

Section 3

Risks of Tobacco Use

Objectives

Before class begins, write the objectives on the board. Have students copy the objectives into their notebooks at the start of class.

1. Focus

Warm-Up Quick Quiz

Use the **Instruction** clickers to survey student responses.

Presentation EXPRESS

Statement three is the false statement. Explain that treatments exist for emphysema and chronic bronchitis, but no cures. Ask students if they were surprised that any of the other statements were actually true.

Teaching Transparency W55

Connect to YOUR LIFE *Sample answer:* I would use the label "Warning: Smoking these cigarettes can kill you!" I would use this label because tobacco use is the leading cause of preventable death in the United States.

Sensitive Issues

If students have family members with tobacco-related illnesses, the issue of long-term risks of tobacco use may be sensitive to them. Be careful not to imply that the sick individuals are responsible for their own illnesses because they chose to use tobacco. Point out that most older smokers were already addicted to tobacco when they learned of its health risks. Add that most tobacco users wish they had never started using tobacco because it is so hard to stop.

Section 3

Objectives

- **Describe** the long-term health risks of tobacco use.
- **Identify** the long-term risks of exposure to secondhand smoke.
- **Examine** how smoking by a pregnant woman can affect her baby.

Vocabulary

- chronic obstructive pulmonary disease (COPD)
- chronic bronchitis
- emphysema
- leukoplakia
- mainstream smoke
- sidestream smoke
- secondhand smoke

Risks of Tobacco Use

Warm-Up

Quick Quiz All of the following statements are true except for one. Which statement do you think is false?

- 1 In the United States, over 400,000 people die from smoking each year.
- 2 Children of people who smoke have a greater risk of developing asthma.
- 3 Scientists have developed cures for chronic bronchitis and emphysema.
- 4 Smokers die about 13 years earlier than nonsmokers.
- 5 Smokeless tobacco increases one's risk of cardiovascular disease.

WRITING Explain why you gave the answer that you did.



Long-Term Risks

In Section 2, you read about the immediate effects that tobacco has on a person's health. You may have noticed some of these effects, such as stained teeth and bad breath, in tobacco users you know. What you cannot notice, however, is the development of much more serious problems. **With every dose of tobacco, users increase their risk of developing respiratory diseases, cardiovascular disease, and several different forms of cancer.**

Did you know that tobacco use is the leading cause of preventable death in the United States? Cigarette smoking alone is directly responsible for the deaths of over 400,000 Americans each year. Many more people die each year from cigar, pipe, and smokeless tobacco use. More than 6 million children living today may die early because of a decision they will make during their teen years—the decision to use tobacco.

Connect to YOUR LIFE What warning label would you put on cigarette packages? Why?

Focus On ISSUES

L3 Debate: Should Tobacco Be Illegal?

Point out that tobacco is the only legal product that can cause death and disability when used as intended. For this reason, many people think tobacco products should be illegal. Other people think tobacco products should remain legal. They

argue that adults should have the right to do what they want as long as they do not harm others. Assign groups of students to debate this issue. Give groups a chance to present their debate to the rest of the class.



FIGURE 7 Over time, smoking can affect the function of many body systems and processes. Although some of these effects may be merely unpleasant, serious damage to the respiratory system can be life threatening.

Smoking also leads to . . .

- Increased risk of stomach ulcers
- Slower healing of injuries
- Increased colds and flus
- Increased allergies and asthma
- A constant runny nose
- Frequent headaches
- Dulled sense of taste and smell
- Premature wrinkling

Respiratory Diseases

You may know smokers who suffer from a hacking cough that does not go away. “Smoker’s cough” is the result of damage caused by tar. Cells that line the respiratory tract have hairlike extensions called cilia. The cilia move in a sweeping motion and push mucus and particles away from the lungs and toward the throat to be swallowed.

Tar sticks to the cilia, prevents them from moving, and damages them over time. Dust, tobacco smoke toxins, and mucus then accumulate in the airways. Coughing is the body’s attempt to clear the airways.

