

Core knowledge content

Respiratory System

People breathe in (inhale) air through their mouth and nose. This air travels through the larynx (voice box) then down the trachea (windpipe) into the lungs. The windpipe divides into two main bronchial tubes, one for each lung. These, in turn, subdivide further. The right lung is divided into three lobes, or sections, and the left lung is divided into two lobes. Each lobe is like a balloon filled with sponge-like tissue. Air goes through smaller and smaller branches called bronchioles to reach the air sacs called alveoli. Gas exchange occurs in the alveoli when oxygen attaches to red blood cells and carbon dioxide from the bloodstream is exhaled. Red blood cells carry oxygen to all parts of the body.

The bronchial tubes are lined with cilia (like very small hairs) that have a wave-like motion. This works like a broom to carry mucus (sticky liquid) upward and out into the throat, where it is either coughed up or swallowed. The mucus catches much of the dust, germs, and other unwanted matter from the air before it enters the alveoli.

The ribs are bones supporting and protecting the chest cavity. The 'rib cage' moves to a limited degree, helping the lungs to expand and contract as the person inhales and exhales.

When a person is physically active, their heart and lungs work together to provide oxygen for the working muscles. The physical and social benefits of being active can be less fun for smokers as they struggle to breathe during exercise.

Tobacco and Tobacco Smoke

Smoking, and exposure to tobacco smoke, has been clearly established as the cause of multiple health conditions and remains the leading cause of preventable illness and death in Ontario. Most concerning for youth is the exposure to nicotine, the highly addictive substance found in tobacco cigarettes. Exposure to nicotine before the age of 25 can alter youth brain development, lead to cognitive impairments, and dependence.

Tobacco is made from dried tobacco leaves, and mixed with other chemicals to produce cigarettes, cigars, and smokeless tobacco (pipes, snuff/snus, and chew/spit tobacco). Tobacco use is the leading preventable cause of death in Canada.

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Tobacco smoke contains 7000 chemicals and 70 of these are known to cause cancer. Tobacco smoke causes heart disease and other lung diseases. It is also linked with a number of types of cancers including lung, nasopharynx (upper throat), nasal cavity, paranasal sinuses, lip, larynx (voice box), mouth, pharynx (throat), esophagus (swallowing tube), and bladder. It has also been linked to the development of cancers of the pancreas, cervix, ovary, colon, kidney, stomach, and some types of leukemia.

Cigarettes, cigars, pipes, and spit and other types of smokeless tobacco all cause cancer. There is no safe way to use tobacco.

Second hand smoke is the harmful smoke from the end of the lit cigarette and the smoke, which is exhaled from the smoker's respiratory system.

This second hand smoke settles on furniture, rugs, clothes and anything in an enclosed space. This is termed "third-hand smoke".

Nicotine

Nicotine is found naturally in the tobacco leaf. It is the chemical that makes tobacco products so addictive. Nicotine can also be found in electronic cigarettes (vapes). In Ontario, nicotine is a legal drug but you must be 19 years of age or older to purchase tobacco products or e-cigarettes.

When smoked, nicotine is absorbed through the lungs and into the bloodstream and to other organs in the body. It can take as little as 10 seconds for nicotine to reach the brain after it is inhaled. Initially, nicotine may cause you to feel good or energized, or alert and calm. Nicotine causes blood vessels to constrict (narrow) which increases blood pressure. It also increases heart rate, decreases body temperature, alters brain waves and relaxes muscles. Nicotine effects the lungs by paralyzing cilia (tiny hair-like structures in the lungs), which are responsible for cleaning dirt and germs out of the lungs. This in turn makes smokers more vulnerable to colds, flu, bronchitis and other diseases. In large doses (two drops on your tongue), nicotine is poisonous and can cause death. New smokers may experience coughing, dizziness and dry/irritated throat. They may also have nausea, weakness, stomach cramps and headache. These symptoms may decrease once a tolerance to nicotine is developed.

