Review and/or ACS Evaluation
Recurrent sustained SVT or any degree of SVT associated with hemodynamic symptoms, no ablation†	FC I/IA/initial FC II/IIU & ATC/GBC	No‡ AETC	ACS review
	FC II/III & ATC/GBC	No‡ MAJCOM	ACS review
	FC IIU	No‡ AFMSA	ACS review
	MOD	No‡ AFGSC	ACS review
Any degree of SVT requiring antiarrhythmic medication for suppression	FC I/IA/II/IIU/III/ initial FC II/ & ATC/GBC	No MAJCOM	ACS review
	MOD	Maybe AFGSC	ACS review

* Waiver in untrained FC II and III individuals is on a case-by-case basis.
‡ Waiver is possible after successful ablation – refer to "Radiofrequency Ablation (RFA) of Tachyarrhythmias" waiver guide.
† Sustained or symptomatic SVT requires medical evaluation board (MEB).
** AFMSA is waiver authority for any case in which the driving force for the waiver is retention standards.

If the disease process appears mild and stable, waiver for all classes of flying duties will generally be valid for three years with ACS reevaluation/review at that time for waiver renewal. Each waiver recommendation will specify requirements and timing for waiver renewal.

A query of AIMWTS in Nov 2013 showed 311 aeromedical summaries written for individuals with SVT. The breakdown of the waivers that have been disqualified with SVT as a listed diagnosis and those who were disqualified for SVT explicitly are as follows: 17 FC I/IA (0 disqualified); 188 FC II (21 disqualified, 14 disqualified for SVT); 88 FC III (13 disqualified, 12 disqualified for SVT); 13 ATC/GBC (2 disqualified, 2 disqualified for SVT); and 5 SMOD cases (none disqualified The majority of the qualified cases were for nonsustained single episode of SVT, followed by recurrent non-sustained SVT and then SVT treated with radiofrequency ablation.

IV. Information Required for Waiver Submission.

ACS review/evaluation is required for all classes of flying duties for SVT. One 24-hour Holter monitor should be obtained. If the initial SVT is found on a Holter, then that Holter will suffice and repeat Holter is not warranted unless requested by the ACS/USAF Central ECG Library. If the

evaluation reveals only one isolated run of SVT of 3- to10-beats duration, no further testing is typically required. Aeromedical disposition will be recommended after the studies are forwarded to the ACS for review and confirmation. If more than one run of SVT is present, or if a single run is more than 10-beats in length, ACS evaluation is required. No additional studies are routinely required prior to ACS evaluation. If however, the treating physician deems it clinically necessary to perform additional studies, it is required that all studies be forwarded to the ACS for review. There is no minimum required nonflying observation period for waiver consideration for SVT, unless ablation is performed. Ablation of all SVT mechanisms is addressed in the "Radiofrequency Ablation (RFA) of Tachyarrhythmias" guide.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

For initial waiver (ACS review or evaluation) the AMS should contain the following information:
A. Complete history and physical examination – to include detailed description of symptoms, medications, activity level and CAD risk factors (positive and negative).
B. Original or legible copy of the tracings documenting SVT (ECG, rhythm strip, Holter, treadmill, etc.). (Notes 1 and 2)
C. Copy of the report and representative tracings of the Holter, if not provided under B. (Notes 1 and 2)
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, echocardiogram). (Notes 1 and 2)
E. Additional local cardiac testing is not routinely required but may be requested in individual cases.

For renewal waivers [ACS follow-up evaluations (re-evaluations)] the AMS should contain the following information:
A. Complete history and physical examination – to include detailed description of symptoms, medications and activity level.
B. Local follow-up cardiac testing is not routinely required prior to ACS re-evaluation. If requested for individual cases, it will have been specified in the report of the previous ACS evaluation.
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, echocardiogram). (Notes 1 and 2)

Note 1: All studies should be submitted electronically to the EKG Library. If required, call ACS to get correct mailing address for all required videotapes and CDs. For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD-9 code for supraventricular tachycardia	
427.0	Paroxysmal supraventricular tachycardia

ICD-10 code for supraventricular tachycardia	
I47.1	Paroxysmal supraventricular tachycardia

V. References.

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WAIVER GUIDE
Updated: Jul 2013
Supersedes Waiver Guide of Mar 2010
By: LtCol Henry Klein (RAM 13) and Dr Dan Van Syoc
Reviewed by Col Roger Hesselbrock, ACS Neurologist and Maj Eddie Davenport, chief ACS Cardiologist

CONDITION:
Syncope (Jul 13)

I. Overview.

Syncope is a symptom defined as a transient, self-limited loss of consciousness, potentially leading to falling. The onset of syncope is relatively rapid, and the subsequent recovery is spontaneous, complete, and usually prompt. The underlying mechanism is a transient global cerebral hypoperfusion. Presyncope or "near syncope" occurs when an individual has symptoms of hypoperfusion, such as feeling faint or experiencing tunnel vision, but does not lose consciousness. An underlying condition that predisposes a flyer to syncope or near syncope could have significant aeromedical significance due to the potential for incapacitation or loss of aircraft control.[1-4] In addition, injuries associated with syncopal attacks occur in about one-third of patients and recurrent episodes can have a significant psychological impact.[5] Also, it is important to distinguish syncope from seizures, since the latter have a high risk of recurrence and cause severe incapacitation. The history is critical in making this distinction.

Syncope is a common clinical problem, and has been estimated to account for 3-5 percent of emergency room visits and 1 percent of hospital admissions. The etiology is diverse: syncope can be caused by disturbances in homeostasis or neuronal-mediated reflexes, cardiovascular disease or arrhythmias, neurologic or psychiatric conditions, medications and a variety of metabolic disorders. Careful evaluation is required to determine the etiology and risk for recurrence or long-term complications. Even after evaluation, the cause of syncope remains unknown in many cases.[5] An evaluation of the Framingham Heart Study revealed that approximately 37 percent of syncopal events were due to unknown causes.[6] A 2001 Italian prospective study evaluated 341 consecutive emergency department visits for syncope and found the following distribution of causes: neuronal-mediated (e.g., vasovagal) – 58 percent; cardiac disease – 23 percent; neurologic or psychiatric – 1 percent; and unexplained syncope – 18 percent.[7]

Neuronal-mediated syncope refers to a reflex response causing vasodilatation and/or bradycardia (rarely tachycardia) leading to systemic hypotension and cerebral hypoperfusion. Types of neuronal-mediated syncope include neurocardiogenic (vasovagal) syncope, carotid sinus syncope, situational syncope, and glossopharyngeal neuralgia. Patients with vasodepressor or vasovagal syncope do not appear to be at increased risk for all-cause or cardiovascular mortality, but may be subject to recurrent symptoms. The overall recurrence rate for vasovagal syncope has been estimated at 30 percent. Risk factors for recurrence have not been well-characterized, but a history of previous syncopal episodes and the number of episodes indicate a greater risk of recurrence.[8, 9]

In contrast, syncope due to underlying cardiac disease or arrhythmia is associated with significantly higher all-cause and cardiovascular mortality, and risk of recurrence. Thus it is important to evaluate patients with a history of syncope for potential cardiac causes. A detailed study of a large

group of syncope patients initially labeled as syncope of unknown cause has suggested that 45 to 80 percent of such cases could be assigned a cardiac cause.[6]

The clinical history is the most important factor in establishing a diagnosis in syncope patients. When evaluating patients, the flight surgeon should consider the postural setting, pre-syncopal (premonitory) symptoms**,** the syncopal episode, and the syncopal setting. The detailed history is designed to rule out cardiac or neurological disease. Recent research in athletes with syncope has concluded that syncope or presyncope that occurs during exertion is more likely to be life-threatening than episodes that occur at rest.[10] Patients should be questioned closely for family history of cardiovascular disease or unexplained sudden death. The standard 12-lead electrocardiogram (ECG) should be part of the routine evaluation, with particular attention paid to rhythm, QT interval, bundle-branch morphology, and any evidence of ischemia or hypertrophy. If there are any questions or concerns after the ECG, then echocardiography should be performed.[11]

Tilt-table testing is the only method for diagnosing neurocardiogenic syncope that has undergone rigorous testing. In spite of that, there are serious questions concerning sensitivity, specificity, diagnostic yield, and day-to-day reproducibility of this modality. In patients with a negative evaluation (no evidence of cardiac disease), the pretest probability that the diagnosis is neurocardiogenic syncope is high, so the tilt-table test contributes very little to the diagnosis. An additional diagnostic tool is the implantable loop recorder (ILR). The device can record automatically or be activated by the patient after a syncopal episode. Due to the need for surgical implantation and the cost, this device should be reserved for patients with recurrent syncope in whom the diagnosis remains uncertain despite a conventional evaluation.[11, 12] Additionally, the ILR has been utilized in some patients with an unexplained diagnosis in an effort to better demonstrate whether or not there was a cardiac etiology. A Canadian study has shown that the ILR is more likely to uncover a cardiac diagnosis than is conventional testing.[13]

Medication treatment options have had varying rates of success. Only a minority of patients with vasovagal syncope require treatment, and most can be managed conservatively. Patients should be encouraged to liberalize their fluid and salt intake, unless they have contraindications such as hypertension. All patients should be taught physical counterpressure maneuvers. Midodrine hydrochloride, a direct α1-receptor agonist and vasoconstrictor is the first-line therapy for patients having frequent presyncope or syncope or for those with brief or no prodromes.[14] Beta-blockers have been used for many years in patients with recurrent neurocardiogenic syncope, but the published studies to date are inconclusive. Similarly fludrocortisone has been utilized for its sodium retention properties and early studies indicate it may reduce neurocardiogenic syncope. Due to the role that serotonin may have in regulating sympathetic activity, selective serotonin-reuptake inhibitors (SSRI) have been proposed as therapy. One randomized placebo-controlled study with the SSRI paroxetine showed a significant improvement demonstrated by significantly longer syncope-free intervals. Transdermal scopolamine has also been utilized without significant effect.[11, 15]

There have been numerous non-medicine treatment modalities studied in the past decade. A double-blind randomized study utilizing pacemaker therapy has not demonstrated reduction in the risk of recurrent syncope.[16] Physical Counterpressure Maneuvers (PCM) have been used with success in some groups to abort attacks and reduce recurrent episodes. PCM tools include leg crossing, handgrip or arm tensing – the patients are trained to use the maneuvers in situations in

which they have been prone to vasovagal syncope and immediately when they note prodromal symptoms.[1, 17]

II. Aeromedical Concerns.

Any underlying condition that predisposes an aviator to suffer syncopal attacks could lead to incapacitation and loss of aircraft control. For this reason, loss or disturbances of consciousness, orthostatic or symptomatic hypotension, or recurrent vasodepressor syncope are disqualifying. Any aviator being treated with beta blockers, scopolamine, paroxetine, fludrocortisone, or alpha-agonists will not be eligible for a waiver as these medications are not approved for aviation duties in the US Air Force.

The following limited circumstances do not require a waiver:

A. An isolated (single) episode of neurocardiogenic syncope associated with venipuncture, prolonged standing in the sun (or similar benign precipitating event) which is less than 1 minute in duration, without loss of continence, and followed by complete and rapid recovery without sequelae, if thorough neurological and cardiovascular evaluation by a flight surgeon reveals no abnormalities. Multiple or recurrent episodes will require a more complete evaluation and a waiver.

B. Physiologic loss of consciousness (LOC) caused by reduced oxygen tension, general anesthesia, or other medically induced LOC provided there is full recovery without sequelae.

C. G induced loss of consciousness (G-LOC) during a centrifuge run does not require waiver for continued flying duty, unless there are neurologic sequelae, or evidence that the G-LOC occurrence is associated with coexistent disease or anatomic abnormality. Inflight G-LOC caused by an improperly performed anti-G straining maneuver, or a disconnect of the anti-G protective gear is not disqualifying, and is managed as a physiological incident. The local flight surgeon completes appropriate post-incident medical evaluation and reports the incident according to applicable directives.

For the situations described above the evaluation should include:

A. History: The history is the most important component and should include: a complete description of the syncopal episode to include posture, pre-syncopal symptoms, duration, pre- or post-syncopal amnesia, convulsive accompaniments; any precipitating factors such as venipuncture, medical procedure or standing in formation; other contributory factors (dehydration, inadequate nutrition, strenuous exercise, fatigue, recent illness, etc.) and documentation of any previous syncopal or near-syncopal episodes. A history of previous episodes or any other features exceeding the parameters described above, require a waiver. To the extent possible, details of the syncopal episode such as pre-and post-syncopal appearance and behavior, duration of loss of consciousness, post-syncopal posture and any convulsive accompaniments should be based on reliable witness observations. If the episode was not witnessed, then duration and other details of the syncopal episode cannot be verified.

B. Physical Exam: The cardiovascular exam should assess pulses for rate, rhythm and differences between extremities; resting and orthostatic blood pressure, and auscultation for murmurs or

abnormal heart sounds. Orthostatic hypotension is diagnosed when one or more of the following is present within two to five minutes of quiet standing:

- ≥20 mmHg fall in systolic pressure
- ≥10 mmHg fall in diastolic pressure
- Symptoms of cerebral hypoperfusion

Neurologic exam should assess mental status, cranial nerves, motor and sensory function, deep tendon and plantar reflexes, coordination, gait and Romberg test. Any neurological deficit(s) or cardiovascular abnormalities require further evaluation and necessitates waiver submission. If seizure is a diagnostic concern, an electroencephalogram (EEG) will be a necessary part of the evaluation.

C. The evaluation for G-LOC has additional requirements. In-flight G-LOC must be reported as a physiologic event. Evaluation should include a description of the sequence of events and careful video tape recorder (VTR) review for adequacy of anti-G straining maneuver. Cases in which G-LOC continues to occur despite correction of underlying factors and/or additional and training conducted by an aerospace physiologist are managed IAW AFI 11-4-4, *Centrifuge Training for High-G Aircrew*.

III. Waiver Consideration.

Air Force aviators with orthostatic or symptomatic hypotension or recurrent vasodepressor syncope are disqualified for all flying classes. They will need to be evaluated carefully before consideration for a waiver. As noted in the section above, not all aviators experiencing a syncopal episode require a waiver. Consideration for waiver is limited to cases in which the risk of recurrence is low and/or the underlying condition or triggering factor can be adequately controlled. Benign syncope limited to predictable settings may be waived if there is negligible risk of recurrence in the aviation environment. If a treatable etiology for syncope is found, then correction of the underlying condition may allow a return to flying status. However, certain conditions (e.g., arrhythmia) and/or medications may pose unacceptable risks of recurrence or side effects. If the etiology of syncope remains unknown despite extensive diagnostic evaluation, then a clinical judgment based on careful consideration of all available information must be made before allowing a flyer to return to the cockpit. For MOD and ATC/GBC personnel, recurrent syncope is disqualifying for retention, therefore a waiver is indicated.

Table 1: Waiver potential for syncope

Flying Class (FC)	Waiver Potential Waiver Authority#	ACS Review/Evaluation
I/IA	Yes AETC	Yes*
II/III	Yes MAJCOM	Yes*
ATC/GBC	Yes MAJCOM	No
MOD	YES AFGSC	No

*Most cases will not result in an in-person ACS evaluation
#MAJCOMs have waiver authority for simple syncope; if the cause of the syncope is disqualifying, the member needs an additional waiver for that condition.

Review of the AIMWTS database in Jul 2013 revealed a total of 291 waivers submitted with the diagnosis of syncope. Of this total, 24 were FC I/IA (12 disqualified), 105 were FC II (20 disqualified), 124 were FC III (52 disqualified), 26 were ATC/GBC (15 disqualified), and 12 were MOD (1 disqualified). There were a total of 100 disqualifications. Most of the DQ cases were for issues related to syncope – some were on beta blockers, others had unexplained etiologies and others had ongoing issues with syncope. About 20 percent of the DQ cases were disqualified for issues other than syncope.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for syncope should include the following:
A. Complete history and physical exam as described above. If possible, the flight surgeon should interview witnesses personally and the AMS should indicate which elements of the history were provided by witnesses. Past medical history, medications, allergies, and family history (especially of sudden death, arrhythmia or epilepsy) should be documented.
B. Consultations: Cardiology consultation is required if cardiac etiology is suspected or etiology is unknown. If clinically indicated, tertiary testing such as echocardiogram, Holter or event monitor, tilt-table testing, stress-test, electrophysiology studies, etc may be necessary. Neurology consultation should be obtained if the LOC cannot be attributed to syncope and/or neurologic deficits are identified or suspected. If clinically indicated, tertiary testing such as neuroimaging or EEGs, etc may be necessary. Psychology or psychiatry consultation should be obtained if psychogenic factors are suspected.
C. Documentation should include the following:
1) ECG
2) Results of any laboratory or imaging studies, cardiodiagnostic testing, and neurologic tests such as EEGs. For Aeromedical Consultation Service (ACS) review/evaluation, original images, tapes, etc. will be required.

ICD-9 code for syncope	
780.2	Syncope and collapse

IC-10 code for syncope	
R55	Syncope and collapse

V. References.

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WAIVER GUIDE
Updated Sep 2015
Supersedes waiver guide of Sep 2011
By: Col Tim Duffy and Dr. Dan Van Syoc
Reviewed by LtCol Mark True, AF/SG consultant for Endocrinology

CONDITION:
Systemic Glucocorticoid (Steroid) Treatment (Sep 15)

1. Overview.

Systemic glucocorticoids (GC) are potent anti-inflammatory agents that are frequently used in the treatment of a variety of medical conditions. There are several known side effects to these agents to include skin thinning, purpura, Cushingoid appearance, weight gain, bone loss, glucose intolerance, acceleration of atherosclerosis, cataracts, gastritis, immunosuppression, euphoria, hypomania, depression and psychosis.[1] Therefore, aviators who are undergoing treatment with GC are <u>not</u> considered for a waiver and medical conditions requiring standing (long-term) doses of glucocorticoids are not generally considered stable or waiverable. The underlying disease process necessitating GC usage must also be considered.

For more benign conditions, brief (less than three weeks) treatment with systemic GC is not concerning. However, patients who are on high doses of GC for extended periods of time are at risk for complications such as avascular necrosis, immunosuppression, cataracts, myopathy, obesity, osteoporosis and suppression of the hypothalamic-pituitary-adrenal (HPA) axis with resultant adrenal insufficiency.[2] HPA axis suppression has been reported to occur in up to 63% of those on long term GC treatment. GC toxicity is generally dose and duration dependent. These patients can present with hypotension, abdominal pain and other features of adrenal crisis such as are seen in primary adrenal insufficiency (Addison's disease) during times of stress.[3] GC usage is associated with serious neuropsychiatric effects in 6% of patients. These effects are unpredictable and may involve affective, behavioral and cognitive manifestations. The administered dose is considered the most significant risk factor. Other effects include hyperkalemia and hypoglycemia.[4]

II. Aeromedical Concerns.

HPA axis suppression after the completion of GC therapy is the most significant concern. This is unlikely to occur with a short course of daily morning therapy, but becomes more common with courses exceeding three weeks or with split-dose or nighttime therapy. If an aviator requires a longer course of therapy, the dose should be tapered over several weeks depending on the level of steroids and as the underlying condition tolerates. The goal of tapering is to use a rate of change that will prevent both recurrent activity of the underlying disease and symptoms of cortisol deficiency due to persistent HPA suppression.[5] The primary aeromedical concern is the response to stress after discontinuation of long courses of GC. The normal adrenal is able to meet these needs; however, the suppressed HPA axis may not be capable, and adrenal crisis can be precipitated.[6] The unique stresses of aviation could precipitate adrenal crisis in an aviator with suppressed HPA axis.

III. Waiver Considerations.

Aviators (FC I/IA, II, and III) who are undergoing treatment with systemic GC are not eligible for waiver. Treatment with systemic GC is not specifically listed as disqualifying for ATC/GBC and MOD duties, but adrenal hyperfunction (Cushing's syndrome), not responding to therapy and adrenal hypofunction are not qualified for retention standards. Therefore, these members need to be carefully evaluated and considered before returning to duty. Conditions which require long term use of GC typically require waiver, but the history of GC use by itself is not disqualifying as long as the medication has been discontinued, symptoms have resolved and the HPA is intact. Therefore, documentation of an intact HPA axis should be accomplished prior to return to flying status if GC use was greater than 3 consecutive weeks within the last 12 months.[7] After GC treatment, if waiver is required for the underlying condition, the aeromedical summary (AMS) should include results of the ACTH stimulation test. Refer to the applicable waiver guide for assistance in the development of an AMS for the underlying condition.

IV. Workup Required after Use of Oral Glucocorticoids.

If an aviator has received systemic steroid therapy for over three weeks within the preceding twelve months, documentation of normal basal and stress cortisol levels off medication is required prior to returning to flying status. Basal cortisol levels are drawn in the morning from a fasting individual. The short adrenocorticotropic hormone (ACTH) stimulation test is used to document stress response. A dose of 250 mcg of Cosyntropin® (recombinant ACTH) is injected IV or IM after a baseline cortisol level is drawn. A stimulated cortisol is drawn 60 minutes later. The two samples need to be carefully labeled as basal and stimulated. A stimulated cortisol >18 mcg/dL is considered normal. Stimulation testing can be performed at any point after GC discontinuation but as a general rule is performed one month after discontinuing therapy; if abnormal, it can be repeated at monthly intervals until normalized.

Please see the table below for a summary of the workup requirements based upon the duration of GC therapy.

Table 1: Workup Required Based on Duration of GC Therapy

Duration of Steroid Therapy	Flying Class	Studies Required
≤ 3 weeks of GC therapy during the preceding 12 months	All	N/A
> 3 weeks of GC therapy during the preceding 12 months	All	-- Normal basal cortisol level (>10 mcg/dL) off medication and -- Normal stress cortisol level (>18 mcg/dL) off medication -- Testing can be performed anytime after discontinuation of treatment but typically testing is begun 1 month after GC medication discontinuation

V. References.

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WAIVER GUIDE
Updated: Jun 2016
Supersedes Waiver Guide of Jun 2012
By: Capt Chris McLaughlin (RAM 17) and Dr Dan Van Syoc
Reviewed by LtCol Timothy Phillips, Urology consultant to AF/SG

CONDITION:
Testicular Cancer (Jun 16)

I. Overview.

Testicular tumors account for 1% the incidence of all tumors and 0.1% of all cancer deaths in men.[1] However, it is the most common malignancy in men in the 15- to 35-year age group. The incidence of testicular cancer in Western Europe and North America has been showing an increase, doubling, in the last 40 years with the etiology unclear.[1] The incidence is 2.5 to 8 times higher in men with cryptorchidism, even when the undescended testis has been brought down surgically.[2, 3] Other risk factors include a personal history of testicular cancer, family history, Caucasian race, and environmental exposures.[3] Testicular cancer most commonly originates from germ cells (95%), but can arise from other cell types (e.g. sex-cord stromal tumors, lymphomas).[2, 3] Germ cell tumors are categorized as seminomas (40%) or non-seminomatous germ cell tumors (NSGCT), which includes embryonal cell carcinoma, yolk sac tumors, choriocarcinomas, and/or teratoma. Germ cell tumors that contain any tumor type in addition to or other than seminoma are categorized as non-seminomatous. This is an important distinction, because the treatment for NSGCT is different than treatment of pure seminoma.

Testicular cancer usually appears as a painless or sometimes (30-40%) painful unilateral intrascrotal mass. Two to three percent of testicular cancers are bilateral, occurring either simultaneously or successively.[2] Five-10% of germ cell tumors present at an extra-gonadal site, predominantly retroperitoneum or mediastinum.[4] These extragonadal germ cell tumors tend to have a delayed presentation, and may manifest with supra-clavicular adenopathy, back pain, lower extremity edema, or symptoms of renal failure from compression of retroperitoneal structures.

Scrotal ultrasound is the gold standard for testicular imaging, having a sensitivity of almost 100% and is used to determine whether a mass is intra- or extra-testicular.[3] However, when a clinical diagnosis indicates a high likelihood of a solid testicular mass, urology referral and treatment should not be delayed by lack of an ultrasound.[2]

Alpha-fetoprotein (AFP), β-human chorionic gonadotropin (β-hCG), and lactate dehydrogenase (LDH) (marker of tissue destruction) are serum tumor markers that contribute prognostic value in diagnosis and staging.[2] AFP can be produced by yolk sac tumors, teratoma, embryonal carcinoma or combined tumors but is not increased in pure choriocarcinoma or pure seminoma. β-hCG is secreted by both seminomas (5-10% - usually below 500 ng/mL) and NSGCT (all choriocarcinomas and 40-60% embryonal carcinoma).[2, 5] Chest x-ray and chest, abdominal and pelvic computed tomography (CT) are also recommended for staging and monitoring.[2]

The standard treatment of all primary testicular cancers is a unilateral radical inguinal orchiectomy with high ligation of the spermatic cord (although testis sparing procedures can be considered in

some cases). An inguinal orchiectomy provides not only histopathologic and staging information but potentially a complete cure for individuals with testis-confined disease.[2, 4] In well-defined cases with multiple biopsies of the tumor bed, sparing of the rete testis, normal preoperative plasma testosterone, and tumor size less than 20 mm, the surgeon may choose organ-sparing surgery.[4]

Table 1. American Joint Committee on Cancer (AJCC) Testicular Cancer Staging System.[6]

Stage	Primary Tumor (pT)	Regional Lymph Nodes (N)	Distant Metastasis (M)	Serum Tumor Markers (S)
0	pTis	0	0	0
I	pT1-4	0	0	0
IA	pT1	0	0	0
IB	pT2, 3 or 4	0	0	0
IS	Any pT/Tx	0	0	1-3
II	Any pT/Tx	1-3	0	X
IIA	Any pT/Tx	1	0	0-1
IIB	Any pT/Tx	2	0	0-1
IIC	Any pT/Tx	3	0	0-1
III	Any pT/Tx	Any N	1	SX
IIIA	Any pT/Tx	Any N	1a	0-1
IIIB	Any pT/Tx	N1-3 Any N	0 1a	2 2
IIIC	Any pT/Tx	N1-3 Any N Any N	0 1a 1b	3 3 Any S

pT – pTX (primary tumor cannot be assessed), pT0 (no evidence of primary tumor), pTis (intratubular germ cell neoplasia [carcinoma in situ]), pT1 (tumor limited to testis and epididymis without vascular/lymphatic invasion; tumor may invade into the tunica albuginea but not the tunica vaginalis), pT2 (tumor limited to testis and epididymis with vascular/lymphatic invasion, or tumor extending through the tunica albuginea with involvement of the tunica vaginalis), pT3 (tumor invades the spermatic cord with or without vascular/lymphatic invasion, pT4 (tumor invades scrotum with or without vascular/lymphatic invasion).
N – NX (regional lymph nodes cannot be assessed), N0 (no regional lymph node metastasis), N1 (metastasis with lymph node mass 2 cm or less in greatest dimension; or multiple lymph nodes, none more than 2 cm in greatest dimension), N2 (metastasis with lymph node mass > 2 cm but ≤ 5 cm in greatest dimension; or multiple lymph nodes, any one mass > 2 cm but ≤ 5 cm greatest diameter), N3 (metastasis with lymph node mass > 5 cm in greatest dimension).
M – MX (distant metastasis cannot be assessed), M0 (no distant metastasis), M1 (distant metastasis), M1a (non-regional nodal or pulmonary metastasis), M1b (distant metastasis other than to non-regional lymph nodes and lungs).
S – SX (marker studies not available or not performed), S0 (marker study levels within normal limits), S1 (LDH <1.5 times upper limit of normal and hCG < 5000[mIu/ml] and AFP < 1000 [ng/ml]), S2 (LDH 1.5 to 10 times upper limit of normal or hCG 5000-50,000 or AFP 1000-10,000), S3 (LDH > 10 times normal or hCG > 50,000 or AFP > 10,000).

Approximately 80% of seminomas present with stage I disease (limited to the testis), while 15% have stage II disease. NSGCT has a greater tendency to present with metastatic disease.[2, 4, 5]

Seminomas most commonly metastasize via lymphatics to retroperitoneal nodes, and more rarely spread hematogenously to other areas (e.g., liver, lung, bones, or brain). Seminomas are very sensitive to radiation therapy (RT) while NSGCT are more radioresistant. Seminomas frequently do not have elevated tumor markers, while NSGCT have elevated β-hCG or AFP in 85% of cases.[2, 4, 7]

Most patients with Stage I seminoma are cured by orchiectomy alone. A small percentage of patient relapse. To prevent relapse in patients with stages IA and IB pure seminoma, the standard management options after initial orchiectomy include active surveillance, RT, or chemotherapy with 1-2 cycles of carboplatin. The disease specific survival for stage I disease is 99% irrespective of the management strategy used.[9] With respect to surveillance, a number of prospective non-randomized studies of surveillance have been conducted. The relapse rate seen in these studies is 15-20% at 5 years, and most of the relapses are first detected in infra-diaphragmatic lymph nodes.[8-11] Surveillance is listed as the preferred option (category 1) for patients with pT1-pT3 tumors by the NCCN Testicular Cancer Panel. If surveillance is not applicable, alternatives are either adjuvant carboplatin or RT. Each has distinct advantages and disadvantages.

When RT is elected, acute side effects are mostly gastrointestinal, particularly nausea.[12] One-2 cycles of single agent carboplatin has similar survival rates to radiotherapy.[13] The benefits of adjuvant treatments must be balanced with the long-term risks of side effects (heart disease and secondary malignancy for RT / long-term effects of carboplatin remain undetermined). Individuals with stage II seminomas treated with post orchiectomy RT have 5-year disease-free survival rates of approximately 80%, ranging from 70 to 92%, but overall survival with salvage therapy approaches 100%.[2, 4, 7] In individuals with distant metastases or bulky retroperitoneal disease after orchiectomy (e.g., stage IIC, III) chemotherapy is the most common treatment, most commonly bleomycin, etoposide and cisplatin (BEP). More than 90% of individuals with stage III achieve complete response.

In contrast to patients with pure seminoma, those with NSGCT are more likely to harbor metastatic disease at presentation. Approximately 33% of individuals with NSGCT present with disease limited to the testis (stage I). NSGCT treatment after orchiectomy depends on stage at presentation, and can include observation, chemotherapy or retroperitoneal lymph node dissection (RPLND), individually or in combination. Treatment planning is based on tumor markers and their behavior after orchiectomy, radiographic staging with CT, and risk stratification. Occult metastatic disease is frequent, with 30% of clinical stage I NSGCT having pathologic evidence of metastatic disease (stage II or greater) despite normalization of tumor markers and normal imaging.[7, 14] Metastasis is most commonly found in the retroperitoneal lymph nodes, but can skip the retroperitoneum, with pulmonary lesions being the next most common site. RPNLD is the only modality that can accurately delineate pathologic stage I from pathologic stage II. The risk of relapse in observation of stage I NSGCT is 27-35%, with more than 50% during the first year after orchiectomy, although late relapses ($\geq$ 24 months) occurring in 10%.[1, 4] The cure rate for clinical stage I is approximately 95%, with similar rates regardless of treatment (observation + salvage therapy if recurrence develops, primary RPNLD, or primary chemotherapy). However, it should be noted that salvage therapy is almost always more intensive and complex than primary RPLND or primary chemotherapy. For higher stage NSGCT, chemotherapy is usually the initial treatment, followed by post-chemo RPLND or surveillance.[2] The most common chemotherapy for NSGCT is a combination of bleomycin, etoposide and cisplatin. However, similar cancer control rates have

been achieved with elimination of bleomycin and a longer course of therapy with etoposide and cisplatin in an effort to avoid the pulmonary toxicity of bleomycin.