Tobacco smoke and other accumulating toxins also irritate the lining of the bronchi. Bronchi are the tubes that carry air between the trachea and the lungs. The bronchi become inflamed, which restricts the amount of air that can enter and leave the lungs.

Chronic Obstructive Pulmonary Disease If a person continues to smoke over a long period of time, the damage that occurs to the respiratory system becomes permanent. He or she may develop **chronic obstructive pulmonary disease (COPD)**, a disease that results in a gradual loss of lung function.

COPD develops slowly, but its effects are severe. People with COPD find it difficult to fill their lungs with air. Simple activities, such as climbing stairs, may leave them gasping for breath. Chronic bronchitis and emphysema are two types of COPD. Many people with COPD have both chronic bronchitis and emphysema.

- ▶ **Chronic Bronchitis** In people with **chronic bronchitis**, the airways are constantly inflamed. Over time, mucus-producing cells increase in size and number, producing more and more mucus. The constricted airways and overproduction of mucus make breathing difficult.

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2. Teach

L3 EL Reading/Note Taking 16-3

L2 Adapted Reading/Note Taking 16-3

Long-Term Risks

L3 Building Health Skills

Accessing Information Challenge students to find several recent, reliable statistics about deaths related to tobacco use. (Examples might include: Tobacco kills half of the smokers who do not quit; and almost one in three cancer deaths is due to tobacco use.) Have students use the facts to create a brochure about the dangers of tobacco use. Display the brochures in the classroom. **WRITING**

Respiratory Diseases

L3 Teacher Demo

Obtain a three-dimensional model of the respiratory system from the science department or a physician’s office, hospital, or anti-smoking clinic. Trace the path of smoke into the lungs and point out the respiratory structures that smoke affects. Call on students to describe how the structures are damaged by tobacco smoke.

L2 Building Vocabulary

Students who have had bronchitis may be confused by the use of the term in this context. Explain that it means “inflammation of the bronchi” and can be caused by infection or smoking. When bronchitis is caused by infection, it is called *acute bronchitis* and can be cured with antibiotics. When bronchitis is caused by smoking, it is called *chronic bronchitis* and cannot be cured.

Differentiated Instruction

EL English Language Learners

Some of the section vocabulary terms, including *emphysema* and *leukoplakia*, may be difficult for students to pronounce and learn. Read the vocabulary terms aloud, and ask students to repeat the

terms after you. Students can also make vocabulary flashcards that include phonetic spellings of difficult terms. Pairs of students can practice pronouncing the terms and quiz each other on the definitions.

Hands-On Activity

Make a Model of a Smoker's Lungs

You may want to do this activity as a class demonstration. Use a 1-liter bottle. Rinse and dry both the bottle and cap. The tubing should be 5–10 cm long and about the same diameter as a cigarette. You can use a nail to make the holes in the cap and side of the bottle. Keep the room well ventilated to reduce students' exposure to sidestream smoke.

Make sure you get permission from school administrators before lighting a cigarette on school grounds.

Think and Discuss Answers

1. The cotton ball is brown because it is covered with sticky tar.
2. The inside of the bottle is coated with a brownish gray film of tar.
3. Smoking coats the teeth, throat, and lungs with tar, causing irritation and possibly cancer.

L4 Active Learning

Challenge students to create a model of lungs affected by emphysema. For example, students might use a new balloon to represent a healthy alveolus and a stretched out balloon to represent an alveolus that has lost its shape and elasticity. Torn balloons could represent alveoli that have started to break down. Set aside class time for students to demonstrate their models.