Chronic exposure to nicotine affects brain development. This is particularly harmful during periods when the brain is developing, such as in young people or during fetal

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development (pregnancy). These lasting changes can negatively affect a person's thinking, reasoning and/or behaviour, including memory and attention.

Nicotine is addictive. Young people may become more easily addicted because their brains are rapidly growing and developing. Nicotine can also train the adolescent brain for addiction to other drugs.

When some people go for more than a few hours without nicotine they may experience withdrawal symptoms. These symptoms may include dizziness, shakiness, headaches, anxiety and irritability, nervousness and restlessness, difficulty concentrating or sleeping, increase appetite, slight depression, cravings (for a cigarette). Many people continue to smoke to avoid these feelings.

Tar

Tar is a sticky black/brown substance that is the main cause of lung and throat cancer in smokers. Tar causes bad breath and unsightly yellow-brown stains on fingers and teeth. Tar builds up in the lungs causing the cilia to get stuck together and preventing them from cleaning out the lungs and airways. The tar builds up in the lungs, along with mucous, dust, dirt, and germs. The body tries to rid itself of these substances – leading to a smoker's cough.

Carbon Monoxide

Carbon monoxide (CO) keeps the red blood cells from carrying oxygen to the cells. CO is found in car exhaust or faulty furnaces. It is the law that all homes have CO detectors adjacent to sleeping areas because CO is a deadly, poisonous gas. When someone smokes, the carbon monoxide attaches to the red blood cells more readily than the oxygen needed by the cells. This causes fatigue, less energy, and inability to reach peak performance in sports. CO can cause dizziness, shortness of breath, and loss of energy.

Electronic Cigarettes (Vapes)

Electronic cigarettes (e-cigarettes), commonly referred to as “vapes”, use a battery, a heating element and a liquid containing cartridge (e-liquid or e-juice) to create an aerosol or vapour that is inhaled. The cartridges come in different flavours which may be appealing to young people. E-cigarette products do not contain tobacco although many contain nicotine, the addictive component in tobacco.

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Electronic cigarettes may be perceived as being less harmful than cigarettes, but there are still risks. Many cartridges contain nicotine and the aerosol contains other chemicals that may be harmful. Injuries have been reported from exploding batteries in electronic cigarettes.

Addiction and Withdrawal

One of the most important factors associated with future substance problems is the early initiation of use. If someone begins using at an early age, they are more likely to develop substance use disorders and other problems later on in life (OSDUS 2013). Preventing initiation of tobacco use by youth is one of the most effective means of reducing lifetime tobacco use (Order Amending the Schedule to the Tobacco Act, June 17, 2015).

Addiction means that the body and brain become so used to a drug that it becomes very difficult to live without. Tobacco contains nicotine which is one of the most addictive substances. The effects on the brain can be imperceptible at first, as nicotine ‘hijacks’ the brain’s internal reward system. The insidious process of dependence has begun.

For a smoker, the physical habit happens every time they light up. Their hand goes up to their mouth for every puff of the cigarette; for someone who smokes a pack a day that hand to mouth action may occur 90,000 times a year. That’s a hard habit to stop.

Young people who smoke a few cigarettes with friends might believe that they will never be addicted. When they do try to quit or cut down, they will realize how difficult it is. A person can be addicted after two to five cigarettes. Nine out of ten regular smokers say they would like to quit. Each year over a third of smokers try to quit. Some are successful at quitting but many are not; it may take several attempts.

The body and brain become dependent on nicotine and withdrawal symptoms can interfere with an attempt to quit. Withdrawal symptoms may include the following:

- Constipation
- Coughing
- Hunger
- Difficulties sleeping
- Irritability
- Difficulties concentrating
- Nausea
- Diarrhea
- Sweating
- Dizziness
- Appetite changes
- Cravings
- Fatigue
- Headaches
- Clumsiness
- Shakiness

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If withdrawal symptoms are a concern, talk to a health care professional. Nicotine replacement therapy can help individuals cope with withdrawal symptoms. If a smoker who is trying to quit feels sad or mildly depressed and the feeling does not go away after several days, they should see a health care provider.