Individuals with seminomas with stage I, II and stage IIIA and IIIB and individuals with NSGCT with stage I, II and IIIA have a five-year survival of 91%.[4, 15] Stage IIIC seminomas or stage IIIB NSGCT have a five-year survival rate of 79%. Stage IIIC NSGCT have a five-year survival rate of 48%.[15]

There are some potential long-term toxicities of chemotherapy.[14] These possible long-term side effects include the following:

1. Leukemia: there is a 0.5-2% risk of developing leukemia after treatment with etoposide, depending on the total dose administered.
2. Other solid tumors: there is an approximately 1.5-fold increased risk for second malignancies after chemotherapy for testis cancer.
3. Pulmonary toxicity: there is a 2-3% risk for pulmonary fibrosis after treatment with bleomycin, depending on total dose. Rarely, this can be fatal. Bleomycin also increases the risk of pneumonitis associated with exposure to high concentrations of oxygen. Individuals treated with bleomycin should avoid prolonged exposure to high concentrations of oxygen. Development of pulmonary toxicity can be measured with pulmonary function testing with diffusion capacity testing (DLCO) and bleomycin therapy can be curtailed in this event.
4. Vascular toxicity: up to 1/3 of patients can develop Raynaud's phenomenon after chemotherapy. Patients may need to protect their hands with gloves while working in a cold environment if this develops. There is a 2-2.5-fold increased risk of myocardial infarction after chemotherapy. Patients should protect their cardiovascular health by refraining from tobacco use and maintaining a healthy lifestyle and diet.
5. Neurotoxicity: peripheral sensory neuropathy, which can include ototoxicity, is associated with cisplatin therapy. In general, it is mild and not functionally limiting and frequently improves with time. If it occurs, it usually manifests as paresthesia or dysesthesia in the extremities and does not limit activity. Motor neuropathy is extremely rare.
6. Nephrotoxicity: cisplatin is also associated with nephrotoxicity. Periodic assessment of renal function should be included in the follow up regimen.
7. Infertility: the BEP chemotherapy regimen will cause infertility in all patients temporarily. There is a 25% chance that sperm production will never recover. There is a 50% chance that sperm production will recover to pre-treatment levels. This generally occurs between 12 and 36 months after completion of therapy.[14]

Semen cryopreservation should be discussed with men diagnosed with testicular cancer prior to instituting therapy, as treatment may have an irreversible impact on fertility.

II. Aeromedical Concerns.
The aeromedical concerns primarily relate to surveillance after diagnosis and the potential long-term morbidity of chemotherapy. Surveillance is intensive and mandatory, regardless of the initial treatment (observation, radiotherapy, chemotherapy, RPLND). Assignments and assignment limitations should be instituted in order to comply with follow up recommendations. Follow up should be scheduled in accordance with standards published by the National Comprehensive Cancer Network at www.NCCN.org. Follow up depends on tumor type, stage and initial treatment. The NCCN is a non-profit consortium of cancer treatment centers that provides evidence-based guidelines for the management and follow up of cancers and should be considered a standard of care in the management and follow up of testicular cancer.[16]

Chemotherapeutic morbidity, particularly pulmonary toxicity associated with bleomycin, must be ruled out in the flying community. In the past, the use of bleomycin in aviators would have been permanently disqualifying. This was based on the risk of pulmonary fibrosis with exposure to oxygen. The value of bleomycin in the treatment of malignancies is in part a function of its specific toxicity, since it does not induce bone marrow aplasia, and thus does not add to the toxicity that limits most oncologic drugs. Instead, the principal target organ of bleomycin-induced injury is the lung, with acute pulmonary damage occurring in 6-18% of treated patients. The pathophysiology of delayed toxicity of bleomycin is complex. In the medical literature of the last thirty years, a number of patients have been described who, having previously received bleomycin therapy, have developed pulmonary toxicity when undergoing subsequent surgery. Typically, these have been young individuals receiving modest levels of oxygen (33-42%) during long operations (4-8 hours). The true incidence of such delayed toxicity is unknown, since the subsequent literature has largely consisted of isolated case reports or small series.[17, 18] A more cogent argument can be made that the period of risk is primarily in the first year after therapy, since most cases occurred within that time frame. However, it is equally possible that this observation represents a bias related to the timing of operative intervention.

Applicable data had been non-existent, a state of affairs that has been somewhat altered by unpublished data recently supplied by the Duke Hyperbaric Unit.[17] Although it had been the practice in hyperbaric medicine to avoid hyperoxia in bleomycin-treated individuals, the undoubted benefit from hyperbaric oxygen (HBO) in wound healing and osteonecrosis posed against the uncertain risk of delayed bleomycin toxicity led several years ago to a change in policy. Since then, the Duke unit has treated 11 individuals previously exposed to bleomycin with HBO. There was a wide range of time between the last dose of bleomycin and the institution of HBO, ranging from 1 month to 22 years. The range of cumulative bleomycin doses was not noted. Anywhere from 8 to 44 treatments with 100% oxygen at 2 ATA (PiO2 ~ 1475 mmHg) were administered for two hours per treatment, once or twice daily. One individual experienced significant chest discomfort and a decline in diffusion capacity of 50%; both resolved following a break in treatment, and she successfully completed HBO treatment with a reduction in frequency of her sessions. More recently, researchers at Duke described 15 patients with bleomycin exposure prior to HBO and without any adverse changes in arterial blood gases, spirometry, chest radiographs, or clinical symptoms.[19] While the Duke experiences do not represent occupational exposure per se, and the number of individuals treated is small, the amount of oxygen exposure from HBO therapy is far in excess of what would be expected in aviation, and suggests that the risk of delayed toxicity outside the operating room may be minimal.

Based on this data, policy was changed for aviators treated with bleomycin. Those aviators returning to non-high performance aircraft would be evaluated as usual, addressing risks of tumor recurrence and potential toxicity from chemotherapy. Assuming they had not developed bleomycin pneumonitis during therapy, then no restrictions from altitude chamber or other sporadic oxygen exposure is warranted. For aviators returning to a high-performance cockpit (aircraft requiring routine use of 100% oxygen), and assuming that bleomycin pneumonitis had not occurred during their treatment protocol, an ACS evaluation is no longer required. For those who did experience bleomycin pneumonitis, the ACS evaluation will include pulmonary function testing (spirometry, plethysmographic lung volumes, and diffusion capacity) and high-resolution CT scanning of the lungs. This evaluation will be repeated at the one and two year point of active flying. Because it is possible, and biologically plausible, that the common perception of an increased period of risk within the first year is correct, a grounding period of one year from the end of treatment is required before the baseline evaluation is undertaken.

There have been case reports of life-threatening pneumonitis developing in patients with a history of bleomycin-induced lung injury, who were later given supplemental oxygen for surgical procedures. Therefore, aviators who have a history of bleomycin-induced lung injury should not be allowed to return to airframes that require routine use of 100% oxygen. Also, they should be exempted from the portions of the altitude chamber qualification that require 100% oxygen use. Use of 100% oxygen during emergencies such as fire or rapid decompression is acceptable and should not be discouraged.[17, 18]

III. Waiver Consideration.

History of testicular cancer is disqualifying for all flying classes. An MEB is required prior to waiver submission. For trained assets, waiver may be submitted after six months in remission and completion of all therapy.

Table 1: Waiver potential for testicular cancer

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Seminoma and nonseminoma – all stages	Yes* AETC	Yes
II/RPA Pilot/III*	Seminoma and nonseminoma – all stages	Yes+* AFMSA	Maybe†
ATC/GBC MOD	Seminoma and nonseminoma – all stages	Yes*# AFMSA	Maybe

*Initial/untrained applicants (all classes) must be in remission 5 years prior to waiver submission
+ For trained FC II, RPA Pilot and III individuals, waiver may be considered six months after treatment completed, in remission and asymptomatic.
† For high performance (routine use of aviator mask while flying), individuals treated with bleomycin will no longer require an ACS evaluation unless problems arise and the evaluation is requested by the waiver authority.
# Waiver authority for MOD personnel is AFSPC or GSC.

AIMWTS search in Jun 2016 revealed: 119 cases of testicular cancer; 6 FCI/IA, 64 FC II, 43 FC III, 4 GBC and 2 MOD. Of the 119 cases, only ten were disqualified. Of the ten disqualified, six were disqualified because of the diagnosis of testicular cancer (e.g., new metastases to the lung, treated with bleomycin, and recent diagnosis of testicular cancer), one due to complication of the surgery [fracture of coccyx and development of coccydynia, requiring control with narcotics] and three were disqualified for another primary medical condition. The vast majority of the cases were stage I.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for testicular cancer should include the following:
A. History – symptoms, pathology, stage, treatment, including date of last treatment, complications of treatment such as pulmonary toxicity, surveillance plan and activity level.
B. Physical – genital, lymph nodes, abdomen, chest, and cardiovascular.
C. Consultation from Urology, Oncology to include all six-month follow-up.
D. Labs: Initial and latest - α-fetoprotein (AFP), β-human chorionic gonadotropin (β-hCG), and lactate dehydrogenase (LDH).
E. Pulmonary function tests, in individuals who underwent chemotherapy or RT to chest.
E. Imaging: Chest x-ray and abdominal/pelvic CT.
F. Pathology report.
G. Tumor board report.
H. MEB findings/ALC.

The AMS for waiver renewal for testicular cancer should include the following:
A. Interval history and detailed physical examination.
B. All applicable labs and imaging tests as in the initial aeromedical summary.
C. Consultation from: Urology, Oncology.

ICD-9 code for testicular cancer	
186.9	Malignant neoplasm of testis, other and unspecified

ICD-10 code for testicular cancer	
C62.90	Malignant neoplasm of unspecified testis, unspecified whether descended or undescended

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WAIVER GUIDE
Updated: Jul 2015
Supersedes Waiver Guide of Oct 2011
By: LtCol Tory Woodard (RAM 16) and Dr Dan Van Syoc
Reviewed by LtCol Roger Wood, AF/SG consultant for Hematology/Oncology

CONDITION:
Thalassemia (Jul 15)

I. Overview.

Thalassemia refers to a spectrum of disorders that result from reduced or absent globin chain production. Typically an autosomal recessive condition, it is among the most common genetic disorders worldwide. Although rare in the United States, an estimated 5% of the world's population may be affected.[1, 2] Highest thalassemia gene frequencies occur in areas surrounding the Mediterranean, and in South Asia, South-East Asia, and Oceania, and is thought to have developed due to the protective effects against malaria in heterozygotes.[3] About 15% of American Blacks are silent carriers for α-thalassemia. α-thalassemia trait (minor) occurs in 3% of American Blacks and also in 1-15% of persons of Mediterranean origin. β-thalassemia has an incidence of 0.8% in American blacks and 10-15% in individuals from the Mediterranean and Southeast Asia.[4] Over 50% of the US thalassemia population now consists of people of Asian ancestry due to demographic changes from immigration and other population shifts.[5]

Figure 1. Thalassemia Syndromes[6, 7]

- Alpha-thalassemia
  - Silent α-thalassemia
  - α-thalassemia trait (α^0 or α^+)
  - Hb H disease
  - Hb Bart's Hydrops Fetalis
- Beta-Thalassemia
  - Thalassemia minor (trait)
  - Thalassemia intermedia
  - Thalassemia major
- Others
  - Delta-beta Thalassemia (Hb Lepore)
  - Variant hemoglobin with thalassemia phenotype (Hb E)
  - Beta-Thalassemia with other variant hemoglobin (Hb S, Hb C, Hb E)

The thalassemias are characterized by reduction in the synthesis of globin chains (α or β) causing decreased hemoglobin synthesis and a hypochromic microcytic anemia from defective hemoglobinization of red blood cells.[8] Clinical severity varies widely, depending on the degree of impaired or altered synthesis and whether coinheritance of other abnormal globin alleles exists.[4] Severity may range anywhere from a silent carrier state through severe hemolytic anemia, or even fetal demise.[1]

Recall normal circulating adult hemoglobin is approximately 98% hemoglobin A. It is a tetramer containing two α chains and two β chains ($\alpha_2\beta_2$). Hemoglobin A_2 normally comprises 1-2% of adult

hemoglobin and is formed of two α chains and two δ (delta) chains ($\alpha_2\delta_2$). Hemoglobin F is the major fetal hemoglobin, but comprises less than 1% of adult hemoglobin. It is formed of two α chains and two γ (gamma) chains ($\alpha_2\gamma_2$).[9]

α-Thalassemia

α-thalassemia (Figure 2 and Table 1) results from deletion of one or more of the four genes responsible for α-globin synthesis. Four-gene deletions result in fatal hydrops fetalis with 90-95% Hb Barts (γ_4). Three-gene deletions results in hemoglobin H (Hb H). A two-gene deletion results in individuals with α-thalassemia trait, and a one-gene deletion results in the "silent" carrier state.[10]

Figure 2: α-Thalassemia Terminology[6]

-α/αα heterozygous α^+-thalassemia (silent α-thalassemia)
-α/-α homozygous α^+-thalassemia (α^+-thalassemia trait)

α^0-thalassemia

--/αα heterozygous α^0-thalassemia (α^0-thalassemia trait)
--/-- homozygous α^0-thalassemia (Hb Bart's)

Compound heterozygous α-thalassemia

--/-α heterozygous α^0 with heterozygous α^+ (Hb H)

Key: αα/αα = normal individual (2 α-globin genes on each of two chromosomes)
- α = one gene on a chromosome
- - = no genes on a chromosome

Individuals with α-thalassemia trait may not be anemic, but may exhibit mild hypochromia and microcytosis with laboratory exam. Their Hb A_2 and Hb F levels are normal. Hb H disease results in hemolytic anemia with ineffective erythropoiesis, although survival into mid-adult life without transfusions is now common. Hb Bart's is a more virulent condition, with the resulting hydrops fetalis producing death in-utero or shortly after birth.[4] Readily available gap PCR gene deletion testing can identify the majority of persons with α-thalassemia, including silent α-thalassemia (-α/αα).[10]

Table 1: α-Thalassemia Hemoglobins and Red Blood Cell Indices[11]

Phenotype	Genotype	HbA (%)	HbA_2 (%)	HbF (%)	HbH (%)	HbBart (%)	Hb (g/dL)	MCV (fl)	MCH (pg)
Normal	αα/αα	96-98	2-3	<1	0	0	15	90	30
Silent	- α/αα	96-98	2-3	<1.0	0	0	14.5	75-85	26
Trait (α^0 or α^+)	--/αα or - α/-α	96-98	1.5-3.0	<1.0	0	0	12-13	68-76	23
Compound	- -/-α	60-90	<2.0	<1.0	0.8-40	2-5	7-10	57-65	18
Bart's	- -/- -	0	0	0	5-10	85-90	3-8	136	32

β-Thalassemia

β-thalassemia (see Table 2) is usually caused by one of more than 200 point mutations in β-globin chain synthesis, or may rarely result from deletions.[6] Homozygous β-thalassemia is a serious

medical condition. Previously, most persons with the condition died in childhood, but individuals treated from birth with transfusions now commonly live to over forty years of age.[7] β-Thalassemia major, with either absent or reduced beta chain production, results in a significant amount of HbF ($\alpha_2\gamma_2$). This tetramer is unstable, readily breaks down, and thus results in severe microcytic, hypochromic anemia. It may be associated with massive enlargement of the liver and spleen, due to excessive red-cell destruction and extramedullary erythropoiesis. Pathological fractures may result from thinning of the cortex secondary to bone marrow expansion.[12] Transfusion therapy is necessary to sustain life.[7] β-thalassemia intermedia encompasses a wide range of disorders between transfusion-dependent patients with growth and development retardation to asymptomatic patients.[6] Thalassemia minor (thalassemia trait) usually presents as only minimal or mild anemia, but may demonstrate profound microcytosis, hypochromia, and target cell presence. Hemoglobin electrophoresis classically reveals an elevated HbA_2, but some forms are associated with normal HbA_2 and/or elevated HbF. Individuals with β-thalassemia trait should be warned that their blood picture resembles iron deficiency and can be misdiagnosed.[4]

Table 2: β-Thalassemia Hemoglobins and Red Blood Cell Indices.[8]

Phenotype	β-Globin Genes	HbA (%)	HbA_2 (%)	HbF (%)	Hb (g/dL)	MCV (fl)	MCH (pg)
Normal	Homozygous β	97-99	1-3	<1	15	90	30
β minor (trait)	Heterozygous β^0or β^+	80-95	4-8	1-5	♂ 11-15 ♀ 9-14	<79	<27
β intermedia	*	10-30	2-5	70-90	7-10	50-80	16-24
β major	Homozygous β^+or β^0	0-10	4-10	90-96	<7	50-70	12-20

*Homozygous β^+ (mild) or compound heterozygous β^+/β^0 (more severe)

Other Thalassemias

Delta-beta (δβ) thalassemia produces a phenotype of β –thalassemia intermedia when homozygous and a β-thalassemia minor phenotype when heterozygous. It does not demonstrate increased Hb A_2 (A_2 may usually be < 4%). When a person with microcytic, hypochromic anemia is noted to have Hb A_2 levels less than 4% and elevated HbF levels, δβ- thalassemia should be suspected. The Kleihauer-Betke (K-B) acid elution test may be used to distinguish it from hereditary persistence of fetal hemoglobin (HPFH).[6]

Sickle cell trait (Hb AS)/β-thalassemia, may produce a symptomatic clinical sickling syndrome similar to Sickle Cell Anemia (Hb SS) disease, unlike Sickle cell trait without thalassemia.[6] Hemoglobin Lepore produces a thalassemia syndrome varying in severity from β-thalassemia intermedia to β-thalassemia major when homozygous. The heterozygous condition is clinically comparable to β-thalassemia minor, but the hemoglobin electrophoresis shows Hb Lepore, mildly increased Hb F, and low Hb A_2.[6]

Hb E has increasing prevalence worldwide with frequencies as high as 80% in some populations in South and Southeast Asia. It has now become the most common thalassemia syndrome on the U.S. West Coast. Heterozygous Hb E or Hb E trait (Hb AE) or Hb E/α^0-thalassemias cause mild anemia with normal indices. They are otherwise asymptomatic. Hb E/α^+-thalassemia or homozygous Hb E produce hypochromic microcytic anemia and may occasionally cause splenomegaly. Hb E/β^0 is associated with splenomegaly and causes clinical illness similar to β –thalassemia intermedia or major. It is occasionally mild enough to be found incidentally in adulthood.[13, 14]

Hb C is another significant variant hemoglobin thalassemia. Heterozygous Hb C trait is asymptomatic and may have no anemia or red blood cell changes. Hb C/β-thalassemia, however, causes a clinical syndrome with microcytic anemia and occasional splenomegaly. The severity is usually mild and the clinical findings depend on whether the β^0 or β^+-thalassemia form is involved.[7, 15, 16]

II. Aeromedical Concerns.

The diagnosis of thalassemia syndrome for aeromedical purposes does not require the detailed genotypic analysis that may be necessary for genetic counseling. Flyers diagnosed with these syndromes should be informed that formal genetic counseling with their partner is recommended, due to the potentially catastrophic outcomes in their offspring. Further testing may be required for genetic counseling purposes in these cases. In general, β-thalassemia and variant hemoglobins can be diagnosed utilizing hemoglobin electrophoresis. α-thalassemia was often a diagnosis of exclusion, because no readily available direct testing existed for this condition. While most cases of α-thalassemia can now be easily classified by PCR deletion analysis, a presumptive diagnosis based on clinical phenotype evaluation may be more cost effective and adequately sufficient for aeromedical disposition.[6, 11, 17]

The primary aeromedical concern regarding the thalassemia syndromes include anemia, hemolysis, splenomegaly, and sickling potential. Although unlikely, mild cases of homozygous thalassemia syndromes could present for aeromedical disposition. Thalassemias may compromise the oxygen-carrying capacity of the individual when significant anemia exists or sickling symptoms occur. Flying duties are thus typically contraindicated for β-thalassemias major and intermedia, Hb AS/ β-thalassemia, Hb AE/ β-thalassemia, Hb H, and other similar conditions. Splenomegaly is disqualifying for many USAF flying classes and may have service retention implications if unable to be surgically corrected.

Heterozygous β-thalassemias generally do not impair normal life and are compatible with aircrew duties. The potential concern is the severity of the anemia and the possibility of splenomegaly.[18] Most individuals with β-thalassemia minor require no medication and live normal lives, suffering no ill effects or restrictions.[9] Heterozygous α-thalassemias, such as silent thalassemia and α-thalassemia trait, rarely produce more than a mild anemia and are therefore compatible with most flying duties.

Table 3. Suggested Diagnostic Testing[6, 11]

1. CBC with peripheral smear and reticulocyte count
2. Iron studies (serum iron, iron saturation/TIBC and ferritin)
3. Hemoglobin electrophoresis (including Hb H and Hb Bart analysis)

Hemoglobin Electrophoresis Results	Suspected Diagnosis
Normal hemoglobin types Normal Hb A_2 and Hb F levels No iron deficiency	Presumed α-thalassemia
Elevated Hb A_2 Elevated or normal Hb F No variant Hb	β-thalassemia
Hb A_2<4% with elevated Hb F	Suspect δβ-thalassemia, even if no Hb Lepore found. Kleihauer-Betke (K-B) acid elution test may be used to distinguish HPFH.
Hemoglobin variant	Hb C, Hb E, Hb S (Heterozygote vs. Homozygote)
Hemoglobin variant With elevated Hb A_2, Hb F	Combination variant hemoglobin β-thalassemia

III. Waiver Considerations.

Hemoglobinopathies and thalassemia are disqualifying for flying classes I/IA, II and III duties. Thalassemia is not specifically disqualifying for ATC/GBC and MOD duties. USAF experience suggests a waiver for α- and β-thalassemia minor/trait is likely as long as the anemia is minimal and the individual is symptom free. For the purposes of this discussion, anemia shall be considered minimal if hematocrit levels remain above 40 for men and 35 for females. Symptomatic anemia is disqualifying for retention and all flying class duties. Due to limited USAF experience and the potential clinical variations between individuals, heterozygous thalassemia associated with other hemoglobinopathies cannot be generalized and waiver status for these circumstances will be considered on a case by case basis.

Table 4: Waiver potential for various types of thalassemia.

Flying Class	Condition	Waiver Potential Waiver Authority
I/IA	α-thalassemia (silent thalassemia) and α-thalassemia trait	Yes*† AETC
	Hb H disease	No AETC
	β-thalassemia minor	Yes*† AETC
	β-thalassemia intermedia and major	No AETC
II/III#	α-thalassemia (silent thalassemia) and α-thalassemia trait	Yes*† MAJCOM
	Hb H disease	No MAJCOM
	β-thalassemia minor	Yes*† MAJCOM
	β-thalassemia intermedia and major	No MAJCOM
ATC/GBC; MOD&	α-thalassemia (silent thalassemia) and α-thalassemia trait	Yes*† MAJCOM**
	Hb H disease	No MAJCOM**
	β-thalassemia minor	Yes*† MAJCOM**
	β-thalassemia intermedia and major	No MAJCOM**

* Waiver likely if asymptomatic and hematocrit >32.
** Waiver authority for MOD personnel is AFGSC.
† Indefinite waiver likely if stable hematocrit > 38 for males and >36 for females and asymptomatic.
# Initial FC III waiver authority is AETC.
& Thalassemia only disqualifying for ATC/GBC and MOD if symptomatic; in that case AFMSA is initial waiver authority

Review of AIMWTS in May 2015 revealed 176 cases with a diagnosis of thalassemia or thalassemia trait. Breakdown of the cases revealed: 43 FC I/IA (4 disqualified), 41 FC II (3 disqualified), 65 FC III (4 disqualified), 26 ATC/GBC (1 disqualified), and 1 MOD (0 disqualified).

Many of these cases were granted an indefinite waiver. Of the 12 disqualified cases, most were disqualified for reasons other than the thalassemia.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition have been completed and all appropriate treatments have been initiated using best current clinical guidelines and recommendations. If required, MEBs should be completed prior to waiver submission.

The aeromedical summary for an initial waiver should include the following:
A. History – symptoms (including pertinent negatives) such as fatigue, headache, shortness of breath, dizziness, palpitations and activity level. Additionally, ethnicity, place of ancestral origin, and family history of "anemia" should be included.
B. Physical Exam to include skin, mucous membranes, heart, lung, abdomen (including presence or absence of palpable spleen) and extremities.
C. CBC with reticulocyte count.
D. Iron studies (serum iron, total iron binding capacity (TIBC), and serum ferritin).
E. If spleen is palpable, abdominal ultrasound to quantify splenomegaly.
F. Hemoglobin electrophoresis.
G. Blood smear results (looking for number of target cells, dacrocytes, etc.)
H. Hematology consult.

The aeromedical summary for waiver renewal should include the following:
A. History – Brief summary of symptoms or results that led to diagnosis, or any new symptoms (include pertinent negatives).
B. Physical – skin, mucous membranes, heart, lung, abdomen, extremities.
C. CBC annually.
D. Iron studies.

ICD-9 codes for thalassemia	
282.4	Thalassemia
282.7	Other hemoglobinopathies
282.8	Other specified hereditary hemolytic anemias
282.9	Hereditary hemolytic anemia, unspecified

ICD-10 codes for thalassemia	
D56.9	Thalassemia, unspecified
D58.2	Other hemoglobinopathies
D58.8	Other specified hereditary hemolytic anemias
D58.9	Hereditary hemolytic anemia, unspecified

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WAIVER GUIDE
Updated: Aug 2015
Supersedes Waiver Guide of Dec 2011
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CONDITION:
Thrombocytopenia, Idiopathic Thrombocytopenic Purpura (ITP), and Idiopathic Thrombotic Thrombocytopenic Purpura (TTP) (Aug 15)

I. Overview.

Due to the diversity of underlying disorders, the differential diagnosis of thrombocytopenia is broad. These range from clinically insignificant pseudothrombocytopenia to life threatening disseminated intravascular coagulation and thrombotic thrombocytopenic purpura. As a result, a thorough history and physical exam as well as appropriate laboratory studies are essential in the search for an etiology.

Units can be a confusing factor when dealing with platelet results. It seems there is little standardization. All of the following results are equal:

100 X 10^9/L	100 X 10^3/mL	100,000/mm^3

For the purposes of this waiver guide, the first of these units will be used.

Thrombocytopenia is defined as platelet count of <u>less than 150 X 10^9/L</u>. Platelet counts of 100 X 10^9/L to 150 X 10^9/L are considered mild thrombocytopenia. However, the risk of bleeding with trauma or surgery is generally not increased until platelet counts are below 75 X 10^9/L. Spontaneous bleeding is unusual above 30 X 10^9/L so treatment is usually not initiated unless platelet counts fall below that level. Patients with platelet counts less than 5 – 10 X 10^9/L are considered at high risk for spontaneous, life-threatening hemorrhage.[1]

<u>Pseudothrombocytopenia (PTCP)</u>: The term pseudothrombocytopenia is used to define a state with a falsely low platelet count reported by automated hematology analyzers due to platelet clumping. Commonly, this clumping is caused by an alteration of the platelet surface glycoproteins when they are incubated with a calcium chelator such as EDTA. These modified platelet antigens then react to anti-platelet autoantibodies to form these large agglutinates. Some resources state that the aggregation of platelets in patients with EDTA-dependent PTCP can be prevented by the use of other anticoagulants such as sodium citrate or heparin, but even these agents can induce platelet clumping, and thus spuriously low platelet counts. Clumped platelets on peripheral blood smear are the hallmark. Repeat within 2 weeks with a peripheral smear. If platelet count is then normal, no further action is necessary.[2]

<u>Dilutional Thrombocytopenia</u>: This occurs with massive transfusion using platelet-poor fluids. The platelet count should be repeated when the patient is stable. The condition which required the transfusion will determine if waiver is required.

<u>Persistent Borderline Thrombocytopenia</u>: When platelet counts persist for 3 months in the range of 100 X 10^9/L and 150 X 10^9/L, other etiologies such as medications, viral infections or other

transient conditions have been ruled out, and the aviator is asymptomatic and without other lab abnormalities, a waiver is not required. However, the 10-year probability of developing idiopathic thrombocytopenic purpura (platelet counts persistently < 100 X 10^9/L) was determined in one study to be 6.9%.[3] In the same study, the 10-year probability of developing autoimmune disorders other than ITP was 12.0%. Therefore, complete blood count (CBC) is recommended every six months while on flying status.

Thrombocytopenia Secondary to Decreased Platelet Production: Many conditions can cause decreased platelet production; those likely to affect the previously healthy, flying population include viral infections, nutritional deficiencies, bone marrow disorders, drugs and toxins. A search for such underlying disorders is essential as some are life-threatening while others spontaneously resolve. Transient thrombocytopenia due to viral illness usually spontaneously resolves. Drugs known to occasionally induce thrombocytopenia include quinidine, quinine, sulfa preparations, carbamazepine, methyldopa, aspirin, oral antidiabetic drugs, gold salts, heparin, and rifampin. There are an estimated 87 known drugs with some evidence of causing thrombocytopenia.[4] Recent data indicates that up to 36% of patients on prolonged heparin therapy develop thrombocytopenia.[5] The mechanism is an immune reaction in which drug bound to the platelet membrane acts as a "foreign" antigen. The mechanism is analogous to the immune-mediated destruction of platelets that occurs in idiopathic thrombocytopenic purpura (ITP) and, except for the history of drug ingestion, the disorders are indistinguishable. When the drug is stopped, the platelet count typically begins to increase within 1 to 7 days; gold-induced thrombocytopenia is an exception, because injected gold salts may persist in the body for many weeks.

Thrombocytopenia Secondary to Altered Distribution of Platelets: Hypothermia is a cause of transient thrombocytopenia due to splenic sequestration. Because rewarming is associated with return to normal platelet count and function, the aeromedical concerns focus on the hypothermia itself and are not discussed here. Congestive splenomegaly or hypersplenism is a more common and clinically significant cause of platelet sequestration and more than 200 diseases have been associated with congestive splenomegaly. The clinical and laboratory findings typically include significant splenic enlargement, platelet counts above 50 X 10^9/L, and a decrease in red and/or white blood cell counts.[6] Because the total pool of platelets is normal and mobilization typically occurs with stress, splenectomy is not clinically indicated in most cases. Splenomegaly is disqualifying for flying personnel; splenectomy is not without potential for complications and is not always curative, so great thought needs to be placed into this decision. Individuals should be immunized at least two weeks prior to splenectomy for *Streptococcus pneumoniae*, *Hemophilus influenzae* b, and *Neisseria meningitidis*.

Thrombocytopenia Secondary to Increased Platelet Destruction: These conditions, mainly idiopathic (immune) thrombocytopenic purpura, disseminated intravascular coagulation, and thrombotic thrombocytopenic purpura, manifest with purpura and/or bleeding.

Idiopathic thrombocytopenic purpura (ITP): ITP is caused by autoreactive antibodies that bind to platelets and shorten their life span. *ITP is an isolated thrombocytopenia, with otherwise normal blood counts, normal peripheral smear, and no clinically apparent associated conditions that may cause thrombocytopenia; it is a diagnosis of exclusion.[7] ITP occurs more commonly in women during the second and third decades but can occur in either sex and at any age.[8] Many patients come to medical attention with platelet counts between 5 and 20* X 10^9/L *because they develop petechiae, purpura, gingival bleeding or ecchymoses over the course of several days. Those with*

30 to 50 X 10^9/L *often give history of easy bruising. The spleen size is normal. Platelet antibody testing is not necessary for management decisions in patients with ITP and the current available tests do not distinguish ITP from secondary thrombocytopenic purpura, and a negative test does not rule out the diagnosis of ITP.*[7]

In childhood, ITP is usually acute in onset and many cases resolve with and without treatment. If ITP was diagnosed in childhood (<18-years-old) and complete resolution was achieved, regardless of treatment, prognosis is excellent with no long term sequelae. Adult ITP (≥18-years-old) tends to be of more indolent onset with a course that is persistent, often lasting years, and can be characterized by recurrent exacerbations of disease. Of 86 patients that had a complete response, (despite treatment option) at 2 years, 9 had one or more relapses over the ensuing years of study (mean years of follow up was 10.5).[9]

It is estimated that the lifetime risk of fatal hemorrhage for a person with ITP is approximately 5%. The risk of a nonfatal major hemorrhage was found to be 3% per year for patients less than 40 years of age. No conclusive data exist regarding the ability of clinical or laboratory parameters at presentation to predict the risk of major bleeding.