Hands-On Activity

Make a Model of a Smoker's Lungs

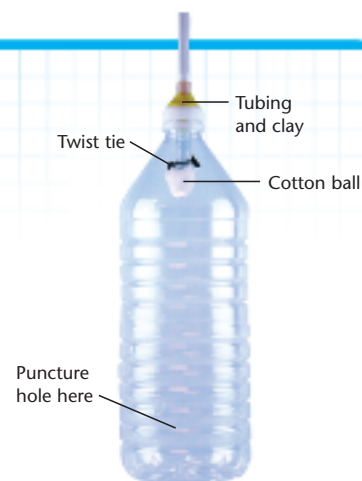
In this activity, you will construct a simple smoking machine to demonstrate how smoking affects the lungs.

Materials

- plastic bottle with cap
- plastic tubing
- clay
- cotton ball
- twist tie
- cigarette
- safety matches

Try This

- 1 Your teacher will make a hole in the bottle cap about the size of the tubing. Your teacher will also poke a hole in the side of the bottle.
- 2 Thread the tubing into the hole in the bottle cap, and seal the edges with clay.
- 3 Place the cotton ball over the tubing on the underside of the cap. Use the twist tie to secure it.
- 4 Insert the cigarette into the other end of the tubing so that the side you light points up.
- 5 Screw the cap onto the bottle.
- 6 Squeeze the bottle to force some air out of it. Then cover the hole with your thumb.
- 7 Have your teacher light the cigarette. With your thumb over the hole, pump the bottle slowly and steadily. This will draw air in through the cigarette.



- 8 When the bottle is full of air, uncover the hole to let some air out. Cover the hole before drawing air in through the cigarette again.
- 9 Your teacher will extinguish the cigarette and dispose of it.

Think and Discuss

- 1 Describe the appearance of the cotton ball after the smoking test.
- 2 What does the inside of the bottle look like?
- 3 Use the model to describe what smoking does to a smoker's teeth, throat, and lungs.

► **Emphysema** Recall that your lungs contain millions of tiny alveoli, or air sacs. Normally, the alveoli expand as you breathe in oxygen and contract as you breathe out carbon dioxide. Tobacco smoke damages alveoli tissue. The damage can lead to **emphysema**, a disorder in which alveoli in the lungs can no longer function properly.

With emphysema, the alveoli lose shape and elasticity. Less oxygen can get into the alveoli and less carbon dioxide can get out. Eventually, the alveoli walls start to break down, which reduces the area in which gas exchange can occur. As a result, people with emphysema are always short of breath.

COPD Treatments Cigarette smoking is responsible for about 90 percent of all COPD deaths. Although there is no cure for COPD, quitting smoking will prevent symptoms from getting worse. Treatments focus on relieving symptoms and slowing the progress of the disease. Possible treatments include medications that open airways, breathing exercises, oxygen treatments, and in severe cases, lung transplants.

WRITING and Health

L3 Public Service Announcement

Have groups of students write a public service announcement segment that warns about the long-term risks of smoking on the cardiovascular system. The PSA should mention increased risks of high blood

pressure, high blood cholesterol, atherosclerosis, heart attack, and stroke. Arrange to have students present their PSAs at a meeting of the school board or parent-teacher organization.

Cardiovascular Disease

Cardiovascular disease—diseases of the heart and blood vessels—kill about 138,000 smokers in the United States every year.

- ▶ A smoker is two to three times more likely to have a heart attack than a nonsmoker.
- ▶ Cigarette smoking doubles a person's chances of suffering a stroke.
- ▶ Smokers are 10 times more likely to develop circulation problems in blood vessels that bring blood to the stomach, kidneys, legs, and feet.

These statistics are not surprising when you consider the damage that substances in tobacco products do to the heart and blood vessels. **The combined effects of nicotine, tar, and carbon monoxide force the cardiovascular system to work harder to deliver oxygen throughout the body.** Tobacco use also raises blood pressure, which, over time, weakens blood vessels and places strain on many organs.

Studies also show that the chemicals in tobacco smoke increase blood cholesterol levels and promote atherosclerosis—the thickening and hardening of artery walls. In addition, nicotine increases the blood's tendency to clot. Clots may block blood flow through narrowed arteries, leading to a heart attack or stroke.



