

Health Effects of Vaping and Tobacco

Lesson 5.3

Essential Question

How would deciding to use tobacco products today affect your lifelong health?



Key Terms

aerosol
carcinogens
chronic obstructive pulmonary disease (COPD)
e-liquid
nicotine
secondhand aerosol
secondhand smoke
smokeless tobacco
tar
thirdhand smoke
tobacco product
vaping devices

Learning Outcomes

Look for the skills icon  to practice health skills.

After studying this lesson, you will be able to

- 5.3-1** identify different tobacco products and explain why they are addictive.
- 5.3-2** assess the hazardous effects of tobacco products.
- 5.3-3** analyze the impact of secondhand and thirdhand smoke and aerosol.

Reading and Notetaking Activity

As you listen to your teacher present the information in the lesson, record any comments or questions you have on a separate sheet of paper or electronically. Then, review your comments and questions with a partner. Try to answer each other's questions using information your teacher shared and content in the lesson. If you have any questions you cannot answer, discuss them with the rest of the class. Use reliable resources to pursue and verify the answers to your questions.



Warm-Up Activity

Tobacco Use and Death

Advocate for Health Before reading this lesson, research the leading causes of death for adults in the US. As you read, take notes about how tobacco and nicotine relate to each cause. If everyone made the decision not to use tobacco products, would the leading causes of death change? Why or why not? Create a simple, one-page poster or slide that reflects your findings. Display your poster in the classroom or hallway.

5.3-1 Tobacco Products

Smoking is the leading cause of preventable death in the United States. Still, every day in the US, about 1,600 people younger than 18 smoke their first cigarette. Some people who smoke cigarettes start by vaping. Vaping increases their risk for smoking by seven times.

According to the Food and Drug Administration (FDA), a **tobacco product** is any product made or derived from tobacco and intended for human consumption. This includes products made from tobacco.

tobacco product

products made or derived from tobacco and intended for human consumption

It also includes products made from synthetic (manufactured) substances derived from tobacco.

Tobacco is a plant with leaves that contain the chemical nicotine.

Nicotine is a toxic substance that gives tobacco products their addictive quality. Historically, cigarettes were the most-used tobacco product among teens. Today, vaping is the most common form.

Cigarettes are a combustible tobacco product. Combustible tobacco products are smoked, or burned and then inhaled. Other combustible products include rolled tobacco, cigars, cigarillos, pipes, blunts, hookah and water pipes, and bidis and kreteks (clove cigarettes). Smokeless tobacco products are noncombustible. These include chewing tobacco, dipping tobacco, snuff, gutka or gutkha, and dissolvables.

Unlike other tobacco products, **vaping devices** heat tobacco or synthetic nicotine without burning it. These devices may be called e-cigarettes, e-cigs, vaporizers, vapes, vape pens, tanks, mods, mod-pods, hookah pens, e-cigars, and e-pipes. They are often called *electronic nicotine delivery systems (ENDS)*. They contain either tobacco or an **e-liquid** made of nicotine (or another drug) and other chemicals.











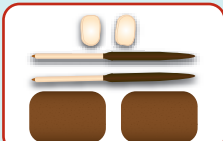




Some people believe vaping devices are safer, healthier, or less addictive than regular cigarettes. All tobacco products can lead to addiction. They can also have serious health consequences (**Figure 5.3.1**).

nicotine toxic substance that gives tobacco products their addictive quality

vaping devices tobacco products that heat tobacco or synthetic nicotine without burning it, producing an aerosol

e-liquid substance made of nicotine (or another drug) and other chemicals; is heated during vaping

Figure 5.3.1 Tobacco products may be combustible, smokeless, or electronic. All can have serious health consequences. *Do all of these tobacco products contain nicotine?*

Types of Tobacco Products		
Combustible Tobacco	Smokeless Tobacco	Vaping Devices (or ENDS)
Cigarettes 	Chewing tobacco 	E-cigarettes 
Cigars, cigarillos, and blunts 	Dipping tobacco and snuff 	Vaporizers (vapes and vape pens) 
Rollled tobacco 	Snus 	E-cigars 
Bidis and kreteks 	Dissolvables 	E-pipes 
Pipes 		Hookah pens 
Hookah and water pipes 		

Combustible Tobacco, top to bottom: Voronina Svetlana/Shutterstock.com; domnitsky/Shutterstock.com; Andris Tkacenko/Shutterstock.com; Claudine Van Massenhove/Shutterstock.com; dimpank/Shutterstock.com; Gerisima/Shutterstock.com. Smokeless Tobacco, top to bottom: J.A. Dunbar/Shutterstock.com; Rob Hainer/Shutterstock.com; gopixgo/Shutterstock.com; Goodheart-Willcox Publisher. Vaping Devices: United States Food and Drug Administration

Case Study

“Just” a Vape



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While Dwayne is in the hospital with pneumonia, his doctor tells him a likely factor for his illness is his daily vaping habit. She warns him of the harmful effects. Dwayne is stunned. He did not realize vaping was harmful. He knew cigarettes were dangerous; he has seen pictures of damaged smokers' lungs in his health classes. Vaping seemed safe, especially since he used nicotine-free vape.

