

Episode 131 – Nicotine Pouches April 25, 2025

Introduction

Nicotine pouches, also known as tobacco-less or tobacco-free nicotine pouches, nicotine buccal pouches, or oral nicotine pouches, are preportioned permeable microfibre pouches containing white nicotine powder. Nicotine pouches do not contain tobacco. The pouches contain plant fibres, flavourings, sweeteners, taste additives, pH buffers, and salt. Approximately 80-90% of a pouch comprises water and microcrystalline cellulose. Nicotine pouches do not require refrigeration. [1] [2] [3]

The pouches are placed between the buccal mucosa and gingiva for 30 to 60 minutes. The powder dissolves in the mouth without spitting. The nicotine is absorbed into the blood stream mainly through the oral mucosa and not through swallowing. The time of maximum nicotine concentration ranges from 22 to 60 minutes. The pouch is discarded after use. Tobacco companies market the pouches as tobacco-free that can be used anywhere and they are often referred to as “white pouches.” [2] [4] [5] [6] [7] [8] [9]

Nicotine pouches are a relatively new product introduced to the U.S. and European markets in 2016 and 2018, respectively. They are becoming increasingly popular as the tobacco industry continues to invest in, develop, and market nicotine products to maintain their profits. This shift is due to a decline in the conventional cigarette market from which tobacco companies make most of their earnings, which has been affected by regulatory tobacco control measures. [3] [4] [10]

Many individuals believe nicotine pouches carry a lower health risk compared to traditional tobacco products because they are tobacco-free and do not involve combustion. However, several surveys examining consumer behaviour showed only a minority of users (20-30% of total participants) cited the lower health risks of these products as their primary reason for using them. Furthermore, many current users are nonsmokers or have never smoked. Thus, while nicotine pouches may offer potential as a harm-reduction tool, they could introduce new health risks for some consumers. [11]

Appeal of nicotine pouches

Nicotine pouches may appeal to youth and nonsmokers, as they are often sold in a variety of fruit flavours, in attractive packaging, and can be consumed discreetly (more so than e-cigarettes). They are also easy to use and lack odour. Pouches are popular with athletes (especially hockey and football) as they are a stimulant that does not affect lung capacity. [4] [12] [13] [14]

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Some nicotine pouches are marketed on social media featuring smiling young adult models. This strategy is similar to that previously used by e-cigarette manufacturers, potentially increasing the appeal of nicotine pouches among young nonusers. Nicotine pouch use does not require spitting like smokeless tobacco. Further, it does not involve inhaling smoke or aerosols like traditional cigarettes or e-cigarettes, respectively. Young people who may be reluctant to try inhalable products might be willing to try nicotine pouches. However, they may not know the relative harm of pouches nicotine. [15]

Additional reasons for use among adolescents and young adults include enhancing sports performance, assisting in vaping cessation, aiding with nicotine cravings, and serving as a party or clubbing drug. Social media also claims nicotine pouches help with weight loss, mood, and focus. [16] [17]

Use among youth

Tobacco-free products, such as e-cigarettes and nicotine pouches, are gaining popularity among children and adolescents, surpassing traditional cigarettes. According to the 2021 International Tobacco Control Youth survey, which captured data across the U.S., Canada, and England, 4% of youth 16 to 19 years reported using nicotine pouches. [18] [19]

In 2024, one of every 42 high school students and one of every 100 middle school students in the U.S. reported using nicotine pouches in the past 30 days. Flavourings in nicotine pouches can make them more appealing to youth. The same study showed 86% of high school students and 85% of middle school students who used nicotine pouches in the past 30 days reported using flavoured pouches. [20]

Poly use

Sparrock et al. (2023) found current cigarette, e-cigarette, and smokeless tobacco users were more likely to have used and currently be using nicotine pouches than nonusers. If nicotine pouch usage were replacing these other tobacco products, we would expect a higher prevalence of nicotine pouch use among former tobacco users rather than current users. These findings indicate nicotine pouches are used in conjunction with other tobacco products instead of being an alternate for reducing harm or acting as a cessation aid for smoking or smokeless tobacco. [21]

Market size

As of 2024, nicotine pouches are legally sold in at least 33 countries, of which 13 have no specific regulations. [22]

In the U.S., from 2016 to 2020, nicotine pouch sales increased from $709,635 USD to $216,886,819. Mint flavours, such as spearmint and wintergreen, were the most commonly sold. However, from January 2019 to June 2020, sales of fruit-flavoured nicotine pouches increased more rapidly than mint and other nonfruit or non-mint flavours. These data may reflect sales to adults or direct or indirect sales to youth. Additionally, sales may be underestimated because they did not include e-commerce or tobacco specialty store transactions. By 2026, the global product market is expected to reach nearly $33 billion USD. [23] [24]