How do you think smoking would affect your ability to stay active as you age?

Cancer

Both tobacco smoke and smokeless tobacco contain many ingredients that are known carcinogens. **Tobacco use is a major factor in the development of lung cancer, oral cancers, and several other cancers.**

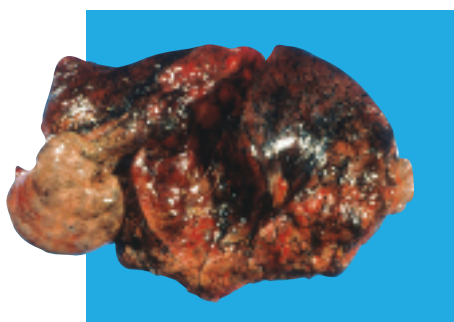
Many factors influence a tobacco user's risk of developing cancer. Some of these factors include when the person started using tobacco, how much tobacco the person has used, and how often the person is exposed to other people's smoke.

FIGURE 8 Most smokers are not fully aware of the damage occurring to their lungs until it is too late.

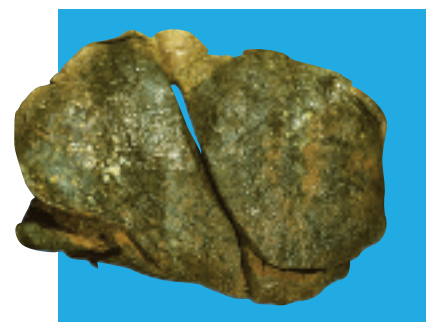
Comparing and Contrasting Compare the lungs of a person with emphysema and a person with lung cancer to the healthy lung.



▲ Healthy lung



▲ Lung with emphysema



▲ Lung with cancer

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Cardiovascular Disease

L4 Building Health Skills

Communicating Have students make an intricate, illustrated concept map that demonstrates how the various risk factors for cardiovascular disease are related to or compounded by smoking. For example, three risk factors for cardiovascular disease are high blood pressure, high blood cholesterol levels, and physical inactivity. Concept maps should indicate smoking increases blood pressure and blood cholesterol. Smokers are also less able to be physically active.

L3 Cultural Connection

Some groups have high rates of certain conditions that can be worsened by smoking. For example, African Americans have high rates of high blood pressure compared to many other groups. Ask: **How might smoking affect someone with high blood pressure?** (*It might make the person's blood pressure higher and increase the risk of heart attack and stroke.*)



Sample answer: It would make it harder to stay active, because I would be out of breath and my heart would be unhealthy.

Cancer

L3 Class Discussion

Ask students to recall from Chapter 1 the kinds of factors that influence health. (*heredity, physical and social environments, culture, media, technology, healthcare, behavior*) Ask: **Which factors that influence a person's cancer risk are discussed on this page?** (*social and physical environments, behavior*) **What other factors might influence a tobacco user's risk of cancer?** (*heredity, other physical environment factors such as air pollution*)

L1 Visual Learning: Figure 8

Ask a student to answer the caption question. Ask other students to explain why the lungs of people with cancer or emphysema look so different from the healthy lung.

Caption Answer Sample answer: The lungs of people with emphysema or cancer look misshapen and discolored.

Differentiated Instruction

L2 Less Proficient Readers

Have students make graphic organizers of the effects of smoking on the cardiovascular system. Tell students to include as many as possible of the following terms and phrases: *smoking, cardiovascular system, heart, blood vessels, heart attack, stroke,*

circulation problems, high blood pressure, high blood cholesterol, atherosclerosis, increased clotting. Check that students' completed graphic organizers accurately represent the relationships among the terms and phrases.

L2 Teacher Demo

Print images of leukoplakia from the Internet. Pass the pictures around the class for students to examine. Whether or not students remember the term *leukoplakia*, they should remember what the condition looks like and that it may lead to cancer. Tobacco use leads to most cases of leukoplakia, but badly-fitted dentures and long-term alcohol use are other causes. People with an impaired immune system may have a similar condition called hairy leukoplakia. Point out that leukoplakia requires medical attention.