Treatment of ITP must be tailored to the individual patient with an attempt to match the risks of therapy with the severity of disease, taking into account the patient's lifestyle. Treatment is based primarily on the severity of the thrombocytopenia and bleeding. All suspect drugs should be discontinued.[10] The goal of all treatment strategies for adult patients with ITP is to achieve a platelet count that is associated with adequate hemostasis, rather than a platelet count in the "normal" range.[11] *Treatment options include corticosteroids, splenectomy, and, for life-threatening bleeding, platelet transfusions and IV immune globulin.* Adults usually are given an oral corticosteroid (e.g. prednisone 1 mg/kg once/day) initially. In the patient who responds, the platelet count rises to normal within 2 to 6 weeks. The corticosteroid dosage is then tapered over one to four months.[12] However, most patients (70 to 95%) either do not respond adequately or relapse as the corticosteroid is tapered; splenectomy can achieve a remission in about ⅔ of these patients.[13] Of the 30 to 40% of adults that require therapy after splenectomy, the incidence of intracerebral hemorrhage ranges from 2 to 3% per year.[8]

<u>Thrombotic thrombocytopenic purpura (TTP)</u>: TTP and hemolytic-uremic syndrome (HUS) are acute, fulminant disorders characterized by thrombocytopenia, microangiopathic hemolytic anemia, fever, variable neurological symptoms, and renal failure. TTP and HUS involve nonimmunologic platelet destruction. Loose strands of fibrin are deposited in multiple small vessels, which damage passing platelets and RBCs. Platelets are also destroyed within multiple small thrombi. Multiple organs develop bland platelet-fibrin thrombi (without the vessel wall granulocytic infiltration characteristic of vasculitis) localized primarily to arteriocapillary junctions, described as thrombotic microangiopathy. TTP and HUS differ only in the relative degree of renal failure. Diagnosis and management in adults are the same. Therefore, in adults, TTP and HUS can be grouped together.[14] Although most cases of TTP have no known etiology, potential causes and associations are pregnancy, deficiency of the plasma enzyme ADAMTS13, hemorrhagic colitis resulting from Shiga toxin-producing bacteria, and drugs (such as quinine, cyclosporine, mitomycin C).

Plasma exchange is the only treatment for TTP in adults which has firm data supporting its effectiveness.[14] In addition, glucocorticoid therapy is often prescribed. More intensive immunosuppressive therapy with rituximab, cyclophosphamide, vincristine or cyclosporine may be

required in some individuals to obtain a remission. In one study relapses occurred in 20% of idiopathic TTP, most within the first year and in those with severe ADAMTS13 deficiency. Many patients describe persistent cognitive abnormalities for many years following recovery that can be documented by tests of new learning and recent memory.

II. Aeromedical Concerns.

Thrombocytopenia itself (apart from the underlying condition) is not likely to affect physical or cognitive performance unless bleeding occurs or the potential for trauma exists, which is inherent in many aeromedical occupations. ITP in adults is frequently a chronic disease that can require treatments not compatible with flying (steroids, immunosuppressive therapy). TTP is an acute, fulminant disease that has a high rate of relapse, especially in the first year. Furthermore, neurological system involvement is common, from seizures, cerebral vascular attacks to mild cognitive deficits. Resolution of symptoms and sequelae needs to be established.

III. Waiver Consideration.

Platelet dysfunctions, idiopathic thrombocytopenia, and generally platelet counts less than 100 X 10^9/L are disqualifying for all flying, special duty positions, and retention. As such, any persistent or symptomatic condition leading to a decreased platelet count is disqualifying. Thrombocytopenia of any cause that requires prolonged therapy, intense medical supervision, or has an unsatisfactory response to therapy would be disqualifying and result in the need for a waiver.

Table 1: Waiver potential for thrombocytopenia, ITP, or TTP

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA Initial II/III	Thrombocytopenia or ITP (childhood, < 18-years-old) that resolved. ITP/TTP/causes other than transient (≥18-years-old).	Yes AETC No AETC
II//III ATC/GBC MOD	Single episode of ITP resolved with platelets >100 X 10^9/L.* Recurrent ITP or not resolved with platelets maintained at >50 X 10^9/L and <100 X 10^9/L.* Recurrent or not resolved ITP with platelets maintained at <50 X 10^9/L. TTP resolved with platelets >100 X 10^9/L† Recurrent TTP	Yes MAJCOM Yes AFMSA No AFMSA Yes AFMSA No AFMSA

* Off all treatment and 6 months of stable platelets.
† Waiver not considered until two years after resolution and ACS evaluation is likely.

Any single hemorrhage or thromboembolic event is DQ for FCI/IA, II and III only, MAJCOM is waiver. Does not apply to ATCGBC/MOD.

AIMWTS search in Aug 2015 revealed a total of 39 individuals with an aeromedical summary for one of the thrombocytopenic disorders. Breakdown of the cases showed 9 FC I/IA cases (3 disqualifications), 19 FC II cases (2 disqualifications), 9 FC III cases (2 disqualification), 2 ATC/GBC cases, and 0 MOD cases. All 7 disqualification cases were disqualified secondary to the thrombocytopenia diagnosis.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for thrombocytopenia, ITP, or TTP should include the following:
A. Comprehensive history and physical to include peripheral blood smear interpretation and course of platelets.
B. CBC with differential.
C. Bone marrow aspiration if over 60 years of age or associated symptoms suggest pathology.
D. Hematology consultation.
E. Cortisol stimulation test if treated with steroids for greater than 3 weeks (see systemic glucocorticoid waiver guide).
F. Medical evaluation board (MEB) results for ITP, TTP and thrombocytopenia associated with splenomegaly.

The AMS for renewal waiver for thrombocytopenia, ITP, or TTP should include the following:
A. Interim history and current exam.
B. CBC quarterly (If individual has gone six years without recurrence then CBC just at waiver renewal time).
C. Hematology consultation if platelets not stable since last waiver or platelets < 100 X 10^9/L.

ICD-9 codes for thrombocytopenic disorders	
287.3	Primary thrombocytopenia
287.4	Secondary thrombocytopenia
287.5	Thrombocytopenia, unspecified
287.31	Immune thrombocytopenic purpura
446.6	Thrombotic microangiopathy (TTP)

ICD-10 codes for thrombocytopenic disorders	
D69.49	Other primary thrombocytopenia
D69.59	Other secondary thrombocytopenia
D69.9	Thrombocytopenia, unspecified
D69.3	Immune thrombocytopenic purpura
M31.1	Thrombotic microangiopathy

V. References.

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WAIVER GUIDE
Updated: Jun 2016
Supersedes Waiver Guide of Jun 2012
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Reviewed by LtCol Roger Wood, AF/SG consultant for Hematology/Oncology

CONDITION:
Thrombocytosis (Jun 16)

I. Overview.

Thrombocytosis, also called thrombocythemia, is generally defined as a platelet count greater than a defined upper limit of normal that usually falls between 350,000/µl to 450,000/µl, depending on the laboratory or medical reference. In one study of 10,000 adult subjects from Italy, the 99th percentile for the platelet count was 409,000/µl for men and 381,000/µl for women.[1] The most commonly cited cut off for normal is often arbitrarily defined as <450,000/µl as this has also been chosen as one of the criteria required for the diagnosis of essential thrombocythemia by the World Health Organization. It is estimated that a platelet count in excess of 450,000/µl occurs in about 2.5% of the population (regardless of sex and ethnicity).[2] Elevated platelet counts are often an incidental or unexpected finding on a complete blood count (CBC) conducted to evaluate an unrelated condition.[3] For those individuals found to have thrombocytosis without associated bleeding or thrombosis, the first challenge is to find the underlying cause.

The causes of thrombocytosis are separated into two categories: autonomous (primary) thrombocytosis and reactive (secondary) thrombocytosis. Autonomous (or clonal) thrombocytosis occurs as a result of myeloproliferative disorders, myelodysplastic disorders, or more rarely as a result of a hereditary condition.[4] Reactive thrombocytosis is most often a normal physiologic response to a coexistent inflammatory condition (e.g., infection, chronic inflammatory condition). Distinction between these two categories is important since autonomous thrombocytosis is associated with a significantly increased risk for thrombotic or hemorrhagic complications whereas reactive thrombocytosis is not.[5] The association of autonomous thrombocytosis with vasomotor symptoms (headache, visual symptoms, lightheadedness, atypical chest pain, acral dysesthesia, erythromelalgia), thrombosis and hemorrhagic complications is well established.[6, 7, 8] As administration of low-dose aspirin (eg, 81 mg/day PO) is often effective for controlling vasomotor symptoms resulting from microvascular inflammation, platelet aggregation and arteriolar microthrombi formation, the most aeromedically relevant complications of thrombocytosis are felt to be the future risk of hemorrhage and thrombotic events.

A. Reactive (secondary) thrombocytosis

The most common reason for an elevated platelet count is reactive thrombocytosis.[5] Studies have concluded that as many as 70 to 90% of all patients with clinically elevated platelet counts have reactive thrombocytosis.[9, 10, 11, 12] Reactive thrombocytosis is most often a normal physiologic response to a coexistent inflammatory condition or surgery. Lifetime reactive thrombocytosis may also be present in patients who have had a splenectomy.

Reactive thrombocytosis is generally a self-limiting condition that resolves with the inciting condition. As mentioned above, reactive thrombocytosis is felt to have little excess associated

thrombotic or hemorrhage risk above that of the underlying causative etiology. However, in cases of extreme reactive thrombocytosis (platelet counts >1,000,000/μL) rates of patients experiencing a significant thrombosis and hemorrhage have been shown to be 1% and 3%, respectively.[6, 12] The list of conditions that may lead to a reactive thrombocytosis is lengthy. The platelet count should normalize within days after "correction" of whatever problem caused the thrombocytosis. A more prolonged elevation of the platelet count suggests an undiagnosed problem, such as a persistent infection. Common conditions include tissue damage from surgery, infection, malignancy, trauma, asplenia, and chronic inflammatory disorders.[8] Other conditions associated with transient thrombocytosis include acute blood loss, "rebound" from thrombocytopenia, iron deficiency, and even exercise.[3, 8]

Reactive thrombocytosis may be a result of a subclinical disorder or occult cancer. Therefore, asymptomatic patients with thrombocytosis must have a comprehensive physical evaluation for malignancy or other potentially treatable disease. The elevated platelet count needs to be confirmed by repeat testing on a different day.

B. Autonomous (primary) thrombocytosis

1) Myeloproliferative disorders:

a) Polycythemia vera (PV) causes thrombocytosis with an increase in blood viscosity. Thrombosis in the brain or other vital organs is a significant threat for PV patients.[13] Thrombocytosis secondary to PV is not felt to be an aeromedically waiverable condition.

b) Chronic myeloid leukemia (CML) – The leukemias have many significant medical complicating factors other than thrombocytosis that have the potential for progression and performance decrement in the aviation environment. Aeromedical waivers for successfully treated CML are evaluated on a case-by-case basis. (See leukemia waiver guide.)

c) Primary myelofibrosis (PMF) – PMF is characterized by the presence of bone marrow fibrosis that cannot be attributed to another myeloid disorder. PMF will often present with anemia, marked splenomegaly, early satiety, and hypercatabolic symptoms including severe fatigue, low-grade fever, night sweats and weight loss. Prognosis for this condition is often poor with a median survival of just 5 years. Thrombocytosis associated with PMF is not felt to be an aeromedically waiverable condition.

d) Essential thrombocytosis (ET) is a diagnosis of exclusion as it is not a cytogenetically or morphologically defined disease entity. It tends to be a disorder of adults in the sixth or seventh decade of life.[14] The median age at diagnosis for ET is 60 with as many as 20 percent being younger than 40. There appears to be a slight female preponderance in ET cases with an estimated prevalence of 24 total cases/100,000 population.[15] No single specific clinical, cytogenic, or molecular test is available for the diagnosis.[16] Janus kinase 2 (JAK2) gene mutation present in 95% of polycythemia vera cases, is also present in 50% of ET cases.[15] ET should be suspected in the asymptomatic patient found to have a chronically unexplained elevated platelet counts, an intact spleen, and normal serum ferritin and C-reactive protein level. The criteria for making this diagnosis has been proposed by the World Health Organization and must include all four of the below items.[17]

i. A platelet count greater than or equal to 450,000/μL.

ii. A bone marrow biopsy consistent with ET.
iii. A lack of any criteria for PV, CML, myelofibrosis, or myelodysplastic syndromes.
iv. The demonstration of a JAK2 mutation or other clonal marker; or in the absence of a clonal marker, no evidence for reactive thrombocytosis.

Most commonly, ET is found incidentally on complete blood counts (CBCs), but less commonly it may be found due to complications. Complications of ET can generally be categorized into thrombotic, hemorrhagic, or progression into one of the other three myeloproliferative disorders.[3] Determinants of an increased risk for complications are generally agreed upon to be age over 60, previous thrombotic event, presence of cardiovascular risk factors (e.g., tobacco use, hypertension, diabetes mellitus), presence of JAK2 mutation, and platelet counts >1,000,000/μL. The annual risk of thrombotic complications in an older case-control study of patients with ET reported in 1990, found the overall risk of thrombotic episodes to be 6.6%/patient-year compared with 1.2%/patient-year in the control group.[18] In this cohort, the most common thrombotic event was a cerebral arterial thrombosis and the corresponding risks for hemorrhagic complications were documented to be much lower (0.33 vs 0 percent/patient year, respectively). The most significant risk factors for thrombosis identified in this historical study were a history of prior thrombosis (31.4%/patient-year) and age over 60 (15.1%/patient-year). Newer studies continue to support the adverse prognostic value of a history of prior thrombosis as well as older age in ET, however these more recent estimates of thrombotic risk have been found to be lower than that reported in the 1990 study.[19,20] The risk of hemorrhage or progression to another myeloproliferative disorder is also less than that of a thrombotic event.[20]

Treatment of ET is generally categorized into one of two types of therapy. Aspirin therapy is indicated for relief of vasomotor symptoms and to reduce the risk of microvascular complications. It is very important to emphasize that aspirin therapy in these patients is not without risk. ET patients with platelet counts over 1,500,000/μl may develop an acquired von Willebrand's disease. Aspirin in these select patients likely increases their risk of hemorrhagic complications. The second category of therapy for ET is cytoreductive therapy. Cytoreductive therapy is generally felt to be of benefit to ET patients at high-risk of complications (age > 60 or a previous history of thrombosis). The two more common cytoreductive agents used are the antimetabolite hydroxyurea and the oral imidazoquinazoline derivative anagrelide.[21] These drugs are <u>not</u> approved for flying status. Furthermore, even if one were to reduce the platelet count to normal range with a cytoreductive drug complication rates still exceed acceptable aeromedical standards (probably because the platelets are still qualitatively abnormal and the fact that only ET patients predicted to be at high risk for complications would be treated with cytoreductive therapy). For patients at high risk for vascular events, some researchers feel that the combination of hydroxyurea and low-dose aspirin is superior to anagrelide plus low-dose aspirin.[22]

2) Myelodysplastic disorders cause different degrees of cytopenia and abnormal cell maturation. These patients are therefore at increased risk of anemia, infection, and bleeding which are often refractory to treatment. Thrombocytosis in less commonly seen in myelodysplastic disorders than thrombocytopenia, but it has been described in 5q- syndrome, and refractory anemia with ring sideroblasts and thrombocytosis (RARS-T).[6] Thrombocytosis associated with myelodysplastic disorders is not felt to have aeromedical waiver potential.

3) Hereditary or congenital thrombocytosis is a rare and heterogeneous genetic disorder that can present clinically like ET (e.g., vasomotor symptoms). This autosomal dominant condition usually

presents at birth but can be discovered at any time during life. Diagnosis should be considered following discovery of thrombocytosis in a young patient with otherwise unexplained thrombocytosis as well as a positive family history. Genetic testing would be required to confirm germline mutations in the *THPO* gene or in the *MPL* gene. Hereditary thrombocytosis may increase risk for thrombosis and hemorrhagic events, but it is not felt to cause myeloproliferation.

Evaluation

The current USAF policy is that any platelet count >400,000/μl must be evaluated prior to continuation of aviation and other military duties. The basic approach to an individual found to have an elevated platelet count should begin with an evaluation for reactive thrombocytosis. As stated above, reactive thrombocytosis is the most common reason for an elevated platelet count and is usually associated with infections, inflammation, trauma, hemolysis, metastatic cancer, asplenia, or iron deficiency anemia. If the platelet count returns to normal after management of the inciting condition, the individual may be returned to duty or flying status as long as the precipitating cause itself is not disqualifying. The presence of chronic thrombocytosis, vasomotor symptoms, thrombohemorrhagic complications, or splenomegaly would all be potential indicators of autonomous (primary) thrombocytosis. Further diagnostic testing would be necessary to distinguish among the different causes of autonomous (primary) thrombocytosis.

In general, persistent thrombocytosis in an aviator should prompt a formal hematology consultation who will guide the diagnostic workup. The laboratory evaluation of thrombocytosis will usually begin with review of the complete blood count (CBC) and peripheral smear. Clues on the peripheral smear indicating a reactive thrombocytosis would be the presence of microcytic anemia (iron deficiency) or Howell-Jolly bodies (asplenia or functional hyposplenism). Alternatively, an underlying myeloproliferative disorder could be suggested by an increase in hematocrit or leukocyte counts on the CBC. Initial laboratory testing will also normally include measurement of a serum ferritin, ESR and C-reactive protein. These labs would be expected to be increased with a reactive thrombocytosis. Of note, a normal serum ferritin level is also useful in excluding the possibility of iron deficiency anemia as the cause of a reactive thrombocytosis. According to the World Health Organization, JAK2 mutation screening is also part of the diagnostic workup for thrombocytosis. Finally, patients in which a reactive etiology to the thrombocytosis cannot be identified will require a bone marrow examination, which would include testing for the Ph+ chromosome. Patients with a reactive thrombocytosis will have normal appearing bone marrow morphology as well as negative JAK2 mutation screening.

II. Aeromedical Concerns.

The aeromedical concerns associated with an aviator with thrombocytosis will depend largely upon the underlying causative etiology.

A. Autonomous (primary) thrombocytosis. As outlined above, not all causes of primary thrombocytosis are felt to have aeromedical waiver potential. Primary thrombocytosis is often associated with an increased risk for thrombotic or hemorrhagic complications that exceeds acceptable aeromedical risk thresholds. In an aviator determined to have an active primary thrombocytosis, only the subset of low-risk essential thrombocytosis that is not requiring of cytoreductive therapy is felt to have waiver potential.

B. Reactive (secondary) thrombocytosis. Thrombotic and hemorrhagic complications are not a significant aeromedical concern in reactive thrombocytosis unless the underlying condition itself predisposes to such complications (e.g., individuals who are post-operative or with malignancy).[5] The elevated platelet count by itself is not expected to cause complications that affect physical or cognitive performance. For the condition to be labeled a reactive thrombocytosis, a credible underlying etiology must be identified. Individuals who have had a surgical splenectomy frequently have lifelong reactive thrombocytosis and once again do not have an increased risk for thrombosis or bleeding.[4, 11] (See splenectomy waiver guide.)

III. Waiver Consideration.

Platelet counts greater than 400,000/µl are disqualifying for all flying classes, ATC/GBC, and MOD personnel, as well as retention. If, after work-up, the elevation is determined to be reactive thrombocytosis secondary to an acute illness (e.g., surgery, infection) and the platelet count returns to normal, waiver is not required.

Table 1: Waiver potential for thrombocytosis

Flying Class (FC)	Condition/Treatment	Waiver Potential Waiver Authority	ACS review/ evaluation
FC I/IA Untrained II/III	Sustained reactive thrombocytosis secondary to splenectomy.	Yes AETC	No
	All other cases of sustained thrombocytosis	No AETC	No
FC II/RPA Pilot/III ATC/GBC MOD**	Sustained reactive thrombocytosis secondary to splenectomy.	Yes MAJCOM	No
	Sustained reactive thrombocytosis not secondary to splenectomy.	Maybe#* AFMSA	Yes
	Essential thrombocytosis without cytoreductive therapy.	Maybe‡ AFMSA	Yes
	Essential thrombocytosis with cytoreductive therapy.	No AFMSA	No
	All other causes of primary thrombocytosis.	No AFMSA	No

Depending on etiology; medical condition causing reactive thrombocytosis must be identified and also likely requires a waiver.
* FC II and III untrained unlikely.
** Waiver authority for MOD is AFGSC.
‡ FC II, RPA Pilot and FC III may be considered for waiver if ET does not require treatment, no history of thrombosis or hemorrhage, platelet count consistently below 1,000,000/µl, no evidence of JAK-2 and no other risk factors (e.g., tobacco use, hypertension, diabetes mellitus) and asymptomatic. Need for low-dose aspirin (eg, 81 mg/day PO) to control vasomotor symptoms may be considered acceptable following an ACS review. No waiver for untrained FC II and III.

AIMWTS search in Jun 2016 revealed a total of 16 cases submitted for a waiver with a diagnosis of thrombocytosis; 8 of the cases resulted in a disqualification. There were no FC I/IA cases, 3 FC II cases (2 disqualified), 9 FC III cases (3 disqualified), 1 ATC/GBC case (disqualified) and 3 MOD cases (2 disqualified).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for thrombocytosis should include the following:
A. Comprehensive history – to include thrombosis or bleeding episodes (negatives included), symptoms, course of platelet values, treatment, and cardiac risk factors.
B. Physical – complete, special attention to skin, neurology and abdomen.
C. Current CBC with differential and peripheral smear.
D. Serum ferritin, erythrocyte sedimentation rate (ESR), C-reactive protein, Janus kinase 2 (JAK2) gene mutation testing, and all other ancillary testing deemed appropriate by the treating specialist.
E. Hematology consultation to include bone marrow biopsy and clonal markers.
F. MEB results if required.

The AMS for renewal waiver for thrombocytosis should include the following:
A. History – summary of initial history (platelets, bone marrow, clonal markers) and symptoms (negatives included).
B. Physical – skin, neurology, abdomen.
C. CBC at least annually (minimum every 6 months for ET) or more frequently at direction of hematologist.
D. Updated hematology consultation.

ICD-9 Codes for Thrombocytosis	
238.71	Essential thrombocythemia (primary thrombocytosis)
238.4	Polycythemia
205.1	Chronic myelomonocytic leukemia
238.75	Myelodysplastic syndrome, unspecified
238.76	Myelofibrosis with myeloid metaplasia (idiopathic myelofibrosis [chronic])

ICD-10 Codes for Thrombocytosis	
D47.3	Essential (hemorrhagic) thrombocythemia
D45	Polycythemia vera
C92.1	Chronic myeloid leukemia
D46.9	Myelodysplastic syndrome, unspecified
D47.1	Chronic myeloproliferative disease

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WAIVER GUIDE
Updated: Mar 2015
Supersedes: Waiver Guide of Mar 2012
By: Maj Benjamin J. Park (RAM 16) and Dr. Dan Van Syoc
Reviewed by LtCol Mark True, AF/SG consultant for Endocrinology

CONDITION:
Thyroid Cancer (Mar 15)

I. Overview.

Thyroid cancer is the most common endocrine tumor representing 3.8% of all new cancer cases in the US.[1] There are four histologic types of thyroid cancer: papillary, follicular, medullary, and anaplastic.[2] The papillary and follicular histotypes are termed differentiated thyroid carcinoma and represent more than 90% of all thyroid cancers.[3] Medullary is a neuroendocrine tumor representing 5%, and anaplastic carcinomas, termed poorly differentiated carcinoma, are responsible for 1.7% of all thyroid cancers.[4, 5] More rare are the thyroid lymphomas or other carcinomas which metastasize to the thyroid.

Over the last two decades, the incidence of thyroid cancer has risen globally to the point where it is now the most common endocrine malignancy.[6] In the U.S., the risk is now more than twice what it was in 1990.[7] The current overall estimated incidence is 12.9 per 100,000, with rates of new thyroid cancer rising on average of 5.5% each year over the past 10 years.[1] Papillary carcinoma demonstrates the greatest proportional increase over time.[8, 9, 10] Rates for follicular, medullary, and anaplastic types, particularly among women, continue to rise across most age ranges. This is especially true for anaplastic carcinomas.[8]

Much of the perceived increase may well be due to improved detection of small papillary cancers, and many thyroid experts feel that this "increase" is actually due to improvements in diagnostic techniques such as ultrasound, imaging studies and ultrasound-guided fine needle biopsy (FNAB).[11] For 2014, the American Cancer Society reports approximately 62,980 new cases of thyroid cancer in the U.S. alone, of which 47,790 (76%) were in women, and 15,190 in men. Of these, nearly 2/3 were diagnosed in patients younger than 55 years of age with 2% occurring in children and teens.[7]

There may also be a role for genetic testing in the future of thyroid cancer diagnosis and treatment, particularly for "inconclusive" cytologic results. A 2011 study of 82 FNA smears, 46 malignant and 36 benign by histology looked to quantify the expression levels of the c-KIT gene by quantitative Real Time PCR. The researchers found a highly preferential decrease in c-KIT transcription for malignant thyroid lesions compared to the benign ones. Their analysis proved to be highly specific and sensitive, improving the cytological diagnostic accuracy by 15%.[12]

In general, 5% of thyroid nodules represent thyroid cancer.[13] Fortunately, the prognosis is usually excellent, with most forms of the disease (apart from the fulminant and lethal anaplastic variety) running an indolent course. Overall the relative 10-year survival rate is better than 90% (second only to non-melanoma skin cancer), and has remained fairly stable. From 2007-2011, the number of deaths from thyroid cancer was 0.5 per 100,000 men and women per year, with death rates rising on average of 0.8% per year.[1] In 2011 the American Cancer Society reported 1,740 deaths from thyroid cancer, of which 980 (56%) were women and 760 men.[7]

Most thyroid cancers are diagnosed at a local stage (61%), occur in non-Hispanic whites (79.5%), and in females. A 2011 study published by the National Cancer Institute found that among women, papillary thyroid cancer rates were highest among Asians (10.96 per 100,000 woman-years) and lowest among blacks (4.90 per 100,000 woman-years), while follicular cancer rates did not vary substantially by race or ethnicity. Medullary cancer rates were highest among Hispanics (0.21 per 100,000 woman-years) and whites (0.22 per 100,000 woman-years), and anaplastic rates were highest among Hispanics (0.17 per 100,000 woman-years). Among men, both papillary and follicular thyroid cancer rates were highest among whites (3.58 and 0.58 per 100,000 man-years, respectively), medullary cancer rates were highest among Hispanics (0.18 per 100,000 man-years), and anaplastic rates were highest among Asians (0.11 per 100,000 man-years).[8]

Papillary Thyroid Cancer:

- Age at diagnosis: Most frequently 30-50 years old, with a peak at age 50, and a female-to-male ratio of about 2.5:1.14
- Clinical Course: Indolent and slow-growing both in the thyroid gland and in secondary sites. Tends to metastasize locally to lymph nodes and strap muscles of the neck. The presence of local cervical adenopathy does not adversely affect prognosis. It can rarely metastasize to the lungs, bone or brain. Lesions less than 1 cm at diagnosis (micropapillary) have a lifetime recurrence rate of about 5% and no change in death rate from the general population. There is an increased incidence in high iodine intake regions, as well as in those receiving external radiation to the neck as a child.[15]
- Pathologic Variants: Can see Follicular, Tall Cell, or Columnar Cell variants which confer a worse prognosis.
- Prognosis: Excellent. Ten year overall survival is 93%.[16] Patients younger than 40 years have better prognosis than older patients.

Table 1: Papillary thyroid cancer*

Stage	**5-Year Relative Survival Rate**
I	Near 100%
II	Near 100%
III	93%
IV	51%

*Based on patients diagnosed 1998 to 1999[17]

Follicular Thyroid Cancer:

- Age at diagnosis: Older population than papillary tumors; peak incidence between ages 40 and 60.[18]
- Clinical Course: Tends to metastasize hematogenously to bone and lungs. Often a bone lesion (lytic lesions and pathologic fractures) is the presenting symptom. Small primary lesions in the thyroid may be overlooked. More commonly seen in iodine-deficient regions.
- Prognosis: Excellent; survival slightly less than with papillary cancer; estimated to be about 85% at ten years.[19] Older patients have a worse prognosis.

Table 2: Follicular thyroid cancer*

Stage	5-Year Relative Survival Rate
I	Near 100%
II	Near 100%
III	71%
IV	50%

*Based on patients diagnosed 1998 to 1999[17]

Anaplastic or Undifferentiated Thyroid Cancer:

- Age at diagnosis: mean age at diagnosis is 65 years and fewer than 10 percent are younger than 50 years.[20]
- Clinical Course: Typical presentation is an older patient with dysphagia, cervical tenderness, and a painful, rapidly enlarging neck mass. Superior vena cava syndrome may also be present, as well as metastatic disease which is found in 30-50% of new diagnoses.[21] Other symptoms may include stridor, and/or hoarseness. Extremely rapid growth and local invasion can lead to strangulation or esophageal obstruction. While exact figures vary, there may be a history of differentiated thyroid cancer which has undergone transformation.
- Prognosis: Grave in spite of combined surgery, radiation, and chemotherapy. Median survival is 5 months; with a one year survival of 20%.[22] All anaplastic carcinomas are considered Stage IV, and have a 5-year relative survival rate around 7% (based on patients diagnosed between 1985 and 1991).[19] Poor prognosis is associated with acute symptoms (within 1 month of presentation with neck tumor, rapid growth, hoarseness, pain, dyspnea, or dysphagia), tumor >5 cm, distant metastases, or a white blood cell count of >10,000.

