

## Cigarettes and Other Tobacco Products

Tobacco use is the leading preventable cause of disease, disability, and death in the United States. Between 1964 and 2004, cigarette smoking caused an estimated 12 million deaths, including 4.1 million deaths from cancer, 5.5 million deaths from cardiovascular diseases, 1.1 million deaths from respiratory diseases, and 94,000 infant deaths related to mothers smoking during pregnancy.<sup>1</sup> According to the Centers for Disease Control and Prevention (CDC), cigarette smoking results in more than 443,000 premature deaths in the United States each year—about 1 in every 5 U.S. deaths<sup>2</sup>—and an additional 8.6 million people suffer with a serious illness caused by smoking.<sup>3</sup> Thus, for every one person who dies from smoking, 20 more suffer from at least one serious tobacco-related illness.<sup>3</sup>

The harmful effects of smoking extend far beyond the smoker. Exposure to secondhand smoke can cause serious diseases and death. Each year, an estimated 126 million Americans are regularly exposed to secondhand smoke and almost 50 thousand nonsmokers die from diseases caused by secondhand smoke exposure.<sup>4</sup>

### How Does Tobacco Affect the Brain?

Cigarettes and other forms of tobacco—including cigars, pipe tobacco, snuff, and chewing tobacco—contain the addictive drug nicotine. Nicotine is readily absorbed into the bloodstream when a tobacco product is chewed, inhaled, or smoked. A typical smoker will take 10 puffs on a cigarette over a period of 5 minutes that the cigarette is lit. Thus, a person who smokes about 1½ packs (30 cigarettes) daily gets 300 “hits” of nicotine each day.

Upon entering the bloodstream, nicotine immediately stimulates the adrenal glands to release the hormone epinephrine (adrenaline). Epinephrine stimulates the central nervous system and increases blood pressure, respiration, and heart rate. Glucose is released into the blood while nicotine suppresses insulin output from the pancreas, which means that smokers have chronically elevated blood sugar levels.

Like cocaine, heroin, and marijuana, nicotine increases levels of the neurotransmitter dopamine, which affects the brain pathways that control reward and pleasure. For many tobacco users, long-term brain changes

induced by continued nicotine exposure result in addiction—a condition of compulsive drug seeking and use, even in the face of negative consequences. Studies suggest that additional compounds in tobacco smoke, such as acetaldehyde, may enhance nicotine’s effects on the brain.<sup>5</sup> A number of studies indicate that adolescents are especially vulnerable to these effects and may be more likely than adults to develop an addiction to tobacco.

When an addicted user tries to quit, he or she experiences withdrawal symptoms including irritability, attention difficulties, sleep disturbances, increased appetite, and powerful cravings for tobacco. Treatments can help smokers manage these symptoms and improve the likelihood of successfully quitting.

## What Other Adverse Effects Does Tobacco Have on Health?

Cigarette smoking accounts for about one-third of all cancers, including 90 percent of lung cancer cases. Smokeless tobacco (such as chewing tobacco and snuff) also increases the risk of cancer, especially oral cancers. In addition to cancer, smoking causes lung diseases such as chronic bronchitis and emphysema, and increases the risk of heart disease, including

stroke, heart attack, vascular disease, and aneurysm. Smoking has also been linked to leukemia, cataracts, and pneumonia.<sup>1,2</sup> On average, adults who smoke die 14 years earlier than nonsmokers.<sup>2</sup>

Although nicotine is addictive and can be toxic if ingested in high doses, it does not cause cancer—other chemicals are responsible for most of the severe health consequences of tobacco use. Tobacco smoke is a complex mixture of chemicals such as carbon monoxide, tar, formaldehyde, cyanide, and ammonia—many of which are known carcinogens. Carbon monoxide increases the chance of cardiovascular diseases. Tar exposes the user to an increased risk of lung cancer, emphysema, and bronchial disorders.

