

A Comparison of the Health Effects of Alcohol Consumption and Tobacco Use in America

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This report represents a work in progress. ACSH realizes that research in the areas of health impacts of alcoholic beverages and of tobacco products is continuing, and we will update this paper as new research and insights are received. We welcome input from readers.

Executive Summary

Public policy makers and legislators face complex challenges when evaluating regulatory and educational approaches to the use of alcoholic beverages and tobacco products. Although the two substances are often presented as if they have similar impacts on health, an examination of the substantial differences in their health-related benefits and risks indicates that they should not be linked for regulatory or educational purposes. This paper briefly reviews:

- patterns of alcohol and tobacco use in the United States, and
- dose-related health benefits and risks.

The risk/benefit profiles of alcoholic beverage and tobacco product use are significantly different. For example, alcoholic beverage consumption can have positive health effects at low to moderate doses, at least in specific populations. The pattern of consumption is apparently as important as the quantity consumed; binge drinking carries definite health risks. The misuse of alcoholic beverages, which is defined as the use of even small amounts of alcohol at inappropriate times, is associated with an increased risk of motor vehicle accidents. Furthermore, use of higher doses of alcohol (doses for which the term “abuse” is appropriate), is also associated with an increased risk of several diseases, violent behavior, suicide, and birth defects.

Unlike with alcohol, no important overall health benefits have been established for tobacco product use at any dosage. Any possible health

benefit related to smoking involves the alleviation or prevention of diseases that are uncommon or are rarely fatal. Moreover, there is overwhelming evidence that cigarette smoking greatly increases a number of health risks, including the risk of various cancers, chronic obstructive pulmonary disease (COPD), heart disease, and stroke. Certain health risks may also be increased even with light use of cigarettes. The use of cigarettes, pipes, and cigars, as well as smokeless tobacco, poses different health risks. Tobacco smoke puts others at risk through environmental exposure.

Use of tobacco products, and the use, misuse, and abuse of alcoholic beverages pose higher risks to special populations, in particular the elderly, children, and adolescents. The use of these products can also pose risks to “passive” consumers, like developing fetuses, children, and other nonusers, through motor-vehicle and other injuries.

The significant differences in individual and public health consequences of the use of alcoholic beverages versus those of the use of tobacco products underscore the opinion of the authors that public policy approaches to these substances should differ.

Introduction

Alcohol and nicotine—the latter obtained almost exclusively from tobacco—are among the most commonly used and abused drugs in the Western world. Both act on the central nervous system and thus fit the definition of a psychoactive drug. The marketing, sale, and use of both products have come under scrutiny from a variety of local, state and national legislative bodies, as well as from several public health organizations. Further, the representation of these products in the popular media often suggests that any use of both substances has similar detrimental effects on health.¹⁻⁵

Statements like “It’s time to get the country looking at the alcohol industry in exactly the same way we’re looking at tobacco,” by Sandy Golden of the Campaign for Alcohol-Free Kids,⁴ imply that alcohol and tobacco are equally deleterious to health, and therefore should be approached in similar ways. But such an interpretation blurs the very real differences between the health effects of alcohol and tobacco. The distinct health risks associated with the misuse and abuse of alcoholic beverages, and of tobacco product use are becoming increasingly clear. Moreover, unlike with tobacco use, scientific research has also indicated that different health benefits may be obtained from light to moderate

use of alcoholic beverages among certain populations.

Recent scientific studies have helped to elucidate the specific health benefits and risks of typical levels of alcoholic beverage consumption and tobacco products use. Knowledge is crucial to the development of effective policies to decrease abuse and minimize negative effects on the public health.

In this report, the American Council on Science and Health (ACSH) will compare and contrast the health risks and benefits of alcohol and tobacco use. While ACSH recognizes that alcoholism and its sequelae are important public health issues, this paper primarily compares the health effects of more typical levels of alcohol use with those of typical levels of tobacco use, particularly cigarette use.

As an organization, ACSH specializes in separating real health risks from hypothetical ones. Thus, the purpose of the present paper is not to attack or defend the use of either alcohol or tobacco products. Rather, its goal is to provide a base of scientific evidence for the discussion of public policy regarding these products. This analysis is a work in progress: we welcome comments from readers for consideration for the next edition of this report. We fully expect that the data on which this version is based will be refined and expanded as research continues.

Alcohol and Tobacco Use in the United States

Alcohol.

Consumption. According to industry sources, current per capita consumption of alcohol in the United States averages 1.97 gallons of liquor,⁶ 1.95 gallons of wine,⁷ and 22 gallons of beer per year.⁸ The National Longitudinal Alcohol Epidemiologic Survey found that 66 percent of the U.S. population over 18 years of age had ever consumed alcohol, and that 44 percent had consumed it during the previous 12 months.⁹ Over the past two decades, the U.S. has experienced an overall decline in per capita alcohol consumption, particularly in consumption of distilled spirits.¹⁰

Patterns of misuse and abuse. Most alcohol-related health problems are due to, or correlated with, heavy alcohol use and/or dependence. In a representative sample of adult Americans, the estimated prevalence of alcohol dependence at some point in a person's life was 13.3 percent, and the prevalence of alcohol dependence was 4.4 percent during the most recent 12 month period.⁹ Other surveys, howev-

COMPARISON TABLES: ALCOHOL AND TOBACCO

Table 1. NET HEALTH BENEFITS OF ALCOHOL CONSUMPTION AND TOBACCO USE

MODERATE CONSUMPTION OF ALCOHOLIC BEVERAGES	EXCESSIVE CONSUMPTION OF ALCOHOLIC BEVERAGES	TYPICAL ¹ USE OF TOBACCO PRODUCTS
<ul style="list-style-type: none"> • <u>Heart disease</u>: Evidence for protective effect in many studies; particularly for middle-aged individuals • <u>Stroke</u>: Evidence for protective effect in many studies • <u>Type 2 diabetes</u>: Evidence for protective effect in some studies • <u>Gallstones</u>: Evidence for protective effect • <u>Infection</u>: Evidence for protective effect in some studies • <u>Overall mortality</u>: Evidence for risk reduction from 1–2 drinks daily 	<ul style="list-style-type: none"> • No net health benefits established 	<ul style="list-style-type: none"> • No net health benefits established²

1. According to data from surveys by the CDC between 1974 and 1995, over 50% of adult, current smokers report smoking over 15 cigarettes per day (<http://www.cdc.gov/tobacco/adstat3.htm>)

2. Use of tobacco products has been linked to reduction of risk or amelioration of disease in the following situations:
Dementing diseases: Suggestion of protective effect in small studies; no protective effect seen in large epidemiologic studies
Cognition: Conflicting evidence for improved cognitive performance in small studies
Osteoarthritis: Evidence for reduced risk in some studies
Endometrial cancer: Evidence for reduced risk in some studies
 These conditions are uncommon or non-life-threatening, or both. They do not outweigh the severely deleterious health effects of the typical use of tobacco products

