PART D: SCIENCE BASE

Section 8: Ethanol

INTRODUCTION

The hazards of heavy ethanol (alcohol) intake have been known for centuries. Heavy drinking increases the risk of liver cirrhosis, hypertension, cancers of the upper gastrointestinal tract, injury, and violence (USDA, HHS, 2000). A recent analysis found that alcohol use is the third leading actual cause of mortality in the United States, after tobacco use and poor diet and/or inactivity (Mokdad et al., 2004). The health consequences of consuming lesser amounts of alcohol are less often a focus of research or government recommendations.

In 1999–2001, 6 in 10 U.S. adults were current drinkers, 95 percent consuming light-to-moderate amounts (i.e., less than 7 drinks per week for women and less than 14 drinks per week for men) (Schoenborn et al., 2004) and 5 percent consuming more. Approximately 35 percent of adult Americans do not drink alcohol, with one in four being a lifelong abstainer (NIAAA, 1997). From a historical perspective, multiple sources suggest that fewer Americans consume alcohol today as compared to 50 to 100 years ago (See Figure D8-1).

The *2000 Dietary Guidelines for Americans* defined moderate alcohol consumption as the consumption of up to one drink per day for women and up to two drinks per day for men (USDA, HHS, 2000). One drink is defined as 12 oz of regular beer, 5 oz of wine (12 percent alcohol), or 1.5 oz of 80-proof distilled spirits. The Committee largely agreed with these earlier *Guidelines*. This section examines a few specific questions to potentially modify the earlier work. The focus remains the health consequences of consuming moderate amounts of alcohol.

OVERVIEW OF QUESTIONS ADDRESSED

This section addresses two major questions related to ethanol and health:

1. Among persons who consume four or fewer alcoholic beverages per day (with a subsearch for persons age 65 and older), what is the dose-response relationship between alcohol intake and (1) total mortality and (2) several major causes of death (i.e., cardiovascular disease, cancer, and trauma)?
2. Using recent national data, what is the relationship between consuming four or fewer alcoholic beverages daily and (1) macronutrient profiles, (2) micronutrient profiles, and (3) overall diet quality?

The search strategies used to find the scientific evidence related to these broad questions appears in Part C. Tables summarizing the findings from the searches appears in Appendix G-3.

QUESTION 1: AMONG PERSONS WHO CONSUME FOUR OR FEWER ALCOHOLIC BEVERAGES PER DAY, WHAT IS THE DOSE-RESPONSE RELATIONSHIP BETWEEN ALCOHOL INTAKE AND HEALTH?

Conclusions

1. In middle-aged and older adults, a daily intake of one to two alcoholic beverages is associated with the lowest all-cause mortality.
2. Compared with nondrinkers, adults who consume one to two alcoholic beverages per day appear to have lower risk of coronary heart disease (CHD).
3. Compared with nondrinkers, women who consume one alcoholic beverage per day appear to have a slightly higher risk of breast cancer.
4. Relationships of alcohol consumption with major causes of death do not differ for middle-aged and elderly Americans. Among younger people, however, alcohol consumption appears to provide little, if any, health benefit; alcohol use among young adults is associated with a higher risk of traumatic injury and death.

Rationale

These conclusions are supported by the *State of the Science Report on the Effects of Moderate Drinking* (NIAAA, 2003), an extensive review of the literature conducted by scientific staff of the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and reviewed by 14 outside experts. In addition to recognizing the apparent mortality benefit of moderate alcohol consumption among middle-aged and older adults, the report concludes, "Except for those individuals at particular risk…, consumption of [up to] 2 drinks a day for men and 1 for women is unlikely to increase health risks" (NIAAA, 2003, p 30). Individuals at particular risk include persons who cannot restrict their drinking to moderate levels, children and adolescents, persons taking prescription or over-the-counter medications that can interact with alcohol, and individuals with special medical conditions (e.g., liver disease).