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Sales of nicotine pouches have surged globally, driven by marketing strategies promoting these products as safer and easier to use alternatives to combustible tobacco. In 2019, the top manufacturers of nicotine pouch brands invested $11.2 million in advertising campaigns in the U.S. [25]

Currently, at least five major tobacco manufacturers sell nicotine pouches. Brand names include Zyn, ZONNIC, On!, Velo, Dryft, Loop, Rouge, Rush, Nordic Spirit, and Lyft. Over 200 flavours are available, including fruit (e.g., black cherry, citrus) and other flavours (e.g., tobacco, peppermint, coffee, licorice). Nicotine content ranges from 2 mg to 50 mg per pouch and is formulated as synthetic nicotine salt or extracted from tobacco plants. Online marketing emphasizes nicotine pouches can be used anywhere and do not require batteries or devices. In the U.S., the prices of these products are comparable to a pack of cigarettes. [8] [10] [12] [26] [27]

Nicotine pouches in Canada

In the U.S., nicotine pouches are classified as tobacco products. Some countries regulate them as a form of nicotine replacement therapy (NRT), some have no specific regulations, and others have banned the sale of the product. In October 2023, Health Canada approved the sale of the flavoured nicotine pouch ZONNIC by Imperial Tobacco. ZONNIC is licensed as a natural health product and authorized by Health Canada for use as a form of NRT. [3] [10] [28]

Initially, ZONNIC nicotine pouches were sold at local convenience stores and gas stations in enticing flavours (e.g., tropic breeze, chill mint, berry frost) and packaging resembling small candy packages. Approved under Canada's *Natural Health Products Regulations*, these pouches could be purchased without a minimum age requirement, marking the first time a nicotine product could be legally sold to children. [29] [30] [31]

On August 28, 2024, Mark Holland, the federal Minister of Health, announced nicotine pouches would only be available in pharmacies across Canada to help prevent harm to youth from using these products. [32]

The new restrictions for nicotine pouches include:

- Banning certain flavours (e.g., berry frost, tropical breeze) and only allowing mint or menthol flavours.
- Limiting sales to behind-the-counter in pharmacies.
- Prohibiting advertising and packaging that could appeal to children and youth.
- Requiring a nicotine addiction warning on the package and labelling the intended use as a smoking cessation aid for adults trying to quit smoking. [32]

Smoking cessation aids, such as nicotine gums, lozenges, sprays, and inhalers, which have an established history of appropriate use, will continue to be available in a wide range of retail locations, in a variety of flavours for adults trying to quit smoking. [32] [33]

Health Canada has authorized various NRTs with 4 mg of nicotine or less as natural health products, regulated under the *Natural Health Products Regulations*. These NRTs

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are authorized to assist adults ≥18 years quit smoking cigarettes. NRTs provide low doses of nicotine through nicotine gums, patches, lozenges, sprays, or pouches. [34]

Nicotine pouches are authorized only as a NRT to help adults quit smoking and should only be used as directed. They should not be used recreationally and should not be used by nonsmokers, people under 18 years, or others at risk of nicotine's toxic effects. Nicotine products should be kept out of the reach of children and teens. Individuals should not buy or use unauthorized nicotine pouches. In Canada, nicotine pouches need Health Canada authorization to be legally sold. Authorized nicotine pouches must have an 8-digit natural product number (NPN) on the label. [1]

Health Canada receives reports that unauthorized nicotine products are being sold in various locations across Canada, including convenience stores, gas stations, and online retailers. Unauthorized nicotine products have not been evaluated for safety, efficacy, or quality by Health Canada and should not be used. They may contain ingredients not listed on the product label, increasing the risk of serious adverse or allergic reactions or interactions with medications and foods. Any adverse events or complaints should be reported to Health Canada.[1] [1]

To date, Health Canada has authorized only one nicotine pouch, ZONNIC, containing 4 mg of nicotine per dose (equivalent to four cigarettes). This amount is usually recommended for adults who smoke 25 or more cigarettes a day and want to quit smoking. In Canada, there are no authorized nicotine pouches with more than 4 mg of nicotine per dose. All NRTs, including nicotine pouches, are not authorized for recreational use or use by nonsmokers and people under 18 years. [1] [13] [35]

ZONNIC ingredients [35]

Medicinal	Nonmedicinal
Nicotine (1-Methyl-2-(3-pyridyl)pyrrolidine) 4 mg	Microcrystalline cellulose
	Flavourings (mint, peppermint, spearmint)*
	Propylene glycol
	Sodium bicarbonate
	Sodium chloride (table salt)
	Sucralose
	Xylitol
	Water

* Flavourings (i.e., spearmint oil, benzyl alcohol, cornmint oil) may cause allergic skin reactions.

