

Cigarettes and Other Tobacco Products

Through the use of cigarettes, cigars, and chewing tobacco, nicotine is one of the most heavily used addictive drugs in the United States. In 2004, 29.2 percent of the U.S. population 12 and older—70.3 million people—used tobacco at least once in the month prior to being interviewed.* This figure includes 3.6 million young people age 12 to 17. Young adults aged 18 to 25 reported the highest rate of current use of any tobacco products (44.6 percent) in 2004.

Findings for high school youth indicate that 25.9 percent of 8th-graders, 38.9 percent of 10th-graders, and 50.0 percent of 12th-graders had ever smoked cigarettes when asked in 2005.** These figures were lower for all three grades from 2004 data, and for 8th-graders and 12th-graders, the decreases were statistically significant.

Statistics from the Centers for Disease Control and Prevention indicate that tobacco use remains the leading preventable cause of death in the United States, causing approximately 440,000 premature deaths each year and resulting in an annual cost of more than \$75 billion in direct medical costs attributable to smoking. (See www.cdc.gov/tobacco/issue.htm.) Over the past four

decades, cigarette smoking has caused an estimated 12 million deaths, including 4.1 million deaths from cancer, 5.5 million deaths from cardiovascular diseases, 2.1 million deaths from respiratory diseases, and 94,000 infant deaths related to mothers smoking during pregnancy. (See www.cdc.gov/nccdphp/publications/aag/osh.htm.)

Secondhand smoke, also known as environmental tobacco smoke, is a mixture of the smoke given off by the burning end of tobacco products (sidestream smoke) and the mainstream smoke exhaled by smokers. It is a complex mixture containing many chemicals (including formaldehyde, cyanide, carbon monoxide, ammonia, and nicotine), many of which are known carcinogens. Nonsmokers exposed to secondhand smoke at home or work increase their risk of developing heart disease by 25 to 30 percent and lung cancer by 20 to 30 percent. In addition, secondhand smoke causes respiratory problems in nonsmokers such as coughing, phlegm, and reduced lung function. Children exposed to secondhand smoke are at an increased risk for sudden infant death syndrome, acute respiratory infections, ear problems, and more severe asthma.

Health Hazards —————

Since 1964, 28 Surgeon General's reports on smoking and health have concluded that tobacco use is the single most avoidable cause of disease, disability, and death in the United States. In 1988, the Surgeon General concluded that cigarettes and other forms of tobacco, such as cigars, pipe tobacco, and chewing tobacco, are addictive and that nicotine is the drug in tobacco that causes addiction. Nicotine provides an almost immediate "kick" because it causes a discharge of epinephrine from the adrenal cortex. This stimulates the central nervous system and endocrine glands, which causes a sudden release of glucose. Stimulation is then followed by depression and fatigue, leading the user to seek more nicotine.

Nicotine is absorbed readily from tobacco smoke in the lungs, and it does not matter whether the tobacco smoke is from cigarettes, cigars, or pipes. Nicotine also is absorbed readily when tobacco is chewed. With regular use of tobacco, levels of nicotine accumulate in the body during the day and persist overnight. Thus, daily smokers or chewers are exposed to the effects of nicotine for 24 hours each day. Adolescents who chew tobacco are more likely than nonusers to eventually become cigarette smokers.

Addiction to nicotine results in withdrawal symptoms when a person tries to stop

smoking. For example, a study found that when chronic smokers were deprived of cigarettes for 24 hours, they had increased anger, hostility, and aggression, and loss of social cooperation. Persons suffering from withdrawal also take longer to regain emotional equilibrium following stress. During periods of abstinence and/or craving, smokers have shown impairment across a wide range of psychomotor and cognitive functions, such as language comprehension.

Women who smoke generally have earlier menopause. Pregnant women who smoke cigarettes run an increased risk of having stillborn or premature infants or infants with low birth weight. Children of women who smoked while pregnant have an increased risk for developing conduct disorders. National studies of mothers and daughters have also found that maternal smoking during pregnancy increased the probability that female children would smoke and would persist in smoking.

In addition to nicotine, cigarette smoke is primarily composed of a dozen gases (mainly carbon monoxide) and tar. The tar in a cigarette, which varies from about 15 mg for a regular cigarette to 7 mg in a low-tar cigarette, exposes the user to an increased risk of lung cancer, emphysema, and bronchial disorders.

The carbon monoxide in tobacco smoke increases the chance of cardiovascular

diseases. The Environmental Protection Agency has concluded that secondhand smoke causes lung cancer in adults and greatly increases the risk of respiratory illnesses in children and sudden infant death.

Promising Research —————

Research has shown that nicotine, like cocaine, heroin, and marijuana, increases the level of the neurotransmitter dopamine, which affects the brain pathways that control reward and pleasure. Scientists have pinpointed a particular molecule [the beta 2 (b2)] subunit of the nicotine cholinergic receptor as a critical component in nicotine addiction. Mice that lack this subunit fail to self-administer nicotine, implying that without the b2 subunit, the mice do not experience the positive reinforcing properties of nicotine. This finding identifies a potential site for targeting the development of nicotine addiction medications.