L2 Class Discussion

Discuss how smoking causes cancer in organs other than the lungs and mouth. Ask: **How can smoking cause cancer in organs that smoke does not contact, such as the pancreas and blood?** (*Carcinogens in smoke enter the blood through the lungs and travel throughout the body.*)

Secondhand Smoke**EL Building Vocabulary**

Have students make a concept map showing their understanding of the terms *mainstream smoke*, *sidestream smoke*, and *secondhand smoke*. Concept maps should show that secondhand smoke consists of mainstream smoke and sidestream smoke. Concept maps should also show how mainstream and sidestream smoke differ. Suggest that students save their concept maps for section and chapter reviews.

Lung Cancer Lung cancer is the leading cause of cancer death for both women and men. Scientists estimate that more than 85 percent of all deaths caused by lung cancer are related to smoking. Unfortunately, by the time most lung cancers are diagnosed successful treatment is unlikely. Only 15 percent of lung cancer patients survive for more than five years.

Oral Cancer Smoking and smokeless tobacco are also associated with oral cancers—cancers of the mouth, tongue, and throat. About 90 percent of oral cancers occur in people who use or have used tobacco. The survival rate for oral cancer is higher than for lung cancer. However, surgery to remove the cancer may be disfiguring.

Tobacco users may develop white patches on their tongues or the lining of their mouths called **leukoplakia** (loo koh PLAY kee uh). Because the sores sometimes become cancerous, they should be monitored by a doctor.

Other Cancers Tobacco carcinogens affect many organs in the body. As a result, tobacco users also have an increased risk of cancers of the esophagus, larynx, stomach, pancreas, kidney, bladder, and blood, among other sites.

Secondhand Smoke

When a person smokes, smoke enters the air from two sources. **Mainstream smoke** is exhaled from a smoker's lungs. Both the cigarette filter and the smoker's lungs trap a lot of substances before they can enter the air in mainstream smoke. The other source, **sidestream smoke**, is smoke that goes into the air directly from the cigarette. Sidestream smoke contains twice as much tar and nicotine as mainstream smoke.

The combination of mainstream and sidestream smoke is called **secondhand smoke**, or environmental tobacco smoke. Secondhand smoke is inhaled by everyone near the smoker.



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TEENS Are Asking ...

Q: I live with a parent who smokes. How can I reduce my risk of health problems due to secondhand smoke?

A: Start by trying to convince your parent to quit smoking. Encouragement generally works better than nagging. However, if that doesn't work, try to persuade your parent to stop smoking inside the house and car. It may help if you explain the health problems

associated with secondhand smoke. If your parent continues to smoke inside, try to reduce your exposure to the smoke by going to your room, taking a walk outside, or opening a window when your parent lights up. Also, make sure you eat fruit. Studies suggest that the fiber in fruit might help protect lungs from damage due to childhood secondhand smoke exposure.

Dangers of Secondhand Smoke Long-term exposure to secondhand smoke can cause cardiovascular disease, many respiratory problems, and cancer. In fact, secondhand smoke exposure increases the risk of a sudden heart attack by about 30 percent. Each year, secondhand smoke causes about 50,000 deaths from heart attacks and lung cancer.

Children are especially vulnerable to secondhand smoke. Each year, secondhand smoke contributes to about 300,000 respiratory infections in children younger than 18 months. Children who are exposed to secondhand smoke are more likely to develop allergies and asthma. Their asthma symptoms are more likely to be worse than those of children who are not exposed. Inhaled secondhand smoke can cause recurring, long-lasting ear infections—a leading cause of hearing loss.

Avoiding Secondhand Smoke Although secondhand smoke is still a serious problem, great progress has been made to eliminate it. Federal, state, and local laws now prohibit or restrict smoking in many public places and workplaces. As smoking becomes less socially acceptable, smoking in public will become even less common.