Table 2. NET HEALTH RISKS OF ALCOHOL CONSUMPTION AND TOBACCO USE

<p>MODERATE CONSUMPTION OF ALCOHOLIC BEVERAGES¹</p>	<p>EXCESSIVE/INAPPROPRIATE CONSUMPTION OF ALCOHOLIC BEVERAGES</p>	<p>TYPICAL² USE OF TOBACCO PRODUCTS</p>
<ul style="list-style-type: none"> • No established health risks in general population • May have detrimental interactions with some medications 	<ul style="list-style-type: none"> • <u>Overall mortality</u>: Estimated 85,000–95,000 premature deaths/year • <u>Liver disease</u>: Strong evidence of risk, especially for heavy drinkers • <u>Heart disease/stroke</u>: Evidence of increased risk of cardiomyopathy and arrhythmias in heavy drinkers; binge drinking associated with increased risk of stroke • <u>Cancer</u>: Conflicting evidence for increased breast cancer risk in moderate-heavy drinkers; evidence for increased risk of death from cancers of the mouth, esophagus, pharynx, and larynx, especially for heavy drinkers • <u>Immune/hormone systems</u>: Evidence for reduced resistance to bacterial infections; reduced libido, infertility • <u>Psychiatric/cognitive disorders</u>: Evidence of overlap between alcohol abuse and psychiatric disorders, 	<ul style="list-style-type: none"> • <u>Overall mortality</u>: Cigarette smoking is the largest single cause of premature death in the United States: Over 400,000 deaths/year due to use of tobacco products. • <u>Lung cancer/other lung diseases</u>: Very strong evidence for cigarette smoking as primary cause of lung cancer; strong evidence that cigarette smoking causes chronic obstructive pulmonary diseases (COPD) and increases risk of COPD mortality • <u>Other cancers</u>: Evidence for causative role of cigarette smoking in many cancers of the lip, mouth, pharynx, larynx, esophagus, bladder, kidney, and pancreas; some evidence for causative role in breast cancer; evidence for increased risk of oral and laryngeal cancers, bone and tooth loss for cigar/pipe smokers; some evidence of increased risk of oral cavity cancers for smokeless tobacco users • <u>Heart disease/stroke</u>: Strong evidence

Table 2. NET HEALTH RISKS OF ALCOHOL CONSUMPTION AND TOBACCO USE (continued from page 9)

<p>MODERATE CONSUMPTION OF ALCOHOLIC BEVERAGES¹</p>	<p>EXCESSIVE/INAPPROPRIATE CONSUMPTION OF ALCOHOLIC BEVERAGES</p>	<p>TYPICAL² USE OF TOBACCO PRODUCTS</p>
<p>but causal relationship not established; alcoholics show cognitive deficits</p> <ul style="list-style-type: none"> • <u>Behavioral</u>: Evidence for violence and aggression; evidence for risky behaviors (e.g., sexual) in heavy drinkers • <u>Special Populations</u>: • <u>Elderly</u>: Excessive alcohol consumption linked to falls, fractures, drug interactions • <u>Adolescents</u>: Animal studies suggest alcohol might interfere temporarily with memory and learning; possible link between adolescent drinking and adult alcohol abuse • <u>Risks to Others</u>: • <u>Motor vehicle-related injuries</u> and death associated with driving under the influence; • <u>Injury to fetus</u> (fetal alcohol syndrome) and cognitive/motor deficits in some children of some mothers who drink heavily during pregnancy 	<p>for increased risk, with dose response, due to cigarette smoking; evidence of increased cardiovascular mortality risk for smokeless tobacco users</p> <ul style="list-style-type: none"> • <u>Other diseases/disorders</u>: Evidence linking cigarette smoking to type 2 diabetes, gastric ulcers, age-related hearing loss, respiratory illnesses, reduced fertility, sexual impotence, facial wrinkles, depression • <u>Behavioral</u>: Some association between cigarette smoking and adverse employment outcomes • <u>Special Populations</u>: • <u>Adolescents</u>: Evidence of link between early-onset smoking and increased risk of smoking-related illnesses in adulthood; increased risk of illegal drug and alcohol use, poorer overall health, particularly of lungs • <u>Minorities</u>: Evidence that African Americans may be particularly vulnerable to the health risks of smoking • <u>Risks to others</u>: Some evidence that 	<p>for increased risk, with dose response, due to cigarette smoking; evidence of increased cardiovascular mortality risk for smokeless tobacco users</p> <ul style="list-style-type: none"> • <u>Other diseases/disorders</u>: Evidence linking cigarette smoking to type 2 diabetes, gastric ulcers, age-related hearing loss, respiratory illnesses, reduced fertility, sexual impotence, facial wrinkles, depression • <u>Behavioral</u>: Some association between cigarette smoking and adverse employment outcomes • <u>Special Populations</u>: • <u>Adolescents</u>: Evidence of link between early-onset smoking and increased risk of smoking-related illnesses in adulthood; increased risk of illegal drug and alcohol use, poorer overall health, particularly of lungs • <u>Minorities</u>: Evidence that African Americans may be particularly vulnerable to the health risks of smoking • <u>Risks to others</u>: Some evidence that

Table 2. NET HEALTH RISKS OF ALCOHOL CONSUMPTION AND TOBACCO USE (continued from page 10)

MODERATE CONSUMPTION OF ALCOHOLIC BEVERAGES ¹	EXCESSIVE/INAPPROPRIATE CONSUMPTION OF ALCOHOLIC BEVERAGES	TYPICAL ² USE OF TOBACCO PRODUCTS
		<p>regular ETS exposure increases non-smokers' risk of heart disease, lung cancer; strong evidence that ETS increases risk of respiratory diseases, and possibly chronic ear infection;</p> <ul style="list-style-type: none"> • <u>Children</u>: Evidence that maternal smoking causes risks to fetus, is a risk factor for SIDS, and is associated with developmental impairment in toddlers

¹ Any negative effects of moderate consumption of alcoholic beverages usually derive from misuse of these products, e.g., from driving too soon after consumption, or from ignoring advice about medications.

Judgment: The ability to operate motor vehicles or machinery may be impaired shortly after consumption.

Liver disease: Alcohol consumption may exacerbate pre-existing liver disease, such as hepatitis.

Drug interactions: Alcohol consumption may impede or potentiate the action of some prescription and nonprescription medications.