Tobacco Laws

There are several provincial and federal laws regulating smoke-free workplaces and public transportation (airplanes, trains, taxis) including the following:

- The [Smoke-free Ontario Act \(SFOA\)](#) bans smoking in all enclosed public spaces, enclosed workplaces and specifically designated outdoor places in Ontario. This would include locations such as malls, schools, restaurants, hospitals, children's playgrounds and restaurant patios. Since 2009, Ontarians cannot smoke in a vehicle with passengers under 16 years of age.

The SFOA also prevents the sale or supply of tobacco to anyone under 19 years of age. Research shows that if you don't start smoking before the age of 19 you probably will not become a life-long smoker. While there is no legal age for someone to smoke, selling or supplying tobacco products to someone less than 19 years of age can result in a \$360.00 fine. Tobacco Control Officers employed by Niagara Region Public Health enforce the SFOA.

- The [Tobacco Act](#) is administered by Health Canada. The Act governs the manufacture, sale, labeling and promotion of tobacco products. Sections of the act are designed to protect youth from advertising which would encourage the use of tobacco products, and to protect the health of youth by restricting access to tobacco products. The Governor in Council makes regulations on these issues.

Tobacco Industry Advertising

In 2012 the Surgeon General's Report concluded that tobacco marketing causes smoking among youth and young adults, even though tobacco companies deny targeting youth. According to The Center for Disease Control and Prevention, the tobacco industry spent \$9.6 billion on advertising in 2012 and over \$300 million in North America on targeting youth. Youth are affected by product placement in movies and video games. Actors or video game heroes may be shown with a cigarette in their hand

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or mouth. The tobacco industry also places animals on the packaging (like Camel cigarettes) to try to attract youth. In the past, tobacco industries placed cigarettes for sale next to the candy to attract youth. The tobacco industry continued to use popular colours and flavouring agents such as fruit, chocolate, vanilla, etc. to tobacco products in order to make these products appealing to youth until expressly prevented by law in June 2015. The tobacco industry is essentially trying to attract replacement smokers. Freeze the Industry (www.freezetheindustry.ca) is a youth led health promotional campaign aimed at exposing tactics of the tobacco industry. [Smoke Free Movies](#) is an alliance of leading health organizations taking collective action to counter the harmful impact of smoking in youth-rated movies. Learn more about this issue and how to take action - [Smoke Free Movies | MOVIES INFLUENCE KIDS. MAKE THEM SMOKE-FREE.](#)

Key Facts:

- Research shows that one of the reasons that young people start to smoke is because of the smoking scenes they see in movies.
- Tobacco companies partner with Hollywood films by marketing tobacco and paying actors to smoke in movies.
- In Ontario, smoking is still permitted in youth-rated movies (G, PG, 14A).
- 37% of youth smokers are likely to have started smoking because of seeing onscreen smoking.
- 86% of movies over the last 10 years that featured tobacco received a youth-rating.

Refusal Skills

Children need to develop the skill of refusing to use tobacco products. Children are usually approached by their friends to start smoking. There are a number of ways to refuse and some work better for people than others. Examples of ways to refuse tobacco products may include:

- simply say “no thanks”
- tell the truth (“smoking makes you smell bad and makes your teeth yellow”)
- give an excuse (“I am in sports” or “My parents would be very upset”)
- change the subject
- suggest an alternative activity
- walk away
- avoid places/situations where you know people smoke

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- tell your friends of your decision not to smoke so they can support you if you are being pressured to smoke.
- reverse the pressure (“you know I don’t smoke, why do you keep asking me?” or “why do you smoke” or “you’re wasting your money, why would I?”)
- use your sense of humour.

