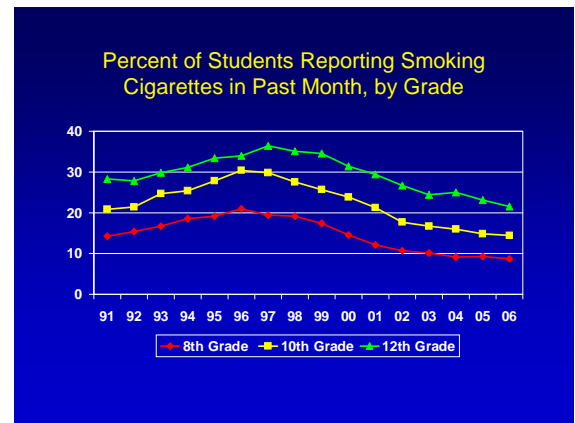


## Tobacco Addiction – November 2007

### A Research Update from the National Institute on Drug Abuse

#### Good News: Tobacco use among teens is at its lowest level in the history of the Monitoring the Future (MTF) Survey of 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> graders.

- Still, 8.7 percent of 8<sup>th</sup> graders, 14.5 percent of 10<sup>th</sup> graders, and 21.6 percent of 12<sup>th</sup> graders were current smokers in 2006—they had used cigarettes in the 30 days prior to being surveyed (MTF, 2006).
- While there has been a sustained decline since the mid-1990's, the past few years indicate a slowing of this decline. In fact, current use, perceived risk, and disapproval of smoking have leveled off among 8<sup>th</sup> graders, suggesting that renewed efforts are needed to ensure that teens understand the harmful consequences of smoking.
- In the population 12 years or older approximately 73 million people reported current use of tobacco in 2005—61.6 million were cigarette smokers, 13.7 million smoked cigars, 2.3 million smoked pipes, and 8.2 million used smokeless tobacco (NSDUH, 2006).
- Although tobacco use has declined among the general population, this is not the case for patients with mental illnesses where it remains substantially higher than the general population—the incidence of smoking in patients with schizophrenia is as high as 90 percent.



#### Bad News: Cigarette smoking kills an estimated 440,000 U.S. citizens each year.

- Since 1964, more than 12 million Americans have died prematurely from smoking, and another 25 million U.S. smokers alive today will most likely die of a smoking-related illness.
- Smoking accounts for about one-third of all cancer deaths.
- It causes lung diseases such as chronic bronchitis and emphysema, and it has been found to exacerbate asthma symptoms in adults and children.
- Smoking substantially increases the risk of heart disease, including stroke, heart attack, vascular disease, and aneurysm.
- Passive or secondary smoke also increases the risk for many diseases—approximately 3,000 lung cancer deaths and 46,000 deaths from coronary heart disease per year among nonsmokers.

### TOBACCO SMOKE AFFECTS THE WHOLE BODY

**Monoamine Oxidase B**

The diagram shows two human figures. The left figure is labeled 'Non-smoker' and 'Normal Enzyme Level', with a blue glow in the brain area. The right figure is labeled 'Smoker' and 'Reduced Enzyme Level', with a red glow in the brain area. Labels point to the brain, lungs, heart, liver, and kidneys.

Source: Copyright PNAS, 100(20):11600-5, 2003

**Smoking causes cancer throughout the body.**

The diagram shows a human figure with red arrows pointing to various organs where cancer is caused by smoking: Throat, Mouth, Larynx (voice box), Esophagus, Lung, Blood (smokeless), Stomach, Pancreas, Cervix, Kidney, and Bladder.

Source: The Health Consequences of Smoking: A Report of the Surgeon General, 2004.

### What Makes Tobacco Addictive?

NIDA-supported research identified nicotine as the main addictive ingredient in tobacco. Nicotine activates reward pathways in the brain and increases levels of dopamine—a key chemical mediating the desire to consume drugs.

Research is showing that nicotine may not be the only psychoactive ingredient in tobacco. Using advanced neuroimaging technology, scientists are finding a marked decrease in the levels of monoamine oxidase (MAO), an important enzyme that is responsible for the breakdown of dopamine. Therefore smokers may continue to smoke to sustain the high dopamine levels that lead to the desire for repeated drug use.

Recently, NIDA-funded researchers have shown in animals that acetaldehyde, another chemical constituent of tobacco smoke, dramatically increases the rewarding properties of nicotine. This effect may be age-related, with adolescent animals displaying far more sensitivity to this effect than adults. This may be one reason why adolescents are more vulnerable to becoming addicted to tobacco than adults.

## Smoking and Adolescence

Nearly 90 percent of smokers start smoking by age 18, and of smokers under 18 years of age, more than 6 million will die prematurely from a smoking-related disease. Tobacco use by teens is not only the result of psychosocial influences, such as peer pressure; recent research suggests that there may be biological reasons for this period of increased vulnerability. Indeed, even intermittent smoking can result in the development of tobacco addiction in some teens.

## Treatments for Tobacco Addiction

Extensive research has shown that treatments for tobacco addiction do work. Although some smokers can quit without help, many need assistance in quitting.

### Medications

Nicotine replacement therapies (NRTs), such as nicotine gum and the transdermal nicotine patch, are used (in conjunction with behavioral support) to relieve withdrawal symptoms—they generally provide users with lower overall nicotine levels than tobacco and thus little abuse potential and they do not contain the carcinogens and gases associated with tobacco smoke.

Other medications include:

- Bupropion, an antidepressant, which was approved by the FDA in 1997 to help people quit smoking, and is marketed as Zyban®.
- Varenicline tartrate (Chantix®), which acts at the sites in the brain affected by nicotine, and may help people quit by easing withdrawal symptoms and blocking the effects of nicotine if people resume smoking.

On the Horizon—A Nicotine Vaccine: By binding nicotine in the bloodstream and thereby blocking its entry into the brain, the resulting reduction of reinforcing effects is expected to prevent relapse. Studies to date have shown that a nicotine vaccine is safe and capable of inducing the production of long-lasting antibodies that help prevent smoking relapse.

### Behavioral Treatments

Behavioral interventions play an integral role in smoking cessation, either in conjunction with medication or alone. They employ a variety of methods to assist smokers in quitting, ranging from self-help materials to individual cognitive-behavioral therapy. These interventions teach individuals to recognize high-risk smoking situations, develop alternative coping strategies, manage stress, improve problemsolving skills, as well as increase social support.

To make behavioral approaches more accessible, researchers have been adapting them for mail, telephone, and internet formats. In 2004, the U.S. Department of Health and Human Services (HHS) established a national toll-free number, 800-QUIT-NOW (800-784-8669), to serve as a single access point for smokers seeking assistance in quitting.

For further information please visit NIDA on the web at [www.drugabuse.gov](http://www.drugabuse.gov) or contact:

Public Information and Liaison Branch  
Office of Science Policy and Communications  
Phone 301-443-1124/Fax 301-443-7397  
[information@nida.nih.gov](mailto:information@nida.nih.gov)

