

Cigarettes and Other Nicotine Products

Nicotine is one of the most heavily used addictive drugs in the United States. In 2002, 30 percent of the U.S. population 12 and older—71.5 million people—used tobacco at least once in the month prior to being interviewed. This figure includes 3.8 million young people age 12 to 17; 14 million people age 18 to 25; and 53.7 million age 26 and older.* Most of them smoked cigarettes.

Cigarette smoking has been the most popular method of taking nicotine since the beginning of the 20th century. In 1989, the U.S. Surgeon General issued a report that 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. The report also determined that smoking was a major cause of stroke and the third leading cause of death in the United States. 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 more than 440,000 deaths each year and resulting in an annual cost of more than \$75 billion in direct medical costs. (See www.cdc.gov/tobacco/issue.htm.)

Health Hazards —————

Nicotine is highly addictive. Nicotine provides an almost immediate “kick” because it causes a discharge of epinephrine from the adrenal cortex. This stimulates the central nervous system, and other endocrine glands, which causes a sudden release of glucose. Stimulation is then followed by depression and fatigue, leading the abuser 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.

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. If women smoke cigarettes and also take oral contraceptives, they are more prone to cardiovascular and cerebrovascular diseases than are other smokers; this is especially true for women older than 30.

Pregnant women who smoke cigarettes run an increased risk of having stillborn or premature infants or infants with low birthweight. 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.

Adolescent smokeless tobacco users are more likely than nonusers to become cigarette smokers. Behavioral research is beginning to explain how social influences, such as observing adults or other peers smoking, affect whether adolescents begin to smoke cigarettes. Research has shown that teens are generally resistant to anti-smoking messages.

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 the 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 now 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 new finding identifies a potential site for targeting the development of nicotine addiction medications.

Other new 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 nicotine use. These changes are comparable in magnitude and duration to similar changes observed during the 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 smoking.

Treatment —————

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 nicotine 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 controllable nicotine craving or thoughts about cigarette use in people trying to quit.

Extent of Use ———

2003 Monitoring the Future Study (MTF)**

Despite the demonstrated health risk associated with smoking, young Americans continue to smoke. However, past-month smoking rates among high school students are declining from peaks reached in 1996 for 8th-graders (21.0 percent) and 10th-graders (30.4 percent) and in 1997 for seniors (36.5 percent). In 2003, rates reached the lowest levels ever reported by MTF; 10.2 percent of 8th-graders, 16.7

percent of 10th-graders, and 24.4 percent of high school seniors reported smoking during the month preceding their responses to the survey.

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 “pack-a-day” smokers. Students’ personal disapproval of smoking had risen for some years, but showed no further increase in 2003 among 8th-graders and only small increases among 10th- and 12th-graders. In 2003, 84.6 percent of 8th-graders, 81.4 percent of 10th-graders, and 74.8 percent of 12th-graders stated that they “disapprove” or “strongly disapprove” of people smoking one or more packs of cigarettes per day.

Other Information

Sources ———

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

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

* These findings are from the 2002 National Survey on Drug Use and Health, produced by HHS's Substance Abuse and Mental Health Services Administration. The survey is based on interviews with 68,126 respondents who were interviewed in their homes. The interviews represent 98 percent of the U.S. population age 12 and older. Not included in the survey are persons in the active military, in prisons, or other institutionalized populations, or who are homeless. Findings from the 2002 National Survey on Drug Use and Health are available online at www.DrugAbuseStatistics.samhsa.gov.

** These data are from the 2003 Monitoring the Future Survey, funded by the National Institute on Drug Abuse, National Institutes of Health, DHHS, and conducted 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.

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