

# Tobacco

## Information for Health Professionals

### Introduction

Nicotine, which is present in the tobacco leaf, is one of the main ingredients in tobacco. It is a Central Nervous System stimulant and is classified as a drug. Tobacco leaves can be burned and inhaled in the form of cigarettes, cigars, pipe smoke, and bidis or absorbed in the form of spit tobacco or snuff. The membranes in the nose, mouth, and lungs act as nicotine delivery systems. In higher doses, nicotine is extremely poisonous (e.g., it is commonly used as an insecticide). Smokers typically feel dizzy and sick when they are first exposed to nicotine.

Nicotine is also highly addictive. The 2014 Surgeon General's report stated that new smokers can become addicted after smoking as few as 100 cigarettes. Nicotine is as physically addictive as cocaine or heroin. It stimulates the release of dopamine in the brain, which positively reinforces the action of smoking. The addictive effect of nicotine is the main reason why tobacco is widely used.

### How nicotine works

The nicotine in tobacco products is quickly absorbed into the bloodstream when inhaled into the lungs or absorbed through the mucous membranes in the mouth. In the brain, nicotine causes biological and chemical changes. It interferes with the balance of neurotransmitters such as dopamine, endorphins, epinephrine and, in particular, acetylcholine.

Acetylcholine is a chemical that carries information between neurons and plays a role in pathways affecting blood pressure, sleeping patterns, memory, aggression, sexual activity and mental functioning. Nicotine mimics acetylcholine by binding to nicotinic acetylcholine receptor sites, leading to an increase in dopamine-mediated rewarding effects. Therefore, the tobacco user may experience feelings of calm and well-being, a greater ability to concentrate, feelings of relaxation, and a short-term decreased urge to smoke. When a tobacco user tries to stop, the absence of nicotine means the dopamine reward pathway is not initiated and withdrawal symptoms are felt.

### Short-term effects

New smokers may experience coughing, dizziness and a dry, irritated throat. Other effects may include nausea, weakness, abdominal cramps, headache, coughing or gagging. These symptoms abate as the user develops a tolerance to nicotine.

Physiological reactions include an increase in blood pressure and heart rate, and constriction of blood vessels, causing lower skin temperature in hands and feet. Users may also report decreased appetite.

## Long-term effects

Cigarettes contain over 600 ingredients that form more than 7000 chemicals when burned, including approximately 70 known carcinogens.

Tobacco is the major preventable risk factor for chronic respiratory diseases. The nicotine, tar, and carbon monoxide found in smoking tobacco damages the cardiovascular and respiratory systems. Long-term effects of tobacco use include increased risk of heart disease, stroke, emphysema, chronic bronchitis, and aneurysms. Smoking tobacco also increases the risk of lung and oral cancers.

Male smokers are twice as likely to experience impotence as male non-smokers. Smoking affects the nervous system, hormones and vascular system. These systems work together with muscle tissue to maintain an erection.

Like smoking tobacco, spit tobacco also affects the cardiovascular system and may be associated with heart disease, stroke and high blood pressure. Long-term effects include leukoplakia (the formation of thick, white patches of the skin inside the mouth), tooth abrasion, gum recession, gum and tooth disease, loss of bone in the jaw, yellowing of teeth, and chronic bad breath. Other health consequences of using spit tobacco include cancer of the mouth (including the lip, tongue, cheek and floor and roof of mouth) and throat.

Recent research is beginning to show some evidence that second- and third-hand exposure to tobacco smoke can be harmful. Lung carcinogens have been found in children who are exposed to second-hand smoke. People exposed to second-hand smoke in their childhood are at an increased risk of developing lung cancer in their adult years. Approximately 2.3% of children aged 0-17 in Alberta are exposed to secondhand tobacco smoke.

Third-hand smoke exposure occurs when contact is made with any object that has been exposed to tobacco smoke. Furniture, carpets and clothing are frequent points of contact with third-hand smoke, especially for children. Although current research has found limited evidence for third-hand smoke causing health issues, work in this area is relatively new and findings should be accepted with caution. It does show, however, that taking steps to limit in-home smoking can reduce children's exposure to harmful carcinogens found in tobacco smoke.

## Tobacco and pregnancy

Babies born to women that smoked during their pregnancies suffer a variety of adverse effects from in vitro exposure to nicotine. Low birth weight and preterm delivery are common issues among infants born to mothers that smoke. They may also grow up to display symptoms of attention deficit hyperactivity disorder (ADHD), as well as have lower cognitive functioning and verbal skills. Orofacial deformities (such as cleft palates) are also associated with maternal smoking behaviours.

## Tolerance and dependence

Nicotine is considered addictive because it alters brain functioning and people use it compulsively. Physical dependence on tobacco is not immediate- it may take weeks or months to develop. Most users

don't find their first experiences with tobacco pleasant. Social pressure and other factors may be required to maintain the level of exposure needed for dependence to develop.