Breathing clean air is a serious issue for everyone. The government and several health organizations have made great strides to protect you from secondhand smoke. But it is important that you also protect yourself.

- ▶ Ask smokers not to smoke around you.
- ▶ Be firm when telling guests that they can't smoke in your home or car.
- ▶ Pick restaurants that do not allow smoking or at least sit in no-smoking areas.

**Connect to
YOUR LIFE**

Describe how you feel when you are exposed to secondhand smoke.

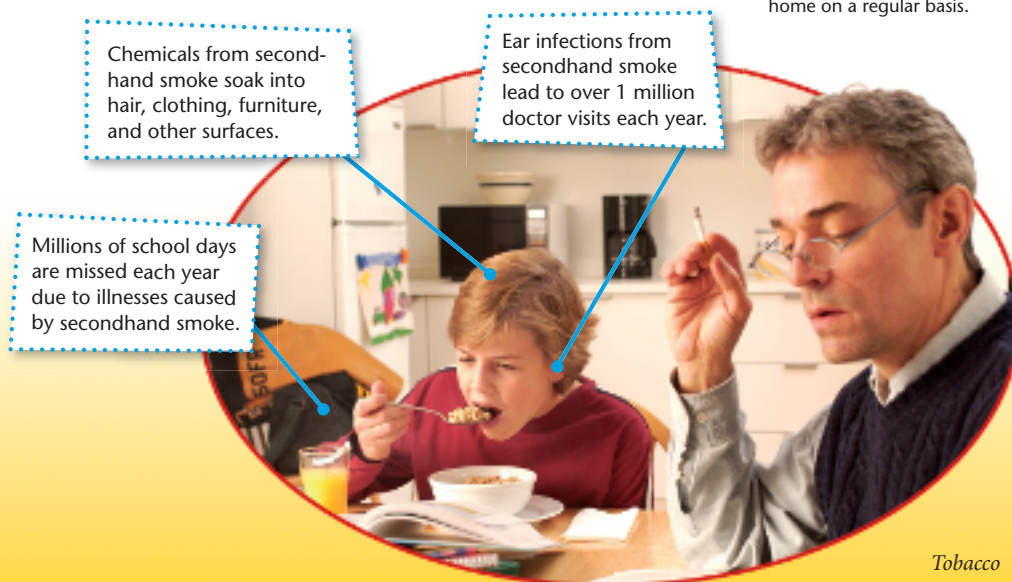


FIGURE 9 About 35 percent of children in the United States are exposed to secondhand smoke at home on a regular basis.

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Go online

PLANETDIARY

For: More on secondhand smoke

Visit: PHSchool.com

Web Code: ctd-5163

L3 Online Activity



Use the Web Code to access an online activity about secondhand smoke. Have students complete the Web activity.

L3 Building Health Skills

Advocacy Have students write a letter to the editor of a local newspaper encouraging smokers in their community to protect the people around them from secondhand smoke. Letters should identify the dangers of secondhand smoke, especially to infants and children. Ask pairs of students to exchange and critique each other's letters. Then, encourage students to send their letters to the editor. **WRITING**

L2 Journal Writing

Ask students to write a journal entry describing situations in which they are exposed to secondhand smoke. For each situation, have them describe a way they could reduce their exposure. (e.g., *If a friend or relative smokes, they could ask the person to smoke outside.*) **WRITING**

**Connect to
YOUR LIFE**

Students might say they feel irritated by the smoke and annoyed by the smokers.