² According to data from surveys by the CDC between 1974 and 1995, over 50% of adult, current smokers report smoking over 15 cigarettes per day (<http://www.cdc.gov/tobacco/adstat3.htm>).

er, have found lower percentages.¹⁰

An individual's risk for alcohol abuse or dependence varies according to several factors, including family history (which includes inherited biochemical and neurophysiological characteristics), sensitivity to the effects of alcohol, expectations about drinking, and social factors.^{10,11} In general, women exhibit lower frequencies of alcohol consumption, abuse, and dependence than men. Some studies have found higher incidences of alcohol-related problems among such minority groups as Native Americans, African Americans, and Hispanics, but small sample sizes make comparisons difficult.¹⁰

Young people are especially prone to alcohol misuse and abuse (e.g., binge drinking). Some studies define any alcohol use by minors as abuse. For the purposes of this study, high-risk patterns of alcohol use by the young are of particular concern. In the course of one year, 70 percent of 12th graders reported misusing alcohol, according to the results of one large study. Misuse in this paper is defined as high-risk drinking, high quantity or frequency of use, and/or negative consequences due to use.¹² Alcohol abuse seems to decline as young people mature and assume adult roles (a phenomenon called "maturing out").¹³

Harm caused by certain patterns of alcoholic beverage use¹⁴ is accompanied by health problems in certain populations. For example, men who consumed at least four drinks per day had a 30 percent greater risk of death from "non-disease" causes, primarily unintentional injuries and suicide, as compared with nondrinkers.¹⁵ Among pregnant women, drinking moderate to heavy amounts of alcohol on a few occasions may be riskier for fetal development than is drinking the same amount of alcohol in low doses at regular intervals.¹⁰ In a survey of students at 140 college campuses, 44 percent reported at least one episode of binge drinking, and 19 percent reported frequent binge drinking.¹⁶

Tobacco

The 1995 National Household Survey on Drug Abuse found that 61 million Americans described themselves as smokers at the time of the survey (about 29 percent of the population), with somewhat more men than women smoking.¹⁷ About 4.5 million of those smokers were aged 12–17, with similar percentages measured for males and females.

The 1995 National Health Interview Survey estimated that 47 million adults (24.7%) were current smokers, with 20.1 percent of adults smoking every day, and another 4.6 percent smoking occasionally.¹⁸ Of

those adults who were current smokers, National Health Interview Surveys between 1974 and 1995 revealed that over 50 percent reported smoking more than 15 cigarettes per day.¹⁹

Although the proportion of Americans who report smoking has declined steadily since the 1970s, the decline was not sufficient to meet the U.S. government's goal of 15 percent prevalence among adults by the year 2000. Instead, it was estimated that 20.7 percent of Americans would be cigarette smokers at the end of the 20th century.²⁰

In contrast to smoking patterns observed in other age groups and to earlier trends, smoking among adolescents has increased recently.²⁰ Most smokers begin smoking as teenagers. Each day, roughly 6,000 youngsters try a cigarette, and 3,000 become daily cigarette smokers.²¹

In contrast to alcohol use, where there is evidence for "maturing out," no such pattern has been observed with cigarette use.²² The risk of long-term nicotine dependence for adolescents is inversely related to the age at which they started smoking.²³

While most smokers continue to smoke daily because of dependence on nicotine, researchers have identified a small subgroup of smokers (less than 20 percent) who do not smoke every day.²⁴

Health benefits associated with the use of alcoholic beverages and tobacco products *(Summarized in Table 1)*

Although much of the publicity on the health effects of alcoholic beverage and tobacco product use has appropriately focused on risks and adverse effects, evidence of some beneficial effects has emerged for light-to-moderate alcoholic beverage consumption. In contrast, research on possible health-enhancing effects of tobacco products has yielded no evidence of significant benefits that outweigh known risks.

Moderate alcoholic beverage consumption

Unless otherwise noted, one drink per day is equivalent to about 12–14 grams of ethanol (a little more than one-half ounce). This amount of ethanol is roughly equivalent to five ounces of table wine, 12 ounces of beer, or 1.5 ounces of 80-proof liquor.²⁵

Heart disease. A substantial body of evidence supports a protective effect of alcohol on the risk of coronary artery disease—the lead-

ing cause of death in Western countries.¹⁰ Persons over 45 or 50 with one or more risk factors for heart disease are most likely to benefit significantly from consuming one or two drinks per day,^{26,27} although various studies have found benefits regardless of age, gender, or ethnic background.¹⁰

Alcohol may exert its beneficial influence in several ways. The strongest and best-studied effect is the rise in blood levels of high-density lipoprotein (HDL) cholesterol (so-called good cholesterol).^{10,28} Low to moderate levels of alcohol consumption also inhibit the formation of blood clots, interfere with vascular inflammatory response, and promote blood flow.^{10,29} It must be noted, however, that high levels of alcohol consumption have opposite effects.

The relative benefits to the heart from wine, beer, and spirits have been a subject of long-standing controversy. Some researchers suggest that red wine in particular (even when alcohol-free) has protective compounds,^{30,31} while other researchers disagree. A review of studies, particularly international comparisons, suggests that the preventive effect is primarily due to alcohol content.^{32,33} Differences found in some studies may be due to variation in drinking patterns, rather than to the type of beverage consumed. Because some of the positive effects of alcohol on blood components last less than 24 hours, a drink of wine, spirits, or beer each day might have greater benefits than a liter bottle of wine, several mixed drinks, or a six-pack consumed on the weekend,²⁷ as these would be considered heavy rather than moderate consumption.

Stroke. Moderate use of alcohol is also linked to reduced risk of ischemic stroke,* another major cause of death and disability.³⁴ Moderate drinkers experience roughly half the risk of stroke as compared to nondrinkers.^{35,36} Data from women enrolled in the Nurses' Health Study³⁷ showed that for those who consumed one alcoholic drink per day (defined in this study as 5 to 14.9 grams of alcohol), the risk of ischemic stroke was reduced by two-thirds compared with the risk for nondrinkers.

Other benefits. Moderate alcohol use also has other benefits. Some studies have found an inverse relationship between drinking and type 2 (non-insulin-dependent) diabetes.^{38,39} Moderate alcohol consumption may also offer some protection against gallstones.³⁸ Finally,

* An ischemic stroke occurs when blood flow to a part of the brain is blocked—for example by a blood clot. This cuts off the delivery of nutrients and oxygen to that portion of the brain.

several studies have found that low consumption of alcohol may protect against infection, including the common cold,⁴⁰ *Helicobacter pylori* (the bacterium associated with ulcers and gastritis),⁴¹ and various bacteria that cause “traveler’s diarrhea.”⁴²

Overall mortality. Large studies, literature reviews, and meta-analyses show a U-shaped (or J-shaped) relationship between the use of alcohol and overall risk of death, with one or two drinks per day preferable to abstinence or heavier consumption.⁴³⁻⁴⁵ One drink per day was associated with the lowest mortality for both men and women in a large prospective study of American adults.¹⁵ In the Nurses’ Health Study, the bottom of the U-shaped mortality curve corresponded to one to three drinks per week.²⁶ Similarly, in the Physicians’ Health Study the lowest mortality was associated with consumption of one to two drinks per day.⁴⁶ The greatest reduction in overall mortality with moderate alcohol consumption has been seen among people aged 45 and over, probably because of age-related changes in common causes of death, particularly heart disease.^{43,44}