Ximena has loved playing basketball since she was a kid. Lately, she has coughing fits during practice. She also gets out of breath more quickly. Ximena does not vape, but she sits with her friends while they do. She knows that may cause her coughing fits. Ximena does not want to spend less time with her friends. But she

worries about not making the varsity team next year if she does not get away from the aerosol.

Audrey is around people who use tobacco all the time. Her mom smokes cigarettes. Her older brother vapes. One day, a boy at school offers Audrey a vape. Audrey thinks that one time cannot hurt. Then Audrey remembers her mother's stained yellow teeth and fingers. She also thinks about her brother's worsening asthma and smelly clothes. Audrey gives the vape back. She says, "No, thanks. I've seen what smoking has done to my family and I don't want to start."



Practice Your Skills

Make Decisions

Consider the stories of Dwayne, Ximena, and Audrey. Are they making healthy decisions? What, if anything, can they do to be healthier? Rewrite each person's story to include a healthier decision. Include any knowledge or refusal skills each person would need to make these decisions.

Share your new stories with a partner. Discuss how a few small decisions can affect your health. Then, write a story about your own personal experience with tobacco. If you could go back in time in your story, what decisions would you make?

5.3-2 Health Effects of Tobacco Products

Tobacco products have many health effects in common. These are health effects related to the impact of nicotine. They also have specific health effects based on the type of product.

The Impact of Nicotine

All tobacco products have nicotine. Most combustible tobacco products have nicotine from the leaves of the tobacco plant. E-liquids with nicotine have a synthetic form. In fact, e-liquids in vapes sometimes have more nicotine than cigarettes.

Nicotine is a highly addictive substance. This means it is difficult to stop using it. In 2010, the US Surgeon General stated that nicotine was as addictive as cocaine and heroin.

A person who uses nicotine has a serious risk for developing a substance use disorder. The stages of substance use are experimentation, regular use, tolerance, dependence, and addiction. A person with an addiction to nicotine may have unpleasant withdrawal symptoms when they try to stop using it.

On top of being addictive, nicotine is toxic and extremely harmful to a person's health (Figure 5.3.2).

Cardiovascular System

The cardiovascular system includes the heart and blood vessels. When people use any tobacco product, nicotine enters their bloodstream. Nicotine's presence triggers the release of the hormone adrenaline. Adrenaline causes an increase in heart rate, breathing, and blood pressure. This makes the heart work harder to pump blood faster around the body.

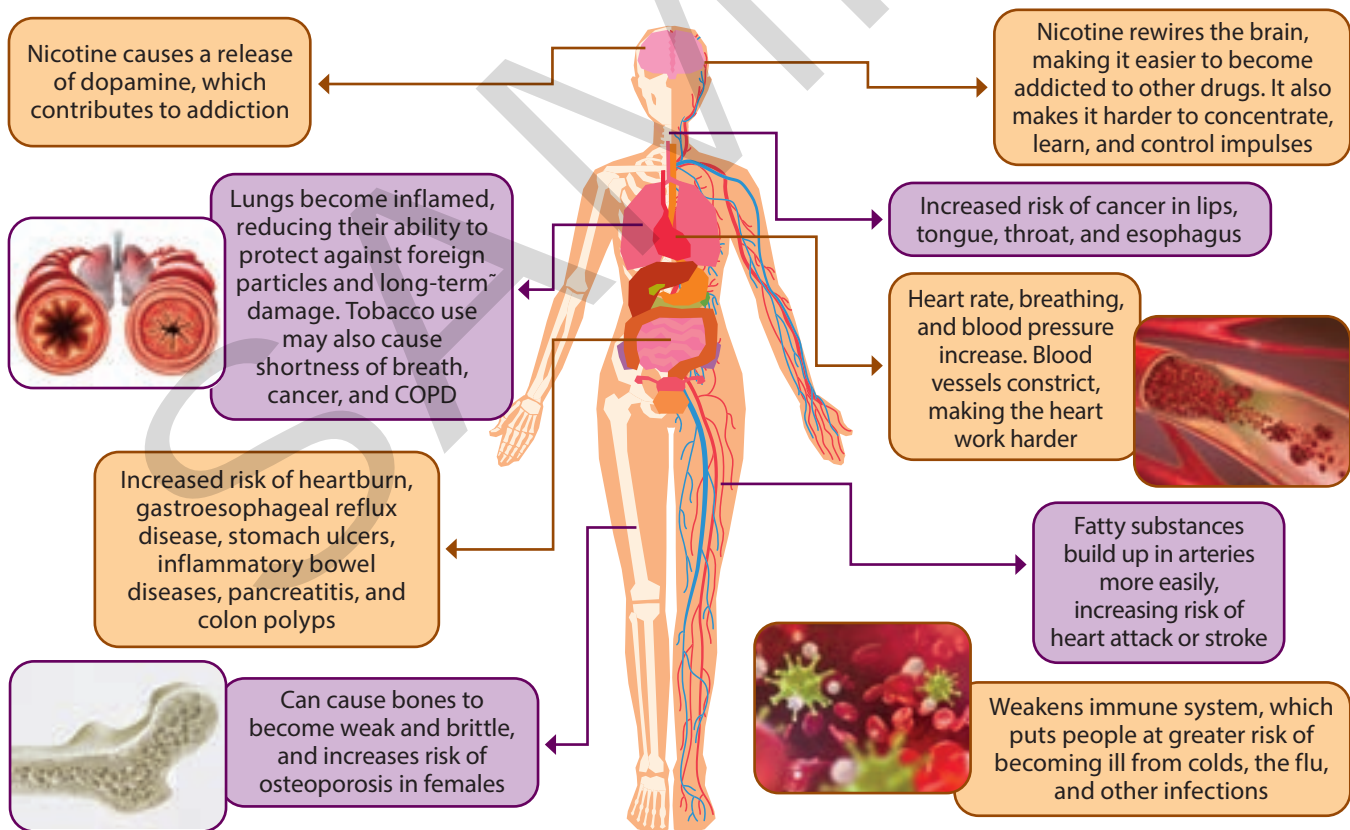
Nicotine also causes the blood vessels to narrow. This means the heart works harder to pump blood. Over time, this can lead to high blood pressure and heart disease. It also makes it harder for oxygen and nutrients to reach the skin, nails, hair, and mouth. People who use nicotine develop wrinkles in their skin, brittle nails, thin hair, bad breath, and diseases of the mouth.