Nicotine

Nicotine is the primary active ingredient in nicotine pouches. Once absorbed, it selectively binds to nicotinic cholinergic receptors in the brain, causing the release of dopamine, which creates a pleasurable response. Nicotine withdrawal causes a significant decrease in brain reward function, contributing to its addictive nature. [4]

[1] Report any health product adverse events or complaints to Health Canada.

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Nicotine is a highly toxic substance. Consuming excessive amounts can lead to acute poisoning, which may result in respiratory failure and death. Symptoms of nicotine overdose include nausea, vomiting, upset stomach, fatigue, dizziness, severe headache, cold sweats, blurred vision, severe heartburn, weakness, fainting, confusion, irregular heartbeat, palpitations, and chest pain.

Additionally, nicotine is extremely addictive. Children and teenagers are particularly vulnerable to its addictive properties as their brains continue to develop throughout adolescence and into early adulthood until about age 25. Even small amounts of nicotine can increase the risk of developing dependence in the future.

Nicotine can negatively affect brain development. Using nicotine during adolescence can damage the areas of the brain that regulate learning, attention, mood, and impulse control. [1] [9]

Nicotine side effects

The most common side effects of nicotine include dry mouth, nervousness, headaches, constipation, indigestion, and sleep disturbances. Simultaneously using multiple nicotine products, including authorized NRTs or varenicline (a prescription medication for smoking cessation), can increase the adverse effects of nicotine.

The risks associated with using nicotine products are particularly high for certain groups of individuals, such as:

- Children and youth.
- People who are sensitive to nicotine.
- Those who never smoke or only smoke occasionally.
- Nursing and pregnant people. Nicotine is toxic to developing fetuses.
- Individuals who have had recent cardiovascular problems (e.g., heart attack, angina, arrhythmia, stroke). [1] [9]

Health risks

Nicotine pouches are discreet, contain high concentrations of nicotine, and come in various appealing flavours, posing the risk of quick adoption among nonsmoking youth and the potential for ongoing nicotine dependence in the broader population. [10]

Nicotine pouches are likely to be a substantially “lower-risk product” relative to tobacco smoking due to their lack of combustion and absence of tobacco. However, the long-term effects of nicotine pouches are currently unknown. [4] [10] [36]

Nevertheless, there are emerging health risks associated with nicotine pouches. Chemical testing conducted in Germany revealed over half of the sampled nicotine pouches contained carcinogenic tobacco-specific nitrosamines (TSNAs). These alkaloid carcinogens, especially N’-nitrosonornicotine (NNN), are considered risk factors for oral, oropharyngeal, and esophageal cancers. Additionally, the analyzed products had over 50 mg of nicotine per pouch, a concentration likely to lead to and maintain nicotine dependence and increase the risk of acute nicotine poisoning. [7] [37] [38]

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In addition, toxic chromium and formaldehyde have been detected in some nicotine pouch products. Any trace of toxic elements should not be present in nicotine pouches because of the potential health risks. [8]

Impact on oral health

Research on the use of nicotine pouches and its effect on oral health is currently limited. However, the oral effects may be similar to other orally administered nicotine products, such as mouth and throat irritation and oral ulcers. [4]

NRT side effects [4] [39] [40]

NRT product	Oral side effects	Systemic side effects
Transdermal patches	N/A	Skin irritation and sensitivity Dizziness Racing heartbeat Sleep problems or unusual dreams (more common with the 24-hour patch) Headache Nausea Muscle aches and stiffness
Gum	Jaw discomfort Mouth sores Bad taste Throat irritation Hiccups Sticking to dental work and dentures	Nausea Racing heartbeat
Lozenges	Hiccups Sore throat Coughing	Nausea, heartburn, gas Headache Trouble sleeping Racing heart
Inhaler	Throat irritation Coughing Oral burning	Runny nose Upset stomach Racing heart Nervousness Headache
Nasal spray	Throat irritation Coughing	Nasal irritation, runny nose, sneezing Watery eyes Racing heart Nervousness Headache

Dental caries

Nicotine pouches typically contain noncaloric sweeteners instead of sugars, posing a minimal direct risk to dental caries development. However, there may be some local plaque accumulation on tooth surfaces near where the pouch is held, increasing caries risk. [4] [27]