Medullary Thyroid Cancer:

- General: Neuroendocrine tumors arising from parafollicular C cells which produce thyrocalcitonin. Sporadic disease is typically seen in older individuals (50-60) and accounts for 80% of cases. Of these 75-95% present as a solitary thyroid nodule; typically in the upper thyroid lobes. The other 20% have inherited tumor syndromes.[23] These syndromes are all autosomal dominant and can be detected with genetic testing. The syndromes are multiple endocrine neoplasia (MEN) type 2A (medullary carcinoma of the thyroid, pheochromocytoma, and multigland parathyroid hyperplasia or tumors), MEN 2B (medullary carcinoma of the thyroid, pheochromocytoma, mucosal neuromas, and marfanoid body habitus), or familial medullary carcinoma. All three involve mutations in the *RET* proto-oncogene and should be suspected in younger patients who present with medullary histology.[24] Lymph nodes are involved pathologically in two-thirds of all cases.[25]
- Clinical Course: Two patterns - a unifocal lesion occurring sporadically in elderly and a bilateral form often associated with pheochromocytomas which tend to be malignant (autosomal dominant MEN type 2). Clinical syndromes include asymptomatic elevated serum calcitonin, intractable diarrhea, Cushing's syndrome, and carcinoid syndrome.
- Prognosis: Overall 10/15 year survival rates approximately 70/65% in the previous studies. When the familial forms were excluded these rates dropped to about 60 and 54% respectively. Younger age at diagnosis, smaller tumor size, and familial form are all associated with better survival rates. Two groups of patients have 10-15 year survival rates no different from the general population: 1)

Patients with the familial form identified by screening (serum calcitonin determinations in relatives of patients with medullary thyroid cancer), and 2) Young patients with tumors <1 cm in size and clinical stage I or II at diagnosis. If local lymph node metastases are identified or when the pre-operative serum basal calcitonin is >400 pg/mL, the 2009 American Thyroid Association (ATA) Guidelines suggest additional cross sectional imaging including chest CT, neck CT, three-phase contrast-enhanced liver CT or contrast-enhanced liver MRI are indicated.[26] Given that any medullary carcinoma may be associated with MEN 2, preoperative testing must also include measurement of serum calcium (to rule out hyperparathyroidism requiring concomitant surgical intervention), plasma fractionated metanephrines as the initial screen for pheochromocytoma, as well as serum calcitonin concentration to establish if the tumor is capable of hypersecreting the hormone. In the case of elevated calcitonin, post-operative values should also be followed as post-operative doubling time has been shown to be a prognostic factor for survival rates.[27]

Table 3: Medullary thyroid cancer*

Stage	**5-Year Relative Survival Rate**
I	Near 100%
II	98%
III	81%
IV	28%

*Based on patients diagnosed between 1985 and 1991[17]

Pathogenesis: Exposure to either external (usually for benign conditions) or ingested radiation in childhood significantly increases the incidence of thyroid cancer. Such exposures result in a higher rate of PTC oncogene mutation than that found in thyroid tumors which do not result from such exposure. By contrast, BRAF gene mutation is less common in such thyroid tumors. Predisposing factors are the dose of radiation (direct correlation), female sex, and younger age at time of irradiation. The carcinogenic effect of irradiation on the thyroid persists for at least 40 years. All patients should be asked about any history of head or neck irradiation in infancy or childhood.

Staging of Thyroid Cancer

Table 4: American Joint Committee on Cancer (AJCC) Thyroid Cancer Staging System.[19]

Stage (T)	Primary Tumor (T)
T1	Tumor 2 cm or lesion greatest dimension limited to the thyroid
T2	Tumor more than 2 cm but not more than 4 cm in greatest dimension limited to the thyroid
T3	Tumor more than 4 cm in greatest dimension limited to the thyroid or any tumor with minimal extrathyroidal extension (e.g., extension to sternothyroid muscle or perithyroid soft tissues)
T4a	Tumor of any size extending beyond the thyroid capsule to invade subcutaneous soft tissues, larynx, trachea, esophagus, or recurrent laryngeal nerve
T4b	Tumor invades prevertebral fascia or encases carotid artery or mediastinal vessels
	All anaplastic carcinomas are considered T4 tumors
T4a	Intrathyroidal anaplastic carcinoma – surgically resectable
T4b	Extrathyroidal anaplastic carcinoma – surgically unresectable
	Regional Lymph Nodes
NX	Regional lymph nodes not assessed
N0	No regional lymph node metastasis
N1	Regional lymph node metastasis
N1a	Metastasis to Level VI (pretracheal, paratracheal, and prelaryngeal/Delphian lymph nodes)
N1b	Metastasis to unilateral, bilateral, or contralateral cervical or superior mediastinal lymph nodes
	Distant Metastasis
MX	Distant metastasis cannot be assessed
M0	No distant metastasis
M1	Distant metastasis

Table 5: AJCC Stage Grouping for Thyroid Cancer.[19]

Papillary or Follicular, Under 45 Years of Age

Stage	Primary Tumor (T)	Regional Lymph Nodes (N)	Distant Metastasis (M)
I	Any T	Any N	M0
II	Any T	Any N	M1

Papillary or Follicular, 45 Years of Age and Older and all Medullary Carcinomas

Stage	Primary Tumor (T)	Regional Lymph Nodes (N)	Distant Metastasis (M)
I	T1	N0	M0
II	T2	N0	M0
III	T3	N0	M0
	T1	N1a	M0
	T2	N1a	M0
	T3	N1a	M0
IVA	T4a	N0	M0
	T4a	N1a	M0
	T1	N1b	M0
	T2	N1b	M0
	T3	N1b	M0
	T4a	N1b	M0
IVB	T4b	Any N	M0
IVC	Any T	Any N	M1

Diagnosis: Carcinoma is a concern in any thyroid nodule. Therefore, all thyroid nodules should be evaluated by an Endocrinologist, ENT surgeon, or someone with experience in the evaluation. The initial evaluation of a thyroid nodule includes a thorough history to include family history for thyroid disease and a personal history of radiation exposure. A TSH should always be checked.[2] A thyroid scan (I^{123}) is indicated if the TSH is suppressed since hyper-functioning or "hot" nodules are essentially never malignant. Hot nodules require no further workup or treatment except ablation if the patient is hyperthyroid. All nodules >1.5 cm, and those <1.5cm with risk factors, should be sampled using fine-needle aspiration for cytology. If an adequate sample is obtained, cytology can accurately diagnose papillary, medullary, and anaplastic carcinoma cells. Approximately 15-25% of aspirations are "inconclusive" or "inadequate". About 20-40% of the suspicious (inconclusive) lesions may be carcinoma. For nodules with benign cytologic results, recent series report a higher false negative rate with palpation FNA (1-3%) than with ultrasound FNA (0.6%).[28] Therefore, thyroid nodules that are not removed need continued follow-up with repeat evaluation if there is evidence of significant size increases. A significant increase in size is defined as an increase of 20% in at least one dimension and an increase of at least 0.2 cm in two dimensions.

Treatment: Managing differentiated thyroid cancers can be a challenge as there have been limited prospective randomized trials of treatment. In general, thyroid malignancies are treated surgically, though there is some research underway on the use of High-intensity Focused Ultrasound Ablation (HIFU) therapy.[16] The extent of surgery is normally determined by cancer type, but most thyroid experts now advise total or near-total thyroidectomy for all patients with a preoperative diagnosis, as this leads to an improved disease-free survival. The major concern with thyroidectomy is

hypoparathyroidism and recurrent laryngeal nerve injury. Many cases of hypoparathyroidism are transient.

Most papillary and follicular carcinomas are also treated with radioactive iodine (I^{131}) and suppressive doses of thyroxine. The goal of radiotherapy is to destroy any residual microscopic thyroid tissue.[29] In most institutions, a post-therapy scan is done a week after treatment with I^{131}. This post therapy scan is highly sensitive for residual disease not seen on diagnostic scans.

About 5-15% of patients become refractory to radioactive iodine and prognosis is poor in these individuals with a 5 year survival rate of 66%. Few treatment options exist while standard chemotherapy has shown little benefit.[30] There is some potential with targeted systemic agents that target vascular endothelial growth factor (VEGF) and platelet derived growth factor (PDGF) and may act by depriving tumor vascular supply.[30] The most extensively evaluated of these targeted therapies include sorafenib (approved for use in Nov 2013) and lenvatinib (currently in phase II and III) which are multikinase inhibitors that inhibit VEGF and PDGF receptors. In the DECISION trial, progression free survival was 10.8 months vs. 5.8 months in patients treated with sorafenib vs. placebo.

Treatment with thyroxine, besides replacing thyroid function in patients who have undergone near-total thyroidectomy, is to minimize release of TSH. The dose of thyroxine is based on the patient characteristics. Lower risk patients are given doses to keep TSH in the low-normal range. Higher risk patients and those with some evidence of residual disease are usually treated with a goal of keeping the TSH undetectable with the minimum of symptoms. Patients need life-long regular follow-up to identify local recurrence or lung metastases. Unlike differentiated thyroid cancer, anaplastic carcinoma responds poorly to treatment. Palliative or debulking therapies are done in conjunction with radiation and chemotherapy with limited success. Treatment of medullary thyroid carcinoma is also surgical, but more aggressive cervical dissections are indicated. Post-surgery, patients are monitored by following the levels of calcitonin as a tumor marker. Persistent elevations of calcitonin indicate residual disease. Those with near normal post-operative calcitonin values can be followed clinically, but those with levels >100 pg/ml of calcitonin should be evaluated for other resectable lesions.

Monitoring: Follow-up is done using thyrotropin stimulated I^{123} or I^{131} scanning and/or thyroglobulin (Tg) measurements with or without recombinant thyrotropin (rhTSH) stimulation. A positive scan or persistent elevations of thyroglobulin can indicate residual carcinoma or recurrence. (This is only true if the patient had a total thyroidectomy with ablation of any remaining thyroid tissue; otherwise, residual normal thyroid tissue can give false positive results.) Thyrotropin stimulation is done by thyroid hormone withdrawal for 6-8 weeks to induce hypothyroidism or by rhTSH injections on two consecutive days. The former has the advantage of being more sensitive, but is much less convenient for the patient and requires the patient to be hypothyroid and DNIF. Recombinant thyrotropin stimulation is much better tolerated by the patients since the hypothyroid symptoms are avoided and can now be used for treatment as well as follow-up. Most recurrences are localized to the thyroid bed or cervical lymph nodes and occur within 5 years of diagnosis. Recurrences are also treated with surgery and/or radioactive iodine.

Due to the relatively indolent nature of differentiated thyroid carcinoma, patients can have detectable thyroglobulin levels, biochemical evidence of persistent disease, without visible disease by imaging studies (ultrasound, CT scanning, MRI, PET scanning). In some cases, it may represent

residual normal thyroid tissue and be completely benign; however, this conclusion should only be made after adequate evaluation. Surgery, repeat radioactive iodine treatment or observation (in some cases) is done as clinically indicated. This low level of disease burden does not impact short-term risk and does not cause incapacitation; therefore, unless there are other indications for grounding, aviators may remain on flying status during the evaluations.

Thyroxine therapy is needed in all patients. Higher risk individuals with differentiated thyroid cancers are treated at doses sufficient to suppress the TSH and render the patient mildly thyrotoxic.

II. Aeromedical Concerns.

Differentiated thyroid cancer poses little aeromedical risk unless there are distant metastases. Fortunately, only 10% of patients develop distant metastases over their life-time, and the majority are seen in the lungs. Bone and CNS metastases are even rarer. The tumors are slow growing in most cases. Even if residual disease is documented, the short-term risks are unchanged unless distant metastases are apparent. The aeromedical concerns center on post-operative and treatment complications. Post-surgical complications include hypothyroidism, and the small risk of damage to the recurrent laryngeal nerves and parathyroid glands due to local invasion, or surgical damage. Hypothyroidism is easily treated with thyroxine replacement; however, there may be times when replacement is deliberately withheld as part of treatment with the goal of inducing hypothyroidism for radioactive iodine scanning or treatment. Hypothyroid aviators should not be flying and should be placed in a DNIF status even if they have a waiver. Since TSH can stimulate tumor growth and TSH suppression can avoid this, appropriate suppressive therapy typically induces a degree of subclinical hyperthyroidism. The mild thyrotoxicosis slightly increases the risk of atrial fibrillation, but is not associated with sudden incapacitation and would not limit aviation duties.

In patients with thyroid cancer, surgery can lead to damage to the parathyroid glands resulting in permanent hypoparathyroidism causing hypocalcemia which can lead to tingling and muscle cramping or potentially life-threatening tetany. With proper treatment, this will be a waiverable condition for any flying class. It is easily treated with calcium and sometimes requires calcitriol, but most patients never have a problem as long as they are taking their pills. Symptoms of hypocalcemia are easily recognizable and reversible with calcium, long before a life-threatening event like tetany would occur. Likewise any lesion of the recurrent laryngeal nerve, whether iatrogenic or part of the natural disease process, would have further potential aeromedical implications. Unilateral involvement would likely result in increased vocal hoarseness which may affect the aviators ability to effectively communicate; particularly in an environment with significant levels of ambient noise. Bilateral damage may result in aphonia which would not be considered waiverable. Unilateral damage should be considered on a case-by-case basis, but bilateral damage is not a waiverable condition.

Medullary thyroid cancer can be an indolent process depending on the extent of the initial tumor. The treatment is aggressive surgical resection. Thus, the same post-operative considerations exist as for the differentiated thyroid carcinomas. Since local invasion is the primary risk; aeromedical concerns center on local damage or risks for future invasion or recurrence. Waiver can be considered if there is no evidence of residual disease and no significant post-operative complications besides the expected hypothyroidism. Waiver can also be considered for those with only biochemical evidence of persistent disease with negative imaging, on a case by case basis, to

include the small number with stable persistent disease with positive imaging, but not bad enough to require surgery.

As all anaplastic thyroid cancer is considered Stage IV, this diagnosis would not be considered waiverable.

III. Waiver Considerations.

History of thyroid cancer is disqualifying for all flying classes. All malignancies require an MEB, and all malignant neoplasms that are unresponsive to therapy or have residuals of treatment or not fitting for further service. Waivers will be considered for Flying Class II and III individuals and RPA Pilots with minimal or no residual disease on monitoring who do not have post-operative hypoparathyroidism, hypocalcemia, or recurrent laryngeal nerve damage, unless those conditions have been adequately treated.

Table 6: Waiver potential of thyroid cancer

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Stages 1 and 2	Yes#† AETC	Yes
II/RPA Pilot	Stages, 1, 2 and possibly early 3	Yes#+† MAJCOM	Yes
III	Stages, 1, 2 and possibly early 3	Yes+† MAJCOM	Yes
MOD	Stages, 1, 2 and possibly early 3	Yes† GSC	No
GBC	Stages, 1, 2 and possibly early 3	Yes† MAJCOM	No

For FC I/IA and untrained FC II and FC III individuals waiver may be considered after 2 years of remission, asymptomatic.
+ For trained FC II and III individuals and RPA Pilots, waiver may be considered six months after treatment completed, in remission and asymptomatic.
† No indefinite waivers.

Review of AIMWTS through November 2014 showed 87 cases of thyroid cancer. Breakdown of the cases revealed: 1 FC I/IA, 46 FC II, 22 FC III, 5 ATC/GBC, and 13 MOD; 7 were disqualified. Of the seven disqualifications (3 FC II, 2 FC III, 1 MOD, & 1 ATC), 4 were disqualified due to a concomitant disqualifying diagnosis, 1 due to failure to provide additional requested info, 1 due to inadequate time lapse since treatment, and one because, as a nurse, the member could not deploy due to an assignment limitation code.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for thyroid cancer should include the following:
A. History – symptoms, pathology, stage, treatment, including date of last treatment and radioactive iodine scans and treatments, surveillance plan, levothyroxine dose, and activity level.
B. Physical – Neck exam.
C. Endocrinology and surgeon reports to include six-month follow-up.
D. Labs – All thyroid function tests to include: TSH, serum thyroxine, Tg, and Tg antibodies. (CEA and calcitonin are relevant if medullary cancer, as are screening tests for appropriate MEN syndromes)
E. Reports of any imaging studies, if done.
F. Tumor board report, military or civilian, if applicable.
G. Medical evaluation board results.

The AMS for waiver renewal of thyroid cancer should include the following:
A. History – brief summary of stage, treatment, frequency of surveillance and results, any symptoms, activity level.
B. Physical – Neck exam.
C. Endocrinology consult.
D. Labs – all thyroid function test results since previous waiver. (include Tg and Tg antibodies, and CEA, calcitonin if medullary cancer)
E. Reports of any imaging studies, if done.

ICD-9 Code for Thyroid Cancer	
193	Malignant neoplasm of thyroid gland

ICD-10 Code for Thyroid Cancer	
C73	Malignant neoplasm of thyroid gland

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WAIVER GUIDE
Updated: Mar 2015
Supersedes: Waiver Guide of Feb 2012
By: LtCol John M. Hatfield (RAM 16) and Dr. Dan Van Syoc
Reviewed by Col Roger Hesselbrock, ACS neurology consultant

CONDITION:
Transient Ischemic Attack (TIA) and Stroke (Mar 15)

I. Overview.

Stroke (cerebrovascular disease) is the acute neurological injury that occurs as a result of brain ischemia or brain hemorrhage. Brain hemorrhage may be secondary to intracerebral hemorrhage (ICH) or subarachnoid hemorrhage (SAH). Brain ischemia may be secondary to atherosclerosis, cardioembolism, artery-to-artery embolism, small-vessel lipohyalinosis, arteritis, arterial dissection, vasospasm, or systemic hypoperfusion. It should be noted here that cerebrovascular accidents (CVA), transient ischemic attacks (TIA), and Coronary Heart Disease (CHD) all share common risk factors and pathological mechanisms from the standpoint of ischemia.

Approximately 795,000 people in the United States (US) have a new or recurrent stroke each year. Approximately 610,000 are first attacks, and 185,000 are recurrent. Of these, 370,000 (46.5%) are males. Of all strokes, 87% are ischemic and 10% are ICH strokes, whereas only 3% are SAH strokes. The enormous morbidity of strokes in general is the result of interplay between the resulting neurological impairment, the emotional and social consequences of that impairment, and the high risk for recurrence. Stroke ranks as the fourth-leading cause of death in the US.[1, 2]

An additional large number of US adults, estimated at 240,000, will experience a TIA. Although a TIA leaves no immediate impairment, affected individuals have a high risk for future ischemic events, particularly in the days and weeks immediately after symptom resolution. On average, the annual risk for future ischemic stroke after an initial ischemic stroke or TIA is approximately 3% to 4%.[3]

The risk factors for TIA and stroke are the same and include increasing age, family history, prior history of TIA/stroke, hypertension, diabetes, dyslipidemia, smoking, physical inactivity, obesity, poor nutrition, chronic kidney disease, sleep apnea, and various psychosocial factors such as anxiety and depression. Other conditions which increase TIA/stroke risk include atrial fibrillation (both clinical and subclinical), sickle cell anemia, cardiac anomalies such as patent foramen ovale (PFO), presence of mechanical artificial heart valve, congenital or acquired hypercoagulable states, some medications, and various vasculidities such as Wegener's Granulomatosis.[3-7]

Ischemic strokes may be classified as large-artery atherosclerosis (LAA), including large-artery thrombosis and artery-to-artery embolism; cardioembolism (CE); small artery occlusion (SAO); stroke of other determined cause (OC); and stroke of undetermined cause (UND). UND (or cryptogenic) generally account for approximately 35% of all strokes, CE ~ 27%, SAO ~ 23%, LAA ~ 13%, and OC ~ 2%.

Until recently, classification of stroke type was based on the TOAST (Trial of ORG 10172 in Acute Stroke) diagnostic criteria.[8] However, as a result of increasing knowledge about stroke mechanisms

combined with the introduction of new diagnostic techniques, a new phenotypic classification scheme is now being promoted. Known as ASCO, the subtypes of this updated scheme are as follows: large artery disease (A), small-vessel disease (S), cardiac source (C), and another cause (O).[9]

Prior to 2009, TIAs were events defined clinically as any sudden, focal, cerebral ischemic event with symptoms lasting <24 hours. This changed in 2009 with the endorsements of both the American Heart Association (AHA) and the American Stroke Association (ASA) of the ABCD2 criteria. The new definition does two things. First, it redefines TIA as: a transient episode of neurological dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction; and stroke as: an infarction of central nervous system tissue; thus creating a tissue diagnosis, and removing the arbitrary time criteria.[10] In some writings, patients with transient symptoms who have infarctions on imaging are referred to as DWI (diffusion-weighted imaging) + TIA, vs. those with negative imaging referred to as DWI - TIA. For the purposes of the new criteria, imaging must be accomplished within 24 hours of the episode.

Secondly, the new definition incorporates a scoring system which is used to risk-stratify these patients as to their immediate future stroke risk. Known as ABCD2, points (indicated in parentheses) are assigned for each of the following factors: Age $\geq$60 years (1); Blood pressure $\geq$140/90 mm Hg on first evaluation (1); Clinical symptoms of focal weakness with the spell (2) or speech impairment without weakness (1); Duration $\geq$60 minutes (2) or 10 to 59 minutes (1); and Diabetes (1). In combined validation cohorts, the 2-day risk of stroke was 0% for scores of 0 or 1, 1.3% for 2 or 3, 4.1% for 4 or 5, and 8.1% for 6 or 7.[10] This redefinition of TIA reduces stroke risk after TIA to approximately 1% at 90 days, and reduces the rate of post-stroke disability by approximately 3.4%.[11]
Several conditions can mimic TIAs. These include, but are not limited to migraine, seizure, vasovagal syncope, arrhythmia, compressive neuropathy, hypoglycemia and/or electrolyte imbalances, hyperventilation, anxiety, and conversion disorder.[12] And while there is insufficient evidence regarding which clinical features are best suited to distinguish between TIAs and mimicking disorders, a 2011 Swiss study involving 303 patients found that almost 1 in every 5 patients suspected of having a TIA actually had a TIA mimic.[13]
Stroke-in-the-young by definition is an ischemic event occurring between ages 15 to 45 years. Similar to stroke in the elderly, cryptogenic strokes account for 33% to 37% of stroke-in-the-young.[17, 18] In contrast to stroke in the older population, LAA accounts for 4% - 7.5% of stroke in the young, SAO 0% - 9%, CE 21% - 24%, and OC 34 – 37%. Cervical artery dissection, occurring in 16% - 24%, is the most common etiology of OC strokes in the young.

Multiple studies of recurrence rate of stroke-in-the-young following an initial event documented similar findings with a recurrence rate of 3% per year, 3.6% in the first year dropping to 1.7% in subsequent years (mean follow up 11.7 years), 6.2% cumulative at three-years, or 17% after ten years (mean follow up 5.7 years) with no leveling of the curve.[14, 15] In one study the annual recurrence rate of stroke-in-the-young or TIA was 5.9% following an initial event for mean follow-up of 26 months.[14] Although most studies of stroke in the young indicate an annual stroke recurrence rate of over 1%, many patients in these studies had significant, sometimes multiple vascular risk factors that are not present in USAF aviators.

A correctable etiology theoretically would alter the risk of recurrent stroke. One such correctable etiology, PFO, is common and has been associated with stroke.[16, 17] The proportion of the general

population with PFO is approximately 20%, but in young stroke patients this proportion is about 50%. Co-occurrence with atrial septal aneurysm (greater than 10-mm septal excursion during a cardiac cycle) seems to confer additional risk. The presence of PFO in the setting of an inherited or acquired thrombophilia is especially important because it provides a potential mechanism for venous material to pass into the arterial circulation (i.e., paradoxical embolization).

Three randomized controlled trials, each investigating the role of PFO for secondary stroke prevention, have now been published. The first of these, the CLOSURE-I trial, investigated the STARFlex device in patients 60 years old or younger with stroke or TIA and a PFO. The primary end point was a composite of stroke or TIA in 2 years of follow-up, 30-day all-cause mortality, and death from neurologic cause between 31 days and 2 years. More than 900 patients were enrolled. The primary end point occurred in 5.5% of the closure group and 6.8% of the medical group (hazard ratio [HR] 0.78; 95% confidence interval [CI], 0.45 to 1.35; P=.37). Major periprocedural complications occurred in 13 (3.2%) patients in the closure group. The authors found plausible alternative explanations to a PFO-related cause for stroke or TIA in a majority of patients in both the closure and medical groups.

The PC trial investigated a different device, the Amplatzer PFO occluder, in patients younger than 60 years with stroke, TIA, or peripheral thromboembolic event who had a PFO. More than 400 patients were enrolled. The primary end point (a composite of nonfatal stroke, TIA, peripheral embolism, and death) occurred in 3.4% of the closure group and 5.2% of the medical group (HR 0.63; 95% CI, 0.24 to 1.62; P=.34). The authors reported three (1.5%) minor procedural complications in the closure group. The Randomized Evaluation of Recurrent Stroke Comparing PFO Closure to Established Current Standard of Care Treatment (RESPECT) trial was published concurrently with the PC trial and also investigated the PFO Amplatzer occluder. The investigators enrolled nearly 1000 patients with cryptogenic strokes and PFO. The primary end point was a composite of nonfatal and fatal ischemic stroke and early death. Nine patients with recurrent stroke were in the closure group and 16 in the medical group (HR 0.49; 95% CI, 0.22 to 1.11; P=.08). Procedure-related adverse events occurred in 21 (4.2%) patients in the closure group.

Taken individually, these three trials did not demonstrate the superiority of PFO closure over medical management; however, a recent meta-analysis of the trials suggests potential benefit.[18] Current clinical practice is to monitor small PFOs and advise closure for larger lesions, particularly those with significant right-to-left shunting.

Seizures may occur following stroke. For all age group strokes, the incidence of new-onset seizures is 8.9% (mean follow up 9 months) to 10.6% (mean follow up 32 months).[19, 20] Stroke-in-the-young is similar. The incidence of new-onset seizures is 10% (mean follow up 11.7 years), 10.8% (mean follow up 31.7 months), or 11% at five years (mean follow up 5.7 years) with no new-onset seizures occurring after five years.[3, 4, 15] One multi-center trial (mean follow up 37.8 months; cryptogenic etiology; age 18 to 55 years) detected a 5.5% incidence within 3 years (mean follow up 38 months).[21] Importantly this study provided a Kaplan-Meier estimate of the risk of first seizure following stroke at one year of 2.1, at two years of 2.9, at three years of 3.7, and at four years 3.7, suggesting some degree of flattening of the curve after three years. This is in concert with the other cited studies that suggest minimal difference in seizure incidence with follow-up of 31.7 months, 32 months, 5.7 years or 11.7 years. Stroke location in the cortex increases the risk of seizure, although seizures were noted in 2.7% of deep lacunar infarcts (mean follow up 9 months).[19, 22]

II. Aeromedical Concerns.

The primary aeromedical concern with cerebrovascular disease is the risk of sudden incapacitation, either from a recurrent stroke or from a seizure. The risk of seizure is unacceptably high for at least the first several years following a stroke. While cortical location is associated with a higher risk of seizure, seizures also occur with subcortical lacunar strokes. The incidence of new-onset seizures declines with time with population studies suggesting the risk is aeromedically-acceptable after three years.

Symptoms of stroke/TIA are abrupt, usually unrelated to any particular activity, and depend on the distribution of the blood vessel occluded. Symptoms can range from distracting to incapacitating and can include weakness, paresthesias, speech disturbance, visual deficit, vertigo, ataxia, and, rarely loss of consciousness. The stroke recurrence rate is highest immediately following the initial stroke but remains unacceptably high indefinitely, 3-4%/yr. Accepted standards for sudden incapacitation for trained pilots is up to 1%/year and up to 3%/yr for non pilot aircrew. Strokes with a well-defined and correctable etiology may have a lower incidence of recurrence although the infrequency of these events precludes unequivocal demonstration of the presumed lower rate of recurrence. Closure of a PFO has yet to be demonstrated to lower the risk of recurrence to an acceptable level. Cryptogenic strokes have the same rate of recurrence as other strokes.

III. Waiver Considerations.

Irrespective of whether the etiology is embolic, thrombotic or hemodynamic, TIA and stroke are disqualifying for FC I/IA, II, III, air traffic controller/ground based controller (ATC/GBC), and missile operator duty (MOD). Waivers will usually not be considered unless a correctable cause is determined and treated. Examples of correctable etiologies might include iatrogenically-induced stroke such as from catheterization or trauma to the carotid artery without residual injury. Modifiable factors such as hypertension and hyperlipidemia are not considered correctable etiologies. Additionally, the occurrence of a stroke/TIA leaves a potential seizure focus. A three-year seizure-free observation period after stroke and a two-year observation after TIA are required prior to any potential waiver consideration. Any manned-aircraft pilot waiver recommendations after stroke or TIA will almost invariably be limited to non high-performance, multi-crew platforms, often with further recommendation for another fully trained pilot present during aircraft operation.

Table 1: Waiver potential after TIA/stroke.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	TIA/stroke secondary to non-correctable cause	No AETC	No
	TIA/stroke secondary to correctable cause treated	Maybe* AFMSA	Yes
II/RPA Pilot	TIA/stroke secondary to non-correctable cause	Maybe* AFMSA	Yes
	TIA/stroke secondary to correctable cause treated	Maybe* AFMSA	Yes
III ATC/GBC MOD	TIA/stroke secondary to non-correctable cause	Maybe* MAJCOM	Yes
	TIA/stroke secondary to correctable cause treated	Yes* MAJCOM	Yes

* Must be at least 3 years post-stroke or 2 years post-TIA, with no or clinically insignificant residual symptoms.
** Waiver authority for MOD personnel is AFGSC.

Review of AIMWTS through Mar 2015 showed 36 cases of TIA/stroke; 16 were disqualified. Breakdown of the cases revealed: 23 FC II (9 disqualified), 10 FC III (6 disqualified), and 3 MOD (1 disqualified).

IV. Information Required for Waiver Submission.

A full neurologic, laboratory, and diagnostic work-up is required after any symptoms of TIA or stroke in an attempt to pinpoint the location and etiology of the symptoms, define the extent of any deficits or anatomic damage, and to rule out potential non-ischemic causes.

The aeromedical summary for initial waiver should include the following:
A. History – details of the incident to include the extent of symptoms, physical findings, timing of onset and resolution, and possible precipitating factors (i.e., Valsalva or +Gz just prior to onset).
B. Neurology consult.
C. An MRI of the brain which includes DWI sequences, and a magnetic resonance angiogram (MRA) of the carotid and vertebral arteries. Ideally, the diffusion-weighted MRI should be accomplished as soon as possible after the event to pick up subtle ischemic changes in the brain (within 12 hours).
D. Laboratory tests to include: complete blood count (CBC), erythrocyte sedimentation rate (ESR), chemistry panel, partial thromboplastin time (aPTT), lipid profile, and rapid plasma reagin (RPR).
E. ECG – 12 lead.
F. Transthoracic echocardiography (TTE) of the heart with agitated saline (bubble contrast) to look for a right to left shunt within the heart.
G. A 24-hour Holter monitor.

H. If the flyer is under the age of 45, then additional laboratory testing to rule out a thrombotic predisposition should include antiphospholipid antibody panel (anticardiolipin antibodies, and lupus anticoagulant factor), protein C, protein S, factor V Leiden, and antithrombin III measurements.
I. Neuropsychological Evaluation (contact ACS for guidance on tests to administer).

The aeromedical summary for waiver renewal should include the following:
A. Interval medical history. Include copies of any interim specialty consultations and follow-up notes.
B. Current neurologic examination results.
C. Copies of any interim laboratory testing results.
D. Copies of reports and images from any interim imaging studies.
E. Current (follow-up) imaging studies for any imaging that was abnormal on the initial evaluation. Send copies of reports and images to ACS.

ICD-9 Codes for transient ischemic attack and stroke	
435.9	Transient cerebral ischemia
434.0	Cerebral thrombosis
434.1	Cerebral embolism
434.9	Cerebral artery occlusion, unspecified
432.9	Unspecified intracranial hemorrhage
443.21	Dissection of carotid artery
443.24	Dissection of vertebral artery

ICD-10 Codes for transient ischemic attack and stroke	
G45.9	Transient cerebral ischemia attack, unspecified
I63.00	Cerebral infraction due to thrombosis of unspecified precerebral artery
I63.19	Cerebral infarction due to embolism of other precerebral artery
I66.9	Occlusion and stenosis of unspecified cerebral artery
I62.9	Nontraumatic intracranial hemorrhage, unspecified
I77.71	Dissection of carotid artery
I77.74	Dissection of vertebral artery

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WAIVER GUIDE
Updated: Jul 2014
Supersedes Waiver Guide of Dec 2010
By: LtCol Marie-France McIntee (RAM XV) and Dr. Dan Van Syoc
Reviewed by: Col Roger Hesselbrock, ACS Neurologist

CONDITION:
Traumatic Brain Injury (Jul 14)

I. Overview.

Traumatic brain injury (TBI) is common; Centers for Disease Control and Prevention (CDC) data from 2003 indicate an annual incidence of 421/100,000 population.[1] This rate has remained relatively constant from 1998-2003 (414-461/100,000). More recent CDC data from 2006 shows a peak TBI and TBI-related death rates occur in the 20-24 year old age group (76.9 per 100,000 and 24.1 per 100,000) with those >= 75 years old having the next highest rates (173.2 per 100,000 and 58.4 per 100,000).[2] In those that recover without apparent deficit, a risk for seizures still exists.