Gradually, nicotine leads to changes in the walls of blood vessels. These changes cause fatty substances such as cholesterol to build up more easily in the arteries. This disrupts the flow of blood through the body. Over time, this buildup can cause heart disease, the leading cause of death in the US.

Respiratory System

The respiratory system's primary function is breathing. Nicotine causes inflammation of the lungs. It also reduces the lungs' ability to protect against foreign particles. Over time, this can lead to long-term damage.

People who use nicotine may have shortness of breath. Nicotine use also increases risk for chronic lower respiratory diseases and cancer. These are also leading causes of death in the US.



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Figure 5.3.2 Nicotine is toxic, and its harmful effects are not always reversible.

Nervous System

The nervous system has the brain, spinal cord, and nerves. Nicotine usually acts as a stimulant. This means it increases heart rate, blood pressure, and breathing. In large doses, nicotine is a sedative, reducing anger and anxiety. Nicotine also makes it harder to concentrate, learn, and control impulses.

Nicotine causes the release of a chemical called dopamine in the brain. Dopamine leads to a pleasurable sensation. This feeling is the same as when people use heroin or cocaine. People continue to use nicotine because they want this feeling. Using nicotine disrupts the brain's natural production of dopamine.

Over time, the body develops a tolerance to nicotine. A person then needs higher levels of nicotine to enjoy the same effects. People then become dependent on nicotine to feel dopamine's positive sensations. Addiction can happen very easily.

Teens are especially sensitive to the effects of nicotine. This is because their brains are still developing. Using nicotine rewires the brain, making it easier to develop an addiction to other drugs.

Digestive System

Nicotine has harmful effects on the digestive system. Nicotine use may hurt the body's ability to process food. This can cause digestive conditions, such as heartburn, gastroesophageal reflux disease, and ulcers. Nicotine use also increases the risk of Crohn's disease (a form of inflammatory bowel disease), pancreatitis, and colon polyps.

Health in the Media

Tobacco in the Media: Then and Now

A long time ago, tobacco companies advertised their products on TV and the radio, as well as in magazines and newspapers. After scientific data clearly proved the serious health consequences of tobacco use, bans forced companies to stop this advertising.

Today, tobacco companies still cannot advertise using these methods. Instead, they try to avoid these laws by using social media. On social media, tobacco companies pay ambassadors and influencers to post content and link followers to tobacco products.

Sometimes posts by influencers do not even mention tobacco. Instead, they advertise upcoming

parties or events where people promote or give away tobacco products. Teens may not recognize that these posts are trying to get people to use tobacco products.

TV shows and movies also show many teens smoking, vaping, and chewing tobacco. It may seem harmless to simply see smoking or vaping in a movie. Research shows, however, that children and teens who see tobacco use in movies are more likely to start smoking. One study published in 2020 found that teens who saw smoking images on television were three times more likely to start vaping.



Practice Your Skills

Set Goals

Think about why companies now use social media to advertise tobacco products. Then discuss with a partner why these ads lead to increased tobacco use. Do you think these ads should be legal? Why or why not? Do you think most teens recognize that social media posts

are advertisements designed to make money for tobacco companies? What strategies could help teens see through these techniques? With your partner, set five SMART goals to protect yourself from the impact of these advertisements. Share these goals with the class, act on them, and evaluate how helpful they are.

Immune System

Using nicotine leads to a weakened immune system. Your immune system includes organs, tissues, and cells that defend against disease-causing bacteria, parasites, and viruses. People who use nicotine have a greater risk of becoming ill. They are more likely to get diseases like the common cold, flu, pneumonia, and meningitis.

Health Effects of Cigarettes

On average, people who use cigarettes long-term die about 10 years earlier than people who do not. According to the US Surgeon General, people who smoke have a higher risk for many different health conditions. These include type 2 diabetes mellitus, colorectal and liver cancers, vision loss, tuberculosis, and arthritis. Smoking cigarettes also leads to stained teeth and hair and clothes that smell like smoke.
