Perhaps because of the known health risks of alcoholic beverages (described in the following section), some researchers have expressed doubts about studies that show beneficial effects. Concerns include the accuracy of classification of drinkers and nondrinkers, possible confounding due to the numerous other potential contributors to coronary artery disease, and avoidance of alcohol by people already suffering from severe disease.¹⁰ But because so many well-controlled studies have found protective effects across many settings, the important public health benefits of moderate drinking, especially for the heart, are now widely accepted.²⁷ Interestingly, moderate drinkers also seem simply to feel better. A Finnish study found a second J-shaped relationship between amount of alcoholic beverages consumed and the perception that one is in good health; this perception has emerged in some studies as a strong predictor of decreased mortality.⁴⁷

Use of tobacco products

Our review identified no significant findings of overall health-enhancing properties of tobacco at any dose. Those findings that have indicated possible health benefits from cigarette smoking have not withstood rigorous analysis. Moreover, any health benefits from tobacco use are trivial compared to the overwhelmingly harmful effects of tobacco use, including lung and other cancers, COPD, and heart disease. The

few conditions that seem to be ameliorated by tobacco use are usually either uncommon or non-life-threatening.⁴⁸

Alzheimer's disease and Parkinson's disease. Although some case-control studies have indicated that smoking might offer some protective effect against Alzheimer's disease,⁴⁹⁻⁵¹ biases related to subject selection or survival cannot be ruled out.⁴⁹ Furthermore, most studies to date did not consider dosage. In contrast, a large prospective study found that smokers had over twice the risk of dementia as people who never smoked.⁵²

Similarly, while case-control studies have found a negative association between Parkinson's disease and level of smoking,^{53,54} this could be due to the fact that, because of the detrimental health effects of smoking, nonsmokers survive longer than smokers.

Cognitive performance. A few small studies have reported that nicotine positively affects attention span and the time required for decision-making in smokers.⁵⁵ However, these findings may be related to the need to reduce the effects of nicotine withdrawal, rather than to an actual enhancement in performance. Studies in which nonsmokers were given nicotine have yielded conflicting results; some showed no enhanced performance effects, while others have shown small improvements in certain aspects of attention and cognition.^{56,57}

Osteoarthritis. Surveys and case-control studies have found a moderate, negative, and dose-dependent association between smoking—or some factor linked to smoking—and the risk of developing certain kinds of osteoarthritis.⁵⁸⁻⁶⁰

Endometrial cancer, hyperemesis of pregnancy.⁴⁸ The possible positive effect of smoking on endometrial cancer must be evaluated in perspective. Although smoking might theoretically prevent the deaths of 6 out of 100,000 women from endometrial cancer, it claims 30 times as many lives from tobacco-related diseases.⁶¹

Potential benefits of nicotine. Some studies indicate that nicotine has potential for use as a pharmaceutical agent that might be useful for treating ulcerative colitis,⁶²⁻⁶⁴ and possibly other diseases. This does not mean, however, that nicotine must be delivered by tobacco products, or that tobacco use is helpful for such conditions.

Those conditions for which some evidence indicates a beneficial effect of smoking are relatively insignificant when compared to the proven detrimental effects of smoking on health. The combined impact of positive effects of smoking on mortality is probably less than 1% of

that of the negative health impact of other smoking-related conditions.¹⁹

Health risks associated with the use of alcoholic beverages and tobacco products (Summarized in Table 2)

Misuse and abuse of alcoholic beverages

Definitions of substance abuse and dependence have changed over the years, and vary by source. The most recent *Diagnostic and Statistical Manual* of the American Psychiatric Association (DSM-IV) gives the following definition:

The essential feature of Substance Dependence is a cluster of cognitive, behavioral, and physiological symptoms indicating that the individual continues use of the substance despite significant substance-related problems....[including] tolerance, withdrawal, and compulsive drug-taking behavior. The essential feature of Substance Abuse is a maladaptive pattern of substance use manifested by recurrent and significant adverse consequences related to the repeated use of substances. There may be repeated failure to fulfill major role obligations, repeated recurrent social and interpersonal problems. Unlike the criteria for Substance Dependence, the criteria for Substance Abuse do not include tolerance, withdrawal or a pattern of compulsive use and instead include only the harmful consequences of repeated use.⁶⁵ (p. 176-82)

Misuse of alcoholic beverages may be considered the use of even small doses in inappropriate circumstances, such as shortly before driving a motor vehicle.

Disease risks.

Historically, problems associated with immoderate drinking were reported to include “symptoms of depraved appetite,” impairment of “the vitality of the blood,” and a “defective organization of the nerves” in offspring of the inebriate.⁶⁶ Today, these disorders have been defined and categorized with more precision,⁶⁷ and in particular, the differences between fetal alcohol syndrome and fetal alcohol effects have been described.

Liver disease. The significant role of alcohol in liver diseases, particularly cirrhosis (scarring), has long been established. It is estimated that more than 2 million Americans suffer from some form of alco-

holic liver disease.⁶⁸ In 1992, deaths from cirrhosis were down by almost half from their 1973 age-adjusted peak, making cirrhosis the 11th leading cause of death, at 8.1 per 100,000.¹⁰ For most heavy drinkers, the “threshold” dose for liver disease—the minimum amount needed to cause the disease—seems to be 600 kilograms for men (equivalent to 72 ounces of beer [6 beers], a liter [6.5 glasses] of wine, or 8 ounces of spirits [5.5 drinks] daily for 20 years). For women, less than one-half that amount may be sufficient.¹⁰

It is unclear whether the decrease in cirrhosis deaths can be primarily ascribed to recent declines in alcohol consumption.⁶⁹ In retrospective studies, for example, it is difficult to determine the role played by alcohol, especially since many death certificates fail to list whether alcohol was involved.⁶⁹ Estimates suggest that alcohol abuse plays a role in 40 to 90 percent of cirrhosis deaths.⁶⁸ Not all heavy drinking leads to liver disease, however, and disease severity cannot be reliably predicted by the amount of alcohol intake alone. Genetic factors (such as variations in the enzymes that metabolize alcohol) and environmental factors (such as cigarette smoking and associated dietary deficiencies) probably also play a role.¹⁰ In addition, hepatitis B and C may increase susceptibility to alcoholic liver disease,⁷⁰ and viral hepatitis can cause cirrhosis independently of alcohol consumption.

In a review of seven papers on cirrhosis, some studies showed a decreased incidence of liver disease when subjects consumed approximately one drink per day, although all studies found that risk increases greatly as intake rises. Women appear to be at greater risk than men for all levels of use.⁷¹

Cardiac diseases, stroke, and high blood pressure.