Conclusion #1 was further substantiated by 17 papers from the Committee systematic review of the scientific evidence examining the relationship between moderate alcohol consumption and mortality for those age 65 and older (See Table D8-1). These findings are primarily from prospective cohort studies, and they are largely consistent with findings from studies of adults under age 65. Moreover, the Committee found no evidence that moderate alcohol consumption adversely affects cognitive functioning as one ages.

More specific evidence on the relation of alcohol intake to health concerns is summarized in the discussion below:

Total Mortality

Studies conducted around the world consistently show that alcohol has a favorable association with total mortality among middle-aged and older adults. A meta-analysis on all-cause mortality using approximately 50 studies demonstrated an inverse association between moderate drinking and total mortality under all scenarios (Gmel et al., 2003). On average, the relative risk of all-cause mortality associated with moderate drinking was approximately 0.80. The J-shaped curve, with the lowest mortality risk occurring at the level of one to two drinks per day, is likely due to the protective effects of moderate alcohol consumption on CHD (Marmot, 2001; Mukamal, 2003) and ischemic stroke (Reynolds et al., 2003), the first and third leading causes of death in the United States, respectively.

The Committee found weak evidence that purported changes in body composition with age support lowering the drinking limit for older men to one drink per day (NIAAA, 2003). A discussion with experts at NIAAA indicated that body composition of the elderly may be less relevant now because, as Americans are aging better, many are losing less lean body mass. In addition, elderly drinkers' level of impairment at any given blood alcohol concentration does not differ from that of younger drinkers (NIAAA, 2003).

Coronary Heart Disease

An inverse association between light-to-moderate alcohol consumption and CHD morbidity and mortality has been demonstrated in a variety of populations and is independent of many other cardiac risk factors, including age, sex, race/ethnic group, smoking habits and body mass index (Corrao et al., 2004, 2000; Marmot, 2001; Mukamal and Rimm, 2001). On average, the relative risk of CHD associated with moderate drinking is between 0.50 and 0.80. The largest potential benefits are found among women age 55 or older, men age 45 or older, and those at risk for heart disease. At younger ages, potential reductions in CHD are probably offset by increases in traumatic death (e.g., Andreasson et al., 1988).

The totality of the evidence does not support beverage-specific effects of certain types of alcohol. While laboratory findings have suggested that red wine might have additional health-promoting compounds, this finding is not consistently translated into the epidemiologic data. For example, Keil and colleagues (1997) present evidence of lower total mortality and CHD rates among moderate drinkers in a beer-drinking population; other population studies have found the largest reductions among those consuming largely distilled spirits (Rimm et al., 1996).

These conclusions were reached and supported by evidence in the NIAAA's *State of the Science Report* (NIAAA, 2003) and by many other recent studies. Although the CHD risk reduction probably is causal (Rimm et al., 1999), several other factors can reduce the risk of CHD (and other chronic diseases) independent of alcohol consumption, including a healthy diet, physical activity, avoidance of smoking, and maintenance of a healthy weight.

Cancer

Although immoderate alcohol intake has been linked to a various types of cancer (Corrao et al., 2004), moderate intake (i.e., up to one drink per day for women, up to two drinks per day for men) is not associated with most major cancers (NIAAA, 2003).

Breast cancer is a likely exception. Compared with nondrinkers, women who consume 1 drink per day appear to have an approximately 10 percent increase in the risk of breast cancer (NIAAA, 2003). Several meta-analyses suggest a linear dose-response relationship between the amount of alcohol intake and breast cancer risk (e.g., Smith-Warner et al., 1998). However, at the lower levels of intake (e.g., 2 drinks per week), the increase is sufficiently small that it is difficult to ascribe the finding to an effect of alcohol per se. The alcohol-breast cancer association may be of particular significance to women with a family history of breast cancer and those on hormone replacement therapy. Epidemiologic evidence indicates that the relative effect of moderate alcohol consumption on breast cancer risk may be small at the individual level but substantial at the population level.

QUESTION 2: WHAT IS THE RELATIONSHIP BETWEEN CONSUMING FOUR OR FEWER ALCOHOLIC BEVERAGES DAILY AND MACRONUTRIENT PROFILES, MICRONUTRIENT PROFILES, AND OVERALL DIET QUALITY?

