

# Nicotine, Tobacco, & Addiction

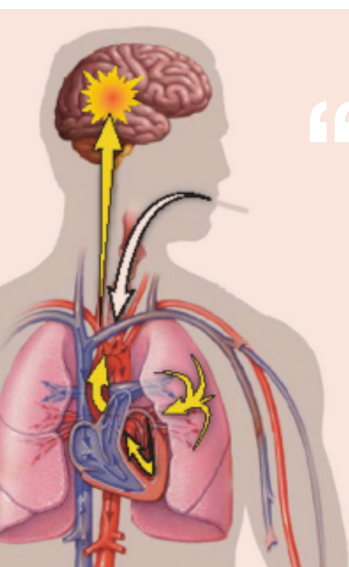


Nicotine, a chemical that exists naturally in tobacco plants, is an extremely addictive drug. It is present in smoked tobacco products (e.g., cigarettes, cigars, cigarillos, pipe, waterpipe), smokeless tobacco products, and many electronic cigarettes. Addiction to nicotine is the fundamental reason people continue using tobacco products.<sup>1</sup>

## Nicotine and Addiction

Nicotine has a powerful effect on the brains of adolescent and adult tobacco users, leading to addiction.

- When someone smokes a tobacco product, nicotine is inhaled into the lungs where it is absorbed into the bloodstream and delivered to the brain within seconds.<sup>2</sup>
- Depending on the type of product, smokeless tobacco users first absorb nicotine through mucous membranes in the mouth or nose, and the gastrointestinal tract, before it is delivered to the brain.<sup>3</sup>
- Nicotine exposure changes the way the brain functions, causing an increase in the release of dopamine and making tobacco users feel pleasure.<sup>1</sup>
- Nicotine also affects receptors in the brain, ultimately causing the brain to need nicotine to maintain normal functioning.<sup>1</sup>
- Over time, tobacco users develop a tolerance to nicotine. That is, a tobacco user will require more nicotine to experience the same effects once experienced from smaller amounts. Thus,
  - Tolerance to nicotine leads to an increase in tobacco use, and
  - Eventually, a tobacco user will adapt to a certain level of nicotine and use tobacco to maintain a body nicotine level that is within a comfortable range.<sup>2</sup>
- Because of the changes in the brains of smokers as a result of continued exposure to nicotine, people who smoke on a regular basis often experience physical withdrawal symptoms within hours after their last cigarette.<sup>4</sup>
  - There are many physical and emotional symptoms of withdrawal, including: dizziness, depression, anger, anxiety, irritability, problems sleeping, trouble concentrating, restlessness, headaches, fatigue, increased appetite, weight gain, digestive problems, oral problems, tightness in the chest, and a slowed heart rate.<sup>2</sup>
  - Many tobacco users who want to quit are not successful because of the powerful physical withdrawal symptoms and the behavioral changes needed to overcome dependence.<sup>2</sup>



“ **The evidence is suggestive that nicotine exposure during adolescence, a critical window for brain development, may have lasting adverse consequences for brain development.** ”

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U.S. Surgeon General

(over)

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## Nicotine and Youth

Nicotine dependence can start during or before adolescence.

- A study comparing tobacco use across 43 countries found:
  - Among students (age 13-15) who had ever smoked, nearly 25% smoked their first cigarette before age 10 years; and
  - Manipur, India had the highest rate of smoking initiation before age 10 (87.8% of ever smokers).<sup>5</sup>
- Because youth and adolescence are critical periods of growth and development, young people are more susceptible and sensitive to the effects of nicotine and can become addicted faster than adults.<sup>6</sup>
- Youth who begin smoking during adolescence are more likely to become addicted and to progress to daily smoking than individuals who start smoking as adults.<sup>7</sup>
- Symptoms of addiction such as withdrawal, craving for cigarettes, and failed attempts at quitting, can appear within the first weeks of smoking.<sup>8</sup>

**3 out of 4**



Number of teen smokers that end up smoking into adulthood, even if they intend to quit after a few years (as a result of nicotine addiction and the challenges associated with quitting)<sup>6</sup>

## Nicotine Manipulation

Tobacco industry research on nicotine has guided the design of products over the years.

