INFORMATION PAPER

Military Vaccine Agency
1 March 2007

SUBJECT: Meningococcal Disease and Meningococcal Vaccines

1. Purpose. To describe meningococcal disease and the vaccines to prevent it.

2. Facts

a. Microbiology. Meningococcal disease results from infection with *Neisseria meningitides* bacteria. It is a serious health threat, because it often causes meningitis (inflammation of membranes around the brain and spinal cord) or blood infections (meningococcemia). These conditions are referred to as meningococcal disease. Symptoms include fever, headache, stiff neck, and discomfort when exposed to bright light, progressing to confusion, sleepiness, and seizures. Despite the use of effective antibiotics, meningococcal disease still results in death in 10% to 14% of those who become ill. Meningococcal disease can be disfiguring or disabling (i.e., limb amputations, hearing loss, brain damage) in up to 20% of those who recover.

b. Epidemiology. Serious (also called invasive) meningococcal disease occurs most often in infants younger than 1 year of age and surges a second time in adolescence. College freshmen living in dormitories and military trainees have a greater risk of developing meningococcal disease than others of their age, probably because of crowded living conditions. Other high-risk groups include people with immune deficiencies, travelers to areas where the disease is common (e.g., sub-Saharan Africa), and people who do not have a spleen (asplenia) or whose spleen is not functioning (e.g., sickle-cell anemia). There are 13 serotypes of meningococcal bacteria. Serotype B accounts for more than 50% of meningococcal disease in infants younger than 1 year of age, but there is no vaccine licensed in the U.S. to prevent serotype B disease. Serotypes C, Y, and W-135 cause more than 75% of illness in people 11 years of age and older. Serotype A disease occurs primarily in Africa and Asia.

c. Vaccines. Two vaccines licensed in the United States prevent meningococcal disease caused by four serotypes: A, C, Y and W-135. Differences in the two vaccines are significant and involve how the antigen (sugars from the bacteria's coating that stimulate the immune system) is prepared. *Menomune® A/C/Y/W-135* polysaccharide vaccine contains the sugar chains (called polysaccharides) from the bacteria's coat or capsule. Unfortunately, polysaccharide vaccines do not protect young children and do not evoke long-lasting immunity. *Menactra™ A/C/Y/W-135* conjugate vaccine, on the other hand, attaches (conjugates) the polysaccharide antigens to a protein carrier (in this case, a diphtheria protein) that results in a more robust immune response. Conjugate vaccines confer both greater and longer protection than polysaccharide vaccines.

(1) Polysaccharide Vaccine. *Menomune®* is manufactured by Sanofi Pasteur. *Menomune®* is a freeze-dried powder containing polysaccharide antigens. The diluent for the 10-dose vial contains thimerosal as a preservative. In clinical trials, immunization produced protective antibody levels in more than 90% of adults. For both adults and children, *Menomune®* is injected subcutaneously (under the skin) as a single 0.5-mL dose. Protective antibody levels are achieved within 7 to 10 days after immunization.

After 3 to 5 years, re-immunize people at high risk (e.g., immune deficiencies, asplenia, travelers to endemic areas).

(2) Conjugate Vaccine. *Menactra*™ also is manufactured by Sanofi Pasteur. In clinical trials, *Menactra*™ provided a longer duration of immunity and an improved immune response in young children. The vaccine is licensed for people between 11 and 55 years of age and the dose is a single intramuscular injection of 0.5-mL. The need for, and timing of, a booster dose of *Menactra*™ has not yet been determined.

d. Cautions. Defer immunization during acute moderate to severe illness. For people with known allergy to thimerosal, use either *Menactra*™ or *Menomune*® single-dose vial (preservative free). Do not immunize people with known allergy to any of the vaccine components. Immunize pregnant women only if the benefit clearly justifies the risk. *Menomune*® is not indicated in children less than 2 years of age, except in unusual circumstances. *Menactra*™ is not currently licensed for children less than 11 years old or adults over 55. The stopper of the *Menactra* vial contains dry natural rubber latex which may cause allergic reactions in latex sensitive people. *Menactra*™ should not be administered to people with bleeding disorders or those on anticoagulants ("blood thinners"), unless the potential benefit justifies the risk of an intramuscular injection.

e. Immunization. *Menactra*™ is recommended for young adolescents (focusing on those 11 to 12 years old) in conjunction with the pre-adolescent healthcare visit or before high school entry. Routine immunization is also recommended for those at increased risk for meningococcal disease: military basic trainees; college freshmen living in dormitories; laboratory workers routinely exposed to *N. meningitides*; people who travel to or reside in countries where the disease is endemic; people who have anatomic or functional asplenia; people who have terminal complement deficiency. Use *Menactra*™ in people 11 to 55 years of age. Use *Menomune*® in children 2 to 10 years of age and in people older than 55 years.

f. Adverse Events. Reported adverse effects after immunization with either *Menomune*® or *Menactra*™ were similar during safety studies and included fever and injection-site reactions (e.g., soreness, redness) most commonly. The incidence of local reactions was slightly higher with *Menactra*™, but similar to the incidence reported following tetanus-diphtheria (Td) toxoid immunization. More serious allergic reactions (e.g., urticaria, wheezing, anaphylaxis, seizures, paresthesia) occur in less than 1 per 100,000 vaccinees.

g. Guillain-Barre Syndrome (GBS, pronounced GHEE-yan bah-RAY). The Food and Drug Administration (FDA) and CDC recently described eight reports of GBS after *Menactra*™ immunization among more than 3.77 million doses of *Menactra*™ distributed (March 2005 through February 2006). GBS is a serous neurologic (nerve) disorder that can occur either spontaneously or after certain infections (e.g., Campylobacter). The rate of GBS is similar to what might be expected as the background rate, that is, without immunization.

h. DoD Policy. Meningococcal immunization is mandatory for basic trainees and cadets at Service academies within the first two weeks of training. Immunize personnel traveling to sub-

Saharan Africa during the dry season (December to June), and other countries as recommended by the CDC. Contact preventive-medicine offices for specific guidance.

i. Special Considerations. Chemoprophylaxis prevents meningococcal disease faster than immunization in close contacts of infected people post-exposure. Ideally, antibiotics should be given within 24 hours after identifying an index infection. Oral *rifampin* is available for adults and children. Oral *ciprofloxin* is available for adults. Intramuscular *ceftriaxone* is an alternative medication for both adults and children.

3. References.

a. Advisory Committee on Immunization Practices. Prevention and control of meningococcal disease. MMWR 2005; 54(RR-7):1-21. www.cdc.gov/mmwr/PDF/rr/rr5407.pdf

b. American Academy of Pediatrics, Committee on Infectious Diseases. Prevention and control of meningococcal disease: Recommendations for use of meningococcal vaccines in pediatric patients. *Pediatrics* 2005; 116(2):496-505.

c. Multiple resources (e.g., product insert, Vaccine Information Statements) assembled by Military Vaccine Agency: www.vaccines.mil/meningococcal

CPT Allison Christ/ 703-681-5101

Approved by LTC Stephen Ford