Other research found that individuals have greater resistance to nicotine addiction if they have a genetic variant that decreases the function of the enzyme CYP2A6. The decrease in CYP2A6 slows the breakdown of nicotine and protects individuals against nicotine addiction. Understanding the role of this enzyme in nicotine addiction gives a new target for developing more effective medications to help people stop smoking. Medications might be developed that can inhibit the function of

CYP2A6, thus providing a new approach to preventing and treating nicotine addiction.

Another study found dramatic changes in the brain's pleasure circuits during withdrawal from chronic tobacco use. These changes are comparable in magnitude and duration to similar changes observed during withdrawal from other abused drugs such as cocaine, opiates, amphetamines, and alcohol. Scientists found significant decreases in the sensitivity of the brains of laboratory rats to pleasurable stimulation after nicotine administration was abruptly stopped. These changes lasted several days and may correspond to the anxiety and depression experienced by humans for several days after quitting smoking "cold turkey." The results of this research may help in the development of better treatments for the withdrawal symptoms that may interfere with individuals' attempts to quit.

Treatment —————

Some individuals simply are able to stop smoking. For others, studies have shown that pharmacological treatment combined with behavioral treatment, including psychological support and skills training to overcome high-risk situations, results in some of the highest long-term abstinence rates. Generally, rates of relapse for smoking cessation are highest in the first few weeks and months and diminish considerably after about 3 months.

Behavioral economic studies find that alternative rewards and reinforcers can reduce cigarette use. One study found that the greatest reductions in cigarette use were achieved when smoking cost was increased in combination with the presence of alternative recreational activities.

Nicotine chewing gum is one medication approved by the Food and Drug Administration (FDA) for the treatment of nicotine dependence. Nicotine in this form acts as a nicotine replacement to help smokers quit smoking. The success rates for smoking cessation treatment with nicotine chewing gum vary considerably across studies, but evidence suggests that it is a safe means of facilitating smoking cessation if chewed according to instructions and restricted to patients who are under medical supervision.

Another approach to smoking cessation is the nicotine transdermal patch, a skin patch that delivers a relatively constant amount of nicotine to the person wearing it. A research team at NIDA's Intramural Research Program studied the safety, mechanism of action, and abuse liability of the patch that was consequently approved by FDA. Both nicotine gum and the nicotine patch, as well as other nicotine replacements such as sprays and inhalers, are used to help people fully quit smoking by reducing withdrawal symptoms and preventing relapse while undergoing behavioral treatment.

Another tool in treating tobacco addiction is a medication that goes by the trade name Zyban. This is not a nicotine replacement, as are the gum and patch. Rather, this works on other areas of the brain, and its effectiveness is in helping to make nicotine craving, or thoughts about cigarette use, more controllable in people who are trying to quit.

Extent of Use ———

Monitoring the Future (MTF) Survey

Despite the demonstrated health risks associated with cigarette smoking, young Americans continue to smoke. However, 30-day*** smoking rates among high school students have declined from peaks reached in 1996 for 8th-graders (21.0 percent) and 10th-graders (30.4 percent) and in 1976 for 12th-graders (38.8 percent). In 2005, 30-day rates had dropped to 9.3 percent for 8th-graders, 14.9 percent for 10th-graders, and 23.2 percent for 12th-graders.

The decrease in smoking rates among young Americans corresponds to several years in which increased proportions of teens said they believe there is a "great" health risk associated with cigarette smoking and expressed disapproval of smoking one or more packs of cigarettes a day. Students' personal disapproval of smoking has risen for some years. In 2005, for example, the percentage of

12th-graders disapproving of smoking one or more packs of cigarettes per day increased significantly, from 76.2 percent in 2004 to 79.8 percent in 2005.

Other Information Sources _____

For additional information on tobacco abuse and addiction, please visit www.smoking.drugabuse.gov.

For more information on how to quit smoking, please visit www.cdc.gov/tobacco.

* NSDUH (formerly known as the National Household Survey on Drug Abuse) is an annual survey of Americans age 12 and older conducted by the Substance Abuse and Mental Health Services Administration. Copies of the latest survey are available at www.samhsa.gov and from the National Clearinghouse for Alcohol and Drug Information at 800-729-6686.

** These data are from the 2005 Monitoring the Future survey, funded by the National Institute on Drug Abuse, National Institutes of Health, DHHS, 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. The latest data are online at www.drugabuse.gov.

*** "Lifetime" refers to use at least once during a respondent's lifetime. "Annual" refers to use at least once during the year preceding an individual's response to the survey. "30-day" refers to use at least once during the 30 days preceding an individual's response to the survey.