In addition to nicotine, cigarette smoke has toxic, cancer-causing chemicals. This can lead to respiratory conditions.

Toxic Chemicals

Cigarettes and cigarette smoke contain thousands of chemicals and toxic substances that harm the body (**Figure 5.3.3**). Nicotine is just one of these harmful substances.

Cigarette smoke has high levels of *carbon monoxide*, a poisonous gas. When inhaled, carbon monoxide interferes with the ability of red blood cells to carry oxygen. This reduces the oxygen in the blood. It also reduces the oxygen that reaches the heart. After beginning to smoke, someone who once ran one lap around the track without becoming out of breath may be breathless after running half as far.

Chemicals Found in Cigarette Smoke

 Acetone <ul style="list-style-type: none">• Found in nail polish remover	 Butane <ul style="list-style-type: none">• Used in lighter fluid	 Lead <ul style="list-style-type: none">• Used in batteries
 Acetic acid <ul style="list-style-type: none">• An ingredient in hair dye	 Cadmium <ul style="list-style-type: none">• Active component in battery acid	 Methanol <ul style="list-style-type: none">• A main component in rocket fuel
 Ammonia <ul style="list-style-type: none">• A common household cleaner	 Carbon monoxide <ul style="list-style-type: none">• Released in car exhaust fumes	 Naphthalene <ul style="list-style-type: none">• An ingredient in mothballs
 Arsenic <ul style="list-style-type: none">• Used in rat poison	 Formaldehyde <ul style="list-style-type: none">• Embalming fluid	 Tar <ul style="list-style-type: none">• Material for paving roads
 Benzene <ul style="list-style-type: none">• Found in rubber cement	 Hexamine <ul style="list-style-type: none">• Found in barbecue lighter fluid	 Toluene <ul style="list-style-type: none">• Used to manufacture paint

A–Z: Nadiia Ishchenko/Shutterstock.com; schankz/Shutterstock.com; gowithstock/Shutterstock.com; JR AK/Shutterstock.com; shinja jang/Shutterstock.com; Joe Belanger/Shutterstock.com; Charles Knowles/Shutterstock.com; Toa55/Shutterstock.com; John Gomez/Shutterstock.com; Arina P Habich/Shutterstock.com; Kenishirotie/Shutterstock.com; STEFANY LUNA DE LINZY/Shutterstock.com; Vera Larina/Shutterstock.com; ungvav/Shutterstock.com; Kyle Lee/Shutterstock.com

Figure 5.3.3 These are some of the thousands of toxic chemicals and substances in cigarettes and cigarette smoke. *Would you otherwise take in any of these chemicals?*

Cigarette smoke has more than 70 **carcinogens**, or cancer-causing substances. These increase a person's risk for cancers of the mouth, throat, esophagus, lung, and bladder. Cancerous cells grow rapidly and form a mass of cells, called a *tumor*. These tumors can spread to other parts of the body.

Due to the toxic chemicals in cigarette smoke, people who smoke have a higher risk for various health conditions. These include osteoporosis, ulcers, fertility issues, and gum disease.

Cigarette use can interfere with eating by changing the shape of taste buds. When food does not taste as good, people may lose their appetite and interest in eating.

Respiratory Conditions

Smoking damages the respiratory system. This makes breathing more difficult. Burning tobacco produces **tar**, which consists of small, thick, sticky particles. Over time, tar builds up in the lungs. It disrupts the ability of fine, hair-like projections called *cilia* to remove foreign particles from the lungs.

Smoking-related damage to the lungs contributes to chronic (long-lasting) respiratory diseases. It can also trigger asthma attacks. People who smoke have a higher risk of getting severe COVID-19 and lung infections.

Chronic obstructive pulmonary disease (COPD) is a group of conditions that make breathing more difficult (**Figure 5.3.4**). Most people with COPD have a combination of chronic bronchitis, emphysema, and asthma.

Chronic bronchitis is an ongoing condition in which the bronchial tubes become swollen and irritated, narrowing the pathway to the lungs. This makes it harder for the lungs to take in enough oxygen. People with bronchitis have coughing spells. They may have difficulty catching their breath.

Emphysema causes the lungs to lose elasticity, permanently enlarging the airways. It destroys the alveoli, or sacs of air, that make up lung tissue.

carcinogens cancer-causing substances

tar residue consisting of small, thick, sticky particles

chronic obstructive pulmonary disease (COPD) group of conditions that make breathing more difficult; includes chronic bronchitis, emphysema, and asthma