Nicotine is a "reinforcing" drug, which means that users desire the drug regardless of the damaging effects. Nicotine is a reinforcer because it causes many smokers to continue to smoke in order to avoid unpleasant withdrawal symptoms. Smokers also adjust their smoking behaviour (e.g., inhaling more deeply) to keep a certain level of nicotine in their body. Nicotine also works as a reinforcer through the creation of additional nicotinic acetylcholine receptors in the brain. This makes the individual feel irritable and restless when there are insufficient levels of acetylcholine or nicotine. They soon come to depend on the nicotine to feel normal and to avoid withdrawal symptoms. When nicotine is withheld, there is a significant decrease in the brain's reward function which can last for days.

Heavy users can have great difficulty quitting smoking. Research suggests there is a strong link between age of onset of smoking and nicotine dependence. Individuals who begin smoking when they are teens, tend to be more dependent than persons who started smoking after age 20.

Stopping is difficult and can be made even more difficult by the fact that users may not experience the consequences until many years after first use. Unlike cocaine, heroin or alcohol abuse, the more dangerous effects of tobacco use are not obvious in the beginning. As well, the pleasurable effects of tobacco may outweigh the abstract possibility of future health consequences.

### **Withdrawal and treatment**

Smokers who usually smoke at least 15 cigarettes per day and/or smoke their first cigarette of the day within 30 minutes of waking are likely to experience withdrawal symptoms. Withdrawal symptoms include low mood, insomnia, irritability, anxiety, difficulty concentrating, restlessness, decreased heart rate, increased appetite, weight gain and craving for nicotine. Symptoms peak from 24 to 48 hours after stopping and can last from three days up to four weeks, although the craving for a cigarette can last for months.

Two-thirds of recent tobacco quitters have cited their health as being the main reason for quitting. In 2015, more than half of smokers had tried to quit in the past year. Of daily smokers, 3% had reported at least 2 or 3 attempts to quit. Relapse is the rule rather than the exception and must be viewed as part of the process of quitting. Two-thirds of Canadians who have ever been smokers have now successfully quit.

Nicotine replacement therapies (NRTs) offer promise in treating nicotine addiction, especially when used along with support programs or counselling. NRTs come in a variety of forms, including nicotine gums, lozenges, nasal sprays, skin patches and inhalers. Prescription medications, such as bupropion and varenicline are also available. These drugs work by increasing brain neurotransmitters (e.g., dopamine and norepinephrine). A nicotine vaccine is currently in the process of development.

The research proves that NRTs double the chances of long-term cessation. Success increases when NRTs are used in conjunction with a strong support system or behaviour modification through self-help and support group programs.

### **Who uses tobacco?**

In 2015, Alberta's rate of current<sup>1</sup> smokers (15.8%) was close to the Canadian average (13.0%). Alberta has the fourth highest smoking prevalence and cigarette consumption rate in Canada. Daily users smoke an average of 14.7 cigarettes a day in Alberta; this is higher than the national rate of 13.8 cigarettes a day. Males are more likely to be daily smokers, consuming over 3 cigarettes more than females per day (15.2 vs. 11.9).

Approximately 18% of Alberta youth between the grades of 7 and 12 have tried a cigarette. Many smokers begin smoking in their teens; in 2016-2017 the national average age of smoking for the first time was 13.6 years old. In 2016-2017, approximately 23% of students in grades 7 to 12 had ever tried one of the following products: cigarettes, cigars, little cigars or cigarillos, smokeless tobacco, waterpipes, and blunt wraps. One third of students who indicated that they had tried a tobacco product reported that the first tobacco product they used was flavoured. Those who lived in a household with regular smokers are three times more likely to smoke than teens who do not (22.4% vs. 7.0%, respectively).

Through the purchase of cigarettes, smokers contribute billions of dollars in taxes that non-smokers do not; however, the costs associated with smoking are now exceeding the revenue generated from tobacco taxes. The health and economic costs associated with tobacco use are around \$17 billion annually; this includes \$4.4 billion directly related to health care costs.

The individual cost to a smoker's health and well-being is enormous, but financial costs are high as well. Because smokers have more health problems and higher mortality rate, they pay higher life insurance premiums. In Alberta, a smoker who smokes a pack per day spends more than \$4,300 per year on cigarettes (based on an average price of \$11.61 per pack).

### ***Electronic cigarettes and society***

Although cigarette smoking has decreased significantly over time, the use of electronic cigarettes ("e-cigs") have become more popular in recent years, with over 3.9 million Canadians trying it. Alberta has the fourth highest prevalence of use and past 30-day use of e-cigarettes in Canada. For current smokers, electronic cigarettes may seem like a safer alternative to cigarettes when they feel that they cannot quit. In 2015, a national survey found that 50% of current or former smokers who had ever tried an e-cigarette reported using it as a cessation aid. Over one-third of cigarette users reported using e-cigarettes as a way to smoke fewer cigarettes, or as a way to smoke in more places more discretely. For beginners and among youth, some of the reasons why electronic cigarettes are appealing relate to the

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<sup>1</sup> A current smoker, as defined by Health Canada, "includes daily smokers and non-daily smokers (also known as occasional smokers)." It is determined from the response to the question "At the present time do you smoke cigarettes every day, occasionally, or not at all?"

different flavourings that e-cigarettes come in, the intrigue of experimentation, and a perceived low risk of use.