Pregnant women who smoke cigarettes run an increased risk of miscarriage, stillborn or premature infants, or infants with low birthweight.<sup>2</sup> Maternal smoking may also be associated with learning and behavioral problems in children. Smoking more than one pack of cigarettes per day during pregnancy nearly doubles the risk that the affected child will become addicted to tobacco if that child starts smoking.<sup>6</sup>

While we often think of medical consequences that result from direct use of tobacco products, passive or secondary smoke also increases the risk for many

diseases. Secondhand smoke, also known as environmental tobacco smoke, consists of exhaled smoke and smoke given off by the burning end of tobacco products. Nonsmokers exposed to secondhand smoke at home or work increase their risk of developing heart disease by 25 to 30 percent<sup>7</sup> and lung cancer by 20 to 30 percent.<sup>2</sup> In addition, secondhand smoke causes respiratory problems, such as coughing, overproduction of phlegm, and reduced lung function and respiratory infections, including pneumonia and bronchitis, in both adults and children. In fact, each year about 150,000 – 300,000 children younger than 18 months old experience respiratory tract infections caused by secondhand smoke.<sup>4</sup> Children exposed to secondhand smoking are at an increased risk for sudden infant death syndrome, ear problems, and severe asthma. Furthermore, children who grow up with parents who smoke are more likely to become smokers, thus placing themselves (and their future families) at risk for the same health problems as their parents when they become adults.

Although quitting can be difficult, the health benefits of smoking cessation are immediate and substantial—including reduced risk for cancers, heart disease, and stroke. A 35-year-old man who quits smoking will, on average, increase his life expectancy by 5 years.<sup>8</sup>

## Are There Effective Treatments for Tobacco Addiction?

Tobacco addiction is a chronic disease that often requires multiple attempts to quit. Although some smokers are able to quit without help, many others need assistance. Generally, rates of relapse for smoking cessation are highest in the first few weeks and months and diminish considerably after about 3 months. Both behavioral interventions (counseling) and medication can help smokers quit; but the combination of medication with counseling is more effective than either alone.

### **Behavioral Treatments**

Behavioral treatments employ a variety of methods to assist smokers in quitting, ranging from self-help materials to individual counseling. These interventions teach individuals to recognize high-risk situations and develop coping strategies to deal with them. The U.S. Department of Health and Human Services' (HHS) national toll-free quitline, 800-QUIT-NOW, is an access point for any smoker seeking information and assistance in quitting.

### **Nicotine Replacement Treatments**

Nicotine replacement therapies (NRTs), such as nicotine gum and the nicotine patch, were the first pharmacological treatments

approved by the Food and Drug Administration (FDA) for use in smoking cessation therapy. NRTs deliver a controlled dose of nicotine to a smoker in order to relieve withdrawal symptoms during the smoking cessation process. They are most successful when used in combination with behavioral treatments. Current FDA-approved NRT products include nicotine chewing gum, the nicotine transdermal patch, nasal sprays, inhalers, and lozenges.

### **Other Medications**

Bupropion and varenicline are two FDA-approved non-nicotine medications that effectively increase rates of long-term abstinence from smoking. Bupropion, a medication that goes by the trade name Zyban, was approved by the FDA in 1997 for use in smoking cessation. Varenicline tartrate (trade name: Chantix) targets nicotine receptors in the brain, easing withdrawal symptoms and blocking the effects of nicotine if people resume smoking.

### **Current Treatment Research**

Scientists are currently pursuing many other avenues of research to develop new smoking cessation therapies. One promising intervention is a vaccine called NicVax that works by targeting nicotine in the bloodstream, blocking its access to the brain and thereby preventing its reinforcing effects.

Preliminary trials of this vaccine have yielded promising results, with vaccinated smokers achieving higher quit rates and longer term abstinence compared to smokers given placebo. NicVax is now being evaluated in Phase III clinical trials; successful completion will bring NicVax closer to final approval by the FDA.

## **How Widespread Is Tobacco Use?**

### **Monitoring the Future Survey<sup>†</sup>**

Current smoking rates among 8th- and 12th-grade students reached an all-time low in 2009. According to the Monitoring the Future survey, 6.5 percent of 8th-graders and 20.1 percent of 12th-graders reported they had used cigarettes in the past month. Current smoking also decreased among 10th-graders, to about 13 percent in 2009. Although unacceptably high numbers of youth continue to smoke, these numbers represent a significant decrease from peak smoking rates (21 percent in 8th-graders, 30 percent in 10th-graders, and 36 percent in 12th-graders) that were reached in the late 1990s.

The decrease in smoking rates among young Americans corresponds to several years in which increased proportions of teens said they believed there was a “great” health

risk associated with cigarette smoking and expressed disapproval of smoking one or more packs of cigarettes per day. Students' personal disapproval of smoking has risen for some years; for example, the percentage of 12th-graders reporting disapproval of smoking one or more packs of cigarettes per day increased from 68.8 percent in 1998 to 81.8 percent in 2009. During the same period, the percentage of 8th-graders who said it was "very easy" or "fairly easy" to obtain cigarettes declined from 73.6 percent in 1998 to 55.3 percent in 2009.