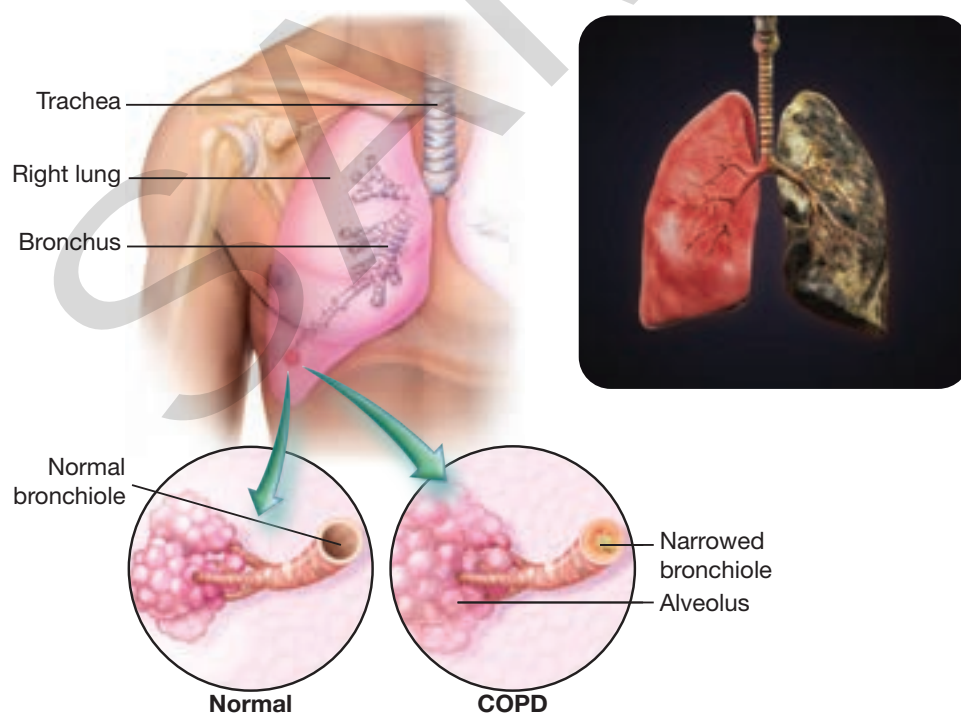


Figure 5.3.4 Chronic obstructive pulmonary disease (COPD) clogs the bronchioles and damages the lungs, making it more difficult to breathe. On the left is a normal, healthy lung. On the right is a smoker's lung, which shows the effects of COPD.
What three lung diseases are in COPD?

Left: © Body Scientific International; Right: iStock.com/Nerthuz

This makes breathing difficult. A person must breathe faster to get enough oxygen into the lungs and bloodstream.

Asthma is a chronic disease caused by blockages of airflow to and from the lungs. Inhaling cigarette smoke irritates the lining of the airways. This can cause an asthma attack. Because cigarette smoke damages the cilia, the lungs cannot get rid of unwanted particles. These particles stay in the airways and trigger asthma attacks.

Health Effects of Vaping

Some people see *vaping*, or the use of vaping devices, as a harmless alternative to smoking cigarettes. But vaping is not harmless (Figure 5.3.5). Many people believe vaping produces a water vapor that people inhale. In reality, vaping produces an aerosol.

Figure 5.3.5 The statements at the top show common myths about vaping. Read each explanation to see why these ideas are incorrect. *Did you previously believe vaping was harmless?*

Myths and Facts About Vaping

The infographic features a central banner that reads "REALITY CHECK" with three asterisks on either side. Above the banner, five colorful, overlapping shapes represent myths that are crossed out with large grey 'X' marks. Below the banner, five corresponding colored boxes provide the reality check for each myth, with lines connecting the boxes to the specific myths they address.

Myths (crossed out):

- My e-liquid is just flavoring.
- Everyone I follow on social media vapes.
- Vaping isn't addictive since there is no nicotine.
- Vaping doesn't hurt anyone else.
- When I vape, I am just inhaling water vapor.

Reality Checks:

- E-liquid pods can contain the same amount of nicotine as 20 cigarettes. Nicotine-free e-liquids may even contain nicotine.
- Vaping companies sell their products and make money through social media campaigns.
- Vaping produces aerosol, not water vapor. This aerosol can contain harmful substances.
- Bystanders also breathe the harmful chemicals in secondhand aerosol exhaled by people who vape.
- E-liquids contain harmful chemicals, including some that have been linked to serious diseases.

smartboy10/DigitalVision Vectors via Getty Images

Vaping brings nicotine (or another drug) into the body. This has significant health risks. E-liquids with nicotine have large amounts of nicotine. Even some e-liquids that claim to be nicotine-free contain nicotine.

Vaping also harms health in other ways. Vape battery explosions can cause serious injury and even death. Some people use vaping devices to consume other drugs like marijuana. Vaping any e-liquid can have serious health risks.

Most of the time, when people vape, they are consuming an e-liquid with many chemicals. The vaping device heats the e-liquid into an **aerosol** people inhale (Figure 5.3.6). When someone vapes, these chemicals enter the body. They affect its organs and systems.

Scientists are studying the long-term effects of inhaling the chemicals in aerosol. This research is difficult because companies that make e-liquids do not list all the ingredients. People who vape do not know what exactly they are inhaling.

Some people claim that the flavorings in e-liquids are generally recognized as safe (GRAS). This means the FDA has approved that they are safe for ingestion. But the FDA has not said they are safe to inhale.

Inhaling chemicals in aerosol can lead to respiratory conditions. These include inflammation and long-term lung damage. As more people vape, reports of lung diseases are increasing.

