

NICOTINE

EXPERTS AGREE THAT, WHILE ADDICTIVE AND NOT RISK-FREE, NICOTINE IS NOT THE PRIMARY CAUSE OF SMOKING-RELATED DISEASES

NICOTINE OCCURS NATURALLY IN TOBACCO

Nicotine is the most well-known molecule in tobacco and is present in small quantities in other plants, such as eggplants, tomatoes and potatoes. Because it is so well-known, it is tempting for people to wrongly associate all the dangers of smoking with nicotine. Nicotine is present in all tobacco products: cigarettes, fine-cut tobacco for hand-rolling, cigars, pipe tobacco and smokeless tobacco. In almost all cases, the nicotine used in electronic cigarettes and nicotine replacement therapies (NRTs), such as nicotine patches and inhalers, is also derived from tobacco plants. It is the key ingredient of nicotine replacement therapies designed to help smokers quit smoking. It's also in smoke-free products, to make them acceptable to smokers who would otherwise continue smoking cigarettes.

NICOTINE IS NOT THE PRIMARY CAUSE OF SMOKING-RELATED DISEASE

Nicotine is addictive and is not risk-free. However, contrary to what many people believe, nicotine is not the primary cause of smoking-related diseases. For example, even the U.S. Surgeon General stated that “there is insufficient data to conclude that nicotine causes or contributes to cancer in humans.” While the Surgeon General has acknowledged the possibility that nicotine might be a tumor promoter based on animal and mechanistic studies, the current scientific consensus appears to be that nicotine does not initiate cancer and is far less harmful than many of the harmful and potentially harmful chemicals found in cigarette smoke.

These conclusions are corroborated by long-term health data on snus usage. Snus is a low-nitrosamine smokeless tobacco that has been used for more than a century in Sweden.

Many people still mistakenly believe that nicotine is a major cause of tobacco-related diseases. A literature review of 54 studies has shown that peoples' assumptions about nicotine vary and are often wrong.¹ According to another review, these incorrect assumptions could alter the outcome or even the validity of smoking cessation trials.¹

“It’s not the nicotine that kills you, it’s all the other carcinogens in lighting tobacco on fire” —Scott Gottlieb, former commissioner of the U.S. Food and Drug Administration, interview on CNBC, Aug. 24, 2017

“The available scientific evidence, including long-term epidemiological studies, shows that relative to cigarette smoking, exclusive use of these specific smokeless tobacco products poses lower risk of mouth cancer, heart disease, lung cancer, stroke, emphysema, and chronic bronchitis.” —FDA press [announcement](#) on modified risk orders for eight smokeless tobacco products (2019).

THE PROBLEM WITH BURNING: SMOKE EXPLAINED

It is widely known that cigarette smoking is harmful and can lead to smoking-related diseases. But the main problem is the smoke itself. When a cigarette is lit, the combination of fuel (tobacco) and an oxidizer (oxygen) generates a self-sustaining combustion process that consumes the tobacco and generates smoke, energy (heat and light) and ash.

“Very few things in life are entirely safe, but vaping is less risky than smoking. It’s safer and less harmful because there’s no combustion, no burning. What causes the vast majority of the harm from smoking is the tar that’s produced when the cigarette is burned that has over 4,000 chemicals in it.” —Prof. Linda Bauld, a public health expert at Edinburgh University, the Telegraph, Sept. 21, 2019

Cigarette smoke has over 6,000 chemicals. Approximately 60 of these chemicals are known to cause cancer, while an additional 40 are classified as potentially harmful. Public health authorities have classified several chemicals in tobacco smoke as the likely causes of smoking-related diseases, such as lung cancer, heart disease and emphysema. A number of health authorities—such as the U.S. FDA, Health Canada and the WHO—have developed priority lists detailing these chemicals as “Harmful and Potentially Harmful Constituents” (HPHCs).

NICOTINE IS NOT RISK-FREE

Nicotine is addictive and not risk-free. For example, it is highly toxic when ingested or absorbed in high doses. Nicotine can increase a person’s heart rate and blood pressure, which can be problematic for those with heart disease or severe high blood pressure. Other people should also refrain from tobacco or nicotine use, including minors and pregnant or breastfeeding women. Because nicotine is addictive, nicotine-containing products should not be used by, or sold to, minors.

NICOTINE IS KEY TO ACHIEVING TOBACCO HARM REDUCTION

A growing number of public health experts recognize the role that nicotine can play in tobacco harm reduction policies. This is precisely because it is an important part of why many smokers continue smoking, along with taste, flavor, ritual, sensory experience and other reasons. Smoke-free products closely approximate the taste, sensory satisfaction and ritual of cigarettes and therefore have the potential to be acceptable for people who would otherwise continue to smoke but are interested in switching to a better alternative.

“If there is to be an overarching public health goal, it should be focused on a ‘smoke-free society’ not a ‘nicotine-free society.’” —Clive Bates, former director of Action on Smoking and Health (ASH), Feb. 17, 2020, [Counterfactual Blog](#)

“[...] the new products create trade-offs—for example, we can achieve deeper reductions in disease by promoting switching to lower-risk nicotine products, but that might mean more nicotine use. When policymaking demands a priority, the policy should in my view focus primarily on the greatest harms, and these are the major non-communicable diseases.” —Clive Bates, former director of Action on Smoking and Health (ASH), Feb. 17, 2020, [Counterfactual Blog](#)

“These new products, nicotine products that don’t involve smoke or disruptive technology, they’re able to replace smoking and pose a fraction of the risk to users. It’s true that we don’t have a time machine, and we can’t go forward 50 years and find out what will happen. However, it’s not as if we know nothing. We know a lot about what is in the vapor aerosols, we know about toxic exposure in the body, and everyone’s convinced risks will be much, much lower. The exposure is lower, the toxicity of vapor is much lower. From that, you can assume that the risks will be much lower over the longer term.” —Clive Bates, former director of Action on Smoking and Health (ASH), July 2, 2019, [Euroactiv](#)

“Re-examination of nicotine’s role in society requires re-considering the harm minimization perspective within tobacco control. The primary goal of harm minimization is preventing the use of nicotine containing products among non-users, while pragmatically acknowledging that less harmful products can reduce risk for those who smoke any combusted form of tobacco product. As such, harm minimization is wholly consistent with tobacco control goals to prevent any use by underage youth and encourage complete smoking cessation in both youth and adults.” — David Abrams et al., Jan 11, 2018, [Harm Minimization and Tobacco Control: Reframing Societal Views of Nicotine Use to Rapidly Save Lives](#)

ADDITIONAL RESOURCES

Philip Morris International’s Scientific Update on nicotine [here](#).

Article on nicotine on PMIScience.com [here](#).