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Oral mucosa

A case study by Miluna-Meldere et al. (2024) investigated the visual and histopathological changes in oral mucosal in five nicotine pouch users. Visually, the lesions varied in form and intensity, but all appeared white at the sites where the pouches were placed. Histopathological analyses revealed parakeratosis with acanthotic epithelium, intraepithelial and connective tissue edema, and chronic inflammatory infiltration with lymphocytes and macrophages. The authors concluded nicotine pouches significantly impact oral mucosa with white lesions, revealing important changes at the cellular level. [41]

A systematic review by Rungraungrayabkul et al. (2024) included three studies, two from Europe and one from the U.S. (total of 190 participants). The review found oral mucosal changes at the site of placement were common among nicotine pouch users. Oral lesions varied from slight wrinkling to various white lesions (grainy, round, leathery, and linear), seemingly related to the number of nicotine pouches used per day and their duration of use. The malignant potential of these oral lesions is not yet known. Other reported side effects included dry mouth, sore mouth and throat, gingival blisters, and a strange jaw sensation. [7]

The rising popularity of nicotine pouches has raised concerns that flavoured pouches may cause adverse oral health effects and promote systemic toxic effects due to nicotine and other by-products being absorbed systemically through the oral mucosa.

Shaikh et al. (2022) examined the effects of several popular flavoured nicotine pouch brands sold in the U.S. The researchers hypothesized flavoured nicotine pouches are unsafe and could cause inflammation in oral and respiratory epithelial cells.

Human gingival epithelium cells and human bronchial epithelial cells were treated with extracts from various flavoured nicotine pouches, and the levels of nicotine pouch-induced inflammatory cytokine release (TNF-α, IL-6, IL-8), cellular reactive oxygen species (ROS) production, and cytotoxicity were assessed.

The data showed increased cytotoxicity at the highest concentration in oral cells and the lowest concentration in lung cells at 4–24 hours. The most significant response in oral cells was with tobacco, citrus, and cool cider-flavoured pouches in both ROS production and cytokine secretion. Additionally, spearmint showed an increased response in lung cells. Nicotine pouches containing original tobacco, mango, and black cherry flavours demonstrated higher levels of ROS release in lung cells.

These findings suggest both flavoured and unflavoured nicotine pouches are unsafe and may cause systemic and local toxicological responses from chronic use. Nicotine pouch use could lead to oral epithelial injury by releasing ROS via activation of inflammatory cytokines, such as TNF-α, IL-6, and IL-8, leading to oral and lung problems. The authors continue their research to understand how flavoured nicotine pouches may cause oral and pulmonary toxicity and impact periodontal health. [42]

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Periodontal disease

A pilot study by Miluna-Meldere et al. (2024) investigated the presence of periodontal pathogens in the saliva of nicotine pouch, e-cigarette, and conventional cigarette users compared to participants who do not use tobacco and/or nicotine products (control group). The results showed several periodontal pathogens (*Tannerella forsythia*, *Prevotella intermedia*, and *Porphyromonas gingivalis)* were present in saliva samples from users of nicotine pouches, e-cigarettes, and conventional cigarettes but not in those from the control group. These results suggest the presence of periodontopathogenic bacteria in the saliva of nicotine pouch and e-cigarette users could alter the oral microbiome, leading to periodontal diseases. However, further research is needed. [12]

Nicotine pouches are held between the lip and gingival tissues, similar to chewing tobacco and snus, which may lead to mechanical injury and irritation. The *in vitro* study by Shaikh et al. (2022) demonstrated nicotine pouch extracts cause a cytotoxic response in gingival epithelial cells. Thus, physical proximity facilitates the release of toxic chemicals into the local microenvironment, which may result in periodontal problems. [42]

Nicotine in pouches may directly or indirectly deteriorate periodontal tissue. *In vitro* studies show nicotine exposure significantly activated nicotinic acetylcholine receptor expression, repressed periodontal ligament fibroblast cells and stem cell viability, and increased the generation of cellular ROS.

Nicotine, the main ingredient in nicotine pouches, plays a vital role in periodontal disease by affecting cytokine levels as nicotine enhances the production of IL-1β, IL-8, IL-6, IL-10, and IFN-γ. Nicotine also causes significant bone loss, especially in furcation areas in periodontal healthy or periodontitis animal models. Locally absorbed nicotine has been shown to increase bone degeneration.