Conclusion

A daily intake of one to two alcoholic beverages is not associated with inadequate intake of macronutrient or micronutrients, or with overall dietary quality

Rationale

Ten papers from the Committee's systematic review of the scientific evidence provided data useful to the conclusion that the consumption of one to two alcoholic beverages per day is not associated with macronutrient or micronutrient deficiencies:

- Seven cross-sectional studies (Barefoot et al., 2002; D'Avanzo et al., 1997; de Castro and Orozco, 1990; Jacques et al., 1989; Rosell et al., 2003; Schroder et al., 2002**;** Tremblay et al., 1995
- Three clinical trials (Foltin et al., 1993; Orozco and de Castro, 1991; Tremblay et al., 1995)

At the Committee's request, U.S. Department of Agriculture's Center for Nutrition Policy and Promotion used a modeling process described in Appendix G-2 to examine the relationship of moderate alcohol consumption with nutrient intakes and diet quality of participants in the *National Health and Nutrition Examination Survey* (NHANES) 1999–2000. The analysis demonstrated that

- Energy and nutrient intakes generally increased with increasing amounts of alcohol
- Among women, the Healthy Eating Index increased with increasing amounts of alcohol.
- Among men, the highest Healthy Eating Index was found among men who consumed an average of two drinks per day.

Nonetheless, alcoholic beverages supply calories but few nutrients. The energy contribution from alcoholic beverages varies widely. Specifically, some alcoholic beverages, such as dessert wines and mixed drinks, provide almost three times as many calories as do the standard drink portions: 12 oz. of beer, 5 oz. of wine, or 1.5 oz. of distilled spirit (see Part E, Table E-3 for a list of selected alcoholic beverages and their calorie content).

For those who choose to drink an alcoholic beverage, it is advisable to consume it with meals to slow alcohol absorption. Data suggest that the presence of food in the stomach can slow the absorption of alcohol (Jones et al., 1997) and thereby mitigate the associated rise in blood alcohol concentration.

SUPPLEMENTARY INFORMATION

Adverse Effects of Moderate Alcohol Consumption

The Committee also reviewed evidence regarding adverse effects of moderate alcohol consumption (NIAAA, 2003).

- ***Trauma.*** According to the NIAAA report (2003), studies on relationships of alcohol with injuries from falls and with violence and/or abuse frequently do not distinguish between

moderate and excessive drinking. Studies of acute effects of alcohol show that even moderate-dose consumption compromises brain performance in terms of error detection, processing speed, and response time. Low levels of drinking and blood alcohol content below 0.08 percent increase the risk of driving-related accidents. Thus, there are compelling temporary reasons not to drink alcohol, such as when planning to drive, operate machinery, or take part in activities that require attention, skill, or coordination.

- ***Hepatic effects.*** Alcohol abuse is the leading cause of liver-related mortality in the United States, accounting for at least 40 percent, and perhaps as many as 90 percent, of cirrhosis deaths (CDC, 1993; Vong and Bell, 2004). Lower levels of alcohol intake can result in liver function abnormalities short of cirrhosis. For example, moderate alcohol consumption may potentiate the carcinogenic potency of other hepatotoxins (NIAAA, 2003).
- ***Young age.*** Children or adolescents should not consume alcohol. Alcohol consumption increases the risk of traumatic injury, which is the number one cause of death in this age group. Animal data on alcohol-related structural changes in the brain, while less compelling, illustrates why drinking is inappropriate for adolescents (Land and Spear, 2004; Markwiese et al., 1998). "Designer drinks" (i.e., newer alcohol products that tend to target young adults) are of recent concern because of their possible effect on underage drinking.
- ***Pregnancy (including the first few months of pregnancy—often before the pregnancy is recognized).*** Moderate drinking during pregnancy may have behavioral or neurocognitive consequences in the offspring. Heavy drinking during pregnancy can produce a range of behavioral and psychosocial problems, malformations, and mental retardation in the offspring (NIAAA, 2003).
- ***Breastfeeding.*** The level of alcohol in breast milk mirrors the mother's blood alcohol content. Low or moderate alcohol consumption does not enhance lactational performance and actually may decrease infant milk consumption. Recent data indicate that alcohol consumption while breastfeeding has adverse effects on the infant's feeding and behavior (NIAAA, 2003).
- ***Other conditions.*** The NIAAA review also provides documentation that alcohol consumption should be avoided by individuals who cannot restrict their drinking to moderate levels, individuals taking medications that can interact with alcohol, and persons with specific medical conditions, such as liver disease (NIAAA, 2003).