Head injury can be classified in several ways. The Glasgow Coma Scale (GCS) is the most widely utilized, commonly applied to acute head injury to convey severity to emergency services personnel. This scheme categorizes without regard to image findings. This scale is quite good in predicting the outcome at six months following head injury but is predictive of seizures only for a severe GCS score.[3, 4]

Annegers et al. performed a retrospective study of the Olmsted County, MN, population from 1935-1984, identifying the incidence of seizures following head trauma.[5] Annegers scheme takes into consideration duration of loss of consciousness (LOC) and/or amnesia, skull fracture and brain injury.

Mild	Moderate	Severe
LOC or amnesia < 30 minutes	LOC or amnesia > 30 minutes but < 24 hours or skull fracture	LOC or amnesia > 24 hours or presence of subdural hematoma or brain contusion

This study provides the best estimate of seizure risk following severity of head injury but is limited by the lack of modern imaging techniques.

The DOD in 2007 released a classification scheme for TBI.[6]

Mild	Moderate	Severe
Normal structural imaging	Normal or abnormal structural imaging	Normal or abnormal structural imaging
LOC < 30 minutes	LOC >30 minutes but < 24 hours	LOC > 24 hours
AOC < 24 hours	AOC > 24 hours – severity based on other criteria	AOC > 24 hours – severity based on other criteria
PTA < 1 day	PTA >1 day but < 7 days	PTA > 7 days

This classification did not ascribe seizure risk relative to degree of TBI. This classification scheme was used as the basis for the aeromedical classification table that follows.

Penetrating head injuries have a persistent unacceptable risk of subsequent seizures. A retrospective study of Vietnam War veterans noted posttraumatic epilepsy in 53% at 15-years; of these 7% experienced their first seizure more than ten years following their trauma.[7] Interestingly in a subsequent 35-year follow-up study, 11/87 (12.6%) of subjects with seizures experienced their first seizure more than 14 years after injury.[8] A 0-25 cc volume loss was associated with a 42% seizure incidence while loss > 75 cc was associated with an incidence of 80%. A retrospective study of the Iraq-Iran War (1980-1988) confirmed the Vietnam study with the likelihood of persistent seizures after 21-years being 74.7%.[9]

Imaging can provide prognostic information. CT classification is strongly related to outcome, with worst outcome for patients with diffuse injuries in CT class III (swelling) or CT class IV (shift).[10] MRI can demonstrate hemorrhagic contusions with gliosis and hemosiderin dregs which can be associated with post-traumatic epilepsy.[11] However to date neuroimaging does not provide a reliable estimate of seizure incidence following mild or moderate head injury.

The relative risk of seizures following mild TBI (utilizing the Annegers' criteria) compared to the normal population remains elevated for five years while the relative risk after moderate or severe TBI remains elevated for over ten years.[12] The actual incidence of seizures, however, becomes aeromedically acceptable much sooner. Given the incidence of unprovoked seizures in the general population is approximately 66/100,000 patient years, the incidence of first seizure following mild TBI at one year is approximately 0.189%/yr (0.061-0.439), for moderate TBI at one year approximately 0.409%/yr (0.146-0.860); and for severe TBI at five years approximately 1.019%/yr (0.512-1.952) with a relatively wide confidence interval at all points.[13] A significant body of research into biomarkers that might identify those at greatest risk of developing post-traumatic epilepsy (PTE) is on-going and holds great promise for the future. Numerous abnormalities during the latent period develop in response to brain injury; alterations in gene expression for neurotransmitter receptors and ion channels, neurodegeneration, inflammatory response, blood-brain barrier (BBB) damage to name a few. Better animal models are also being sought. While all of this holds promise for the future, findings at present are too immature to prove useful in predicting who will go on to develop PTE.[14]

II. Aeromedical Concerns.

Aeromedically the two major concerns are (1) residual neurological or neurocognitive deficit and (2) risk of sudden incapacitation from a seizure. The risk to safety of flight from a fixed neurological deficit is readily apparent. Neurocognitive deficit may not be readily apparent but can be assessed with appropriate testing. The risk of seizure is more difficult to predict.[15] In USAF aircrew who met waiver criteria, seizures occurred at a rate of 24.53/100,000 person-years.[16] Furthermore standard operating conditions of military aircraft (sleep disruption or deprivation and hypoxia) may act as facilitators for seizure break-through. Prophylactic use of anticonvulsant medications (AEDs) would not be appropriate, both for their central acting effects on cognition and alertness and the potential hazard of withdrawal seizure following abrupt discontinuation of AEDs.

III. Waiver Consideration.

A history of TBI is disqualifying for all flying classes. GBC and MOD members with aeromedically mild head injury do not require a waiver if the neurological examination is normal. The Aeromedical Standards Working Group established a difference in acceptable risk for sudden

incapacitation for aircrew and MOD, based on the AFSC. This acceptance of risk is reflected in the management tables listed below for selected AFSCs following aeromedically moderate or severe head injury (See Table 3 – Specific AFSCs that Qualify for Earlier Waiver). For FC I/IA candidates, see footnote below Table 1.

Table 1: Aeromedical Classification and Evaluation of Head Injury

Degree of Head Injury	**Minimal Observation Time**	**Evaluation Requirements***
Aeromedical Mild (LOC or amnesia < 30 minutes; normal MRI)	**1 month**	**Flying Class I, IA, II, III, GBC[#], MOD[#]:** **ACS:** none - local evaluation **Neurological exam:** Complete neurological and mental status examination by a Flight Surgeon. **Imaging:** MRI** **Neuropsychological evaluation:** Local to include assessment of general cognitive functioning. Screen each of the major cognitive domains (IQ, attention, memory, visual spatial, mood, and a clinical interview).†
Aeromedical Moderate (LOC or amnesia > 30 minutes but < 24 hours or non-displaced skull fracture; normal MRI)	**6 months**	**Flying Class I, IA, II, III, GBC, MOD:** **ACS:** review **Neurological exam:** Complete neurological and mental status examination by a neurologist **EEG:** obtain locally if there was immediate seizure **Imaging:** MRI** **Neuropsychological evaluation:** Local to include assessment of general cognitive functioning. Screen each of the major cognitive domains (IQ, attention, memory, visual spatial, mood, and a clinical interview).†
Aeromedical Moderate (LOC or amnesia > 30 minutes but < 24 hours or non-displaced skull fracture; MRI demonstrating evidence of diffuse axonal injury or hemosiderin deposition/plugs)	**2 years for most AFSCs, 6 months for specific AFSCs[+]**	**Flying Class I, IA, II, III[+], GBC[+], MOD[+]:** **ACS:** evaluation **Neurological exam:** ACS neurologist **EEG:** obtain locally if there was immediate seizure **Imaging:** MRI locally within one month of injury[**]; MRI during ACS evaluation **Neuropsychological evaluation:** A local NP evaluation during the 3-9 month post-TBI period. Include assessment of general cognitive functioning. Screen each of the major cognitive domains (IQ, attention, memory, visual spatial, mood, and a clinical interview). Include with waiver any test scores and history of brain injury. ACS will examine for return to baseline†

Degree of Head Injury	Minimal Observation Time	Evaluation Requirements*
Aeromedical Severe (LOC or amnesia > 24 hours; normal MRI or MRI demonstrating inconsequential hemorrhage or evidence of diffuse axonal injury or hemosiderin deposition/plugs)	**2 years**	**Flying Class I, IA, II, III, GBC, MOD:** **ACS:** evaluation **Neurological exam:** ACS neurologist **EEG:** during ACS evaluation **Imaging:** MRI locally within one month of injury**; MRI during ACS evaluation **Neuropsychological evaluation:** a local NP evaluation during the 3-9 month post-TBI period. Include with waiver any test scores and history of brain injury. ACS will examine for return to baseline.†
Aeromedical Severe (LOC or amnesia > 24 hours; presence of subdural hematoma or brain contusion; MRI demonstrating more significant abnormalities)	**5 years for most AFSCs, 2 years for specific AFSCs+**	**Flying Class I, IA, II, III+, GBC+, MOD+:** **ACS:** evaluation **Neurological exam:** ACS neurologist **EEG:** during ACS evaluation. **Imaging:** MRI locally within one month of injury**; MRI during ACS evaluation **Neuropsychological evaluation:** a local NP evaluation during the 3-9 month post-TBI period. Include with waiver any test scores and history of brain injury. ACS will examine for return to baseline†
Aeromedical Severe (penetrating injury, volume loss > 25cc, late seizure)	**No waiver possible**	**Flying Class I, IA, II, III, GBC, MOD**

*Certification authority for all initial cases is AETC except for MOD personnel, but if an IFC I/IA candidate needs a waiver, the case is forwarded to AFMSA. Most renewal cases will go to the MAJCOM for waiver consideration

No waiver required with normal neuro exam

** For all cases sent to the ACS, MRI images should be sent along with the report

+FCIII and MOD AFSCs that may be considered for waiver for moderate head injury at 6 months or for waiver for severe head injury at 2 years are listed in Table 3: Specific AFSCs that Qualify for Earlier Waiver below

† Call ACS Neuropsychology or consult Guidance for NP testing (provided by the ACS)

Table 2 below applies to IFC applicants with a remote history of TBI. If the exam at the time of injury is normal and there is no imaging performed, the candidate can be waived without the imaging test if the neurological exam is normal and the history reveals no concerns.

Table 2: IFC applicants (all classes) with history of remote (>=5 years) TBI

Normal exam and imaging at time of injury	**Neurological exam:** flight surgeon **Imaging:** report and images of prior studies **Neuropsychological evaluation:** not required unless felt clinically indicated by flight surgeon **Review:** AETC/SGP. ACS review at discretion of AETC
Abnormal exam, imaging or EEG at time of injury	**Neurological exam:** flight surgeon **Imaging:** report and images of prior studies, non-contrast brain MRI if no follow-up neuroimaging was performed **EEG:** report of previous studies, sleep-deprived EEG if any previous study was reported as abnormal **Neuropsychological evaluation:** not required unless felt clinically indicated by flight surgeon **Review:** AETC/SGP. ACS review at discretion of AETC
Seizure within 24 hours of time of injury*	**Neurological exam:** flight surgeon **Imaging:** report and images of prior studies, non-contrast brain MRI if no follow-up neuroimaging was performed **EEG:** report of previous studies, sleep-deprived EEG if no previous studies performed or if any previous study was reported as abnormal **Neuropsychological evaluation:** not required unless felt clinically indicated by flight surgeon **Review:** AETC/SGP. ACS review at discretion of AETC

* seizures occurring after 24 hours of TBI are disqualifying; refer to Seizures/Epilepsy/Abnormal EEG chapter of Waiver Guide for assessment/disposition guidance

Listed in Table 3 are the FC III, GBC, and MOD AFSCs that can be considered for an earlier waiver (6 months for moderate and 2 years for severe injury).

Table 3: Specific AFSCs that Qualify for Earlier Waiver

1A2X1	Aircraft Loadmaster
1A3X1	Airborne Mission Systems
1A4X1	Airborne Operations
1A6X1	Flight Attendant
1A8X1	Airborne Cryptologic Language Analyst
1A8X2	Airborne ISR Operator
1B4X1	Cyberspace Defense Operations
1C6X1	Space Systems Operations
1T0X1	Survival, Evasion, Resistance, and Escape
1T2X1	Pararescue
13BX	Air Battle Manager
13LX	Air Liaison Officer
13SX	Space & Missile
17DX	Cyberspace Operations

AIMWTS search in May 2014 revealed a total of 1072 individuals with a waiver that contained a diagnosis of closed head injury. The breakdown of cases was as follows: 281 FC I/1IA (29 disqualifications), 260 FC II (9 disqualifications), 473 FC III (60 disqualifications), 27 ATC/GBC (6 disqualifications), and 31 MOD (8 disqualifications). There were a total of 112 cases resulting in a disposition of disqualify, and in well over half of the cases the major reason for the disqualification was the head injury.

IV. Information Required for Waiver Submission.

Waiver package should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines and recommendations. The aeromedical summary for the initial waiver for TBI should follow the guidelines outlined above in Table 1. Mild TBI cases may be considered for an indefinite waiver, but all other waivered cases are generally time-limited initially.

The aeromedical summary for waiver renewal for TBI should include the interval history since the previous TBI waiver and all applicable imaging tests appropriate for the degree of initial injury. Consultation from a neurologist is also recommended.

ICD-9 codes for traumatic brain injury	
800-801	Skull fracture
850.1	Concussion with brief loss of consciousness
854.01	Intracranial injury of other and unspecified nature without open intracranial wound with no loss of consciousness
854.02	Intracranial injury of other and unspecified nature without open intracranial wound with brief (less than one hour) loss of consciousness
854.03	Intracranial injury of other and unspecified nature without open intracranial wound with moderate (1-24 hours) loss of consciousness
959.01	Head injury, unspecified

ICD-10 codes for traumatic brain injury	
S02.0	Fracture of vault of the skull, closed
S06.0X1 S06.0X2	Concussion with loss of consciousness of 30 minutes or less
S06.890	Other specified intracranial injury without loss of consciousness
S06.9X1	Unspecified intracranial injury with loss of consciousness of 30 minutes or less
S06.9X2	Unspecified intracranial injury with loss of consciousness of 31 minutes to 59 minutes
S06.9X3	Unspecified intracranial injury with loss of consciousness of 1 hour to 5 hours 59 minutes
S06.9X4	Unspecified intracranial injury with loss of consciousness of 6 hours to 24 hours
S09.80	Unspecified injury of head

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WAIVER GUIDE
Updated: Jan 2014
Supersedes Waiver Guide of Sep 2010
By: Maj Russell Tontz (RAM XV), Col Patrick Storms (AF RAM and Gastroenterologist), and Dr Dan Van Syoc

CONDITION:
Ulcerative Colitis (Jan 14)

I. Overview.

Ulcerative Colitis (UC) is a chronic relapsing inflammatory bowel disease (IBD) that is characterized by periods of remission interrupted by symptomatic flares of intestinal inflammation.[1] The cause in unclear, but genetic, dietary and environmental factors play a role in what appears to be an aberrant immune response.[2] The annual incidence of UC in the United States is between nine and 12 cases per 100,000 persons, with no apparent racial or gender-specific differences.[3] As yet no dietary factor has been identified despite epidemiologic associations with Western diets.[4] The belief that stress triggers IBD may not be the case as much as stress likely modulates disease manifestations.[5]

In contrast to Crohn's Disease (CD), the inflammation of UC is limited to the colonic mucosa. Symptoms vary between individuals, but often include bloody stools, rectal urgency, and abdominal pain. In addition, patients often manifest signs of anemia and weight loss.[6, 7] The clinical presentation is dependent on the extent of colonic involvement and severity of disease. Disease restricted to the rectum is referred to as ulcerative proctitis (confined to rectum; generally distal 25 cm); left sided colitis is that confined from the distal to splenic flexure, pancolitis is the term to define disease that involves the entire colon, including the cecum; and backwash ileitis is inflammation of distal 10cm or less of terminal ileum in the setting of pancolitis.[8] About 30% of patients exhibit immune mediated inflammatory disorders of other organs. The liver is affected in 5% of patients (primary sclerosing cholangitis and autoimmune liver disease), joints in 20% (seronegative arthritis of the large joints, sacroiliitis, and ankylosing spondylitis), the eye in around 5% (scleritis, episcleritis, and anterior uveitis), and skin in 5% (erythema nodosum and pyoderma gangrenosum).[9] Local complications of UC include massive hemorrhage, fulminant colitis, intestinal perforation and stricture or toxic megacolon (both rare). Despite the burden of a chronic illness, more than 90% of UC patients are able to maintain capacity for work after 10 years of disease and the overall quality of life is not impaired significantly.[10]

The diagnosis of UC is made by exclusion of other causes of diarrhea (in particular, infectious etiologies) and a characteristic history with corresponding mucosal findings on endoscopy. The patient's symptom severity, endoscopic extent of the disease, and pattern of relapse will generally drive clinical treatment considerations.

The goal in UC medical management is to achieve and maintain remission. The definition of remission will be based on histologic, endoscopic or clinical findings.[11] The mainstay treatment for mild-to-moderate UC remains 5-aminosalicylic acid (5-ASA), which has been shown to be effective in sustaining remission and reducing relapse[1] The prevalence of sulfasalazine intolerance due to the sulfapyridine has limited its use in clinical practice, but studies suggest that most aminosalicylates are equal in their potency.[1] Mesalamine is administered either topically (when disease is limited to

the distal colon) or orally (which requires some mechanism to bypass the upper intestine). Currently, oral mesalamine coated in a manner that delays intestinal release (e.g., Pentasa®, Asacol®) is much preferred. For distal colonic disease, combined topical and oral mesalamine has proven to be more effective than single use of either.[12] More recent studies suggest that patients with moderately active UC benefit more from higher doses of salicylates rather than lower doses. Also with adherence rates estimated at 60%, the use of once daily dosing has proven as effective as more frequent dosing regimen.[1] Dose-related toxic effects of sulfasalazine include headache, nausea, and vomiting. Hypersensitivity reactions include rash, fever, aplastic anemia, agranulocytosis, hepatitis, pancreatitis, nephrotoxicity, pulmonary fibrosis and hemolysis.

For moderate to severe UC or mesalamine-refractory UC, the primary agent used for induction of remission has been oral corticosteroids. Once controlled, the maintenance of remission should be through the use of mesalamine and not corticosteroids. For those classified as moderate to severe who have not responded to aminosalicylates or corticosteroids, azathioprine or other immunosuppressants such as 6-metacapurine or azathioprine may be considered. When using immunosuppressive agents it is important to recall that the onset of clinical improvement may be delayed for several weeks after initiation of therapy. The anti-Tumor Necrosis Factor (anti-TNF) agents infliximab (Remicade®) and adalimumab (Humira®) have been studied extensively and are both FDA-approved for treatment of UC. These two medications have demonstrated efficacy in achieving steroid-free remission, mucosal healing and decreasing the need for colectomies.[13, 14]

A select percentage of patients will benefit from the synergistic therapeutic effect of concomitant immunosuppressive and anti-TNF therapy , but the therapeutic efficacy must be balanced against potential adverse events such as the development of a very rare, yet lethal cancer, hepatosplenic T-cell lymphoma, occurring in young CD patients (age range: 12–40 years; median age; 22 years).[15] The concomitant use of immunosuppressants and infliximab has been implicated in the risk of non-Hodgkin lymphoma, resulting in warning statements for all marketed TNF blockers citing the increased risk for development of lymphomas. As most anti-TNF agents require lifelong maintenance therapy once started, patients will have true potential for developing these deadly diseases.

Individuals who have reached remission should remain on maintenance therapy with aminosalicylates indefinitely, as these agents have been demonstrated to assist in maintaining remission. Almost all patients have at least one relapse during a 10-year period, and 25% will require colectomy within 3 years of onset for uncontrollable disease.[16, 17]

One feared long-term complication of chronic UC is colorectal cancer. Patients with extensive ulcerative colitis have a markedly increased risk for colon cancer in comparison to the general population, beginning 8 to 10 years after diagnosis and increasing with time. The usual figure is 4-5 times that of the general population and it increases by a factor of 50 for those who also have primary sclerosing cholangitis complicating their UC. The risk for malignancy is also a function of the anatomic extent of the disease; the risk is much greater with pancolitis than with left-sided disease. Patients with long-standing ulcerative colitis are at risk for cancer even if their symptoms have been relatively mild; that is, colon cancer is seen in patients whose disease has been quiescent for 10 to 15 years. In ulcerative colitis, colon cancers are frequently submucosal and may be missed at colonoscopy and therefore microscopic examination of biopsy specimens is required. The current standard of care is to perform surveillance colonoscopy with random biopsies in patients with long-standing ulcerative colitis beginning 8 to 10 years after the onset of disease and repeated

every 1 to 2 years. If the specimens show dysplasia, the patient is sent for colectomy. Although it is clear that dysplasia is associated with colon cancer in patients with ulcerative colitis, the utility of surveillance colonoscopy has not been firmly established.[18]

Removal of the colon effectively cures ulcerative colitis by removing the source of the inflammation. Indications for surgery include medically refractory disease, intractable disease with an impaired quality of life, unacceptable side effects from medications, uncontrolled hemorrhage, toxic megacolon, perforation, and development of dysplasia or cancer.[8] There are no prospective randomized trials comparing medical treatment of UC to surgery for any indication, but the three absolute indications for surgery are exsanguinating hemorrhage, frank perforation, and documented carcinoma.[19]

II. Aeromedical Concerns.

The severity of the patient's clinical presentation impacts aeromedical concerns. Patients with diarrhea can experience distraction, hypovolemia, and poor performance in G straining maneuvers. Bleeding can cause anemia, which can impact the performance of physically-demanding tasks. Relapse is generally unpredictable and can impact performance in austere locations without access to gastroenterologic care. UC patients also need to be screened for anxiety and depression which is commonly secondary to their chronic condition.[20]

Oral steroids and immunosuppressants (other than infliximab, adalimumab or azathioprine) are not approved for flying duties due to adverse systemic effects. Both infliximab and adalimumab have been shown to be efficacious in the treatment of ulcerative colitis, however their use can have implications on military deployability. The medications require the storage in temperature controlled conditions and can increase the risk for opportunistic infections such as tuberculosis. Aviators treated with infliximab or adalimumab need to be observed for at least six months on the medication before consideration of waiver to allow for assessment of response and possible adverse effects.[21-23]

III. Waiver Consideration.

UC and ulcerative proctitis are disqualifying for all flying classes. Waiver is not recommended for FC I/IA and untrained FC II and FC III individuals. Any extraintestinal manifestations of UC should be addressed as separate diagnoses and will require individual work-up. (See venous thromboembolic disease, primary sclerosing cholangitis, and ankylosing spondylitis waiver guides.) If a course of oral steroids of greater than three weeks duration is required to achieve control, but is followed by maintenance of remission on waiverable medications, waiver could be considered after the pituitary axis has returned to normal function (based on Cortrosyn® stimulation testing; see waiver guide – systemic glucocorticoid (steroid) treatment).

For ATC/GBC personnel, the important consideration is for gastrointestinal bleeding. Regarding MOD personnel, there are no listed disqualifications that pertain to ulcerative colitis, gastrointestinal bleeding, or diarrhea, but UC is disqualifying for retention standards in the Air Force. This means that MOD personnel will require a waiver as well as an MEB.

Table 1: Waiver potential for Ulcerative Colitis

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	Ulcerative colitis, mild+, moderate, severe or treated with colectomy	No AETC
II	Ulcerative proctitis and ulcerative colitis, mild+ Ulcerative colitis treated with colectomy Ulcerative colitis, moderate or severe (not mild)	Yes*#& AFMSA Maybe* AFMSA No AFMSA
III	Ulcerative colitis, mild+ Ulcerative colitis treated with colectomy Ulcerative colitis, moderate or severe (not mild)	Yes*& AFMSA Maybe* AFMSA No AFMSA
ATC/GBC	Ulcerative colitis, mild+, moderate, severe or treated with colectomy	Yes*& AFMSA
MOD	Ulcerative colitis, mild+, moderate, severe or treated with colectomy	Yes*& AFGSC

* Waiver for untrained candidates in any category is unlikely.
+ Mild = 4 bowel movements/day without bleeding, no fever, erythrocyte sedimentation rate (ESR) <20, no anemia, normal liver function tests (LFTs).
& Individuals treated with infliximab or adalimumab will receive a restricted waiver (not worldwide qualified, TDY requires access to transport and refrigeration of adalimumab) and waiver authority is AFMSA. Observe for at least 6 months on therapy before consideration of waiver to allow for assessment of response and possible adverse effects. MEB is required.
# AFMSA is waiver authority if limitation code C from MEB in place (for FC IIC not worldwide qualified).

AIMWITS search in Nov 2013 revealed a total of 157 members with an AMS that included a diagnosis of UC. Breakdown of the cases was as follows: 0 FC I/IA cases, 97 FC II cases (6 DQ), 35 FC III cases (11 DQ), 10 ATC/GBC cases (3 DQ), and 15 MOD cases (2 DQ). Of the total 22 cases disqualified, 14 were directly due to the diagnosis of UC and 4 were for multiple medical reasons that included UC.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for ulcerative colitis initial waiver and waiver renewal associated with relapse should contain the following:
A. History – work-up results, disease course (gastrointestinal symptoms), current therapy, presence of complications and surgical resection, presence or absence of any symptoms suggesting extraintestinal disease (e.g. uveitis, arthritis, ankylosing spondylitis, thromboembolism, primary sclerosing cholangitis, skin disease).
B. Labs: Complete blood count (CBC), ESR, LFTs, C-reactive protein (CRP), and albumin.
C. Colonoscopy with mucosal biopsy results.
D. Consultation report from internal medicine or gastroenterology.
E. If on adalimumab or infliximab, results of chest x-ray and IPPD results.

The AMS for ulcerative colitis waiver renewal without relapse should include the following:
A. History – time line of disease, weight changes, work-up results, disease course (gastrointestinal symptoms), current therapy, presence of complications and surgical resection, presence or absence of any symptoms suggesting extraintestinal disease (e.g. uveitis, arthritis, ankylosing spondylitis, thromboembolism, primary sclerosing cholangitis, skin disease).
B. Labs: Complete blood count (CBC), ESR, LFTs, CRP, and albumin.
C. Colonoscopy report with results if indicated.
D. Consultation report from internal medicine or gastroenterology.

ICD-9 codes for Ulcerative Colitis	
556.2	Ulcerative proctitis
556.9	Ulcerative colitis, unspecified

ICD-10 codes for Ulcerative Colitis	
K51.20	Ulcerative (chronic) proctitis
K51.90	Ulcerative colitis, unspecified

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Supersedes Waiver Guide of Aug 2009
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CONDITION:
Urticaria, Angioedema, and Anaphylaxis (Jul 13)

I. Overview.

Urticaria, angioedema, and anaphylaxis are the prototypical manifestations of mast cell activation and fall upon a continuum of the same underlying disease process. The common denominator in these conditions is the release of potent inflammatory mediators from mast cells. Urticaria and angioedema are affected primarily by activation of cutaneous mast cells, which are commonly located around capillaries, lymphatics, appendages, and nerves in the skin. Massive activation of mast cells in the intestinal tract, respiratory tract, and central nervous system produces the multisystemic, potentially catastrophic symptom complex of anaphylaxis.[1] It needs to be noted that 85-90% of individuals with anaphylaxis have urticaria/angioedema, but it is uncommon for those with a history of chronic urticaria/angioedema to develop anaphylaxis.

A major problem in determining the incidence of anaphylaxis has been a lack of universal consensus on its definition.[2, 3] One of the more accepted current definitions is "a serious allergic reaction that is rapid in onset and can cause death." Calculating the actual incidence is further complicated by the fact that many cases are never reported. Estimates place the annual incidence rate for anaphylaxis between 3 and 21 per 100,000 person years. There are about 1500 reported anaphylaxis-related deaths annually in the US.[4] It occurs in all age groups, though the common etiologies tend to differ between children and adults. That assumes that an etiology can be determined at all, since the exact cause of anaphylaxis may remain unidentified in up to two thirds of patients.[5, 6] When a cause for anaphylaxis can be determined, the more common etiologies are drugs, foods, insect stings, and physical factors such as exercise.[7] The most common drugs are aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs), and penicillin. Latex had become a more common cause since the advent of universal precautions, and approximately 8-17% of health care workers experience some form of allergic reaction to latex.[4]

Urticaria is a common disorder affecting up to 25% of the population at some point in their lifetime, but it is uncommon to progress to a chronic condition. The normal lesion is an intensely pruritic, circumscribed, raised, erythematous plaque, often with central pallor.[8] Urticaria is classified as acute or chronic; it is acute if the episodes have occurred over a period of six weeks or less, and chronic if persisting longer than that. Chronic urticaria can lead to serious quality of life impairment.[9] Angioedema is characterized by nonpitting, non-pruritic, well-defined, edematous swelling that involves subcutaneous tissues, abdominal organs, and the upper airway.[10] As with anaphylaxis, most cases of chronic urticaria or angioedema tend to be idiopathic.[11]

In most cases of acute urticaria or angioedema, the diagnosis is readily apparent with a thorough history and exam. Conditions that can masquerade as urticaria include erythema multiforme minor, nonspecific maculopapular exanthemata, mast cell releasibility syndromes such as urticaria pigmentosa and urticarial vasculitis.[12] As noted earlier, angioedema can occur without urticaria and

if this is the case, the treating physician needs to consider the possible diagnosis of ACE inhibitor associated angioedema and hereditary angioedema (HAE) which typically involves subcutaneous sites, the gut and the larynx. C4 is the best screen for HAE.[13] Autoimmune thyroiditis is the only systemic disorder known to be associated with chronic urticaria and angioedema. Of patients with chronic urticaria, 27% have antithyroglobulin antibody, antimicrosomal antibody, or both, while 19 percent have abnormal thyroid function. There is no evidence at this time that these antithyroid antibodies are pathogenic; the thyroid abnormality appears to be a parallel abnormality and may actually reflect the presence of an underlying autoimmune process.[14] However, treatment of the thyroiditis will sometimes resolve the urticaria/angioedema.

Another factor that needs to be considered in the evaluation of patients with these allergic-type diseases is food allergies. IgE-mediated food allergies can affect 6% to 8% of children and approximately 1-3% of adults. In such food allergies, symptoms typically develop within minutes of ingestion, every time the food is ingested and typically resolve within 24 hours without recurrence unless the food in once again ingested. In adults, the most common offending agents are shellfish, fish, peanuts, and tree nuts; in children, milk and egg allergies predominate. Symptoms of food-induced allergies range from localized urticaria to life-threatening anaphylaxis. If the primary care physician suspects a food allergy, referral to an allergy specialist is indicated for specific testing. The management in these cases is avoidance of the offending food as immunotherapy is currently unsafe in patients with food allergies.[15]

Other etiologies for allergic symptoms are physical. In a small number of individuals, exercise can produce a spectrum of allergic symptoms ranging from mild urticaria to a serious anaphylactic reaction. Cholinergic urticaria are lesions that develop due to an exaggerated cholinergic response to an increase in body temperature (or to anxiety, stress, or exercise). If the diagnosis is unclear, a passive warming test can be performed by immersing the patient in warm water and observing any changes. For suspicions of exercise-induced anaphylaxis, an exercise challenge test can be performed. These should be performed by an allergist due to risks for reproducibility of symptoms with exercise.[16] Other physical triggers include vibration, cold water/temperatures, solar and pressure.

Treatment for most cases of chronic urticaria and angioedema begins with removal of any agents or activities that are known to exacerbate the condition (though, as with anaphylaxis, almost two-thirds of chronic cases have no identifiable inciting agent). Management of most symptomatic patients begins with H_1 antihistamines. First generation antihistamines are effective, but the sedation side-effects may be dangerous for many activities. Therefore, the second generation medications such as loratadine and fexofenadine are often recommended, as common dosing regimens do not have a sedative side effect.[12] These medications are typically prescribed as once a day, but twice daily dosing is safe and commonly efficacious in these settings. Chronic urticaria and angioedema tend to eventually disappear regardless of treatment. For 50% of these patients, the hives will clear in 3-12 months and 40% will clear in 1-5 years.