Whereas moderate drinking can help the heart, heavy drinking (more than four drinks per day) interferes with its mechanical functioning. Over a period of years, heavy intake of alcoholic beverages can cause cardiomyopathy (chronic disease of the heart muscle), which may eventually lead to heart failure. Alcohol appears to be responsible for 20–50 percent of cases of cardiomyopathy.^{10,21} Both chronic heavy drinking and acute overconsumption (“holiday heart syndrome”) can also induce disturbances in the rhythm of the heart.²⁹

Occasional episodic heavy drinking, also known as binges, and irregular drinking patterns have been associated with increased risk of ischemic stroke in men.^{35,36} Some researchers have found a U-shaped relationship between alcohol intake and stroke overall. However, stud-

ies that analyzed risk by type of stroke have found a dose-dependent association only for a less common type of stroke, known as hemorrhagic stroke.^{10,71} Interpretation is difficult, because of the small numbers of subjects used in some studies.^{37,71}

Some studies have shown that light drinking has a beneficial or neutral effect on blood pressure; by contrast, consuming more than two alcoholic drinks per day seems to increase the risk of hypertension, which is a risk factor for stroke and heart disease. Blood pressure seems to be less affected by drinking in women than in men.^{10,29}

Breast cancer? A number of studies have found a weak association between drinking—especially in greater amounts, or at certain ages—and increased rates of breast cancer; other studies have found no increased risk.^{72,73} Conflicting results from case-control studies may reflect variations in controlling for other cancer risk factors.⁷¹

One pooled analysis of six prospective studies found that for each 10 grams of alcohol consumed per day, the risk of invasive breast cancer increased by 9 percent. When data for postmenopausal women alone were analyzed, the picture was less consistent, and the risk of developing invasive breast cancer appeared lower.⁷⁴ In contrast, a recent analysis of the relationship between alcohol consumption and breast cancer in the Framingham Study found that low to moderate consumption of alcohol (<15 grams/day) was not associated with an increased risk of breast cancer.⁷⁵ Another prospective study of adult mortality rates found that, compared with nondrinkers, drinking women's risk of dying from breast cancer was 20 percent higher at one drink per day, and 50 percent higher at two or three drinks per day.¹⁵

Given the variation in study results, it is premature to caution women about a link between alcohol and breast cancer. Also worth considering is the fact that the female death rate from heart disease is nearly five times that of breast cancer, and the risk of developing heart disease is significantly reduced with moderate drinking.⁷⁶

However, women with no risk factors for coronary heart disease may have reason for some caution. When consuming more than 2 drinks (>30 g. of alcohol) per day, this group had nearly 3.5 times the risk of death from breast cancer compared with nondrinkers, as reported in one large prospective study.²⁶ More research is needed to help such women make decisions about balancing risks and benefits. Further, it is important to emphasize again that the scientific consensus to date suggests that there are not sufficient data to support a general causal relationship

between alcohol consumption and breast cancer.⁷⁷

Other cancers. A major review found a clear dose-dependent relationship between drinking and risk of death from cancers of the mouth, esophagus, pharynx, and larynx—and possibly for liver cancer.⁷¹ The absolute number of such deaths, however, is small.

Other disease risks. Alcohol abuse is linked to reproductive problems in both men and women, including reduced sex drive and infertility.^{10,78} Abuse of alcohol can also interfere with the immune system, by lowering resistance to bacterial infections like pneumonia and tuberculosis.¹⁰ Alcohol abuse is also one of the most common causes of acute pancreatitis, and heavy drinkers are at increased risk for chronic pancreatitis.

Psychiatric disorders.

Various studies have found that psychiatric disorders, including depression, schizophrenia, anxiety disorders, and antisocial personality, are frequently associated with alcohol abuse. The nature or direction of causality is not clear.^{10,79} Binge drinking is associated with greater risk of depression.⁸⁰

Cognitive effects of alcohol abuse/dependence.

Cognitive deficits are common among alcoholics. Despite normal overall intelligence, about 45–70 percent of alcoholics entering treatment show specific deficits in problem solving, abstract thinking, memory, and other areas.⁸¹ In contrast, some studies have shown that moderate drinking is associated with improved cognitive function.⁸²

Overall disease mortality.

After review and analysis of 156 papers, Anderson and colleagues offered a rough population-level estimate of “when to say when,” claiming that all individuals are likely to accumulate risk of harm at the levels of alcohol consumption of more than 20 to 30 grams a day.⁸¹ The dose-dependent relationships between the amount of drinking and cirrhosis of the liver, several cancers, high blood pressure, and stroke make a strong case for a causal role of excessive alcohol use. A dose-response relationship was also seen for alcohol consumption and total mortality.⁷¹

Health risks in special populations.

The elderly. Moderate alcohol consumption—a drink a day for women, up to two for men—seems to benefit older people; however,

excessive drinking poses risks, including falling while intoxicated, hip fracture due to reduced bone density, greater sensitivity to the effects of alcohol, and interactions with medications.⁸³

Alcohol abuse and dependence are underdiagnosed in the elderly, perhaps due to confusion of symptoms with other medical and psychiatric conditions, like poor nutrition or mood disorders. Depressive disorders are also three times more common among alcoholics than among other persons over 65,⁸³ which further complicates the picture. Older alcoholics are also at greater risk of brain damage from excessive drinking. They exhibit more brain tissue loss and cognitive deficits than would be expected from the effects of aging or alcohol abuse alone.¹⁰

Infants and children. Alcohol consumption by pregnant women can have effects on offspring, ranging from lifelong consequences of fetal alcohol syndrome^{84,85} to smaller effects on thinking and behavior. Fetal alcohol syndrome, which is characterized by mental and physical retardation, hearing defects, and facial anomalies, occurs in roughly one in 20 children of alcoholic mothers.¹⁰

Although there seems to be a dose-dependent relationship between drinking and level of risk—with episodic heavy drinking being particularly risky—even “social” drinking during pregnancy is believed by some to affect thinking, learning, behavior, and fine motor skills in offspring in ways that last through childhood and into adolescence.^{10,86,88} Not all exposed children show such effects, however, and the practical significance of low-level exposure to alcohol is difficult to assess. One recent meta-analysis found no effects of moderate maternal drinking (from 2 drinks per week to 2 per day) in the first trimester of pregnancy on fetal malformations.⁸⁹ A recent review stated that animal models demonstrate that the effects of alcohol on the fetus are clearly dose-related, and that maternal blood alcohol levels and pattern of drinking are the most important determinants of fetal effects.⁹⁰ The extent to which these animal studies are relevant to humans has not been established.