Reasons Not To Drink Alcoholic Beverages

Abstention is an important option; approximately one in three American adults does not drink alcohol. Moreover, studies suggest adverse effects at even moderate alcohol consumption levels in specific individuals and situations, as described above.

People Who Should Not Drink:

- Individuals who cannot restrict their drinking to moderate levels
- Children and adolescents
- Individuals taking prescription or over-the-counter medications that can interact with alcohol
- Individuals with specific medical conditions (e.g., liver disease)

Situations Where Alcohol Should Be Avoided:

- Women who may become pregnant or who are pregnant
- Women who are breastfeeding

- Individuals who plan to drive, operate machinery, or take part in other activities that require attention, skill, or coordination

UNRESOLVED ISSUE

What Is The Relationship Between Consuming Four Or Fewer Alcoholic Beverages Daily And Obesity?

Available data on the relationship between alcohol consumption and weight gain/obesity are sparse and inconclusive. There are contradictory findings at the higher end of the spectrum (i.e., 3 to 4 drinks per day) that may relate to fundamental limitations of the cross-sectional study design. At moderate drinking levels (i.e., up to one drink per day for women, up to one drink per day for men), there is no apparent association between alcohol intake and obesity.

Ten observational papers from our systematic review of the scientific evidence provided data useful to this conclusion.

- Cross-sectional (Barefoot et al., 2002; Dorn et al., 2003; Gavaler and Rosenblum, 2003; Lahti-Koski et al., 2002; Rosell et al., 2003; Sherwood et al., 2000)
- Case control (Andersson and Rossner, 1996)
- Prospective cohort (Hoffmeister et al., 1999; Sherwood et al., 2000; Vahtera et al., 2002; Wannamathee and Shaper, 2003)

In summary, although prospective data are limited, there is no apparent association between consuming one or two alcoholic beverages daily and obesity.

SUMMARY

A daily intake of one to two alcoholic beverages is associated with the lowest all-cause mortality and a low risk of CHD among middle-aged and older adults. Among younger people, however, alcohol consumption appears to provide little, if any, health benefit; alcohol use among young adults is associated with a higher risk of traumatic injury and death. Thus, the Committee recommends that if alcohol is consumed, it should be consumed in moderation, and only by adults. Moderation is defined as the consumption of up to 1 drink per day for women and up to 2 drinks per day for men; and 1 drink is defined as 12 oz of regular beer, 5 oz of wine (12 percent alcohol), or 1.5 oz of 80-proof distilled spirits. A number of situations and conditions call for the complete avoidance of alcoholic beverages.