Saying “no” to someone you like or want to be accepted by can be difficult. This is why it is best to plan ahead, and decide beforehand what to say to someone who offers a tobacco product. If someone continues to pressure you to use tobacco products consider whether or not they are a good friend or someone you want to hang out with.

Supplemental Knowledge

Frequently Asked Questions from Children: Adapted from [guides-and-publications/smoking-and-quitting-en.pdf](https://www.niagararegion.ca/health/guides-and-publications/smoking-and-quitting-en.pdf)

If everyone knows that smoking is bad for your health, why do people do it?

Even with Canadian advertising bans on tobacco products, cigarette smoking is often still shown in films, including movies and cartoons aimed at children. (See <http://smokefreemovies.ca/>)

Cigarettes are among the most sophisticated drug-delivery devices ever invented, meaning that children and teens who experiment with smoking are more likely to become dependent on smoking than on any other drug they might try. Many smokers don’t realize how powerful nicotine can be, and think that they will never become addicted to smoking.

Why is it hard for some people to quit smoking? How can I help them?

The nicotine in cigarettes changes the brain’s internal reward system, and that change is what causes dependence. Nicotine acts on the same part of the brain as other drugs of dependence, such as cocaine and heroin. Once the drug has “hijacked” the brain, a person becomes addicted and needs to smoke to avoid unpleasant withdrawal symptoms such as constipation, coughing, hunger, difficulties sleeping and irritability.

Another reason why it is hard for many people to quit is the constant repetitive hand-to-mouth behaviour of regular smoking. It’s also hard to quit when cigarettes are widely available, and when people are around others who are smoking. Smoking becomes associated with other pleasurable activities, like going for a walk, having a meal, socializing with friends, and so on. When a person tries to quit, all of these activities

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become constant reminders of “triggers” to smoke and it takes time for people to be successful.

Let the smoker know that you care for him/her, no matter what. It is good to talk about your feelings and what worries you. Celebrate the smoker’s successes. Some smokers may be able to quit smoking the first time they try but many will need to quit a number of different times before they quit for good. Nicotine replacement therapy can help some smokers cope with the withdrawal symptoms associated with quitting smoking. If someone you know would like more information or is interested in quitting smoking they can contact the Niagara Region Tobacco Hotline (905-688-8248 ext. 7393 or 1-888-505-6074 ext. 7393 or through the Niagara Region website www.niagararegion.ca)

Are my parents going to get sick and die from smoking?

Tobacco use seems harmless at first because it takes years for a person to get sick from smoking. But the truth is that smoking is associated with emphysema, heart disease, cancer (including breast cancer), diabetes, mental health problems such as depression, and other addictions. About half of the people who keep smoking will die from a disease caused by smoking. However, quitting smoking can improve health and increase life expectancy. It is never too late to quit smoking. (Refer to next question)

Is it ever too late to quit smoking?

It’s never too late. Quitting smoking increases life expectancy and improves quality of life.

People who quit smoking increase their chances of living longer. They improve their general health leading to a better quality of life. No matter how old they are, they will start to feel major and immediate health benefits and have more energy to live life to the fullest.

Scientists have developed many effective medications to help people struggling with nicotine addiction. Counseling can make a person’s attempt to quit more likely to be successful. Choosing the right time and having supports in place can be important for success in quitting smoking.

If there is smoking around me, how can I protect myself and others?

Second-hand smoke is even more toxic than the smoke inhaled directly from a cigarette, since the tobacco burns at a lower temperature. That lower temperature means more tar and carbon monoxide in the air.

If you live with someone who smokes the best thing is to make your house and car smoke free. Let that person in your life know that you care about them and their health,

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and would like to see them quit smoking. If that person is not ready to stop smoking (remember nicotine is very addictive) then let them know you are concerned about the effects their smoking has on your health. Discuss ways to limit the amount of second-hand smoke exposure you are experiencing (ie. designate a space outside the home for smoking, no smoking in the car, etc.)