Adolescents. Clinical studies of the effects of alcoholic beverage use on young Americans (under age 21) are ethically and legally prohibited. In experiments with animals, some studies indicate differences in the reactions of younger and older animals to alcohol consumption. The equivalent of one alcoholic drink could temporarily interfere with memory and learning in adolescent animals, for example, while such effects were not seen in adult rats. Similar age-related effects have been found

in young adult humans; the effects are more pronounced in people in their early 20s versus later 20s.⁹¹ Other studies have found that young animals also acquired tolerance to the effects of alcohol more quickly and were less sedated by alcohol than adults.^{92,93} It is important to emphasize, however, that the extent to which such animal data can be extrapolated to humans is not known.

In recent years, adolescents appear to be drinking more heavily, and at younger ages.⁹⁴ While individuals in some cultures successfully integrate early, light alcohol use without later difficulties, in the United States an early start seems to increase a person's risk for future alcohol abuse and associated problem behaviors.⁹⁵ A large national sample of adults showed that 40 percent of those who started drinking at age 14 or younger became alcohol-dependent, compared with 10 percent of those who started at age 20 or older. With each year that the onset of drinking was delayed, the odds of dependence declined by 14 percent, while the odds of alcohol abuse declined by 8 percent.⁹⁶ The meaning of these correlative data is not entirely clear. It might be that individuals predisposed to alcohol dependence are also predisposed to early use, rather than that early experimentation necessarily causes later problems.

Behavioral risks.

Vehicular accidents. Accidents caused by drunk drivers have become a rallying point for alcohol-control groups. Although the total number of alcohol-related traffic deaths has declined in recent years to below 50 percent of all traffic deaths,⁹⁷ motor-vehicle-related injuries remain the leading cause of death for Americans aged 1–24 years.⁹⁸ Between 1985 and 1996, nearly one quarter of motor-vehicle-related deaths (including pedestrians and bicyclists) of children under 15 involved alcohol, and 60 percent of those children killed were passengers in the drunk driver's car.⁹⁸ In 1996, alcohol-related motor vehicle crashes killed 17,126 Americans.⁹⁹

In the 1991 Youth Risk Behavior Survey, 17 percent of high-school students reported driving under the influence of alcohol at least once in the previous month.¹⁰⁰ In 1993, persons aged 16 to 24 comprised 15 percent of licensed drivers—but 28 percent of drinking and driving deaths, according to data from the National Highway Traffic Safety Administration.¹⁰

For the elderly, risk of having motor vehicle accidents seems increased by an interaction between age and alcoholism, perhaps

because of greater effects of alcohol on them than on nondrinkers of the same age. The risk of injury from crashes is also greater for older persons.⁸³

Most fatally injured drunk drivers seem to have been chronic heavy drinkers. Chronic heavy drinkers may require both medical treatment and legal sanctions in order to reduce the likelihood of automobile fatality or injury.¹⁰¹ Drunk drivers are substantially less likely to use seat belts, nonuse of which may also contribute to the death rate.¹⁰²

Violence and aggression. Alcohol abuse is correlated with violent crime. Several reviews indicate that up to 86 percent of violent offenders were drinking or intoxicated at the time of the crime. To a lesser extent, victims were often under the influence of alcohol as well.^{103,104} Most studies, however, have not specified the precise level of alcohol consumption by attackers or victims. Alcohol abuse is a factor in assaults of all types, domestic violence, child abuse, and suicide.¹⁰⁴ It must be emphasized that these studies are often difficult to interpret because of methodological problems involving sample size and representativeness of subjects.¹⁰

Although alcohol does promote impulsive behavior, misinterpretation of social cues, and narrowed attention, violence cannot be blamed on intoxication alone. Cultural expectations about the behavioral effects of alcohol probably play a large role in the types of behaviors exhibited after consumption of alcoholic beverages. Research subjects have been found to behave more aggressively after drinking beverages they falsely believed to contain alcohol.¹⁰⁴

Other risky behaviors. Heavy drinking (8 or more drinks per day) is more likely to result in sexual activity than light-to-moderate alcohol use; the difference is especially pronounced when the sexual behavior involves a new partner.¹⁰ Such use is also linked to high-risk sex (possible exposure to sexually transmitted diseases), especially among teens, college-age youth, and gay men.^{10,105} Among college students, frequent binge drinking (5 or more drinks per occasion for men, 4 or more for women, at least twice a week) was associated with high risk for many problem behaviors, including drunk driving, risky sex, injury, damaging property, and problems with the police.¹⁶

Other costs of alcohol abuse.

Estimates of the economic burden of alcohol abuse and alcoholism vary, depending on which factors are chosen for inclusion and which

sources of data are used. The most recent estimate (1992) of the economic costs of alcohol abuse and alcoholism in the United States is \$148 billion. Roughly two thirds of the total was attributed to lost productivity, due to illness and premature death, while the remainder involved the costs of treating alcohol dependence and related medical problems.¹⁰⁶ However, the true costs of the health damages caused by alcohol may be underestimated, because of misclassifications of cause of death and failure to list alcohol involvement on death certificates.¹⁰⁷

Health risks associated with the use of tobacco products

No popularly used products have been the subject of as many health warnings as tobacco products, particularly cigarettes. Much research has demonstrated the direct and indirect effects of cigarette smoking on the public's health.

Cigarette smoking.

Lung cancer. In 1964 the groundbreaking Surgeon General's Report on Smoking and Health pinpointed cigarette smoking as the primary cause of lung cancer.¹⁰⁸ In 1978, a 20-year prospective study of British physicians aged 40 to 79 confirmed that the incidence of lung cancer increased with the amount and duration of smoking.¹⁰⁹ The same dose response was demonstrated for smokers under 40 with lung cancer.¹¹⁰

By 1987, mortality from lung cancer among women in the United States surpassed that from breast cancer.¹¹¹ Although once considered a rare disease among women, lung cancer, primarily caused by cigarette smoking, is now the leading cause of cancer death of women in industrialized countries.¹¹²

A comparison between the two large prospective cancer prevention studies (CPS-I, 1959–1965, and CPS-II, 1982–1986), revealed that the relative risk for lung cancer quadrupled in female smokers and doubled in male smokers. The risk increased from 2.7 to 12.8 for females, and from 11.9 to 23.2 for males.¹¹³

Lung diseases other than cancer. Chronic obstructive pulmonary diseases (COPD), such as emphysema and chronic bronchitis, comprise the fourth leading cause of death in the U.S.; these diseases also are largely attributable to smoking.^{108,114} Indeed, comparisons of

COPD mortality rates in the two cancer prevention studies mentioned above show significant differences between smokers and nonsmokers, and a large increase in the COPD mortality rate among smokers between the two study periods: 73.6 deaths vs. 103.9 per 100,000 in male smokers; 17.6 vs. 61.6 per 100,000 in female smokers.¹¹⁵