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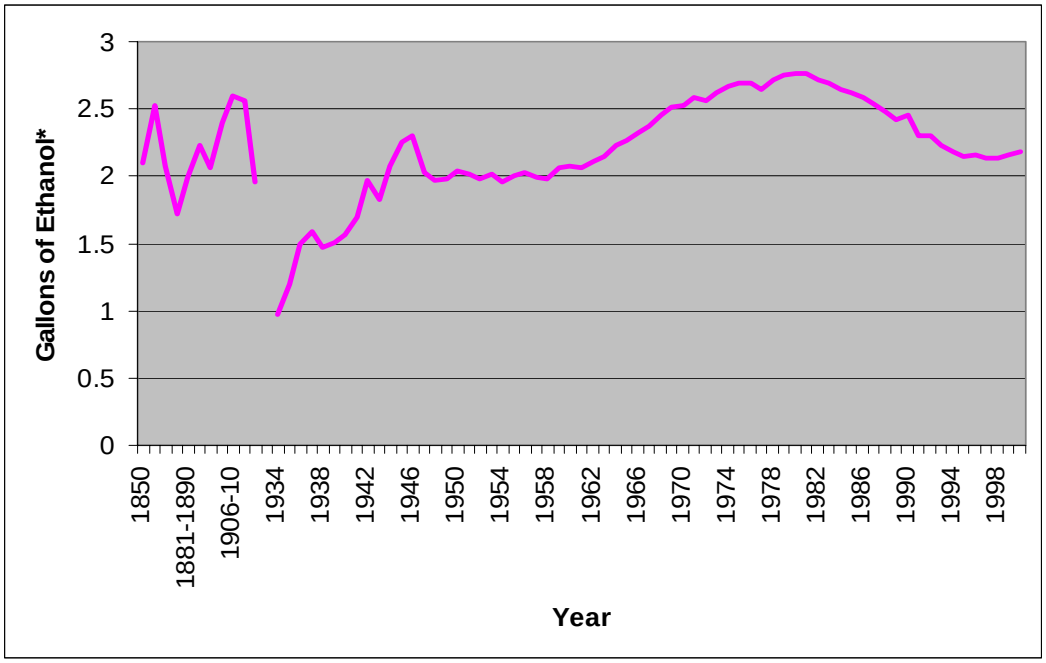
Figure D8-1 Historical Perspective of Per Capita Ethanol Consumption in the United States



*Gallons of ethanol, based on population age 15 and older prior to 1970 and on population age 14 and older thereafter

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Table D8-1. The Relationship Between Moderate Alcohol Consumption and Mortality (age 65+)
Inclusion Criteria: Prospective, Case-Control, Cross-Sectional Studies; Human Subjects; Publication Dates 1997 and After

Citation	Design	Population	Exposure	Outcome	Duration	Results	Statistics
Camargo et al., 1997	Prospective cohort	22,071 men in *Physicians' Health Study*, aged 40-84 years with no history of MI, stroke, transient ischemic attack, or cancer	<1 drink/wk; 1 drink/wk; 2–4 drinks/wk; 5–6 drinks/wk; 7–13 drinks/wk; ≥ 14 drinks/wk	all-cause mortality	10.7 years	Multivariate RR (age >52 y) <1 drink/wk 1.00; 1 drink/wk 0.81(0.63–1.03); 2–4 drinks/wk 0.71 (0.57–0.89); 5–6 drinks/wk 0.88 (0.69–1.12); 7–13 drinks/wk 1.02 (0.86–1.22); ≥14 drinks/wk 1.63 (1.23–2.14)	95 percent confidence interval; P-value association - linear p=0.0 non-linear p<0.001
Chyou et al., 1997	Prospective cohort	8,006 Japanese-American men living in Hawaii, between 45–68 years at initial examination in 1965–1968	occasionally; lightly; moderately; heavily	overall mortality	22 years	J-shaped pattern in risk for intake of alcohol; synergistic interaction between BMI and alcohol—Men with intermediate BMI (21.21–26.30 kg/m2) and drank occasionally to lightly (0.01–24.99 oz/mo) RR 1.00 (reference group); Men with lowest BMI (<21.21 kg/m^2) and drank moderately to heavily (≥ 25 oz/mo) RR 1.63 (1.33–1.99)	Synergistic interaction between BMI and alcoho *p*=0.0017; RR - 95 percent confiden interval
Dawson, 2001	Prospective cohort	42,910 adults 18 years and older; data from 1988 *National Health Interview Study* linked with the National Death Index for 1988 through 1985	abstainers; infrequent drinkers; light; moderate	mortality	7.5 year followup	Relative to lifetime abstainers and infrequent drinkers, the risk of death from external causes increased directly with volume of intake. No evidence for reduced risk of death among light or moderate drinkers.	
Dawson, 2000		37,682 U.S. adults age 25 years and older; data from 1988 *National Health Interview Study* linked with the National Death Index for 1988 through 1985	lifetime abstainers; past-year abstainers; light; moderate; heavy; very heavy	all-cause mortality		OR past-year abstainers 1.00; light 0.76 (0.68–0.84); moderate 0.84 (0.74–0.96); very heavy 1.17 (0.93–1.47)	95 percent confidence interval
Farchi et al., 2000	Prospective cohort	1536 males aged 45–65 in 1965 in Northern and Central Italy	<12 g/d; 13–48 g/d; 49–84 g/d; 85–120 g/d; over 120 g/d	age-adjusted life expectancy; total mortality	30 years	Age-adjusted life expectancy (years+/-SE) <12 g/d–19.6+/-0.9; 13–48 g/d–20.9+/-0.5; 49–84 g/d–21.6+/-0.4; 85–120 g/d–19.4+/-0.6; over 120 g/d–20.6+/-0.2	Years+/-SE