One lung disease related to vaping is *popcorn lung* or *bronchiolitis obliterans*. *Diacetyl*, a flavoring found in more than 75 percent of flavored e-liquids, causes this disease. Popcorn lung causes scarring and inflammation in the bronchioles, the smallest airways in the lungs. This can lead to coughing, shortness of breath, and difficulty breathing.

aerosol suspension of fine particles or droplets in the air, or a suspension of fine particles or droplets in the air—like dust, smoke, deodorant spray, or bug spray



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Figure 5.3.6 Aerosol created by vaping devices contains harmful chemicals connected to serious health consequences. Chemicals include volatile organic compounds (VOCs), or pollutants that evaporate in the air; ultrafine particles that can be inhaled deep into people’s lungs; and cancer-causing substances.

Teens who vape also have a greater chance of getting COVID-19, the flu, and other lung infections. Vaping leads to more severe COVID-19 or flu infections that may need to be treated in a hospital. This is because vaping scars the lungs and harms the lungs' immune defenses.

Health Effects of Smokeless Tobacco

Smokeless tobacco includes chewing tobacco, snuff, *snus* (a form of snuff), and dissolvable tobacco. *Chewing tobacco* is wads, or plugs, of tobacco leaves placed between the cheeks and gums. *Snuff* is a finely cut or powdered tobacco people inhale or place between the cheek and gums. Dissolvable tobacco comes in flavored mouth drops or strips.

All forms of smokeless tobacco have nicotine and carcinogens. The harmful effects of these substances are the same as if they were smoked. The presence of nicotine makes smokeless tobacco just as addictive as cigarettes. Because smokeless tobacco goes directly into the mouth, people absorb even more nicotine (**Figure 5.3.7**).

Because smokeless tobacco does not involve inhaling smoke, people who use these products are less likely to develop lung diseases than people who smoke. But they have more risk of developing other serious diseases.

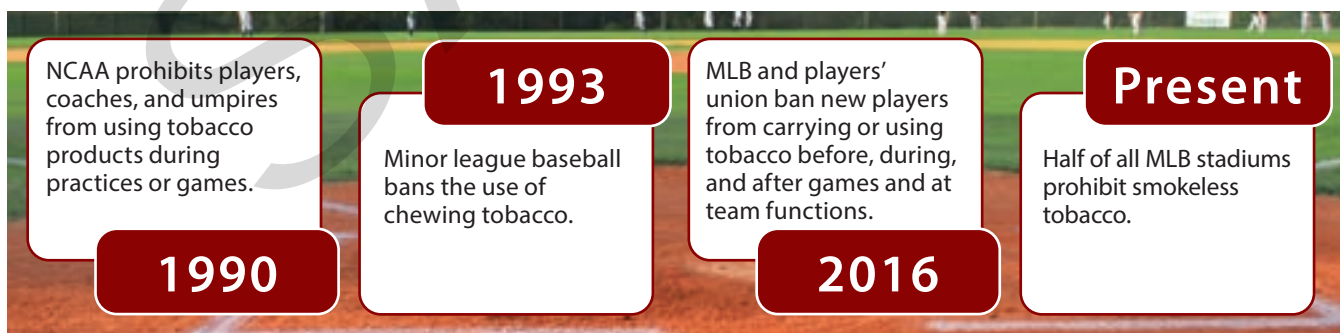
When using smokeless tobacco, people absorb nicotine through their mouth tissues. Nicotine stains the teeth and can lead to gum recession. Using smokeless tobacco can lead to *leukoplakia*. This is a condition with thickened, white, leathery spots inside the mouth. It can develop into oral cancer.

Smokeless tobacco use increases risk of other health conditions. These include heart disease, respiratory irritation, gum disease, and tooth decay.

Mental, Social, and Legal Consequences

Using tobacco affects not just a person's body, but a person's mind and social relationships. Consequences in one area of health also affect other areas of health. The effects of tobacco use are long lasting.

Smokeless Tobacco Bans in Baseball



World in Hand/Shutterstock.com

Figure 5.3.7 Though chewing and dipping tobacco have long been associated with baseball, this trend has been on the decline. Recognizing the dangers to players' health, various organizations and many players support the ban of smokeless tobacco.

Do people who use smokeless tobacco absorb more or less nicotine than people who smoke? How?

Research in Action

Tobacco Use and Risky Behaviors

Did you know that doing some risky behaviors makes you more likely to try others? Risky behaviors can have negative health outcomes. They include behaviors like smoking cigarettes, vaping, being physically violent, and texting and driving.

Many teens tell themselves that risky behaviors are not harmful if they are less risky than other behaviors. For example, some teens vape and explain that vaping is safer than smoking cigarettes. What teens do not realize is that vaping makes them much more likely to smoke cigarettes. A 2017 study by researchers at the CDC found that students in grades

7–12 who had tried vaping were more than twice as likely to start smoking.

Students who use tobacco products have a greater risk of other risky behaviors. Researchers in one study compared the rates of risky behaviors among high school students who had or had never used tobacco products. Students who used tobacco products were more likely to have risky behaviors. These included getting in a physical fight and texting and driving. They were also more likely to use other health-harming substances, such as alcohol, marijuana, and illegal drugs.