- Internal company documents, from as far back as the 1950s, show how the tobacco industry extensively studied the role and effects of nicotine and how best to design cigarettes to deliver nicotine to smokers, and optimize its effects to create and sustain nicotine dependence.<sup>9</sup>
- Tobacco companies use additives such as ammonia, sugars, and levulinic acid to enable smokers to extract nicotine from tobacco more easily, speed up nicotine absorption by the lungs, and enhance the delivery of nicotine to the brain.<sup>10</sup>
- Although nicotine is the main addicting chemical in tobacco, the combination of nicotine and design features in modern cigarettes and other tobacco products increase the risk of addiction, actually exceeding the risks of addiction for cocaine, heroin, alcohol, or cannabis.<sup>10</sup>

## Key Messages

- Tobacco products are highly addictive because they contain nicotine.
- Youth are particularly susceptible to becoming addicted to nicotine and tobacco products.
- Policies that make tobacco products less affordable, less attractive, less socially acceptable, and less available to youth will reduce the risk of youth addiction to tobacco. These policies include:
  - Tobacco tax increases and other policy measures that raise the price of tobacco products (WHO FCTC Article 6);
  - Comprehensive protection from secondhand smoke (WHO FCTC Article 8);
  - Large graphic health warnings on tobacco products (WHO FCTC Article 11);
  - Comprehensive bans on tobacco products advertising, promotion and sponsorship (WHO FCTC Article 13); and
  - Measures that prohibit the sale of tobacco to persons under the age of 18 and other measures that limit underage access to tobacco products (WHO FCTC Article 16).
- As part of a comprehensive approach to protect youth from tobacco addiction, countries can also regulate the content of tobacco products, including nicotine, as well as menthol and other flavorings (WHO FCTC Articles 9 and 10).

1. HHS, How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease: A Report of the Surgeon General, Centers for Disease Control and Prevention, Office on Smoking and Health, 2010. [www.ncbi.nlm.nih.gov/books/NBK53017](http://www.ncbi.nlm.nih.gov/books/NBK53017). 2. American Cancer Society. Guide to Quitting Smoking. [www.cancer.org/healthy/stayawayfromtobacco/guidetoquittingsmoking/guide-to-quitting-smoking-why-so-hard-to-quit](http://www.cancer.org/healthy/stayawayfromtobacco/guidetoquittingsmoking/guide-to-quitting-smoking-why-so-hard-to-quit). 3. National Cancer Institute and Centers for Disease Control and Prevention. Smokeless Tobacco and Public Health: A Global Perspective. Bethesda, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Institutes of Health, National Cancer Institute. NIH Publication No. 14-7983; 2014. 4. Evans v. Lorillard, 990 N.E. 2d 997 (Mass. 2013). 5. Tobacco use among youth: a cross country comparison. The Global Youth Tobacco Survey Collaborative Group. Tobacco Control 2002; 11: 252-270. 6. HHS, Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General, Centers for Disease Control and Prevention, Office on Smoking and Health, 2012. [www.surgeongeneral.gov/library/reports/preventing-youth-tobacco-use/index.html](http://www.surgeongeneral.gov/library/reports/preventing-youth-tobacco-use/index.html). 7. Chyke A. Doubeni, George Reed and Joseph R. DiFranza Early Course of Nicotine Dependence in Adolescent Smokers PEDIATRICS Volume 125, Number 6, June 2010. 8. DiFranza, JR, et al., "Initial Symptoms of Nicotine Dependence in Adolescents," Tobacco Control 9:313-19, September 2000. 9. Wayne, GF & Carpenter, CM, "Tobacco Industry Manipulation of Nicotine Dosing," Handbook of Experimental Psychology (192):457-85, 2009. 10. Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR), Addictiveness and Attractiveness of Tobacco Additives, 2010.