Other cancers. More than 50 of the thousands of chemicals in cigarette smoke are known animal carcinogens.¹¹⁶ The majority of cancers of the lip, mouth, pharynx, larynx, and esophagus, as well as many cancers of the bladder, kidney, and pancreas, are attributable to cigarette smoking.¹⁰⁸ In the CPS-I and CPS-II studies, the combined risk of death from these smoking-related cancers increased over time from 2.7 to 3.5 in male smokers and from 1.8 to 2.6 in female smokers.¹¹³ Evidence also increasingly suggests that smoking may play a role in breast cancer¹¹⁷⁻¹¹⁹ and cervical cancer^{120,121} in women. Smoking also seems to be a significant risk factor in the development of esophageal and gastric cardio-adenocarcinomas.¹²²

Heart disease and stroke. Cigarette smoking nearly doubles the risk of coronary heart disease (CHD) for both men and women,¹¹⁵ and this risk increases with the number of cigarettes smoked. For example, participants in the Nurses' Health Study who smoked 25 or more cigarettes a day had 5.5 times the risk of fatal CHD as nonsmokers. Those who smoked 1–4 or 5–14 cigarettes per day had two to three times the risk of a nonsmoker¹²³ for CHD. Furthermore, prospective studies have found that smoking roughly doubles the risk of thromboembolic and hemorrhagic stroke.^{124,125}

Other diseases and disorders. Cigarette smoking has been implicated in a wide range of health problems, including type 2 diabetes,^{39,126} age-related hearing loss,¹²⁷ reduced fertility,^{108,128} respiratory illnesses,⁴⁰ and facial wrinkles.¹²⁹ It has also been linked to sexual impotence,^{130,131} cataracts and age-related macular degeneration,¹⁹ gastric ulcers,¹³² increased risk of abdominal aneurysms and peripheral vascular disease,¹³³ and depression.¹³⁴ Depressed persons have also been shown to experience more difficulty quitting smoking than nondepressed persons. If they do succeed, they are at increased risk of recurrence of depression, which suggests a relationship between smoking and depression that has been described as “complex, pernicious, and potentially life-long.”¹³⁴

Overall mortality. Cigarette smoking remains the largest single preventable cause of premature death in the United States.¹¹⁵ It is esti-

mated that from 1990 to 1994, more than 2.1 million Americans died from causes related to cigarette smoking: 906,600 from cardiovascular disease, 778,700 from neoplasms, 454,800 from nonmalignant respiratory diseases, and 5,500 from smoking-related fires.¹³⁵ From the 1960s to the 1980s, the rate of early deaths of female smokers versus women who had never smoked doubled,¹¹⁵ largely due to increases in lung cancer. Altogether, deaths among smokers attributable to smoking have risen to 57 percent among males and to nearly 50 percent among females. In other words, one in two smokers of either sex will die prematurely of a smoking-related disease.¹¹³ If current tobacco-use patterns continue, smoking will prematurely end the lives of roughly 5 million Americans who were under age 18 in 1995.²¹

Health risks associated with the use of other forms of tobacco.

Cigars and pipes. Cigar smoking has increased in recent years, perhaps in part because it is misperceived as a safe alternative to cigarettes. In 1996, one in four U.S. high school students reported smoking at least one cigar in the previous year.^{136,137}

Smokers who switch to cigars or pipes may reduce their risk of lung cancer and COPD, largely because they tend to use less tobacco than if they had continued smoking cigarettes. However, they remain at high risk for oral and laryngeal cancers,^{138,139} as well as for loss of bone in the jaws and subsequent tooth loss (140). Compared with smokers who never used cigarettes, smokers who switched from cigarettes to pipes or cigars had significantly higher risks of developing lung cancer, ischemic heart disease and COPD, presumably because they inhaled more tobacco smoke over the long term.¹³⁸

Smokeless tobacco. Each year, about 824,000 Americans aged 11 to 19 experiment with smokeless tobacco, and roughly 304,000 become regular users. Use is uncommon among women.¹⁴⁰ Among high school students who tried smokeless tobacco, 73 percent did so by ninth grade.^{141,142}

The use of smokeless tobacco has been implicated in cancers of the oral cavity.¹⁰⁸ Use of smokeless tobacco by youth is associated with early indicators of periodontal degeneration and lesions in oral soft tissue.²³ The risk of death from cardiovascular disease is higher for smokeless tobacco users than for nonusers of tobacco, although not as high as that of smokers.¹⁴²

Health risks in special populations.

Infants and children. Maternal smoking carries special risks for infants commonly classified as Fetal Tobacco Syndrome.¹⁴³ Smoking by pregnant women has been linked to a higher incidence of problems during pregnancy (e.g., placenta previa, placental abruption, and uterine bleeding),¹⁴⁴ as well as low infant birthweight, prematurity, miscarriage, stillbirth, and neonatal death. It is estimated that if all pregnant women quit smoking, the fetal and infant death rate would decrease by 10 percent.¹⁰⁸ The risk of low birthweight seems to derive primarily from smoking during the third trimester of pregnancy.¹⁴⁵ In addition, maternal smoking appears to be an independent risk factor for sudden infant death syndrome (SIDS).^{146,147}

Maternal smoking also appears to interfere with mental development, and may lead to increased rates of retardation, cerebral palsy and epilepsy.^{108,148} Toddlers whose mothers quit smoking during pregnancy showed higher cognitive abilities than those whose mothers continued to smoke.¹⁴⁹ Several studies have found increased behavioral problems among children whose mothers smoked during pregnancy, although no link has been demonstrated between behavior problems and smoking at other times.¹⁵⁰ Intellectual, emotional, and behavioral deficits seen in children born to mothers who smoke can be traced to the neuroteratogenic effects of nicotine on the developing brain.¹⁵¹

Children of smokers are also at risk for nicotine poisoning from ingestion of available cigarettes or cigars.¹⁵²

Adolescents. Nearly all first-time use of cigarettes currently occurs before high school graduation, at an average age of 14.5 years. If young people can avoid cigarette smoking throughout adolescence, fewer will begin smoking later in life. Early onset of smoking is also linked to greater risk of smoking-related disease in adulthood.^{32,153}

Young people who smoke are much likelier to use illegal drugs and to drink heavily.¹⁷ They are also likelier than their nonsmoking peers to report poor overall health as well as specific respiratory symptoms.¹⁵⁴ Additionally, youth smoking is linked to retardation of lung function and growth and to decreased physical fitness.^{23,155} Teenage girls are reported to use smoking to self-medicate for depression and anxiety.¹⁵⁶

Minorities. New research suggests that while African-Americans report smoking fewer cigarettes per day than Caucasians or Mexican-Americans, their serum cotinine levels (a commonly used marker of tobacco use and environmental tobacco exposure) are higher.¹⁵⁷ This

may be due to slower clearance of cotinine and/or higher smoke intake per cigarette, and might explain the higher rates of smoking-related diseases such as lung cancer, and greater difficulty quitting, among African Americans.¹⁵⁸

Behavioral risks.