Practice Your Skills

Practice Health-Enhancing Behaviors

Teens who vape or smoke have riskier health-related behaviors than those who do not. With a partner, discuss why. Why does making one risky choice lead to other risky choices? What barriers stop some teens from making better health choices?

With your partner, brainstorm ways teens can end a habit of making risky choices. What resources and support could teens use? What information can help them resist negative influences and make healthier choices? Create an infographic about the influences leading to a pattern of risky behavior. Include steps teens can take to stop the pattern.

Mental Consequences

Most teens believe they can smoke, vape, or chew tobacco occasionally or even regularly for a few years and then easily quit. The reality is that addiction happens very quickly. This makes it difficult to stop using tobacco products.

Using nicotine can rewire your brain. You are then more likely to develop addictions to other drugs.

Nicotine can make it harder to concentrate, learn, and control impulses. People who use nicotine are more likely to do other risky behaviors, such as illegal drug use.

Nicotine can make mental health conditions and mental illnesses worse. People may use nicotine to relieve symptoms instead of seeking treatment.

Social Consequences

Tobacco use can harm a person's social relationships. An addiction to nicotine hurts everyone around that person.

When people feel dependent on a substance, getting more of that substance feels more important than anything else. Teens may lie to their parents, guardians, or friends. They may steal money to buy cigarettes, smokeless tobacco, vaping devices, or e-liquid. Lying and theft can cause long-term trust issues in a relationship and the community.

In addition, teens who use tobacco model this behavior for others. This can lead others to develop addictions.

Because tobacco use harms health, people may withdraw from teens who use tobacco products. People who use tobacco products may have to leave a social situation to smoke or vape. This can lead them to feel left out.

Legal Consequences

Teens who use and misuse tobacco can face serious legal consequences. In the US, all states prohibit people under the age of 21 from buying tobacco products or vapes. Some cities, such as Beverly Hills in California, have banned the sale of tobacco products.

Teens who try to buy tobacco products or ask someone else to buy them may get in trouble. They may pay fines or perform community services. Some states suspend driving privileges for teens who illegally buy or possess tobacco products.

Many schools have policies that do not allow the use of cigarettes, smokeless tobacco, and vaping devices. Students who bring tobacco products to school or use them at school-sponsored events may face disciplinary actions. They could even face suspension. Teens can also face legal consequences for using tobacco products in public places, such as restaurants and workplaces.

5.3-3 Secondhand and Thirdhand Smoke and Aerosol

People who use tobacco products are not the only ones at risk for negative health effects. Smoking and vaping both release substances into the air other people breathe.

Cigarette smoking produces **secondhand smoke**. People who regularly breathe in secondhand smoke have a greater risk of lung cancer or heart disease. Secondhand smoke is especially dangerous for fetuses, infants, and children (**Figure 5.3.8**).

secondhand smoke

smoke that people inhale involuntarily when someone nearby is smoking

Secondhand Smoke During Pregnancy and Childhood

Fetuses exposed to secondhand smoke during pregnancy

- receive nicotine and carbon monoxide through the placenta, which reduces the amount of oxygen passed to the fetus
- experience increased risk of death, premature birth, or low birthweight

Babies and children exposed to secondhand smoke during pregnancy

- have an increased risk of sudden infant death syndrome (SIDS)
- commonly experience behavior-related issues, including attention deficit disorders, hyperactivity, and aggression

Children exposed to secondhand smoke during childhood

- experience more respiratory conditions such as pneumonia, bronchitis, and asthma attacks
- have higher rates of sore throats and ear infections
- are more likely to develop smoking habits of their own



Anucha Naisuntorn/Shutterstock.com

Figure 5.3.8 Fetuses, infants, and children are especially vulnerable to secondhand smoke, throughout pregnancy and while they grow. Smoking also increases a pregnant person's risk of miscarriage. *Is secondhand aerosol dangerous for fetuses, infants, and children?*

Vaping produces **secondhand aerosol**, which people nearby inhale. According to the US Surgeon General, secondhand aerosol from vaping can contain harmful chemicals. These include nicotine, diacetyl, and heavy metals.

Concerns about the effects of secondhand smoke have led several states to pass laws banning smoking in many public areas. These laws protect the health of customers and staff. Some states have similar laws to protect people from secondhand aerosol.

If you share the air with people who are smoking or vaping, take steps to reduce your risk of exposure:

- Avoid spending time in places that allow smoking and vaping.
- Do not ride with people who smoke or vape while driving.
- Ask that people smoke or vape only outdoors or in a room sealed off from the rest of a home or building.
- Increase air circulation in buildings where people smoke or vape by opening the windows.
- Perhaps most importantly, encourage a friend or family member who smokes or vapes to stop. Support the person's efforts toward quitting.

Thirdhand smoke is the particles and gases left over after a cigarette is extinguished. The particles and gases left over from a vaping device are called *thirdhand aerosol*. The particles in thirdhand smoke and aerosol land and remain on any surface in the area (**Figure 5.3.9**).