My dad smokes cigars. Is that as bad as smoking cigarettes?

Cigar smoking is not safer – even if you don't intentionally inhale the smoke. If you don't inhale, large amounts of nicotine can be absorbed through the lining of the mouth. Like cigarette smoking, cigar smoking poses serious health risks including cancer (lip tongue, throat, esophagus, larynx and lung etc.). Smoking cigars does not reduce your risk of nicotine dependence. Also, cigars often burn for longer periods of time, which leads to more second-hand smoke in the air. The only safe level of cigar smoking is none at all.

Does second hand smoke affect my pet?

Even your pets are affected by second hand smoke. Second hand smoke has been linked to several types of cancers in dogs, cats and birds. Pets are more likely to develop health problems if they live in a home with smokers. Third hand smoke is dangerous for pets too. Dogs and cats lick third hand smoke from their fur when they groom themselves. Birds also take in these toxic chemicals when they pick through their feathers.

Is everybody smoking?

Current smoking rate is around 8% for high school students (OSDUHS 2015). Everybody is not doing it. You may drive by your local high school and notice the smoke pit that consists of 10-20 students, some of whom are smoking. This group represents a very small number of the school population which typically is 500 – 1000 students. Smokers are in the minority – there are far fewer students who use tobacco than those who do not. The tobacco industry spends billions on advertising every year and millions in North America on targeting young people to try to get them to start smoking. They hope that once they start, they will be “hooked”, stay smokers, and be a “replacement” smoker.

Aboriginal Use of Tobacco

Among the First Nations and the Metis, tobacco is often used in small amounts in ceremonies connected to cleansing and communicating with the spirit world. In these cultures tobacco is one of the four sacred medicines (natural tobacco, cedar, sage, and sweet grass). In its original form, tobacco had a spiritual purpose. The tobacco used in

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cigarettes and cigars is harmful to our health and not connected to spirituality. See www.tobaccowise.com to learn more about the Aboriginal Tobacco Program that works with Aboriginal communities to decrease and prevent the misuse of tobacco.

Where to get help

- Parents
- Teacher/Principal/VP
- Child and Youth Worker
- Public Health Nurse
- Doctor
- Trusted adult
- Kids Help Phone 1-800-668-6868 or www.kidshelpphone.ca
- Smokers' Helpline 1 877 513-5333 or www.smokershelpline.ca (phone, text or web support available)
- Niagara Region Tobacco Hotline 905-688-8248 ext. 7393 or 1-888-505-6074 ext. 7393 or www.niagararegion.ca

Resources

- Unfilteredfacts.ca
- Focused on educating the public on health related issues like substance use prevention. Check out the [Use Your Instincts Campaign](#)
- Smokershelpline.ca
- [Drug Free Kids Canada](#)
- Community Addictions Services of Niagara Region: www.cason.ca
- Pathstone Mental Health: www.pathstonementalhealth.ca
- Centre for Addiction and Mental Health (CAMH) – Smoking and Quitting: Clean Air for All
- <https://www.camh.ca/-/media/files/guides-and-publications/smoking-and-quitting-en.pdf>

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References

National Institute of Drug Abuse: <https://www.drugabuse.gov>

Ontario Student Drug Use and Health Survey (OSDUHS) 2019:
http://www.camh.ca/en/research/news_and_publications/ontario-student-drug-use-and-health-survey/Pages/default.aspx

Know the risks: e-cigarettes and young people: <https://e-cigarettes.surgeongeneral.gov/>

Health Canada “On the road to quitting – guide to becoming a non-smoker for young adults”: <https://www.canada.ca/en/health-canada/services/publications/healthy-living/road-quitting-guide-becoming-non-smoker-young-adults.html>

Canadian Public Health Association: www.cpha.ca