Flavour additives in nicotine pouches may harm periodontal health as menthol additives impact human periodontal ligament fibroblast vitality and proliferation through increased oxidative stress and proinflammatory and pro-senescence responses. Flavourings may also quickly cause adolescent dependence on nicotine by increasing positive and decreasing negative subjective experiences. Furthermore, menthol flavour facilitates the penetration of toxic chemicals (e.g., NNN) and nicotine across buccal and floor-of-mouth mucosa, posing a risk to the soft tissue. [2] [42]

Research has found poly nicotine product use (i.e., nicotine pouch alongside cigarette, e-cigarette, or smokeless tobacco use) may increase the risk of periodontal disease. Nicotine pouches may also impact surgical outcomes since nicotine promotes vasoconstriction and thrombosis, affecting vascular health and wound healing. [2] [21] [43] [44] [45]

Smoking cessation

Published evidence on nicotine pouches as a smoking cessation tool is limited. Nicotine pouches have been shown to deliver nicotine effectively, with maximum observed

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concentrations of nicotine similar to lozenges and higher than nicotine gum. In comparison to cigarettes, nicotine pouches produced a slower and lower magnitude of nicotine delivery to the user. These characteristics have been suggested to have 'lower abuse liabilities' but were less satisfying and rewarding. [4]

Currently, various NRT products are available: transdermal patches, gum, lozenges, inhalers, nasal spray, and sublingual tablets. Several adverse effects have been reported with the use of the available NRTs, which could lead to people trying alternative therapies to aid in smoking cessation, such as nicotine pouches. It could be suggested nicotine pouches are easier to use than other forms of NRT, such as nicotine gum, which requires the user to “chew and park.” [4]

Phan et al. (2024) showed almost half of adults who use tobacco were aware of nicotine pouches through various media channels, which was associated with higher odds of nicotine pouch use. [46]

Globally, there has been considerable opposition to the introduction of nicotine pouches and how they are marketed. It has been suggested nicotine pouches may introduce the gateway effect, providing a stepping stone to cigarette smoking due to the combination of addictive nicotine, pleasant flavours, and attractive packaging. This could also be appealing to previous nonsmokers or young people. However, it is too early to confirm these concerns. [4]

Addressing nicotine pouch use

Parents and caregivers of children and youth can:

- Learn about the different types and risks of using tobacco products, including nicotine pouches.
- Set a good example by being tobacco-free and maintaining a tobacco-free home.
- Talk to children, teens, and young adults about why all forms of tobacco products are harmful to them.
- Talk to children, teens, and young adults about the risks of nicotine use, including nicotine pouches.
- Encourage and support youth who use tobacco products to quit. [1] [47]

Oral health professionals can:

- Learn about the different forms of tobacco and nicotine products and their associated risks.
- Ask all clients if they use any tobacco products, including nicotine pouches.
- Talk to children, teens, and young adults about why all forms of tobacco and nicotine products are harmful for them.
- Encourage clients to quit using tobacco and nicotine products. Provide support and evidence-based treatments to help them quit successfully.[2] [47]

[2] Refer to Episode 101 for additional information on smoking cessation and tobacco use.

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Take home messages

- Nicotine pouches are a relatively new product that oral health professionals should be aware of.
- People who do not currently use tobacco products, including nicotine pouches, should not start.
- Youth, young adults, and pregnant and nursing individuals should not use nicotine pouches.
- Oral health professionals should include conversations about nicotine pouches in their routine professional activities to educate youth and parents on their risks.
- More research is needed to fully understand the short- and long-term systemic health effects of using nicotine pouches.
- Prolonged and regular use of nicotine pouches is expected to increase the risk of oral health problems. Further studies are crucial to understand oral health implications associated with nicotine pouch use.

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Client Resources

Kids Help Phone

- Support available in multiple languages 24/7 by calling 1-800-668-6868
- https://kidshelpphone.ca/

I quit for me
This guide is for youth who want to quit using tobacco, cigarettes, or vapes.
https://www.canada.ca/en/health-canada/services/publications/healthy-living/i-quit-for-me-guide-youth.html

Youth Vaping, Substance Use, and Technology Dependence Program (YOUTH-VAST)
Youth-VAST offers targeted support to help youth ages 12 to 21 across Ontario. Individuals can refer directly to the program; no physician referral required.
https://www.camh.ca/en/patients-and-families/programs-and-services/youth-vast

Smoker's Helpline
1-866-366-3667 https://www.smokershelpline.ca/

Refer your clients for proactive phone support
https://smokershelpline.ca/healthcare/make-a-referral

Quit with Confidence: Guide to a smoke-free life
https://www.canada.ca/en/health-canada/services/smoking-tobacco/quit-smoking/introduction.html

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