Treatment of anaphylaxis is an emergency. Published guidelines for the management of anaphylaxis are fairly consistent. These published guidelines emphasize the early use of intramuscular epinephrine, supine position, airway support, and intravenous fluid resuscitation. Furthermore, medical providers need to be aware that the time course of anaphylaxis can be monophasic, biphasic, or protracted in nature.[18] The incidence of biphasic reactions is around 20 percent.[18,19] Most cases respond promptly to management, but some reactions are prolonged up to 24 hours or

more or resolve only to return later.[19] Observation of the patient for 4-6 hours after last dose of epinephrine is the recommended minimum time; severe cases or those with comorbid conditions should be considered for admission to the hospital.[18] All anaphylactic patients need to be referred to an allergist/immunologist for evaluation, and instructed on the necessity of self-treating any future episodes with pre-loaded epinephrine syringes. Family members also need to be trained on proper indications for using epinephrine. Prevention of future anaphylaxis episodes is critical. If there is an identifiable trigger, this needs to be avoided if possible or treated with immunotherapy. If the trigger is not known or obvious, allergy specialists need to be consulted to aid in a diagnosis and development of a long-term treatment plan.

II. Aeromedical Concerns.

Several aeromedical concerns exist with respect to the allergic reaction spectrum of disease that includes urticaria, angioedema, and anaphylaxis. First and foremost, anaphylaxis poses a risk of sudden incapacitation as it can be life threatening from airway compromise and/or cardiovascular collapse in as little as three to five minutes. Likewise, angioedema and urticaria also pose a risk of incapacitation but not to the same degree. The pruritus from urticaria can be distracting for the aviator and could jeopardize the flying mission particularly during critical phases of flight. Additionally, most medications used to treat this condition have a potential for sedation, although new generations of anti-histamines are much less sedative in nature. Angioedema can be a risk for airway compromise as well as a risk without airway involvement. The facial swelling could adversely affect the fit of vital life support gear such as an aviators mask or disrupt the fitting of spectacles. None of these conditions have a great potential for subtle performance decrement with regard to the higher senses. All of these conditions do pose issues with being stable or expected to remain so under the stresses of the aviation environment. Additionally, the possibility of progression and recurrence exists with all of these disease processes. The first signs and symptoms might not be difficult to detect, but they do pose a risk to the individual and/or the safety of others. Most cases of urticaria and/or angioedema are idiopathic in nature and recurrence can be very difficult to predict. This unpredictability makes disposition of these aviators difficult as there is no clear clinical evidence to predict an appropriate waiting time to rule out recurrences. At this time one year is stated, but it is only an "educated guess." These diseases do not require exotic tests or regular invasive procedures although their frequent and severity may require frequent absences from work or flying duties. Finally, in their most severe form, the diseases can be incompatible with the performance of unrestricted flying duties in particular if an Epi-pen is needed and/or specific triggers cannot be identified and easily avoided.

III. Waiver Consideration.

The three conditions of chronic urticaria or cold urticaria, angioedema, and anaphylaxis are each disqualifying for all flying classes in the US Air Force. Although angioedema is not mentioned by name as disqualifying, it is included as the allergy community considers angioedema as an extreme presentation of urticaria. Severe urticaria is disqualifying for retention as is a reliable history of anaphylaxis to stinging insects, or of a moderate to severe reaction to common foods, spices, or food additives. For those reason, ATC/GBC and MOD personnel will need a waiver to continue in those duties if returned to duty by MEB actions.

Factors that are important in waiver decision-making with regards to urticaria, angioedema, and anaphylaxis are frequency of episodes, the extent and severity of lesions and/or episodes, the type

and amount of medication necessary to control the illness and the ability of the aviator to totally avoid any known triggers to the episodes.[17] If there is a clinical need to have an Epi-Pen available at all times, that makes the case incompatible with unrestricted flying duties. For angioedema and especially anaphylaxis, the two critical questions are: 1) are we reasonably certain as to the offending antigen; and, 2) can the latter be reliably avoided?

In patients with initial episodes of urticaria and angioedema with a known cause, routine treatment and grounding until resolved is appropriate. If there are recurrences and the condition becomes chronic (greater than six weeks), then a more aggressive approach needs to take place and a waiver will become necessary prior to returning the aviator to flying duties. Anaphylaxis is not graded acute or chronic, so any aviator case diagnosed as anaphylaxis necessitates grounding followed by a thorough evaluation prior to consideration for a waiver.

Although it is recommended that an aviator with one of these conditions be disease-free for one year prior to consideration of a waiver, the ACS would recommend review of the case as soon as possible to facilitate adequate clinical care and maximize the chances for a subsequent waiver approval and to possibly consider waiver sooner than the one year mark. If an aviator with a history of idiopathic urticaria/angioedema without anaphylaxis is advised to carry an EpiPen only as a precautionary measure, the ACS has, in the past, recommended a FC IIC waiver (dual control aircraft, with another rated aviator).

Reactions to any required vaccines, other than local reactions, need to be evaluated by a MILITARY allergist unless it is documented to be a vasovagal reaction. IgE-mediated vaccine reactions are exceedingly rare events. While it may be easier to be seen by a civilian allergist, this is not acceptable, as civilian providers will often recommend that the vaccine not be administered in such cases, and this is an inappropriate answer for military members who need to remain world-wide qualified for deployment purposes.

Table 1: Waiver potential for urticaria, angioedema, and anaphylaxis.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	History of chronic urticaria and/or angioedema	Maybe AETC	Yes
	History of anaphylaxis	No AETC	No
II/III	Chronic urticaria and/or angioedema	Yes*+! MAJCOM	Yes
	History of anaphylaxis	Maybe#! MAJCOM	Yes
RPA	Chronic urticaria and/or angioedema	Yes MAJCOM	Yes
	History of anaphylaxis	Yes MAJCOM	Yes
ATC/GBC	Severe urticaria or anaphylaxis to stinging insects or common foods, spices or food additives^	Yes MAJCOM	At the discretion of the waiver authority
MOD	Severe urticaria or anaphylaxis to stinging insects or common foods, spices or food additives^	Yes AFGSC	At the discretion of the waiver authority

* If resolved for at least one year without events of urticaria/angioedema and all chronic treatment is with approved medications.
+ If immunotherapy used, it must be well tolerated and the aviator must be stable on a maintenance dose.
# Anaphylaxis can be considered for a waiver ONLY if the cause is identified and can be treated and/or totally avoided; no waiver potential for untrained assets.
! No indefinite waivers.
^ This is considered an unsuitable condition which would require commander approval then waiver to be submitted in particular if the medications used to control the condition are not compatible with duty.

AIMWITS search in Jul 2013 revealed a total of 187 cases that met the criteria for chronic urticaria. Of these cases, 14 were FCI/IA (1 disqualified), 88 were FC II (7 disqualified), 67 were FC III (13 disqualified), 14 were ATC/GBC (3 disqualified), and 4 were MOD (0 disqualified), with a total of 24 out of 187 cases resulting in a disqualification.

There were 35 angioedema cases. Of that total, 3 were FC I/IA (1 disqualified), 17 were FC II (1 disqualified), 11 were FC III 95 disqualified), 4 were ATC/GBC (0 disqualified), and there were no MOD cases, for a total of 7 out of 35 cases resulting in a disqualification.

There were 77 anaphylaxis cases. Of that total, 6 were FC I/IA (2 disqualified), 26 were FC II (4 disqualified), 36 were FC III (9 disqualified), 5 were ATC/GBC (0 disqualified) and 4 were MOD (3 disqualified), for a total of 18 out of 77 cases resulting in a disqualification.

There were numerous overlaps in each category. The vast majority of all of the disqualifications were due primarily to the diagnoses of urticaria, angioedema, or anaphylaxis.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for urticaria, angioedema, or anaphylaxis must include the following:
A. History specifically discussing the episode(s), frequency of events, any known triggers and timing after exposure to these triggers, pattern of recurrence, duration of attacks, family history of atopy, and treatments used with their effectiveness.
B. List and fully discuss all clinical diagnoses requiring a waiver.
C. All emergent treatment data including any EMS run notes, triage notes and ED treatment records.
D. Results of any skin testing or RAST testing, if performed. If placed on immunotherapy, documentation that member is stable on a maintenance dose.
E. Labs: all tests at the discretion of the treating allergist, but do include results of all tests performed.
F. Clinical consultation report from an allergist.
G. Documentation that the aviator has been counseled about the risks of future attacks and understands the necessity of clinical evaluation should another attack occur.
H. Documentation that the aviator is asymptomatic off all daily medications.
I. Medical Evaluation Board results.

The AMS for waiver renewal for urticaria, angioedema, or anaphylaxis must include the following:
A. Interim history specifically discussing any recurrences or any changes in the disease pattern and all medications used.
B. Labs: new labs if ordered since last waiver
C. Clinical consultation report from an allergist or from the flight surgeon if there have been no intervening concerns.
D. If on immunotherapy, documentation that it is still well tolerated.
E. Documentation that the aviator is asymptomatic off all daily medications.

ICD-9 codes for Urticaria, Angioedema, Anaphylaxis	
708	Urticaria
995.1 & 277.6	Angioedema
995.0, 995.2 & 995.6	Anaphylaxis

ICD-10 codes for Urticaria, Angioedema, Anaphylaxis	
L50.0	Allergic urticaria
L50.1	idiopathic urticaria
T78.3	Angioneurotic edema
D84.1	Defects in the complement system
T78.00	Anaphylaxis due to unspecified food .01 Peanuts; .02 Shellfish; .03 other fish; .05 Tree nuts, seeds; .07 milk & dairy products; .08 eggs
T78.2	Anaphylactic shock, unspecified

V. References.

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WAIVER GUIDE
Updated: Jul 2014
Supersedes Waiver Guide of Mar 2011
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CONDITION:
Uterine Fibroids (Leiomyomas) (Jul 14)

I. Overview.

Uterine leiomyomas, or fibroids, are the most common benign gynecologic tumor in women and they are the most common reason for hysterectomy. They occur in up to 70% of Caucasian women and 80% of African-American women by age 50. The highest prevalence of these tumors occurs during the fifth decade of a woman's life.[1] Some studies have shown that up to 25% of reproductive aged women have uterine fibroids, but most women with symptomatic fibroids are in their 30s or 40s.[2, 3] Fibroids can occur within the uterine wall, on the external surface of the uterus, or within the endometrial cavity, and when larger, an individual fibroid may become transmural. They vary in size and number and increase size in response to estrogen. They generally progress over a lifetime, and may stabilize or regress after menopause from decreased endogenous estrogen. They are often asymptomatic and monitored through annual exams. Treatments are considered when the fibroids become symptomatic, are found to be rapidly growing, are associated with infertility, or other situations.

Leiomyomas arise from smooth muscle cells of the uterus, and contain an increased amount of extracellular collagen and elastin matrix as well as a thin pseudocapsule.[2, 4] They are generally described by their location in the uterus: intramural, submucosal, subserosal, and cervical. Uterine fibroids grow in response to estrogen. The cause of these tumors is incompletely understood, although it is known that each tumor results from a single muscle cell. Fibroids, and their symptoms, often regress during the post-menopausal period as the woman's steroid hormone levels decrease. There is evidence that some factors may increase the risk of developing uterine fibroids, such as early menarche (less than age 10), family history of fibroids, red meat consumption, hypertension, uterine infection, alcohol consumption (especially beer), and race (more common in black women). However, other factors may reduce the risk of uterine fibroids, which include parity of two or more, smoking, progestin-only contraceptives, and combination oral contraceptive use.[2, 4] Uterine fibroids rarely involved malignant changes, which includes leiomyosarcoma, in less than 1% of cases.

<u>Symptoms</u>
The majority of women with fibroids are asymptomatic, but one in three will experience pelvic pain or pressure, with dysmenorrhea being the most frequent complaint.[1] Fibroid symptoms include increased uterine bleeding, pelvic pressure and pain (bulk symptoms), and reproductive dysfunction.[1] The most common symptoms include painful pelvic pressure and irregular uterine bleeding.[3] The pain is usually described as menstrual pain and/or pressure and is related to the size and number of fibroids. The fibroids can apply pressure to other pelvic organs or nerves, cause non-menstrual pain, and may interfere with normal bowel or bladder function. The abnormal uterine bleeding is experienced by up to 30% of women with fibroids. The irregular bleeding is typically heavy and prolonged, and may result in iron deficiency anemia.[5] Patients with subserosal tumors or numerous tumors may also have reproductive dysfunction.[2, 4]

Treatment

Treatment for uterine fibroids is aimed at symptom relief, infertility, or suspicious appearance. Most fibroids are asymptomatic and are managed expectantly. When symptomatic, fibroids are managed based upon factors such as size, location, woman's age, reproductive considerations, and symptomatology.[6] Symptomatic fibroids can be treated medically or surgically.

Medical management includes managing symptoms, and decreasing or inhibiting circulating estrogens. Medical treatments commonly include contraceptive hormones, and nonsteroidal anti-inflammatory drugs (NSAIDs). NSAIDs may reduce pain symptoms, but they do not appear to reduce blood loss.[7] Contraceptive hormones may not reduce fibroid size, but they are commonly used and effective in relieving the symptoms of menorrhagia and dysmenorrhea without increasing fibroid size.[8] The evidence suggests that both combination oral contraceptives and progestin-only contraceptives may decrease the risk of developing clinically significant lieomyomas.[9,10] The levonorgestrel intrauterine system (IUD) has been shown in small studies to control the heavy uterine bleeding associated with leiomyomas.[10] Treatment with contraceptive hormones, progestin-only medications, and progesterone containing IUDs are considered acceptable for use in aviation.

Other medical treatment may also include gonadotropin-releasing hormone (GnRH) agonists/antagonists, mifepristone (RU-486), aromatase inhibitors, danazol, and raloxifene. GnRH related drugs can cause a decrease in bone mineral density and osteoporosis and are associated with a rapid return to pre-treatment uterus size when the medicine is discontinued.[6, 7] The GnRH drugs are often used temporarily for 2 to 3 months to reduce fibroid size in preparation for surgery, but may be used up to 6 months. The GnRH related medications can have unpredictable side effects and are not approved in aircrew. Aromitase inhibitors are medications that block the production of estrogen from the ovary and other peripheral sites. They act similarly to Gn-RH analogs, but tend to have fewer side effects. These medications can also have unpredictable side effects and are not approved in aircrew. The medical measures used to treat symptomatic fibroids are an alternative to surgery that can offer symptom relief, but these medications may have bothersome side effects and unknown long-term effects.

Surgical modalities are the mainstay of treatment.[6] Surgical approaches include hysterectomy (by abdominal, vaginal, or laparoscopic approach), myomectomy (by laparoscopy, laparotomy, or hysteroscopy), myolysis, uterine artery occlusion, and uterine artery embolization.[7] Hysterectomy is the definitive procedure to provide a cure as it is the only treatment that eliminates the possibility of recurrence.[3]

Surgical and non-surgical procedures are selected based on age, patient conditions, procedure availability, desire for fertility, and size of fibroids. Minimally invasive laparoscopic and hysteroscopic procedures have become more common, but uterine size may require more significant surgery. These techniques are used for hysterectomy or myomectomy depending on the condition and desire for fertility.

Myomectomy involves removing the significant fibroids and retaining the uterus. The repeat surgery rate after myomectomy has been shown to have a recurrence rate of 11.7% after one year, and 84.4% after eight years.[12] Laparoscopic or hysteroscopic myomectomy by excision removal or morcellation are minimally invasive surgical techniques to remove fibroids. Morcellation of fibroids involves employing a device to cut larger fibroids into smaller pieces to facilitate their removal and removal of the uterus during a minimally invasive procedure. There are some

concerns related to laparoscopic morcellation of fibroids as a small risk exists of retaining occult tiny fragments of leiomyoma cells in the pelvis after surgery that may contain sarcoma cells.

An alternative procedure to surgical removal is uterine artery embolization. In this interventional radiology procedure, the uterine arteries are selectively embolized through a femoral artery approach. This procedure not considered definitive, but in observational studies, embolization has been associated with a reduction in uterine volume, a decrease in excessive uterine bleeding, and a lower rate of subsequent hysterectomy.[13] It is considered an accepted method to use in selected women, but is associated with a higher risk of requiring a subsequent procedure or a failure to control symptoms.[14]

II. Aeromedical Concerns.

Symptomatic fibroids may cause significant distraction or impairment during flight due to dysmenorrhea, menorrhagia, anemia, and non-menstrual pain symptoms such as pressure, bloating, and urinary frequency/urgency. Associated anemia may also be a concern. The medical treatment of fibroids can lead to side effects unacceptable for flying status. The use of hormone suppressive medications such as contraceptive pills, progesterone supplementation, or a progesterone containing intrauterine device is generally well tolerated and considered acceptable for flying duties. The use of other medications such as GnRH agonists/antagonists, aromatase inhibitors, or similar medications is often associated with significant and unpredictable symptoms. The symptoms associated with these can have an adverse effect on duty performance and symptoms may vary within and across patients. The use of GnRH medications is generally utilized on a temporary basis and typically in preparation for surgical treatment. Surgical treatment, due to its associated recovery period and possible complications, would be incompatible with flying duties until the individual is fully recovered and histology is confirmed as benign. Uterine artery embolization is associated with pain and irregular uterine bleeding, which is also incompatible with flight duties until the procedure is confirmed as uncomplicated and the patient is fully recovered and asymptomatic.

III. Waiver Consideration.

Asymptomatic fibroids are not disqualifying and as such, require no waiver. Symptomatic uterine fibroids, however, are disqualifying for flying classes (FC) I, IA, II, and III. The condition is not listed as disqualifying for ATC/GBC and MOD duties, nor is it disqualifying for retention purposes, but significant symptoms and/or treatments may require duty restriction or limitation based on the medication and clinical evaluation. The use of hormone suppressive medications such as contraceptive pills, progesterone supplementation, or a progesterone containing intrauterine device do not require a waiver. The use of any hormonal suppressive therapy should be monitored for adverse effects and effectiveness in controlling fibroid symptoms as they relate to duty performance. The use of other medications such as GnRH agonists/antagonists, aromatase inhibitors, or similar medications requires a waiver due to their association with significant and unpredictable symptoms. Use of these medications also requires a trial period to assess tolerance before considering a waiver. A history of a surgical treatment for symptomatic benign fibroids, if uncomplicated, fully recovered, and asymptomatic, does not require waiver for any flying class exam, however, the non-malignant histology should be documented. These patients are not required to have their cases reviewed by the ACS.

A history of myomectomy or uterine artery embolization is not considered disqualifying provided asymptomatic after full recovery from the procedure, and there are no persistent complications or physical limitation. Hysterectomy is the definitive treatment for fibroids eliminating the risk of recurrence. A history of hysterectomy for benign uterine fibroids is not disqualifying provided the patient is asymptomatic after full recovery from surgery, and they is no persistent complications and no physical limitation. Myomectomy and uterine artery embolization have a higher rate of recurrence over years. Embolization is associated with persistent bleeding and other symptoms following the procedure. History of myomectomy or uterine artery embolization is is not considered disqualifying provided asymptomatic after full recovery from the procedure, and there are no persistent complications or physical limitation.

Table 1: Waiver potential for uterine fibroids

Flying Class (FC)	**Condition**	**Waiver Potential** **Waiver Authority**
I/IA	Medically treated with OCPs, progestin or NSAIDs	Maybe AETC
	Medically treated with GnRH analog*	No AETC
II/III	Medically treated with OCPs, progestin or NSAIDs	Yes MAJCOM
	Medically treated with GnRH analog*	No MAJCOM
ATC/GBC#	Medically treated with OCPs, progestin or NSAIDs	Yes MAJCOM
	Medically treated with GnRH analog*	Maybe MAJCOM
MOD#	Medically treated with OCPs, progestin or NSAIDs	Yes AFGSC
	Medically treated with GnRH analog*	Maybe AFGSC

*Gn-RH analogs are generally used for 2-3 months (rarely longer) in preparation of surgery and then discontinued.
No waiver required unless unable to perform duties or treated with unapproved medications.

AIMWITS search in Jun 2014 revealed nine aviators with an AMS containing the diagnosis of uterine fibroids; a total of four of them were disqualified. All but one of the cases was FC III; the other case was FC II. The one FC II case resulted in disqualification disposition and three of the remaining eight cases were disqualified.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for uterine fibroids should include the following:
A. History and physical. History should include degree of impairment from the symptomatic uterine fibroids, level of functioning before and after uterine fibroid treatment modalities, presence and/or resolution of anemia/fatigue, treatment modalities used, and treatment option considerations (e.g., future fertility desired).
B. Gynecology consultation.
C. Results of special exams or interventions.
D. Current complete blood count.
E. Histology report, if applicable.

The AMS for waiver renewal for uterine fibroids should include the following:
A. Interval history since last aeromedical summary with emphasis on any symptoms compatible with the disorder.
B. Current complete blood count.
C. Consultation from gynecologist or treating physician.

ICD-9 code for uterine fibroids	
218	Uterine leiomyoma

ICD-10 code for uterine fibroids	
D25.9	Leiomyoma of uterus, unspecified

V. References.

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WAIVER GUIDE
Updated: Jul 2015
Supersedes waiver guide of Nov 2011
By: LtCol Paul Puchta (RAM 16) and Dr. Dan Van Syoc
Reviewed by LtCol Dan LaMothe, Chief, Aerospace Ophthalmology Branch of the ACS

CONDITION:
Uveitis (Jul 15)

I. Overview.

Uveitis is the general term for inflammation of the uveal tract which consists of the iris, ciliary body and choroid.[1] The uveal tract is the vascular coating of the eye, lying between the sclera and neuroepithelium. The uvea contains nerves, supporting connective tissue, and a variable number of melanocytes that are responsible for its distinctive color. Uveitis is a relatively uncommon condition with an estimated incidence of 17.4 to 52.4 cases per 100,000 person-years and a prevalence of 58.0 to 114.5 per 100,000 persons. It accounts for almost 15% of all causes of blindness among people of working age in high income countries.[2] Uveitis is reported to be responsible for up to 10% of cases of blindness in the US.[3] In 2005 a Standardization of Uveitis Nomenclature (SUN) working group was formed to develop an anatomical classification system, condition descriptors, a standardized grading system and common terminology to be used for following the activity of uveitis.[4] The basic anatomical classification has four groups:

- Anterior uveitis – Anterior chamber
- Intermediate uveitis - Vitreous
- Posterior uveitis – Retina or Choroid
- Panuveitis – Anterior chamber, vitreous, and retina or choroid

Anterior uveitis is characterized by inflammation of the anterior uveal tract. It includes iritis, iridocyclitis and anterior cyclitis. Inflammation confined to the anterior chamber is called iritis; if it extends into the retrolental space it is named iridocyclitis. When the inflammatory reaction involves the cornea it is known as keratouveitis and sclerouveitis when it affects that sclera and uveal tract. Anterior uveitis is the most common form of uveitis (approximately four times more prevalent than posterior) with an annual incidence rate of 8.2 per 100,000.[5] The primary site of inflammation for intermediate uveitis is the vitreous and includes pars planitis, posterior cyclitis and hyalitis. Posterior uveitis is composed of inflammatory conditions involving the retina and/or choroid. These can be a focal or multifocal, retinitis or chorioretinitis with or without vitritis or vasculitis. Panuveitis describes an inflammation involving the anterior chamber, vitreous, and retina or choroid.

The hallmark of acute anterior uveitis is the presence of white blood cells and serum protein in the anterior chamber secondary to breakdown of the blood-aqueous barrier with associated increased vascular permeability in the affected eye.[6] The classic symptoms of anterior uveitis include acute eye pain, redness, photophobia and blurred vision.[7] The symptoms may only be minimal (blurry vision or mild redness), if the inflammation begins insidiously (e.g., JRA, Fuchs' heterochromic iridocyclitis). The degree of visual loss can also be variable. Individuals may also present with excessive tearing as their primary symptom. Those with intermediate or posterior uveitis typically have floaters and/or impaired vision. Blurred or impaired vision can be the result of myopic or

hyperopic shifts, the presence of inflammatory cells, cataract formation, the development of a scotoma and/or secondary to floaters.

The etiology of uveitis includes infectious agents (viral, bacterial, parasitic, fungal), systemic inflammatory diseases, isolated eye diseases, as well as idiopathic ocular inflammation. The infectious agents known to elicit uveitis include cytomegalovirus (CMV), toxoplasmosis, syphilis, tuberculosis, cat scratch disease, Lyme disease, histoplasmosis and West Nile virus. The list of systemic inflammatory diseases associated with uveitis is extensive and includes HLA-B27 associated disorders, sarcoidosis, Behçet's disease, drug hypersensitivity reaction, juvenile rheumatoid arthritis (JRA), Kawasaki disease, systemic lupus erythematosus and Sjögren's disease. The HLA-B27 associated disorders include ankylosing spondylitis, reactive arthritis, ulcerative colitis and Crohn's disease. Isolated eye diseases include acute posterior multifocal placoid pigment epitheliopathy (APMPPE), multiple evanescent white dot syndrome (MEWDS), subretinal fibrosis and uveitis syndrome, and birdshot retinochoroidopathy.[8] Most anterior uveitis cases represent sterile inflammatory autoimmune-type reactions, whereas more often posterior uveitides are associated with infectious etiologies.[9] However, approximately 30% of individuals with uveitis do not have any apparent associated infectious etiology or systemic disease, and are simply identified as idiopathic. A comprehensive history and review of systems must be obtained for every patient who presents with intraocular inflammation. The diagnosis of uveitis requires a slit lamp examination of the eye to properly look for signs of intraocular inflammation. The presence of leukocytes in the anterior chamber of the eye is characteristic of anterior uveitis, intermediate uveitis if the leukocytes are located in the vitreous humor, and posterior uveitis if active chorioretinal inflammation is found.

Any treatment strategy for uveitis must bear in mind a number of elements. First, underlying etiology, which will define the type of treatment needed. Second, the extent of uveitis and associated inflammation based on the following: 1/anatomical location within the eye (SUN classification); 2/ unilaterality versus bilaterality; 3/associated systemic disease. Third, the severity of the disease, which may drive additional or alternative treatments. These elements are all important elements to be aware of when deciding whether topical, local or systemic treatments will be needed.[10] Treatment for noninfectious uveitis usually consists of a cycloplegic agent and topical ophthalmic steroids.[11] Systemic steroids typically are reserved for patients with bilateral disease not responding to topical medications. Recurrent cases, those not responding to topical therapy, and cases with inflammation beyond the anterior chamber or with visual impairment should be referred to an ophthalmologist. If there is a systemic or infectious etiology for the uveitis, it should be treated accordingly. Topical or systemic nonsteroidal anti-inflammatory drugs (NSAIDs) and immunomodulatory (e.g., methotrexate, cyclosporine, tacrolimus, and etanercept) therapy may be required.

There is significant interest in the use of intravitreal steroid treatment for noninfectious uveitis when an intermediate or posterior etiology is identified. As systemic steroid use has significant side effects and topical therapy is only effective for anterior uveitis, a more efficacious method is needed to treat such cases. Currently there are studies using fluocinolone acetonide and dexamethasone intravitreal implants with good initial results.[3, 12]

II. Aeromedical Concerns.

For the flight surgeon, uveitis of any etiology is of concern due to possible complications and sequelae. The acute condition can cause distracting pain. Floaters and blurred vision can impair performance and affect flight safety. Long term sequelae include pupillary abnormalities, cataract, glaucoma, retinal scarring, retinal detachment, keratopathy, and loss of vision. The flight surgeon also needs to be concerned with possible underlying disease processes which may require aeromedical disposition as well.[13]

III. Waiver Considerations.

Acute, chronic or recurrent inflammation of the uveal tract, except for healed traumatic iritis is disqualifying for flying classes I/IA, II and III. If the uveitis is secondary to a systemic disease, waiver consideration will also depend on the status of the systemic disease, see applicable waiver guides. While not specified in AFI 48-123 and the MSD as disqualifying for ATC/GBC and MOD personnel, uveitis should be disqualifying if it is recurrent or chronic and leads to frequent absences from duty or results in decrease or loss of vision.

Table 1: Waiver potential for uveitis.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Single episode (mild, nongranulomatous, unilateral), resolved.	Maybe* AETC	Yes
	Single episode (granulomatous and/or bilateral), recurrent episodes and/or on-going visual symptoms/sequelae.	No# AETC	Yes, only in cases eligible for waiver
II/III trained	Single episode, recurrent episodes without visual symptoms/sequelae	Yes MAJCOM**	Yes, initial and maybe subsequently
	Single episode, recurrent episodes with visual symptoms/sequelae	Maybe MAJCOM**	Yes
II/III untrained	Single episode (mild, nongranulomatous, unilateral), resolved.	Maybe* AETC**	Yes
	Single episode (granulomatous and/or bilateral), recurrent episodes and/or on-going visual symptoms/sequelae	No# AETC**	Yes, only in cases eligible for waiver
ATC/GBC MOD**	Single episode, recurrent episodes without visual symptoms/sequelae	N/A	N/A
	Single episode, recurrent episodes with visual symptoms/sequelae	Maybe MAJCOM	Yes

* If uveitis occurred greater than one year ago.
** Waiver authority for MOD personnel is AFGSC.
# If disease treated/remission and waiver eligible for that disease then waiver may be considered if no visual sequelae, ACS review/evaluation required.

A review of the AIMWTS database in May 2015 revealed 137 cases of uveitis; 19 were disqualified. There were 0 FC I/IA cases, 72 FC II cases (5 disqualifications), 57 FC III cases (11 disqualifications), 6 ATC/GBC cases (2 disqualifications), and 2 MOD cases (1 disqualification). Of the 19 disqualified, all but 2 were secondary to the uveitis symptoms.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for uveitis (single mild episode, nongranulomatous, unilateral and without evidence of systemic disease) should include the following:
A. History – signs, symptoms, duration, treatment and must include pertinent review of system negatives.
B. Physical – complete.
C. Ophthalmology consultation.

The AMS for initial waiver for uveitis (granulomatous, bilateral, greater than mild or recurrent and no evidence of systemic disease) should include the following:
A. History – Signs, symptoms, duration, and treatment (must include pertinent review of system to include pertinent negatives).
B. Physical – complete.
C. Ophthalmology consultation.
D. Chest x-ray to rule out sarcoidosis and tuberculosis.
E. Labs: Syphilis serology, Lyme titer, HLA-B27, erythrocyte sedimentation rate (ESR).
F. IPPD.

The AMS for waiver renewal of uveitis should include the following:
A. History – etiology, signs, symptoms, duration, frequency, and treatment.
B. Physical – complete if recurrent.
C. Ophthalmology/optometry consultation.

ICD-9 Codes for Uveitis	
364.3	Unspecified iridocyclitis
363.2	Unspecified forms of chorioretinitis and retinochoroiditis
360.12	Panuveitis

ICD-10 Codes for Uveitis	
H20.9	Unspecified iridocyclitis
H30.93 1, 2, 3, 9	Unspecified chorioretinal inflammation
H44.11 1, 2, 3, 9	Panuveitis

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WAIVER GUIDE
Updated: Jan 2011
Supersedes Waiver Guide of May 2007
By: Dr Dan Van Syoc
Reviewed by Dr Bill Kruyer, ACS chief cardiologist

CONDITION:
Valve Surgery - Replacement or Repair (Jan 11)

I. Overview.

Replacement or repair of a cardiac valve is a complicated aeromedical subject and disposition consideration. This presently is a surgical procedure, but catheter-based techniques are under active investigation. In the military aviator/aircrew population valve replacement or repair will usually be for severe regurgitation of the aortic or mitral valve. In the older aviator population with bicuspid aortic valve, significant aortic valve stenosis is an unusual possibility. Procedures for mitral stenosis and tricuspid valve disease are very rare. One occasional consideration in candidates for initial flying training may be balloon valvuloplasty of congenital pulmonary valve stenosis performed during childhood. Due to the broad spectrum of procedures, types of valve prostheses and other considerations, valve replacement/repair considered for waiver must be evaluated by the Aeromedical Consultation Service (ACS) (See Table 1). Information in this waiver guide will thus be very general.