Gaziano et al., 2000	prospective cohort	89,299 U.S. men from the *Physicians' Health Study* who were age 40–84 years in 1982 and free of known MI, stroke, cancer or liver disease	rarely/never drinkers; 1 drink/wk; 2–4 drinks/ wk; 5–6 drinks/wk; 1 drink/d; ≥ 2 drinks/d	total mortality	5.5 years of followup	RR of total mortality rarely/never drinkers 1.00; 1 drink/wk 0.74; 2–4 drinks/ wk 0.77; 5–6 drinks/wk 0.78; 1 drink/d 0.82; > or = 2 drinks/d 0.95	Total mortality significant 95 percent CI, except >or= per day (0.79-1.14)
Hoffmeister et al., 1999	Prospective cohort	15,400 representative sample of German population and 2,370 regional sample of the Berlin-Spandau, age 25–69 years	0 g/d; 1–20 g/d; 21–40 g/d; 41–80 g/d; >80 g/d	all-cause mortality	7 years for Berlin-Spandau population	All-cause mortality hazard ratio (HR) for men - 0 g/day 1.00; 1–20 g/d 0.51 (0.29–0.90); 21–40 g/d 0.90 (0.51–1.56); 41–80 g/d 0.93 (0.49–1.76); >80 g/d 0.44 (0.10–1.86); All-cause mortality hazard ratio (HR) for women - 0 g/day 1.00; 1–20 g/d 0.83 (0.47–1.47); 21–40 g/d 1.29 (0.61–2.72); 41–80 g/d 0.81 (0.25–2.65); >80 g/d 4.20 (1.23–4.30)	95 percent confidence interval
Jackson et al., 2003	Prospective cohort	112,528 U.S. men from the *Physicians' Health Study*, 1320 of whom reported a baseline history of stroke	rarely or never drink; very light (<1 drink/d); light (1–6 drinks/wk); moderate (≥ 1 drink/d)	total mortality	4.5 years	RR rarely or never drink 1.00; <1 drink/d 0.88 (0.60–1.28); 1–6 drinks/wk 0.64 (0.48–0.85); ≥ 1 drink/d 0.71(0.54–0.94)	95 percent confidence interval; *p*=0.03 for trend
Keil et al., 1997	Prospective cohort	1071 and 1,013 women, age 45–65 years, from the Ausburg region of Germany	nondrinkers; drinkers (further divided by grams of alcohol/d)	total mortality	8 years	Hazard rate ratio nondrinkers 1.00; drinkers 0.59 (0.36–0.97); For different alcohol groups - 20–39.9 g/d 0.46 (0.20–0.80); ≥ 80 g/day 1.04 (0.54–2.00)	95 percent confidence interval
Maskarinec et al., 1998	prospective cohort	40,000 persons with Caucasian, Chinese, Filipino, Japanese, and native Hawaiian ethnicity	none, low alcohol intake (1–7 drinks/wk); higher levels of intake (>7 drinks/wk)	all-cause mortality	20 years	Men and women with low alcohol intake (1–7 drinks/wk) had 20 percent reduction in total mortality.	
Mukamal et al., 2001	prospective cohort	1,913 adults hospitalized with AMI between 1989 and 1994 in 45 U.S. community and tertiary care hospitals	none; less than 7 drinks/wk; 7 or more drinks/wk; (1 drink = 15 g alcohol)	all-cause mortality	3.8 years	Hazard ratio (full model) abstainers 1.00; <7 drinks 0.79 (0.60–1.03); ≥ 7 drinks 0.68 (0.45–1.05)	95 percent confidence interval, *p*=0.01 for trend