Current use of smokeless tobacco remained steady among 8th-graders and 12th-graders in 2009 (3.7 percent and 8.4 percent, respectively); however, current smokeless tobacco use among 10th-grade students increased significantly from 5.0 percent in 2008 to 6.5 percent in 2009.

## **National Survey on Drug Use and Health (NSDUH)<sup>††</sup>**

In 2008, 28.4 percent of the U.S. population age 12 and older (approximately 70.9 million people) used a tobacco product at least once in the month prior to being interviewed. This figure includes 2.8 million young people aged 12 to 17 (11.4 percent of this age group). In addition, almost 60 million Americans (23.9 percent of the population) were current cigarette smokers; 13.1 million smoked cigars; almost 8.7 million used smokeless tobacco; and nearly 1.9 million smoked tobacco in pipes.

## **Other Information Sources**

For additional information on tobacco abuse and addiction, please visit [www.smoking.drugabuse.gov](http://www.smoking.drugabuse.gov). For more information on how to quit smoking, please visit [www.smokefree.gov](http://www.smokefree.gov).

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### **Data Sources**

<sup>†</sup> These data are from the 2009 Monitoring the Future survey, funded by the National Institute on Drug Abuse, National Institutes of Health, Department of Health and Human Services, and conducted annually by the University of Michigan's Institute for Social Research. The survey has tracked 12th-graders' illicit drug use and related attitudes since 1975; in 1991, 8th- and 10th-graders were added to the study.

<sup>††</sup> NSDUH (formerly known as the National Household Survey on Drug Abuse) is an annual survey of Americans aged 12 and older conducted by the Substance Abuse and Mental Health Services Administration, Department of Health and Human Services. This survey is available on line at [www.samhsa.gov](http://www.samhsa.gov) and can be ordered by phone from NIDA at 877-643-2644.

### **References**

<sup>1</sup> Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, Department of Health and Human Services. *The Health Consequences of Smoking: What It Means to You*, 2004. Available at: [http://www.cdc.gov/tobacco/data\\_statistics/sgr/sgr\\_2004/00\\_pdfs/SGR2004\\_Whatitmeanstoyou.pdf](http://www.cdc.gov/tobacco/data_statistics/sgr/sgr_2004/00_pdfs/SGR2004_Whatitmeanstoyou.pdf).

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<sup>2</sup> Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, Department of Health and Human Services. *Smoking and Tobacco Use—Fact Sheet: Health Effects of Cigarette Smoking*. Updated January 2008. Available at: [http://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/health\\_effects/effects\\_cig\\_smoking/index.htm](http://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/index.htm).

<sup>3</sup> Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, Department of Health and Human Services. *Tobacco Use: Targeting the Nation's Leading Killer—At a Glance 2009*. Available at: <http://www.cdc.gov/chronicdisease/resources/publications/aag/pdf/tobacco.pdf>.

<sup>4</sup> Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, Department of Health and Human Services. *Smoking & Tobacco Use, Fast Facts*. Available at: [http://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/fast\\_facts/index.htm#toll](http://www.cdc.gov/tobacco/data_statistics/fact_sheets/fast_facts/index.htm#toll). Accessed 7/22/2010.

<sup>5</sup> Belluzzi JD, Wang R, Leslie FM. Acetaldehyde enhances acquisition of nicotine self-administration in adolescent rats. *Neuropsychopharmacology* 30:705–712, 2005.

<sup>6</sup> Buka SL, Shenassa ED, Niaura R. Elevated risk of tobacco dependence among offspring of mothers who smoked during pregnancy: A 30-year prospective study. *Am J Psychiatry* 160:1978–1984, 2003.

<sup>7</sup> Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, Department of Health and Human Services, *Smoking and Tobacco Use—Fact Sheet: Secondhand Smoke Causes Heart Disease*. Updated May 2007. Available at: [http://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/secondhand\\_smoke/health\\_effects/#heart](http://www.cdc.gov/tobacco/data_statistics/fact_sheets/secondhand_smoke/health_effects/#heart).

<sup>8</sup> Office of the Surgeon General, Office of Public Health and Science, Office of the Secretary, Public Health Service, Department of Health and Human Services. *The Health Benefits of Smoking Cessation: A Report of the Surgeon General*. Available at: <http://profiles.nlm.nih.gov/NN/B/B/C/T/>.