Differentiated Instruction

L4 Gifted and Talented

Ask students who need an extra challenge to work together to create a Web site about secondhand smoke that uses a question-and-answer format. Suggest that they first learn more about the problem by visiting Web sites of the American Lung Association, Environmental Protection Agency, or similar organizations. Tell students that their Web

sites should inform people of the dangers of secondhand smoke and suggest ways to reduce the dangers. Supervise their efforts to make sure the information they post is reliable and accurately represented. Encourage other class members to visit students' Web sites. **WRITING**

Tobacco Use and Pregnancy

L1 Visual Learning: Figure 10

Have students read the warning label for pregnant women. Then have them skim the text to find additional problems that may result when pregnant women smoke cigarettes. Ask students to rewrite the warning label so that it also includes these other problems. **WRITING**

3. Assess

Evaluate

These assignments can help you assess students' mastery of the section content.

Section 3 Review

Answers appear below.

Teaching Resources

- Practice 16-3
- Section 16-3 Quiz



L2 Reteach

Have students use the major headings in this section to make an outline they can use to study for a test. Their outlines should include all of the vocabulary terms.

L4 Enrich

Teaching Resources

- Enrich 16-3

Health at School

Anti-Smoking Quotes Suggest that students interview at least ten students. Remind students that the quotes should be suitable for younger children. Help students arrange to share their brochures with students in lower grades.



SURGEON GENERAL'S WARNING: Smoking Causes Lung Cancer, Heart Disease, Emphysema, and May Complicate Pregnancy.

SURGEON GENERAL'S WARNING: Smoking By Pregnant Women May Result in Fetal Injury, Premature Birth, and Low Birth Weight.

FIGURE 10 Despite warning labels, some pregnant women continue to smoke. However, the numbers are falling.

Tobacco Use and Pregnancy

Many of the harmful chemicals in tobacco smoke pass directly from a pregnant woman to her developing baby. **Pregnant women who smoke put their babies at risk for many health problems.** Tobacco smoke increases the baby's heart rate, reduces the baby's oxygen supply, and slows cell growth.

The babies born to mothers who smoke weigh, on average, six ounces less than the babies of nonsmokers. Low birthweight is a risk factor for many problems that could affect a baby throughout his or her entire life.

- ▶ Cerebral palsy
- ▶ Sight impairment
- ▶ Hearing problems
- ▶ Learning difficulties

Pregnant women who smoke also have higher rates of miscarriages, premature births, and stillbirths than women who do not smoke. Babies whose mothers smoked during pregnancy are also at much higher risk for sudden infant death syndrome (SIDS). SIDS is an unexplained disorder in which a seemingly healthy baby dies suddenly, usually while sleeping.

In addition, nursing mothers who smoke produce less milk than nonsmoking mothers. The nicotine in their milk can cause vomiting and diarrhea in nursing babies.

Section 3 Review

Key Ideas and Vocabulary

1. What are three long-term health risks associated with smoking?
2. Describe **leukoplakia**. Why should leukoplakia be monitored by a healthcare professional?
3. Identify three health risks associated with exposure to secondhand smoke.
4. List four problems for which babies of smoking mothers are at risk.

Critical Thinking

5. **Relating Cause and Effect** Do you think that smokers are also vulnerable to the dangers of secondhand smoke? Explain.

Health at School

Anti-Smoking Quotes Interview your peers who do not use tobacco. Ask them to describe how and why they made their decision. Create a brochure containing the most notable quotes along with related facts about tobacco. Do not use students' names. Work with your teacher to find out how you can share your brochure with younger students. **WRITING**

6. **Evaluating** People who fight for the rights of smokers claim that smoking is a personal choice and that they should be allowed to smoke anywhere they want to. Do you agree with this argument? Why or why not? **WRITING**

Section 3 Review

1. respiratory diseases, cardiovascular disease, and several forms of cancer
2. white patches on the tongue or lining of the mouth; the patches can become cancerous
3. cardiovascular disease, respiratory problems, and cancer
4. *Any four:* low birthweight, cerebral palsy, sight impairment, hearing problems, learning difficulties, sudden infant death syndrome
5. *Sample answer:* yes, because they also breathe their own sidestream smoke
6. *Sample answer:* I think this argument is flawed, because it does not address the rights of nonsmokers, who deserve to be protected from secondhand smoke.