II. Aeromedical Concerns.

Aeromedical concerns include thromboembolic events, anticoagulation and/or antiplatelet medications, infective endocarditis, dysrhythmias, residual or progressive post-procedure valvular regurgitation and/or stenosis, and short- and long-term durability of the procedure, especially prostheses. The etiology of the underlying valve disease is also a consideration as it may affect procedure outcomes, e.g. repair of severe mitral regurgitation (MR) due to myxomatous disease has a much better prognosis than severe MR due to rheumatic disease.

Prosthetic valves are of two basic types, mechanical (metal and plastic) and biological (human and nonhuman tissue). Regardless of valve type, valve prostheses in the mitral position have higher thromboembolic rates than those in the aortic position and are thus unacceptable for military aviation. Mechanical valves have higher thromboembolic rates than biological valves and require chronic warfarin therapy, with associated risk of major hemorrhage. The combined risk is considered unacceptable for military aviation. Biological valve prostheses are of several tissue types and designs. They do not require chronic warfarin therapy unless there is some other indication, such as chronic atrial fibrillation. These valves in the aortic position may be a consideration for waiver. Mitral valve repair and annuloplasty for severe MR due to a myxomatous valve (i.e. mitral valve prolapse) also may be a consideration for waiver. Valve prostheses with residual regurgitation or other concerns regarding long-term durability will likely be restricted to low performance aircraft. Select architecturally intact valves with no residual regurgitation may be considered for unrestricted waiver on a case-by-case basis.

III. Waiver Consideration.

Cardiac valve replacement or repair by surgery or catheter-based technique is disqualifying for all classes of flying duties. ACS review/evaluation is required for initial and renewal waiver consideration.

Table 1: Waiver potential for various valve replacements and repairs.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	Mitral valve, aortic valve and tricuspid valve surgery	No AETC	No
	Pulmonic valvuloplasty	Maybe AFMSA	Yes
II	Mitral valve prosthetic (mechanical or biological)	No AFMOA	No
	Mitral valve annuloplasty or repair	Maybe AFMSA	Yes
	Aortic valve (mechanical)	No AFMSA	No
	Aortic valve (biological)	Maybe AFMSA	Yes
	Other procedures or valves	Maybe AFMSA	Yes
III* IIU** ATC/GBC* SMOD***	Mitral valve prosthetic (mechanical or biological)	No MAJCOM	No
	Mitral valve annuloplasty or repair	Maybe MAJCOM	Yes
	Aortic valve (mechanical)	No MAJCOM	No
	Aortic valve (biological)	Maybe MAJCOM	Yes
	Other procedures or valves	Maybe MAJCOM	Yes

*Waiver authority for initial FC III and initial ATC/GBC is AETC.
**Waiver authority for FCIIU personnel is AFMSA except for initial certification which is AETC.
***Waiver authority for SMOD cases is AFSPC or GSC, depending on assigned location.

AIMWITS search in September 2010 revealed 7 cases of aortic valve replacement and 10 cases of mitral valve replacement. Within the AV category there were 5 FC II cases (2 disqualifications) and 2 SMOD cases. Within the MV category, there were 9 FC II cases (3 disqualifications) and 1 FC III case.

IV. Information Required for Waiver Submission.

Prior to waiver submission for valve replacement or repair there is a minimum nonflying observation period of six months. After the six-month observation period, submit an aeromedical summary (AMS) with the following information:
A. Complete history and physical exam – to include description of symptoms before and after surgery, cardiovascular risks (family history, smoking status, lipids, and history of rheumatic disease), medications, and activity level.
B. Copy of pre- and post-procedure local echocardiogram reports. For all FC II individuals and for FC I and III individuals requiring ACS evaluation, send videotape/CD copy of the echocardiographic images to the ACS. (Notes 1 and 2)
C. Copy of the formal operation/procedure report and follow-up progress notes by the attending cardiovascular specialists.
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram, treadmill, Holter monitor). For all FC II individuals and for FC I and III individuals requiring ACS evaluation if reports or tracings not attached in AIMWTS then send to ACS. (Notes 1 and 2)
E. Results of medical evaluation board (MEB) (worldwide duty evaluation for ARC members).
F. Additional local cardiac testing is not routinely required but may be requested in individual cases.

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

V. References.

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WAIVER GUIDE
Updated: Jul 2014
Supersedes Waiver Guide of Jan 2011
By: Dr Dan Van Syoc
Reviewed by Maj Eddie Davenport, chief ACS cardiologist

CONDITION:
Ventricular Tachycardia (Jul 14)

I. Overview.

Ventricular tachycardia (VT) is defined as three or more consecutive ventricular premature beats at a heart rate greater than 100 beats per minute. The spectrum of VT thus ranges from an asymptomatic three-beat run that is unnoticed by the individual to a sustained run with hemodynamic collapse.[1] VT may be due to underlying cardiac disorders, such as coronary artery disease (CAD) and myocardial scarring, hypertrophic or dilated cardiomyopathy, and electrical or ion-channel abnormalities including but not limited to Brugada's syndrome and long QT syndrome. VT is termed idiopathic when no underlying cardiac disorder can be discerned.

Nonsustained ventricular tachycardia (NSVT) is defined as three or more consecutive ventricular beats at a rate greater than 100 beats/min with a duration of less than 30 seconds. It is relatively common and is often asymptomatic. The major clinical challenge is to determine if the NSVT is benign or indicative of an underlying cardiac disorder.[2] NSVT in the presence of structural heart disease is felt to carry a more serious prognosis than NSVT in the absence of such a condition such as coronary heart disease.[3] How does one determine if ventricular ectopy or VT during exercise testing is a predictor of an increased risk of premature death? A 2003 Cleveland study indicated that ventricular ectopy during recovery after exercise testing is a better predictor than is ventricular ectopy occurring only during exercise.[4]

A clinical distinction is made based on the presence or absence of hemodynamic symptoms which may include near syncope, syncope, chest pain, heart failure related symptoms or sudden cardiac death. An electrophysiological distinction is also made based on the duration of the dysrhythmia. That is, VT of greater than 30 seconds is clinically regarded as sustained VT whereas nonsustained VT has a duration of less than 30 seconds. Twenty-nine (29) seconds of asymptomatic VT is thus clinically considered to be nonsustained. In spite of the data and opinions that a VT run of such duration is probably benign in the absence of underlying cardiac disease, it is also probably too long for most aerospace medicine practitioners to feel comfortable returning a flyer to flying duties, especially to a single-seat, high performance cockpit. For the purpose of aeromedical disposition, VT duration will be expressed in total beats rather than seconds. Waiver policy will be determined by thresholds for VT duration in beats and number of runs of VT per evaluation as discussed below.

In a review of 193 aviators evaluated at the Aeromedical Consultation Service (ACS) from 1960 to 1992 for nonsustained VT, the maximum predicted event rate for idiopathic nonsustained VT was 0.3% per year.[5] The longest VT duration was 11 beats or less in 98% of the cohort and the number of VT runs per evaluation was four runs in 90% of the cohort, establishing these two limits as thresholds for the previous and current VT waiver policies. In a more recent review of 140 military aviators evaluated at the ACS from 1995 to 2005 for asymptomatic nonsustained VT, only one member was found to have a cardiac event over a mean follow-up of eight years. The individual

subsequently was shown to have arrhythmogenic right ventricular cardiomyopathy. In this review approximately 25% had some degree of CAD, 5% had significant CAD, 9% had mitral valve prolapse and 11% had bicuspid aortic valve. There was one case of cardiomyopathy.[6]

The aforementioned case review also revealed that of 12 members undergoing centrifuge testing for an initial ACS evaluation of VT, none had acceleration-induced tachyarrhythmias. Thus, centrifuge testing is no longer a requirement for return to high performance flying duties and waiver for nonsustained VT is for unrestricted flying duties. VT unassociated with obvious structural disease can occur occasionally in young otherwise healthy adults. Medical treatment in such individuals has low efficacy, but catheter ablation can be curative.[7]

VT without hemodynamic decompensation can be treated with IV amiodarone, lidocaine, or procainamide, followed by an infusion of the successful drug. If medical therapy is unsuccessful, electrical DC cardioversion can be utilized. NSVT can normally be treated with reassurance, medical therapy, and catheter ablation.[8] VT with hemodynamic decompensation should be treated promptly with DC cardioversion.[9] Patients with NSVT and structural heart disease are at an increased risk of sudden cardiac death and this risk can be reduced in selected cases with an implantable cardioverter-defibrillator and/or medical therapy.[10] Radiofrequency ablation (RFA) for VT is discussed in the RFA of tachyarrhythmias waiver guide and is handled on a case-by-case basis. Long term repeated episodes of VT even if asymptomatic and non-sustained can lead to ventricular remodeling and cardiomyopathy on a previously structurally normal heart and thus regular follow-up is necessary at 1-3 year intervals.

II. Aeromedical Concerns.

Ventricular tachycardia associated with hemodynamic symptoms may render an individual incapable of remaining in control of an aircraft or supporting the flying mission. Though sudden cardiac death related to sustained VT would be an obvious and dramatic explanation for such an event, a less dramatic near syncopal episode is also likely to result in sudden incapacitation or interference with duty performance. Sudden cardiac death is predominantly caused by acute coronary syndromes resulting in sustained VT. For many, this may be the initial manifestation of underlying ischemic or structural heart disease.[11] Underlying CAD may thus be the inciting event that leads to the final common pathway of a dysrhythmic event impairing an aircrew member. Finally, as stated above, repeated episodes of VT even if asymptomatic and non-sustained can lead to ventricular remodeling and cardiomyopathy on a previously structurally normal heart which can manifest as heart failure.

III. Waiver Consideration.

A history of symptomatic or asymptomatic ventricular tachycardia is disqualifying for all classes of flying duties. It is not disqualifying for ATC/GBC and MOD duties unless it is asymptomatic. The currently approved waiver policy recommends unrestricted FC II or FC III waiver when the following findings are present:

- No hemodynamic symptoms associated with any episode of VT.
- No more than 4 episodes of nonsustained VT per study ($\leq$4 episodes VT).
- Duration of each VT episode no longer than 11 beats ($\leq$11 beats duration).
- No underlying cardiac disorder.

Therefore, sustained VT and any duration of nonsustained VT with associated hemodynamic symptoms are disqualifying for all flying classes and for ATC/GBC and MOD duties, without waiver recommendation. Nonsustained VT with underlying cardiac disorder is disqualifying and waiver maybe considered on a case-by-case basis. Nonsustained VT with duration longer than 11 beats and/or with more than four episodes of nonsustained VT per study (e.g. treadmill, Holter) is disqualifying and waiver may be considered on a case-by-case basis. Idiopathic nonsustained VT with duration 11 beats or less and with four or less episodes of nonsustained VT per evaluation is waiver eligible. Waiver may be considered on a case-by-case basis for initial FC I/IA applicants. FC I, FC II and FC III waivers for VT require ACS evaluation/review. Table 1 summarizes the current approved aeromedical policy.

Table 1: Waiver potential for ventricular tachycardia

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA Untrained II, IIU, and III	Nonsustained idiopathic VT (max duration ≤11 beats, ≤4 episodes per study)	Maybe AETC	Yes
	Nonsustained idiopathic VT (max duration >11 beats, >4 episodes per study)	Maybe AETC	Yes
	Nonsustained VT with underlying cardiac disorder*	No AETC	No
	Sustained VT or any duration VT with associated hemodynamic symptoms	No AETC	No
II/III	Nonsustained idiopathic VT (max duration ≤11 beats, ≤4 episodes per study)	Yes MAJCOM	Yes
	Nonsustained idiopathic VT (max duration >11 beats, >4 episodes per study)	Maybe MAJCOM	Yes
	Nonsustained VT with underlying cardiac disorder*	Maybe MAJCOM	Yes
	Sustained VT or any duration VT with associated hemodynamic symptoms	No MAJCOM**	No
ATC/GBC	VT requiring medical treatment	Yes MAJCOM	At the discretion of the waiver authority
MOD	VT requiring medical treatment	Yes AFGSC	At the discretion of the waiver authority

* Cardiac disorders that are unlikely to be waived include moderate and significant coronary artery disease, hypertrophic or dilated cardiomyopathy, and electrical or ion-channel abnormalities.

AIMWITS search in Jun 2014 revealed a total of 108 cases with 17 cases resulting in a disqualification disposition. Breakdown of the cases was: 0 FC I/IA cases, 78 FC II cases (13 disqualified), 26 FC III cases (3 disqualified), 3 ATC/GBC cases (1 disqualified) and 0 MOD cases. The vast majority of the disqualified cases were related to the VT diagnosis or another cardiac condition.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Nonsustained VT will usually be discovered on 24-hour Holter monitor or treadmill performed for a variety of clinical and/or aeromedical indications. ACS evaluation is required for all classes of flying duties if waiver is being considered for sustained or nonsustained ventricular tachycardia. No additional studies are required prior to ACS evaluation. If however, the treating physician deems it clinically necessary to perform additional studies, it is required that all studies be forwarded to the ACS for review. There is no minimum required nonflying observation period for waiver consideration for nonsustained VT.

The AMS should contain the following information:
A. Complete history and physical examination to include detailed description of symptoms before and after the acute episode, medications, activity level and CAD risk factors (positive and negative).
B. Report and complete tracings of the test documenting nonsustained VT (e.g. ECG, Holter monitor, treadmill). (Notes 1 and 2)
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. echocardiography, treadmill, nuclear stress imaging). (Notes 1 and 2)
D. Additional local cardiac testing is not routinely required but may be requested in individual cases.

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manger for (patient's MAJCOM)
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Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

ICD-9 code for ventricular tachycardia	
427.1	Paroxysmal ventricular tachycardia

ICD-10 code for ventricular tachycardia	
I47.2	Ventricular tachycardia

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WAIVER GUIDE
Updated: May 2014
Supersedes Waiver Guide of Jan 2011
By: Dr Dan Van Syoc
Reviewed by Col Mark Packer, AF/SG Consultant for Neurotology

CONDITION:
Vertiginous Disorders, Peripheral (Meniere's Disease, Benign Paroxysmal Positional Vertigo, Vestibular Neuronitis [Labyrinthitis]) (May 14)

I. Overview.

Vertigo is a symptom of illusory movement; it is not a diagnosis.[1] Some may even refer to it as a hallucination of movement.[2] It arises from an asymmetry in the vestibular system due to damage to or dysfunction of the labyrinth, the vestibular nerve, or central vestibular structures in the brainstem. In evaluating the "dizzy" patient, it is important to establish first whether the symptoms represent vertigo or some other form of dizziness such as presyncope. Not all who suffer from vertiginous disorders will describe a classic spinning sensation. Some may describe imbalance or disequilibrium, or be unable to describe their sensations in words. Other clinical features that help characterize vertigo include the time course and presence or absence of provocative or aggravating factors, as well as associated auditory or other central, metabolic, pharmacologic, etc factors or symptoms. Given the ability of the central nervous system to adapt to aberrant sensory input, peripheral vertigo (which is more often paralytic as opposed to excitatory) is generally transient, lasting no more than several weeks (although the susceptibility to repeat attacks may persist for much longer, exacerbated by nonstatic or unequal excitations of the vestibular sensory pathway).[3] Dizziness that is provoked by position change may be presyncopal in nature if the provocative maneuver would be expected to decrease blood pressure or cerebral blood flow. Conversely, dizziness prompted by a position change (such as rolling over in bed) that does *not* have these physiological effects is more likely vertiginous. Finally, *all* vertigo is made worse by head movement, so a patient experiencing dizziness that does *not* worsen with head motion is probably not suffering vertigo.

Differentiation of central and peripheral causes of vertigo is also important. Epidemiologic case reviews of nonspecific dizziness from primary care, emergency department, and specialty dizziness clinics have established that approximately 40% of dizziness is of peripheral vestibular origin, 10% central, 15% psychiatric, and 25% "other" (including presyncope).[4] Features that suggest a central origin include purely vertical nystagmus, nystagmus that changes direction with gaze, nonfatiguing or sustained nystagmus, absence of latency period before onset of positional nystagmus, and focal neurologic deficits. Causes of central vertigo include migraine headaches, traumatic brain injury, multiple sclerosis, cerebrovascular disease, cervical vertigo, anatomic variants such as Arnold Chiari malformation, and neoplasms. Features suggesting a peripheral origin are include latent, fatiguing nystagmus which is horizontal or horizontal-torsional, can be suppressed with visual fixation, and which does not change in direction with gaze.[5] This waiver guide will address only peripheral causes of vertigo.

Identifying other associated symptoms such as hearing loss, pain (head ache), nausea, vomiting, or focal neurological symptoms, as well as review of associated systems and factors that contribute to balance such as age, medication profile, hydration status, visual acuity, proprioception, and

metabolic profile, can help differentiated the cause of vertigo.[6] Once evidence that the vertigo is of peripheral origin has been established, the major differential diagnoses include benign paroxysmal positional vertigo (BPPV), labyrinthitis or vestibular neuronitis (labyrinthitis), superior semicircular canal dehiscence syndrome, trauma and Meniere's disease (endolymphatic hydrops). The lifetime prevalence of a vestibular-induced vertigo is about 7.4%, so it is a common problem in the primary care setting. Of all patients presenting with peripheral vertigo, about 50% will be found to have BPPV.[7, 8]

Benign Paroxysmal Positional Vertigo (BPPV) is characterized by the abrupt onset of relatively brief symptoms of vertigo (typically less than 30 seconds) precipitated by certain head positions and movements.[9] These characteristic symptoms help distinguish BPPV from vestibular neuronitis, which usually causes a single episode of vertigo lasting several days, with symptoms that may be aggravated by any head movement rather than only certain specific motions; and Meniere's disease, which leads to recurrent attacks of spontaneous vertigo that last longer (minutes to hours) and is accompanied by hearing loss and tinnitus. BPPV is usually idiopathic, although it may also occur as the sequela of other primary causes such as head trauma, viral vestibular neuronitis, Meniere's disease, or migraine disorders.[7] There is evidence that post-traumatic BPPV may be more difficult to treat and more likely to recur than idiopathic BPPV. Studies estimate the life-time prevalence of BPPV at 2.4% and that it accounts for 8% of individuals with moderate-to-severe dizziness or vertigo.[1]

BPPV was first described by Barany in 1921. It was several decades before the etiology was determined to be the motion of dislodged otoconia from the utricle (canalithiasis) floating freely in the semicircular canals, most commonly the posterior semicircular canal, but occasionally the horizontal and rarely the anterior canal.[8] Diagnosis of BPPV is established definitively by classic findings on the Dix-Hallpike test, in which an examiner attempts to provoke nystagmus and vertiginous symptoms by rapidly laying a patient from sitting to supine while extending the patient's neck slightly and rotating his head first to one side, and then repeating the maneuver rotating the head to the other side. Findings consistent with classic posterior canal BPPV include the occurrence, after a one- to two-second latency period, of a mixed torsional and vertical nystagmus with the upper pole of the eye beating toward the dependent ear and the vertical nystagmus beating toward the forehead. Upon the subject's return to the seated position, the direction of nystagmus is reversed. The direction of nystagmus may be more strictly horizontal for horizontal canal BPPV and downbeat and torsional for the rare anterior canal variety. The sensitivity of the Dix-Hallpike maneuver in patients with BPPV ranges from 50-88%. Adjuncts that may add sensitivity to the maneuver include using Frenzel lenses, or videogoggles to inhibit visual fixation and magnify torsional movement of the eyes that can be traced and recorded with some equipment to facilitate diagnosis.

Recognition of this canalithiasis mechanism has led to the development of various canalith repositioning maneuvers such as the Epley, modified Epley, and Semont maneuvers, which seek to direct particles from the canal to the vestibule by a series of head movements within the geometric plane of the affected canal. Controlled trials have demonstrated a rate of effectiveness of 70-90% for a single application of these procedures, and home regimens involving self-treatment with a modified Epley maneuver have demonstrated rates of improvement of up to 95% after one week. BPPV is generally a self-limited condition that will remit spontaneously, although remission may take months. Recurrence is not at all unusual; with studies demonstrating that up to 50% of patients will experience recurrence within 5 years, with rates of 15-18% in the first year.[9] Vestibular

suppressant medications (such as meclizine) may reduce the intensity of symptoms, but they do not reduce the frequency of attacks and may in fact delay central nervous system (CNS) adaptation to the abnormal vestibular signals. Recalcitrant cases that are unrelieved by canal repositioning maneuvers may be related to cupulolithiasis, (otoconia adherent to the ampullary macula), canalith jams (overlarge immobile mass of otoconiae), other-than-posterior canal involvement, displacement of the repositioned otoconia into adjacent canals, or multiple canal involvement. Mechanized repositioning devices exist that may be helpful in positioning elderly, disabled, and post-traumatic patients through the necessary positions in a safe, pain free and reproducible manner. Mobile applications have also been developed and are accessible that guide self-administered repositioning. Surgical options are available for the most intractable cases: either singular neurectomy, in which the posterior ampullary nerve is severed (with some risk of hearing loss); or posterior semicircular canal occlusion, in which a plug is fashioned to occlude the semicircular canal lumen to prevent endolymphatic flow and render the cupula insensitive to angular acceleration forces.[7, 9]

Vestibular neuronitis (labyrinthitis) is generally attributed to viral infections, often following the prodrome of a viral URI and occasionally occurring in epidemics. Vertigo associated with vestibular neuronitis typically develops over a period of hours, is severe for a few days, is often accompanied by nausea and vomiting, and resolves gradually over the course of a few weeks. In pure vestibular neuronitis, auditory function is preserved; when this syndrome is combined with unilateral hearing loss and tinnitus, it is called labyrinthitis.[10] Aside from the discrete historical symptomatology in the absence of other central nervous system symptoms or findings, there are no contributing diagnostic tests to specifically diagnose vestibular neuronitis. Vestibular neuronitis may have a positive head thrust test; with rapid turning of the head toward the affected side by the examiner, the individual is unable to maintain visual fixation. Vestibulo-evoked myogenic potentials may be reduced on the involved side, and MRI (if indicated to rule out other suspicions) may show enhancement along the vestibular nerve within the internal auditory canals. Audiometry should be obtained when labyrinthitis is suspected to evaluate complaints of hearing loss. Treatment is generally supportive based on symptoms and relief may be provided by vestibular suppressant medications such as promethazine, prochlorperazine, dimenhydrinate, droperidol, meclizine, or transdermal scopolamine. Medical treatment does not hasten recovery and are all associated with sedation. Corticosteroids, antivirals and vestibular rehabilitation are other possible treatments, although there are few formal studies of these therapies.[11] Symptoms of hearing loss associated with labyrinthitis should be managed by ruling out otitis media, documenting the hearing deficit with audiometry, and treating the hearing loss as a sudden sensorineural hearing loss with oral, and/or transtympanic steroids. Hearing should be followed to assess recovery or progression, and an MRI of the internal auditory canal should be obtained to rule out retrocochlear pathology as 10% of vestibular schwannoma may present with sudden hearing loss.[12] For vestibular neuronitis, recovery occurs as a result of CNS adaptation to the static imbalance in vestibular signals, as well as from restoration of normal labyrinthine function (which is often incomplete). Nearly 15% of patients with history of vestibular neuronitis will later develop BPPV.[8] Most cases will resolve within weeks and there is not a significant propensity for clinical recurrence.[2, 8]

Meniere's disease, also known as idiopathic endolymphatic hydrops, is a condition thought to arise from abnormal fluid and ion homeostasis in the inner ear. It is named for Prospere Ménière, a French physician, who in 1861 first reported that the inner ear could be the source of a syndrome of episodic vertigo, tinnitus, and hearing loss.[13] Meniere's is a diagnosis of exclusion classically characterized by a tetrad of symptoms and requires the following criteria for definite diagnosis: (a) at least two episodes of rotational vertigo lasting more than twenty minutes that is associated with

hearing loss and, generally, prostration from nausea and vomiting (b) fluctuating hearing loss; and (c) episodic tinnitus; and/or (d) the sensation of fullness in the affected ear. Probable Meniere's disease requires one definitive episode. Possible Meniere's disease is considered in patients who have similar symptoms without meeting the defining criteria for Meniere's disease.[14]

Most patients will complain of one symptom such as hearing loss or dizziness upon initial presentation. Meniere's is generally a unilateral disease process, although bilateral disease can occur in 30-50% of patients, generally within the first two years of the disease process. There is a slight female predominance (1.3:1), and the peak incidence of disease is in the 40- to 60-year age group.[8] The etiology of Meniere's is not well understood, but genetic, autoimmune, infectious, traumatic, and vascular causes have been proposed.

There may be a predominance of vestibular or cochlear symptoms with 50% of patients presenting with both vertigo and hearing loss, 19% with only vertigo, and 26% with only hearing loss.[8] In one study of 574 Meniere's patients, over half of the cases had between 1-4 attacks/week and 1-10 attacks/day.[2] Twenty five percent of patients may have associated BPPV. Two to six percent of Meniere's patients may experience Tumarkin's crises (a.k.a. "drop attacks") which are sudden unexplained falls without loss of consciousness or vertigo most likely due to acute utriculosaccular dysfunction causing inappropriate postural adjustment.[8] Vestibulo-Evoked Myogenic Potential testing in Meniere's disease may offer a way to document active MD, potential for bilateral MD, and severe saccular dysfunction seen in Tumarkins crisis.[15]

Current management for this condition focuses on relief of symptoms by controlling endolymphatic homeostasis with a salt restricted diet, diuretics, avoidance of caffeine and alcohol and tobacco. Medical management of Meniere's disease is effective approximately 85% of the time. Symptomatic flare ups are treated with vestibule-suppressants. If allergic disease is prominent in the patient's profile, treatment of allergies may be beneficial. Migraine disease can masquerade as Meniere's and should be suspect in cases that don't fit diagnostic criteria, in refractory cases, and when personal or family history of migraine is elicited. In severe cases interventions to reduce the frequency and severity of the vertigo spells can be offered and selection of these adjuncts depend on how long the patient has had Meniere's definitively diagnosed, and the suspicion or probability that it is or may become bilateral. Interventions can be ablative to the hearing and balance function of the inner ear, and when bilateral disease is suspected, treatments should be selected that preserve function to avoid inducing bilateral vestibular weakness. Office based procedures include intratympanic injection of dexamethasone (non-destructive) and, decreasingly, gentamicin potentially destructive). A range of surgical procedures exist and may be beneficial to refractory patients; however, there is no known effective cure for Meniere's disease. Adjunct therapies include high frequency low pressure air delivery devices that work through a pressure equalization tube.

The sensorineural hearing loss of Meniere's is typically fluctuating and progressive. Low-frequency fluctuating loss with stable high-frequency loss may produce a "peaked" or "tent-like" audiogram. Profound deafness is rare but may occur in 1% to 2% of patients. The diagnosis of Meniere's can be challenging and is often made by excluding other differential diagnoses including: atypical migraine, superior semicircular canal dehiscence syndrome, otologic syphilis, delayed endolymphatic hydrops, acoustic neuroma, perilymph fistula, Cogan's syndrome, neoplasm, and vascular events.

Head trauma can cause peripheral vestibular damage from numerous mechanisms such as blunt concussive, penetrating, explosive blast and barotrauma. *Alternobaric vertigo* is a transient vestibular dysfunction thought to occur as a result of elevated, and probably asymmetric, middle ear pressure. As many as 26% of divers and 10% to 17% of pilots have admitted to experiencing alternobaric-like vertigo. Although the following two traumas are seen mostly in divers, it can be seen in aviators too. Atmospheric inner ear barotrauma, extremes of abrupt pressure changes in middle ear, are capable of damaging middle and inner ear structures and thus causing vertigo, tinnitus and/or hearing loss. Inner ear decompression sickness (IEDS) is a common result of mixed gas, oxyhelium, for deep sea diving. When the inner ear is affected, vestibular and auditory dysfunction are often permanent, particularly if recompression treatment is delayed. Vertigo is a prominent complaint, and often the sole complaint in 50% of individuals with IEDS.[8] IEDS is generally seen in pilots flying unpressurized aircraft.

Migrainous vertigo is increasingly being recognized as an entity distinct from basilar migraine, which includes vertigo only as a symptom within an aura. In migrainous vertigo, headache may not be a regular accompaniment of the vertiginous attacks in over 50% of cases, making definitive diagnosis challenging. Diagnostic criteria for migrainous vertigo are still evolving. Although it is considered to arise from a central cause it may have both peripheral and central characteristics.[16] A separate waiver guide entry exists for headaches (migraine) and should be consulted for further information.

Superior Semicircular Canal Dehiscense Syndrome (SCDS) is a relatively new diagnosis described by Lloyd Minor in 2000.[17] Vestibular and/or auditory signs and symptoms can occur in SCD. Vertigo and oscillopsia (the apparent motion of objects that are known to be stationary) evoked by loud noises and/or by maneuvers that change middle-ear or intracranial pressure (such as coughing, sneezing, or straining). Persons with SCD may experience a feeling of constant disequilibrium and imbalance, and may perceive that objects are moving in time with their pulse (pulsatile oscillopsia). Auditory manifestations of SCD may include autophony (increased resonance of one's own voice), hypersensitivity to bone-conducted sounds, and an apparent conductive hearing loss revealed on audiometry. SCDS is being identified more frequently in the work up of the vertiginous patient, is diagnosed by temporal bone CT imaging, and definitive treatment is surgical resurfacing or plugging of the superior semicircular canal.

Table 1: Summary of Clinical Features of Common Peripheral Causes of Vertigo[16]

Causes	Time Course	Suggestive clinical setting	Characteristics of nystagmus	Associated neurologic symptoms	Auditory symptoms	Other diagnostic features
Benign Paroxysmal Positional Vertigo	Recurrent, brief (seconds)	Predictable head movements or positions precipitate symptoms	Peripheral characteristics	None	None	Dix-Hallpike maneuver shows characteristic findings
Vestibular Neuritis	Single episode, acute onset, last days to weeks	Viral syndrome may accompany or precede vertigo	Peripheral characteristics	Falls toward side of lesion, No brainstem symptoms	Usually none	Abnormal head thrust test
Ménière's disease	Recurrent episodes, last several hours to days	Spontaneous onset	Peripheral characteristics	None	Episodes preceded by ear fullness/pain, accompanied by unilateral hearing loss, tinnitus	Audiometry shows unilateral low frequency hearing loss
Migrainous vertigo	Recurrent episodes, last several minutes to hours	History of migraine	Central or peripheral characteristics	Migraine headache accompanying or following vertigo, positive visual phenomena	Usually none	All tests are normal
Superior Semicir-cular Dehiscense Syndrome	Episodic	Noise or pressure induced vertigo	Peripheral characteristic	None	Noise induced vertigo, autophany	CT, Reduced VEMPs, low freq cond hearing loss with retained stapedial reflex,

II. Aeromedical Concerns.

The aeromedical issues associated with vertigo revolve around the risk of incapacitation and the risk of recurrence of symptoms in flight following an initial event. The threat posed by ongoing vertigo in the flying environment is self-evident. Spatial disorientation, perhaps including vertiginous symptoms, is postulated to be responsible for 10-20% of fatal aircraft mishaps.[18] Since all vertigo is potentially incapacitating (albeit to varying degrees), whether a syndrome is likely to recur or not following apparent resolution of symptoms is the key to whether a flying waiver may be considered.

Vertigo of any cause may be incapacitating, although the vertigo associated with BPPV may rapidly extinguish if provocative maneuvers can be avoided. All forms of vertigo may be aggravated by head movement, but classic posterior canal BPPV is most commonly provoked by rolling over in bed, bending forward, and extending the neck to look up. Horizontal canal BPPV is provoked by lateral head turns when supine and sometimes when sitting. The "check-six" maneuver in aviation may be a particularly problematic provocative maneuver for a flyer with BPPV. Other forms of vertigo are likely to be more incapacitating in flight.