Muntwyler et al., 1998	Prospective cohort	5,358 men from *Physicians' Health Study* who reported a history of MI and provided information on alcohol intake	rarely/never drinkers; 1–4 drinks/ month; 2–6 drinks/wk; 1 drink/d; ≥ 2 drinks/ d	total mortality	5 years	Multivariate RR-age 65–84y rarely/never drinkers 1.00; 1–4 drinks/mo 0.84 (0.65-1.07); 2–6 drinks/wk 0.70 (0.54–0.91); 1 drink/day 0.81 (0.64–1.02); > 2 drinks/d 0.89 (0.55–1.47)	95 percent confidence interval
San Jose et al., 1999	Prospective cohort	18,973 residents in Eindhoven, Netherlands	abstainers; light (1–14 units/wk); moderate (15–28 units/wk); excessive (> or =29 units/wk)	mortality		light or moderate drinkers had lower mortality than either abstainers or heavier drinkers	
Simons et al., 2000	Prospective cohort	1,235 men and 1,570 women age 60 years and over living in Dubbo, New South Wales, first examined in 1988-89	zero consumption; 1–7 drinks/week; 8–14 drinks/wk; 15–28 drinks/wk, >28 drinks/wk (1 drink = 10 g alcohol)	mortality	116 months	Hazard ratio: Men (60–74 y.o.) - no consumption 1.00; 1–7 drinks/wk 0.68 (.49–.94); 8–14 drinks/wk 0.58 (.39–.85); 15–28 drinks/wk 0.62 (.40–.95) >28 drinks/wk 0.56 (.33–.96); Women (60+ y.o.) - no consumption 1.00; 1–7 drinks/wk 0.78 (.61–.99); 8–14 drinks/wk 0.66 (.45–.97); 15–28 drinks/wk 0.67 (.29–1.55)	95 percent confidence interval
Theobald et al., 2000	Prospective cohort	1,828 individuals age 18-65 years	lifelong abstainers; ex-drinkers; <50 g/wk; <140 g/wk	total mortality	22 years	RR compared with intake of wine less than once a week or not at all – Intake of wine once a week or more 0.58 (0.40–0.84); RR compared to lifelong abstainers and <50 g - ex-drinkers 2.64 (1.56-4.49)	95 percent confidence interval
Thun et al., 1997	Prospective cohort	490,000 people (251,420 women and 238,206 men) age 30–104 in 1982 that were part of the *Cancer Prevention Study* II	nondrinkers; less than daily (but at least 3/wk); remaining reported in units per day (i.e. 1/day, 2/day, etc); (1 drink = 12 g alcohol)	all-cause mortality	9 years	RR for 60-79 y.o. with low cardiovascular risk - nondrinkers 1.00; less than daily 0.8 (0.8–0.9); 1 drink/d 0.8 (0.8–0.9); 2 drinks/d 0.8 (0.8–0.9), 3 drinks/d 0.9 (0.9–1.0); ≥ 4 drinks/d 1.0 (0.9–1.1); RR for 60–79 y.o. with high cardiovascular risk - nondrinkers 1.00; less than daily 0.8 (0.8–0.9); 1 drink/d 0.8 (0.8–0.8); 2 drinks/d 0.8 (0.8–0.8), 3 drinks/d 0.8 (0.7–0.9); > 4 drinks/d 0.8 (0.7–0.8)	95 percent confidence interval
Woo et al., 2002	Prospective cohort	2,032 Chinese subjects aged 70 years and older (mean age 80 years)	abstinence; occasional (less than once to up to twice per week); regular (three of more times weekly)	mortality	3 years	OR abstinence 1.00; occasional 0.625 (0.41,0.95); regular 0.684 (0.44,1.07)	95 percent confidence interval - However not statistically significant aft adjusting for age and baseline self-perceived he

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