Unlike alcohol abuse, smoking has not been implicated in violent behavior, although other behavioral risks may exist. Among postal workers, for example, one study found that smoking was associated with adverse employment outcomes (more absenteeism, accidents, injuries, and disciplinary actions), even after adjusting for confounding factors such as exercise, drug abuse, and job category.¹⁵⁹

Health risks from environmental tobacco smoke (ETS).

Involuntary exposure to ETS has become a rallying point for new restrictions on smoking.¹⁶⁰ Tobacco company documents show that company executives and researchers have known about ETS risks since the 1970s, but that the knowledge was suppressed.¹⁶¹

Delays in publication of relevant research may skew the analyses of review articles of the effects of ETS;¹⁶² however, a meta-analysis of 106 reviews of ETS found that the only factor associated with a conclusion that passive smoking is not harmful was an author's link to the tobacco industry.¹⁶³

Lung cancer and heart disease. Various studies have found that exposure to passive smoke is weakly but consistently associated with higher risks of lung cancer, even at low levels of exposure. After adjusting for potential confounding factors, nonsmoking spouses of smokers had an increased risk ranging from 16 percent to 211 percent.¹⁶⁴

Literature reviews suggest that passive smoke exposure increases a nonsmoker's risk of heart disease by about 20 percent, causing altogether perhaps 30,000 to 60,000 additional deaths per year, and roughly three times that many nonfatal cardiac events.^{165,166} Although it is difficult to estimate accurately exposure to ETS, there seems to be a dose-response relationship.¹⁶⁷

Health risks to children. There is strong evidence that ETS exposure increases children's risk of bronchitis and pneumonia (an estimated 150,000 to 300,000 additional cases per year), as well as asthma (8,000 to 26,000 new cases, plus worsening of asthma in 400,000 to

1,000,000).¹⁶⁰ Exposure to tobacco smoke at home has also been implicated in middle-ear infection in preschoolers. Such chronic infections are the most common cause of children's hospital admissions for tympanotomies (ear surgery) and a frequent reason for outpatient visits to pediatricians.^{160,168}

In infants, ETS is linked to a higher risk of SIDS, and the risk increases with the amount of smoke and number of smokers around the infant.¹⁶⁹

Other costs of tobacco use.

Each year, more than 1 million young Americans start smoking cigarettes, adding an additional \$9–10 billion to the U.S. healthcare bill over their lifetimes.¹⁷⁰ Conservative estimates put the economic cost of smoking in 1993 at \$50 billion, or 7 percent of the total U.S. medical care costs.¹⁷¹ This figure does not include such costs as burn care for smoking-related fires, perinatal care for low-birthweight infants of mothers who smoked, and diseases due to ETS. The annual direct cost of pediatric care due to parental smoking is estimated at \$4.6 billion.¹⁷²

Health risks associated with combined use of alcoholic beverages and cigarettes

The combined use of alcohol and tobacco can have a multiplier effect on some disease risks. Between 80 and 95 percent of alcoholics smoke cigarettes—a rate that is three times higher than the percentage of the general population that smokes. Of alcoholics who smoke, 70 percent smoke more than one pack per day—a rate seven times higher than that of the general smoking population.¹⁷³⁻¹⁷⁵

The very high association between smoking and drinking and disease risk may confound the results of investigations of a causal relationship between alcohol consumption and cancers, especially if researchers do not control for the number of cigarettes smoked per day.¹⁷⁵ The risks of mouth, throat, and esophageal cancer among drinkers who smoke are greater than the sum of the independent risks of those substances.¹⁷⁴ For example, drinkers who smoke were found to be 38 times likelier to develop mouth and throat cancer compared with nonsmoking nondrinkers. Those who used tobacco products only were seven times likelier to develop mouth and throat cancer than nonsmoking nondrinkers, whereas those who used only alcoholic beverages were six times likelier

to develop the same cancers.¹⁷⁵ Because the effects of alcoholic beverages are difficult to separate from those of tobacco, diet, infection, and other potential confounders, some experts feel that alcohol may not be a carcinogen at all.^{176,177}

Summary of findings

Scientific data indicate that the vast majority of alcoholic beverage users are light to moderate drinkers who handle alcohol in a reasonable manner and who do not experience serious health effects.

In contrast, the regular use of tobacco products at virtually any dose may harm an individual's health. Additionally, any amount of smoking adds to the risks of ETS exposure.

Scientific studies over the last several decades demonstrate that light to moderate drinking can have health benefits in certain populations, including a reduction in the risk of heart disease and stroke.

No scientific studies, however, have demonstrated any net health benefits from cigarette smoking or the use of cigars, pipes, or smokeless tobacco at any dose. Tobacco products are not included in any health guidelines, except as substances to be avoided.

Excessive drinking is associated with health risks such as liver disease and cardiomyopathy, as well as with behavior problems such as violence and risky sexual behaviors. Excessive drinking is also associated with motor vehicle accidents.

Use of tobacco products at almost any dose is associated with a myriad of health risks, ranging from increased susceptibility to respiratory illnesses to increased risk of lung cancer and cancers of the lip, mouth, pharynx, larynx, esophagus, bladder, kidney, and pancreas. Studies have also shown that the use of tobacco products increases the risk of heart disease and stroke, as well as the risk of a host of other illnesses. African Americans may be particularly vulnerable to the health risks of smoking.

Older adults who drink excessively are at increased risk of falling, hip fracture, and medication interactions with alcohol. Older adults who use tobacco products are at increased risk for many cancers, as well as for heart disease, stroke, type 2 diabetes, gastric ulcers, age-related hearing loss, facial wrinkles, and depression, especially if the habit is lifelong.

Maternal drinking—particularly excessive drinking—may put the fetus at risk of cognitive/motor disorders and fetal alcohol syndrome.

Maternal smoking may impair development of the fetus and is a risk factor for SIDS. Maternal smoking and smoking by others in the environment puts children at increased risk for respiratory diseases. Exposure to ETS also increases the risk of heart disease in adult non-smokers.

American adolescents are at higher risk for misuse and abuse of alcohol and for initiating a lifelong habit of cigarette smoking and/or use of other tobacco products. Misuse and abuse of alcohol increases an adolescent's risk of alcohol dependence in adulthood and is associated with cognitive defects, behavioral risks, and motor vehicle accidents. Early use of tobacco products increases the risk of smoking-related diseases in adulthood and is associated with poor overall health, retardation of lung function and growth, and decreased physical fitness. Early cigarette smoking is also associated with illegal drug use and heavy drinking.

This review evaluates the health benefit and risk data for alcoholic beverages and tobacco products. The findings on the different health effects of the use of alcohol and tobacco products clearly indicate that public health and public education policy approaches to these substances should be significantly different.

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