Vestibular neuronitis is likely to be more incapacitating than BPPV in the short term, but once resolved, should not pose a significant risk of recurrence. Symptoms will usually be severe for several days, and then resolve gradually over a few weeks. Vestibular function may not completely normalize following a case of vestibular neuronitis, but this may be of little clinical significance in the asymptomatic patient, if central vestibular compensation has occurred.

The course of Meniere's disease may be highly unpredictable, with a risk of relentless progression in at least 10% of cases and of recurrence in the other ear in another 30%. Symptoms are usually much more prolonged than with BPPV, typically lasting for hours. Individuals with Meniere's may experience acute attacks of vertigo, nausea, and sometimes vomiting lasting from minutes to hours during which they are unable to perform normal activities, including flight duties. Hearing loss can fluctuate (and will usually worsen over time), interfering with communications.

Migraine associated vertigo may be diagnosed during the dizzy work up, but aeromedical considerations are discussed elsewhere under Headaches.

Superior Canal Dehiscense Syndrome is potentially disabling in flight due to pressure or noise induced symptoms of dizziness, as well as the autophony that can effect communication. This is a less common form of vertigo, but is seen in a significant cohort of patients referred for work up of Meniere's disease. Symptoms range from mildly irritating and inconvenient to the patient to disabling in certain circumstances possibly induced in flight. Surgical treatment can resolve symptoms with resumption of flight duties.

III. Waiver Consideration.

Vertigo of any etiology is disqualifying for all classes of flying, ATC/GBC duties, and for MOD personnel (recurrent episodes of vertigo or other disequilibrium and history of abnormal labyrinthine function).

Vestibular neuronitis is the only major form of peripheral vertigo to have a minimal risk of recurrence, and is the only form of peripheral vertigo for which FC I and unrestricted FC II waivers may be recommended. To be considered for waiver, all symptoms must have resolved, however, with sufficiently normal remaining vestibular function as to cause no clinical disability.

The likelihood of recurrence of BPPV (15-18% in the first year) is much greater than the maximum recurrence risk of 1% per year for potentially incapacitating conditions. The symptoms of BPPV pose a definite risk of incapacitation which may jeopardize flying safety, although the brief duration of symptoms (less than 20-30 seconds) and the fact that symptoms are provoked by only very specific head maneuvers may permit recovery from an in-flight occurrence and safe return if such provocative maneuvers can be avoided. BPPV may therefore pose more risk to mission completion than to flying safety, unless symptoms occur during particularly critical phases of flight. Therefore, waivers are usually only recommended for multi-crew aircraft. It may be appropriate to permit an unrestricted FC II waiver if there has been no recurrence of BPPV symptoms after several years of observation, although the literature suggests a cumulative recurrence rate of 50% for up to five years.

Because of the unpredictable and recurrent nature of symptoms associated with Ménière's disease and the treatment thereof, the potential for sudden incapacitation, and the lack of reliable treatment options, flying waiver (all classes) would be recommended only under exceptional circumstances. Recommended aeromedical dispositions for Ménière's disease, vestibular neuronitis and BPPV, are summarized in Table 2.

Table 2: Waiver potential for peripheral vertiginous disorders

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	Vestibular neuronitis	Yes[1] AETC
	BPPV, Ménière's, SCDS	No AETC
II	Vestibular neuronitis	Yes[1] MAJCOM
	BPPV SCDS	Yes[2] AFMSA
	Ménière's	Maybe[2] AFMSA
III ATC/GBC	Vestibular neuronitis, BPPV SCDS	Yes[1] MAJCOM
	Ménière's	Maybe[2]MAJCOM
MOD	Vestibular neuronitis, BPPV SCDS	Yes[1] AFGSC
	Ménière's	Maybe[2]AFGSC

[1] Waiver for vestibular neuronitis will be considered only if complete resolution of symptoms has occurred.

[2] Waivers (FC IIC) will generally be considered only for multi-crew aircraft if symptoms are well-controlled with low risk for recurrence.

AIMWITS search in May 2014 revealed a total of 212 aviators with the diagnosis of vertigo. A total of 82 were disqualified. Breakdown of the cases revealed: 10 FC I/IA cases (5 disqualified), 118 FC II cases (31 disqualified), 60 FC III cases (35 disqualified), 20 ATC/GBC cases (9 disqualified), and 4 MOD cases (2 disqualified). The diagnosis of vertigo was a factor is all 82 disqualified cases.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for peripheral vertiginous disorders should include the following:

A. Careful history describing: frequency, duration, severity and character of vertiginous attacks; type of maneuvers that provoke symptoms; presence or absence of associated symptoms such as hearing loss, aural fullness, tinnitus, headaches, or focal neurologic symptoms.
B. Past history of syphilis, mumps or other serious infections, inflammation of the eye, autoimmune disorder or allergy, and ear surgery.
C. Physical examination: thorough ENT and neurological evaluation including nystagmus and balance. Document results of Dix-Hallpike testing.
D. Laboratory testing: CBC, ESR, TFTs, lipids, glucose and syphilis serology.
E. Audiogram results including speech discrimination, tympanometry, and acoustic reflexes.
F. MRI of the Brain and Internal Auditory Canal (IAC) to rule out retrocochlear pathology such as cerebello-pontine angle (CPA) tumors, multiple sclerosis, anatomical variants etc.
G. Electronystagmography (ENG, VNG and calorics), vestibular evoked myogenic potentials (VEMP), computerized dynamic posturography (CDP), and rotary chair testing (this needs to be scheduled at a DoD facility and can be seen by an otolaryngologist at the same visit when scheduled appropriately).
H. Otolaryngology consult which may include recommendation for further auditory system testing to include electrocochleography (ECOG) and/or auditory brainstem response testing (ABR). For complex or undiagnosed cases, consider Neuro-Otology consultation through SAMMC or an academic medical center.

The AMS for <u>waiver renewal</u> for peripheral vertiginous disorders should include the following:
A. Interval history since the last waiver submission with details of any vertiginous symptoms (to include pertinent negatives) and any treatment given with results.
B. All lab and test results since last waiver.
C. Otolaryngologist consult report if indicated. For complex or undiagnosed cases, consider Neuro-Otology consultation through SAMMC or an academic medical center.

ICD-9 codes for peripheral vertiginous disorders	
386.0	Meniere's Disease
386.10	Peripheral vertigo, unspecified
386.11	Benign paroxysmal positional vertigo
386.12	Vestibular neuronitis
386.19	Other peripheral vertigo
386.30	Labyrinthitis
386.43*	Superior Semicircular Canal Dehiscense

*semicircular canal fistula

ICD-10 codes for peripheral vertiginous disorders	
H81.4 1, 2, 3, 9	Vertigo of central origin
H81.0 1, 2, 3, 9	Meniere's Disease
H81.39 1, 2, 3, 9	Other peripheral vertigo
H81.13 1, 2, 3, 9	Benign paroxysmal positional vertigo
H81.2 1, 2, 3, 9	Vestibular neuronitis
H81.31 1, 2, 3, 9	Aural vertigo, unspecified ear
H83.0 1, 2, 3, 9	Labyrinthitis
H83.1 1, 2, 3, 9	Labyrinthine fistula

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WAIVER GUIDE
Updated: Aug 2013
Supersedes Waiver Guide of Aug 2009
By: Col Michael D. Jacobson (RAM 13), Col Roger Hesselbrock (ACS Neurologist), and Dr. Dan Van Syoc
Reviewed by Col (sel) Mark Packer, AF/SG Consultant for Neuro-otology

CONDITION:
Vestibular Schwannoma (Formally Acoustic Neuroma) (Aug 13)

I. Overview.

Vestibular Schwannoma (VS), also known as acoustic neuroma, acoustic schwannoma, acoustic neurinoma, and vestibular neurilemoma, is a benign Schwann cell-derived tumor most commonly arising from the inferior vestibular branch of the eighth cranial nerve. These tumors account for approximately 8 percent of intracranial tumors in adults and 80 to 90 percent of all cerebellopontine angle (CPA) tumors. The overall incidence of symptomatic VS is about 1:100,000. Symptomatic incidence may underestimate actual tumor presence, and active screening protocols, as well as incidental diagnosis of asymptomatic lesions with the widespread use of magnetic resonance imaging (MRI) may reflect more accurate incidences of tumors at approximately 1:50-60,000.[1-4] Other factors that may contribute to increased risk include radiation exposure, childhood treatment with low-dose radiation to the head and neck, history of parathyroid adenoma, and an alleged, yet debated connection with cellular phone use.[5] Symptoms associated with VS are typically attributed to compression of associated cranial nerves (VIII, VII, IV, IX, X) , cerebellar compression, and ultimately restricted CSF flow and hydrocephalus or brainstem compression. One large study revealed that the acoustic portion of the VIIIth nerve was involved in almost all cases, with the vestibular, trigeminal and facial nerves involved less frequently.[6] The median age at diagnosis is approximately 50 years.[2] Tumors are unilateral in more than 90 percent of cases, affecting the right and left sides with equal frequency. Bilateral VS is a pathognomonic of the autosomal dominant genetic disorder neurofibromatosis type 2 (NF-2).[7] Any patient under 18 years of age who has a unilateral VS and another neurologic tumor in the brain or spine should be screened for NF-2.

The aviator with asymmetric hearing loss (defined as >25 dB difference in a single frequency, or two consecutive frequencies with >15 dB difference) should be screened for VS. The individual is often unaware of any hearing deficit and many of the cases seen at the ACS were discovered by observing changes in the annual audiogram.

VS has a variable natural history as illustrated by serial imaging studies. The average growth rate is 1-2 mm/year, but rates as high as 25 mm/year have been described.[6] Still, up to 40 percent of tumors overall, and a higher percentage of small tumors, show no growth or even shrink on serial imaging studies.[9, 10] There is no predictive relation between growth rate and tumor size at presentation. In a series of 1,000 vestibular schwannoma cases treated at a single institution, the acoustic function of the VIII cranial nerve was involved in almost all cases (95%) presenting with hearing loss and tinnitus. This was followed by vestibular dysfunction (61%) associated with unsteadiness while walking and the trigeminal nerve (17%) presenting with facial numbness (paresthesia), hypesthesia, and pain. Finally, the facial nerve (6%) was less frequently affected manifesting with facial paresis, hemifacial spasm and, less often, taste disturbances.[11] Direct extension of the tumor to surrounding anatomic structures may induce ataxia (brainstem), or involve

the functions of the lower cranial nerves (IX, X, and XI), leading to dysarthria, dysphagia, aspiration, and hoarseness.

The differential diagnosis includes meningioma (4 to 10 percent of cases), or, less commonly, facial nerve schwannomas, gliomas, cholesterol cysts, cholesteatomas, hemangiomas, aneurysms, arachnoid cysts, lipomas, and metastatic tumor.[5]

Initial evaluation should include a thorough history and physical, with particular attention to hearing loss, changes in speech discrimination (disproportionately low as compared to measured hearing loss), impaired balance and/or visual changes, Weber and Rinne testing to rule out conductive pathology, and neurologic exam, to include cranial nerves and enhanced Romberg (attempt to keep balance and hands and arms steady with outstretched arms and supinated palms, while standing in heel-to-toe position with eyes closed).[12] It should be remembered that 10-15% of sudden sensorineural hearing loss cases are attributed to VS pathology.

Audiometry is the best initial diagnostic test. Demonstration of asymmetrical hearing loss, "roll over" (decreased speech discrimination with increased test volumes), abnormal stapedial reflexes and stapedial reflex decay are signs of retrocochlear pathology and should prompt further testing. Auditory Brainstem Responses (ABR) have been used to screen for VS, but are insensitive to tumors smaller than one centimeter. Gadolinium enhanced MRI is the gold standard for detecting small internal auditory canal (IAC) and CPA tumors, although some centers use Fast Spin Echo T2 weighted imaging with success. Contrast enhanced MR studies with high resolution of the internal auditory canal reliably detects tumors as small as 1 to 2 mm in diameter.[5]

Once the diagnosis of an IAC or CPA mass has been established, management options include: 1) observation with scheduled surveillance, 2) microsurgery, and/or 3) stereotactic radiation therapy. Pharmacotherapy as treatment for VS, or to sensitize tumor tissue as augmentation to stereotactic radiation is investigational at this time. Therapeutics targeting the proliferating molecular signaling in VS is receiving significant investigational attention. Research with Cox-2 and Histone Deacytelase inhibitors (OSU-03012 and OSU-HDAC-42), translation truncation related termination "read through" therapy (PTC 124) at the Ohio State University; vascular endothelial growth factor receptor inhibitors (EGFRi) at Massachusetts General Hospital; Erb B2 inhibitors at the University of Iowa; as well as Rac inhibitors and miR21 inhibitors have proven to be reasonable targets of ongoing research.

Observation is a reasonable option in patients diagnosed with small tumors. Surveillance by follow up MR imaging at 6 months, and then annually is reasonable, especially for the elderly, medically complicated patients who are not good surgical candidates, and patients with poor hearing. More active treatment options should be considered for younger patients where the growth of the tumor over time could be expected to become a problem, and when hearing preservation is a reasonable and highly desired outcome.

Tumor growth rate typically falls within the range of slow (0.02cm/yr) or medium (0.2cm/yr). Patients may elect observation, especially if they have minimal symptoms. Tumors that are diagnosed when they are small (less than 1-1.5cm) with reasonable hearing (Pure tone average better than 30 dB, and speech discrimination better than 70%) may be considered for hearing preservation surgery, and tumors removed when they are smaller offer better outcomes.

With technologic advances, operative mortality has been reduced to less than 1% at high volume centers for this benign but potentially fatal tumor. Complete tumor removal can be accomplished in most patients (depending on tumor size) and there is rare chance for recurrence (0-3.7%).[13] The likelihood of surgical morbidity, which includes hearing loss, facial weakness, and vestibular disturbances, depends upon tumor size. Facial nerve function can be preserved in most patients even with large tumors, and serviceable hearing can be preserved in many well selected patients (tumor less than 1.5cm, fundal cap, superior vestibular nerve of origin).[6, 14, 15] Careful patient selection can maintain mortality rate below 1%.[14] However, only rarely does hearing improve after acoustic tumor surgery. Worsening of vestibular symptoms is expected following surgical removal. This typically resolves by neurological compensation with time and rehabilitation. The risk of spinal fluid leak is variable depending on route of surgery, but is between 6-11% and may require revision surgery or lumbar drainage to resolve. Chronic postoperative headaches can be significant in up to 10%, especially with suboccipital approaches.

Stereotactic radiation therapy is becoming more widely accepted as a viable active treatment option for VS patients. Over 10,000 schwannomas have been treated worldwide by radiation. With this modality, very specific radiation dosing may be concentrated on tumor tissue sparing surrounding normal structures by means of the gamma knife delivery of $Cobalt^{60}$ or via linear accelerators. Current 3-dimensional conformational software allow precise dosing of radiation to the tumor concentrating dose centrally, but ensuring adequate marginal doses to optimize intended outcomes of the procedure. Linear accelerators use intensity modulated radiation therapy and multi-leaf collimators and various number of beams to achieve tumor treatment and tissue sparing. As opposed to total removal of the tumor obtained by conventional surgery, stereotactic radiation treatment is intended to stop growth of the tumor. Treatments may be further modified by fractionating doses which may spare vital structures. These techniques have facilitated reduction of tumor radiation doses from 20+ Gy to current average marginal dosing of 12-13 Gy. Reduced dosing appears to have decreased risk of injury to other cranial nerves while maintaining satisfactory tumor control rates. Fractionation and shielding of vital structures (cochlea) may offer improved hearing outcomes. Though all tumor sizes may be considered for treatment, larger tumors with brainstem compression may create unwanted symptoms due to the initial swelling effect of treatment, while smaller, non-cystic tumors tend to respond better to stereotactic radiation. Current outcomes data offers encouraging short to midterm results with proton beam stereotactic radiation therapy offering excellent control rates (95%) and facial and trigeminal nerve functional outcomes similar to microsurgery preservation rates for small to moderate sized tumors.[16] Long term control is yet to be documented. Hearing outcomes show hearing decline quicker than anticipated by observation or aging. Functional hearing preservation depends on tumor size and treatment modality, but functional preservation is seen in 50-75%. Hydrocephalus, head ache, and cranial nerve V, and VII deficits are single digit complications (1-10%) on average. Malignant transformation of benign pathology to a malignant problem is a low but lethal risk documented in .01 to 0.3% of non-NF2 tumors. Tumor transformation has been documented at 18 years post treatment. Most outcomes reporting shows median follow up less than 10 years.

Since the goal of stereotactic radiation is not tumor removal, but rather growth rate control, it is important to remember that post treatment surveillance is necessary to ensure continued control over time. Some tumors fail to respond to radiation and continue to grow, or are controlled initially, but resume growth over time. Such failures that require surgery tend to have poorer cranial nerve outcomes due to operating in an irradiated field. Recommended surveillance rates will be modified as long term tumor control rates become better documented.

While it is presumed that IAC or CPA tumors are most likely VS, other lesions such as neurosarcoidosis have been shown to mimic these tumors. While outcomes of irradiated tumors cannot be generalized on a large scale due to the different delivery systems, dosing and techniques, it is common to see post radiation swelling/expansion of 2-4mm in approximately 24% of tumors between 6 and 24 months and up to 5 years. Functional hearing preservation post-radiation in weighted averages of pooled Gamma Knife and fractionated sources with greater than 100 patients followed more than 36 months was 68%. Although hearing was preserved there was an average loss of 18dB. This is comparable to surgical preservation rates for size matched tumors. Hearing loss after stereotactic radiation increases with time and has not until lately been consistently tested or reported. Imbalance may be seen in 5-10% of patients, but may be progressive. Dizziness Handicap Indices show better subjective balance function at one year in stereotactic treated groups compared to surgically treated groups. Facial palsy in irradiated patients is reported between 0 and 11.8% with a 5% average permanent weakness rate which is similar to size matched surgical results.

In summary, contrasting surgical removal and radiation control of active treatment methodologies, surgery is a much more significant event with very different risk and reward. Surgical recovery entails a 4-5 day hospital stay, and 3-4 months to compensate for vestibular dysfunction brought on by removal of a section of vestibular nerve along with the tumor. Hearing when preserved (50-75% of selected cases) is preserved long term, and tumor recurrence requiring surveillance or further treatment is 1-4%. Stereotactic irradiation is an outpatient procedure with low immediate complication rates, but residual tumor that requires indefinite surveillance, and radiation effect that causes decline of initial good outcomes over time. Control rates on average are 95% but need to be documented over the long term.

II. Aeromedical Concerns.

Cochlear and vestibular symptoms are of obvious importance to the aviator. Hearing loss and tinnitus can adversely impact communications, while vertigo and disequilibrium can adversely affect the ability to safely control an aircraft. Because of the wide range of progressive and sometimes abrupt symptomatology, conservative observational management is often incompatible with the safe performance of aviation-related duties. All post-operative or post-radiation vestibular symptoms require sustained documentation of compensation over time (radiation effects can manifest 18-24 months after irradiation) prior to waiver consideration, and any hearing loss needs to be stabilized and well documented by competent audiology services. An in-flight hearing evaluation will most likely be required prior to clearing an aviator for flying duties (a helpful case report example by Casto and Choo is referenced below).[17]

III. Waiver Considerations.

Vestibular Schwannoma is addressed in MSD D18 as “acoustic neuroma” and MSD L37 as “history of benign or malignant neoplasms of the brain, pituitary gland, spinal cord, or their coverings.” Other MSD standards may apply, including MSD D4, “history of surgery involving the middle ear, excluding cholesteatoma;” MSD D13, “any conditions that interfere with the auditory or vestibular functions;” MSD D25, “hearing loss greater than H-2 profile;” MSD D26, “hearing loss greater than H-3 profile”, or MSD D27 “asymmetric hearing loss.” Auditory dysfunction requires a work-up by an audiologist (audiology evaluation for initial waiver and waiver renewals must have been accomplished within 12 months of submission to waiver authority). Waivers are required for H-3

hearing loss or greater. Waiver requests for VS patients with clinical observation should have documentation of absent or limited clinical symptoms/signs, documentation of radiographic stability, and documentation of management strategy from appropriate specialists. Waiver requests may be submitted six months after successful surgical treatment of the VS provided any post-treatment sequelae are within acceptable respective flying-class limits. For those VS patients treated with radiotherapy, a waiver can be submitted twelve months post completion of all radiation treatments (due to delay in some of the significant side effects). The tumor must have been unilateral, and there must be complete resolution of vertigo post-treatment. For flyers in high performance jets, in-flight testing should be accomplished to validate vestibular reserve is adequate to maintain awareness during maneuvers without sequelae. Residual cranial nerve deficits should allow full ocular movements without tracking deficits or strabismus, and allow for acceptable protective mask sealing. ENT and neurology consultations are required for waiver consideration (also audiology if hearing deficit occurs). Confirmation of tumor pathology is requested with surgical cases, and surveillance MR scanning is needed for cases treated non-invasively to establish control or growth of the residual suspected vestibular schwannoma.

Table 1: Waiver potential after Vestibular Schwannoma (VS) treatment.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Untreated VS.	No AETC	No
	Completely resected VS with retained functional hearing and no other sequelae	No AETC	No
	Completely resected or radiation treated VS with extra CN-VIII involvement with/without retained functional hearing	No AETC	No
II/II(RPA-Only)/III	Untreated VS.	Maybe# AFMSA	Yes
	Completely resected or radiation treated VS with retained functional hearing and no other sequelae	Maybe*# AFMSA	Yes
	Completely resected or radiation treated VS with extra CN-VIII involvement with/without retained functional hearing	Maybe*# AFMSA	Yes
ATC/GBC/ SMOD	Untreated VS.	Maybe# MAJCOM@	Yes
	Completely resected or radiation treated VS with retained functional hearing and no other sequelae	Maybe*# MAJCOM@	Yes
	Completely resected or radiation treated VS with extra CN-VIII involvement with/without retained functional hearing	Maybe*# MAJCOM@	Yes

* Must be at least 6 months after definitive treatment and no aeromedically significant new or residual symptoms.

No indefinite waivers.
@ Waiver authority for MOD personnel is AFGSC.

A review of AIMWTS cases through June 2013 revealed 23 cases of VS: 0 FC I/IA, 18 FC II, and 5 FC III. All but two cases were granted a waiver. One FC III aviator was disqualified due to residual extremity weakness and facial nerve weakness. The other FC III aviator was disqualified due to persistent tumor after surgical resection and radiation, and complications involving persistent right facial weakness. Five of the FC II cases (all pilots) were granted a FC IIC waiver which stated they were not to be assigned to any aircraft requiring stereoacusis, and one (most recently) was granted a FC II waiver, but restricted to their current fighter airframe (change to a different airframe would require an operational communications check to ensure that the persistent hearing deficit did not cause compromised communications in a different airframe). Of the 23 cases, 4 were treated with stereotactic radiation therapy and no surgery, 16 were treated with surgery alone, one was treated initially with surgery and later with radiation therapy, and two had small lesions and had had no surgery at the time of the most recent AMS. One pilot had the diagnosis of an acoustic hamartoma which is similar to an acoustic neuroma in location and treatment.

Aeromedical Consultation Service (ACS) experience is increasing, with six aircrew that have been evaluated or being evaluated at the ACS for VS since the last Waiver Guide update in 2009. All those disqualified had aeromedically significant residual neurological deficits. Of note, the usual time from initial substandard hearing waiver to VS diagnosis was between 3-6 years.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for <u>initial waiver</u> for vestibular schwannoma should include the following:
A. History – symptoms, hearing exams prior to treatment, treatment course, post-surgical vertigo symptoms, and confirmed resolution of vestibular symptoms.
B. Physical – most recent audiogram and eye exam with emphasis on eye tracking. VNG, and dynamic posturography documentation of vestibular defect and state of compensation.
C. Surgical and pathology reports.
D. ENT consultation report; may also include neurology or neurosurgery; consider referral to SAMMC Neuro-Otology; particularly if local specialty resources unavailable.
E. Reports and image copies from any imaging studies, pre- and post-surgery.
F. Tumor board report, military or civilian, if applicable.
G. Medical evaluation board results as applicable.

The AMS for <u>waiver renewal</u> for vestibular schwannoma should include the following:
A. History – brief summary of current status to include operational impact(s) since last waiver.
B. Physical – audiogram.
C. ENT consultation report.

ICD-9 Codes for Vestibular Schwannoma	
225.1	Benign Neoplasm of Cranial Nerves
388.5	Disorders of Acoustic Nerve

ICD-10 Codes for Vestibular Schwannoma	
D33.3 1, 2, 3, 9	Benign Neoplasm of Cranial Nerves
H93.3X 1, 2, 3, 9	Disorders of Acoustic Nerve

V. References:

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WAIVER GUIDE
Updated: May 2013
Supersedes Waiver Guide of Apr 2010
By: Major David C. Miller (RAM 13) and Dr Dan Van Syoc
Reviewed by Major Eddie Davenport, ACS chief cardiologist

CONDITION:
Wolff-Parkinson-White (WPW) and Other Pre-Excitation Syndromes (May 13)

I. Overview.

Wolff-Parkinson-White (WPW) is the well-known abnormal cardiac conduction pattern defined by an accessory electrical pathway that bypasses the atrioventricular node. WPW pattern is the electrocardiographic pattern of ventricular pre-excitation where the ECG usually demonstrates a shortened PR interval (less than 0.12 seconds) and a slightly widened QRS complex that demonstrates fusion, often referred to as a delta wave. This ECG finding is the result of electrical conduction through an accessory pathway that competes with the atrioventricular (AV) node. WPW pattern requires the absence of any tachydysrhythmia whereas WPW syndrome requires the presence of a tachydysrhythmia for appropriate diagnosis. WPW pattern identified by EKG has been estimated at 0.13 to 0.25 percent in the general population.[1, 2] WPW pattern, once identified on EKG may not be a permanent finding which may affect the rate of diagnosis and the true prevalence.[1, 3, 4] WPW syndrome is much less common than the pattern alone. In a previous study of healthy aviators, WPW pattern was identified in 0.25 percent, yet only 1.8 percent of these patients had any documented dysrhythmia.[5] A much larger study identified the prevalence of WPW syndrome at 0.07 percent of the population.[6] Of specific aeromedical interest, a previous study of subjects with known WPW syndrome demonstrated an incidence of dysrhythmias of 1 percent per patient year.[7]

If a patient presents with cardiac symptoms relating to tachydysrhythmia and an ECG identifies WPW, the patient has WPW syndrome, requiring further evaluation and appropriate treatment, which usually includes radiofrequency ablation of the bypass tract or tracts. Radiofrequency ablation is nearly 100% curative and has a very low risk of complications, particularly for accessory pathways located further from the AV node.

The PRotein Kinase, AMP-activated, Gamma 2 non-catalytic subunit (PRKAG2) gene appears to play a significant role in the development of cardiac tissue. A missense mutation identified on the PRKAG2 gene appears responsible for the inherited form of WPW, which is more frequently associated with WPW syndrome and other cardiac conduction diseases.[8] This mutation, labeled Arg531Gly, substitutes glutamine for arginine at residue 302 on the gene at 7q34-q36.[9] Because of this mutation, the adenosine monophosphate-activated protein kinase does not correctly regulate the ion channels in cardiac tissue.[8] This genetic anomaly is responsible for errant tracts of cardiac tissue that conduct electrical stimuli around the atrioventricular node resulting in ventricular pre-excitation, and potentially provide a pathway for other abnormal electrical stimulus including reentrant tachycardia. Not all cases of WPW syndrome or pattern demonstrate this genetic mutation, but it remains useful in characterizing one potential underlying mechanism for the disease process. Routine genetic testing for WPW is not currently recommended.

II. Aeromedical Concerns.

Aeromedical concerns involve risk of recurrent sustained SVT and symptoms that may incapacitate the aviator or otherwise adversely affect flying performance. WPW syndrome poses a risk of aberrant electrical flow such as sustained atrioventricular node reentrant tachycardia (AVNRT), atrial fibrillation or other dysrhythmia that rarely progresses to fibrillation or sudden cardiac death (SCD). A previous study of 228 aviators followed for 22 years reported 15% of patients with WPW pattern developed new symptoms including new tachydysrhythmias with only one case of SCD in a patient with WPW syndrome over the study duration.[7] This data demonstrates a 1% per patient-year risk of developing symptomatic tachycardia or dysrhythmia, and 0.02% per patient-year risk of SCD. It remains critical to identify those aviators at increased risk for sudden cardiac death or incapacitation due to other underlying cardiac pathology so they may be appropriately risk-stratified prior to assuming aviation duties. High risk findings include fast conduction over the accessory pathway (often referred to as a short refractory period), multiple pathways, and/or the ability to conduct retrograde (thus allowing for re-entry tachycardias). If the WPW pattern resolves with increased heart rates, it is commonly assumed that the pathway cannot conduct quickly. Unfortunately the ability to conduct retrograde or the presence of multiple pathways can only be diagnosed based on an invasive EP study. Without symptoms in an aviator that has intermittent WPW pattern or a pattern that resolves at higher heart rates, there is unlikely a greater than 1% risk of sudden incapacitation especially if over age 35. However, pilot candidates are at somewhat increased lifetime risk given younger age and given longer duration of possible service, therefore an EP study is recommended in untrained pilot candidates and ablation recommended if EP study reveals a high risk pathway. See ablation waiver guide for more detail regarding waiver after ablation.

III. Waiver Consideration.

WPW pattern is disqualifying for all classes of flying duties in the US Air Force. For ATC/GBC and MOD personnel, they are not qualified for retention due to the history of significant arrhythmias, so will require a waiver and an MEB.

Table 1: Waiver potential for WPW and related syndromes

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	Yes* AETC	Yes
II	Yes* MAJCOM	Yes
III	Yes* MAJCOM	Yes
ATC/GBC**	Yes* MAJCOM	Yes
MOD**	Yes* AFSSC	Yes

*FCI candidates will require EP study; all others will require holter monitor and treadmill testing.
** All ATC/GBC and MOD cases requiring an MEB are sent to AFMSA for waiver consideration.

AIMWITS search in February 2013 revealed 165 waivers submitted for WPW pattern on ECG, WPW syndrome, or other preexcitation syndrome. Of the total, 17 were FC I/IA cases, 70 were FC II, 64 were FC III, 1 was MOD, and 17 were ATC or GBC. A total of 17 cases were disqualified. Of the 17 disqualified cases, 2 were FC I, 2 were 2 FC II, 11 were FC III, and 2 were ATC/GBC. Of the total of 17 disqualified cases, five were the direct result of the disease (symptomatic, on unapproved medication, refused ablation, or unsuccessful ablation), 3 were disqualified for initial training, 7 for other medical problems, and in 2 of the cases, it was difficult to determine the cause of the disqualification.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for WPW should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of WPW as well as any treatments.
C. Consultation from a cardiologist.
D. Studies: ECG demonstrating WPW and any other ECGs, Exercise Treadmill Test, Holter monitor, Echocardiography with video, any electrophysiologic studies or therapy. Include video and imaging whenever possible and send to:
Attn: Case Manager for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

The AMS for waiver renewal for WPW should include the following:
A. Interval history with any change in symptoms, medications or activity level.
B. All applicable studies as in the initial aeromedical summary.
C. Consultation from a cardiologist.

ICD-9 codes for WPW	
426	Conduction disorders
426.7	Anomalous atrioventricular excitation

ICD-10 codes for WPW	
I45.89	Other specified conduction disorders
I45.6	Pre-excitation syndrome

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