

Nicotine in Cigarette Smoke: Addiction, Health Effects, Detection Methods, and Smoking Cessation

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Abstract

Nicotine is an addictive substance present in cigarette smoke that causes a great number of health effects and is a leading cause of preventable death.

Objective: This article provides information regarding the addictive nature of nicotine, adverse health effects, current detection methods, alternative approaches, and smoking cessation.

Results and Discussion: An average cigarette allows a person to absorb approximately 1 mg of nicotine, which produces euphoria and establishes addiction. Nicotine binds to nicotinic receptors and activates cell signaling cascade leading to dopamine and other neurotransmitter release resulting in euphoria and pleasure. After exposure to nicotine for some time the receptors become unresponsive/desensitized. Later the receptors become responsive again due to abstinence, which is believed to play a role in dependence. A process called neuro adaptation also generates more nicotinic receptors in response to desensitization. Cigarette smoking produces harmful effects including cancer, cardiovascular disease, COPD, and congenital defects. Detection methods for nicotine include HPLC, HPLC MS/MS, semi-quantitative dipstick, liquid chromatography tandem mass spectrometry (LCTMS), and gas chromatography mass spectrometry (GCMS). Alternative products/approaches to smoking include cigars, pipe smoking, hookah, and e-cigarettes. Currently there is conflicting evidence comparing cigars, pipe smoking, and cigarettes on their effect on mortality. Many studies demonstrate modest efficacy for e-cigarettes as a smoking cessation tool; however, current guidelines recommend use of other forms of nicotine replacement, bupropion SR, or Varenicline.

Implications: This article provides an overview of nicotine addiction through cigarette smoke, their health effects and detection methods. This article discusses the effects of alternative tobacco products and e-cigarettes compared to cigarettes. It also provides current treatment options for smoking cessation.

Keywords: Nicotine; COPD; CNS stimulant; Electronic cigarettes