The prevalence rate of ever trying an e-cigarette among the general population in Canada is 13%. Among grade 7 to 12 students, 23% have ever used an e-cigarette and 11% disclosed daily use. It was also reported that of students who had used an e-cigarette in the past 30 days, 36% had never taken a puff of a cigarette and another 35% were experimental smokers. Likewise, almost 25% of students surveyed thought there was “no risk” of harm from using an e-cigarette once in awhile.

### ***Mental health disorders***

Individuals with mental illness and substance use disorders have higher rates of smoking than the general population. Research has shown that individuals with a mental illness or other substance use disorder are 2-4 times more likely to smoke. People with mental health disorders are also more likely to smoke a greater numbers of cigarettes, and experience more severe dependencies. As a result, these individuals are at greater risk for many tobacco related diseases including cardiovascular illness, respiratory disease, and cancer than the general population.

In Canada in 2010, 15% of current smokers experienced psychological distress compared to 8% of non-smokers. Current smokers were also more likely to be depressed (12% vs. 6% non-smokers), and be diagnosed with a mood disorder (11% vs. 5% of non-smokers), or an anxiety disorder (9% vs. 4% of non-smokers). Current or former smokers both self-reported significantly lower mental health than those who had never smoked.

Individuals with mental illness require medical supervision when quitting or reducing smoking as tobacco can interact with some psychiatric medications. Their medications need to be monitored to prevent adverse effects and toxicity. Smoking cessation can result in reduced medication dosage requirements.

### ***Other substance use***

Current smokers are more likely to engage in risky drinking behavior. In 2010, 15% of Canadian smokers reported weekly binge<sup>2</sup> drinking compared with 4% of non-smokers. Twenty percent of smokers experienced problem drinking compared with 9% of non-smokers.

In Canada, cannabis use is higher among current smokers than non-smokers; 67% of current smokers used cannabis in their lifetime (vs. 31% of non-smokers), 25% used it in the past year (vs. 7% of non-smokers) and 18% experienced cannabis use problems (vs. 4% of non-smokers). Other non-cannabis illicit drug use is also more prevalent among current smokers. Six percent of Canadian smokers reported they have used illicit drugs in the past year (vs. 1% of non-smokers) and 35% have used illicit drugs in

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<sup>2</sup> Binge Drinking, as defined by Health Canada, “heavy drinking is defined as consuming 5 or more drinks on one occasion, 12 or more times over the past year.”

their lifetime (vs. 15% of non-smokers). Five percent of current smokers experienced some form of physical or mental harm due to their illicit drug use.

## Tobacco and the law

1997

- The federal *Tobacco Act* is passed. It replaces the *Tobacco Products Control Act* and the *Tobacco Sales to Young Persons Act*.
- The Act includes regulations that aim to protect the health of the public. Some regulations include:
  - product standards and packaging requirements
  - smoking limits in the workplace
  - restrictions on signage and advertising for retailers
  - restrictions on promotions

2006

- The Alberta provincial *Smoke-free Places Act* is passed.
  - smoking is prohibited in all public spaces where minors are present (including restaurants, healthcare facilities, school facilities, and common areas in residential buildings)

2008

- The Alberta provincial *Tobacco Reduction Act* amends the *Smoke-free Places Act*.
  - smoking is prohibited in all workplaces and public spaces (including bars, restaurants, outdoor patios, and casinos)
  - smoking is prohibited within 5 metres of all entranceways, windows and air intake ducts of workplaces

2009

- The *Tobacco Reduction Act* is amended to include new provisions, including:
  - the creation of a schedule listing prohibited additives to tobacco products
  - prohibiting the sale of tobacco products containing flavourings other than menthol
  - minimum package sizing of 20 cigarettes
  - tobacco sales are not permitted at health care facilities, public post-secondary campuses, pharmacies, and stores that contain a pharmacy

2011

- The federal *Tobacco Products Labelling Regulations* are introduced. Included are measures that state that tobacco packages must have:
  - health warning messages that cover 75% of the package
  - easy to understand toxic emissions statements
  - phone numbers and web site addresses for smoking cessation services

2013

- The Alberta government passed an amendment to *the Tobacco Reduction Amendment Act*, to include a ban on smoking in vehicles when minors are present.

2015

- As of September 30, 2015, the sale of menthol and other flavoured tobacco products in Alberta have been banned under the *Tobacco Reduction Amendment Regulation*. Many health organizations have supported an additional ban on the sale of e-cigarettes, but no actions have yet been taken.

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