Exposure can lead to serious diseases. These include asthma and cancer. These chemicals can even become more dangerous over time.

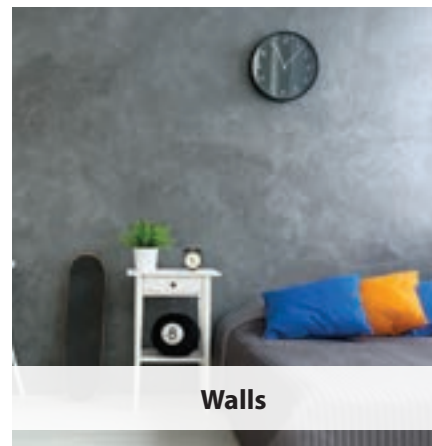
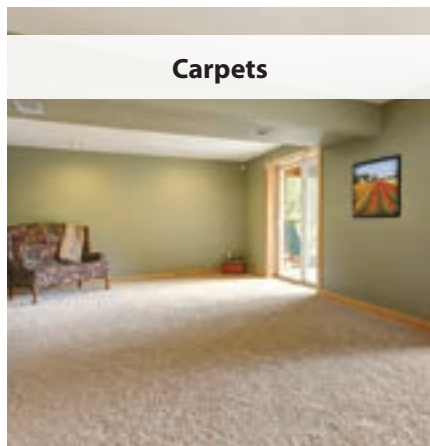
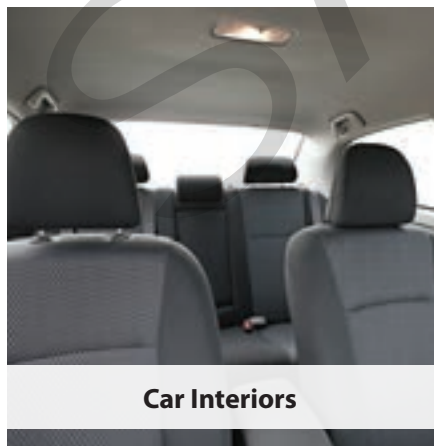
Removing thirdhand smoke and aerosol is extremely challenging. Cleaning methods such as vacuuming, wiping down surfaces, and opening windows do not get rid of the residue. Particles stay behind, even after the smell fades. People are often not aware of their exposure.

The best way to avoid thirdhand smoke and aerosol is not to allow someone to smoke or vape around you. This includes in your home or car.

secondhand aerosol
suspension of fine particles that people inhale involuntarily when someone nearby is vaping

thirdhand smoke
particles and gases left over after someone smokes a cigarette; stays on surfaces nearby

Thirdhand Smoke and Aerosol



Left to right: Peter Gudella/Shutterstock.com; Artazum/Shutterstock.com; Photographee.eu/Shutterstock.com

Figure 5.3.9 The particles and gases left over from cigarettes and vaping devices remain on nearby surfaces and are difficult to clean.

If someone is smoking or vaping around you, reduce your exposure. For example, open the windows in your car or home. You can also shower after exposure.

Tell people about the dangers of thirdhand smoke and aerosol. Many people who smoke or vape do not realize they are harming those around them.

Lesson 5.3 Review and Assessment

Summary

- 5.3-1** A tobacco product is any product made or derived from tobacco and intended for human consumption.
- 5.3-2** Nicotine is toxic. It has severe effects on multiple body systems. Specific tobacco products also have their own health effects and mental, social, and legal consequences.
- 5.3-3** Exposure to secondhand and thirdhand smoke and aerosol can increase the risk of serious diseases and health conditions.

Comprehend Concepts

1. The addictive, toxic substance present in all tobacco products is called (5.3-1)
 - A. carcinogen
 - B. carbon monoxide
 - C. adrenaline
 - D. nicotine
2. Which is *not* a health effect of vaping? (5.3-2)
 - A. Exposure to nicotine
 - B. Inhalation of dangerous chemicals
 - C. Increased risk of respiratory infections
 - D. Decreased risk of addiction
3. A good way to reduce exposure to secondhand smoke is (5.3-3)
 - A. decrease air circulation in buildings
 - B. let people smoke inside
 - C. ride in the car with someone who smokes
 - D. support efforts to quit smoking

Critical Thinking Skills

1. Why might vaping devices be more appealing to teens than regular cigarettes?
2. Explain how using tobacco products negatively affects mental health, family health, and social relationships.
3. Talk with your family to learn about relatives who have been affected by diseases associated with tobacco use. Make a list of family members, their diseases, and whether they used tobacco. Discuss the influence that tobacco use had on these family members and their health.



Health and Wellness Skills

1. **Access Information** Using valid and reliable online and print resources, identify five chemicals commonly found in e-liquids. Choose one to research. Evaluate the resources and use the most credible source. List other products that contain the chemical you chose. Explain how this chemical can harm the body.
2. **Advocate for Health** Talk to your parent or guardian about relatives affected by diseases associated with using tobacco. Use effective communication skills to start this conversation. Ask questions to clarify information. Then, using the information you learn, write a letter to your fellow students about the impact tobacco use can have. Use vocabulary your peers will understand. Tell the story of one of your family members to influence your peers to make positive health choices.