

**Chapter 23**

## Communicable Diseases

**Chapter 24**

## Sexually Transmitted Diseases and HIV/AIDS

**Chapter 25**

## Noncommunicable Diseases and Disabilities

**UNIT PROJECT****Building Healthy Communities**

**Using Visuals** **Special Olympics** provides year-round sports training and athletic competition to over 2.25 million people with intellectual disabilities. The nonprofit organization relies on the time, energy, and enthusiasm of its volunteers.



To learn more about the goals of Special Olympics, use this code to go to the Unit Web Project at [glencoe.com](http://glencoe.com).

**Get Involved.** Conduct research on other organizations in your community that help people affected by disease or disability. Contact one organization and find out how teens can volunteer to help.





***“The future depends on what we do in the present.”***

*— Mahatma Gandhi, early 20th-century philosopher and peace activist*





# Communicable Diseases

## Lesson 1

### Understanding Communicable Diseases

**BIG Idea** Learning about communicable diseases and how they spread can help you prevent them.

## Lesson 2

### Common Communicable Diseases

**BIG Idea** You can lower your chances of catching a communicable disease by learning about the causes and symptoms of these diseases, and how to avoid them.

## Lesson 3

### Fighting Communicable Diseases

**BIG Idea** By learning about and practicing prevention strategies, you can help your body stay healthy.

## Lesson 4

### Emerging Diseases and Pandemics

**BIG Idea** Today, infectious diseases have the potential to spread quickly throughout the world.

## Activating Prior Knowledge

**Using Visuals** Take a look at the photo on this page. Why do you think this teen is at a doctor's office? Have you ever felt the way she does? What did you do to get better? Explain your thoughts in a short paragraph.





# Chapter Launchers

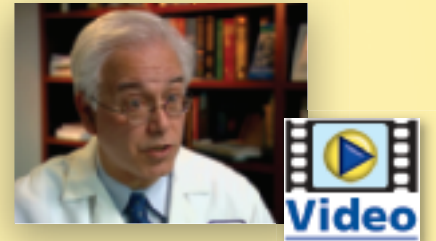
## Health in Action

### Discuss the **BIG** Ideas

Think about how you would answer these questions:

- ▶ How often do you get a cold or the flu?
- ▶ How do you think you get these illnesses?
- ▶ What do you do to recover from them?

### Watch the **Health eSpotlight** Video Series



The Lesson 4 video shows how new medical advances are fighting pandemics. Watch the other videos to learn about topics in this chapter.

### Assess Your Health



**QuickPass**™ GH2011C23S

Visit [glencoe.com](http://glencoe.com) and use this code to access chapter videos, Health Inventories, and other features.



# LESSON 1

# Understanding Communicable Diseases



## GUIDE TO READING

**BIG Idea** Learning about communicable diseases and how they spread can help you prevent them.

### Before You Read

#### Create a T-Chart.

Make a T-chart and label the columns “How communicable diseases are caused” and “How communicable diseases are spread.” As you read, fill in the chart with information about both topics.

Causes	Ways Spread

### New Vocabulary

- ▶ communicable disease
- ▶ infection
- ▶ virus
- ▶ bacteria
- ▶ toxins
- ▶ vector

### Review Vocabulary

- ▶ pathogens (Ch.15, L.1)

### Real Life Issues

**Taking Precautions.** Nolan is very excited about his family’s upcoming vacation in Central America because it will be his first time outside the United States. His friends warn him to be careful about drinking unbot-tled water while in Central America. They say the water might not be safe to drink. Nolan wonders what precautions he can take.



**Writing** Write a paragraph explaining how Nolan might prepare for the trip. Suggest places where he could find information about potential health risks and how to avoid them.

## Understanding the Causes of Communicable Diseases

**Main Idea** Communicable diseases are caused by several kinds of microorganisms.

You’ve probably “caught” an illness from someone before. The illness you contracted was a **communicable disease**, a disease that is spread from one living organism to another or through the environment. Such illnesses are also known as *contagious* and *infectious* diseases.

Communicable diseases can occur when pathogens, microorganisms that cause disease, enter your body. If your body does not fight off the invaders quickly and successfully, you develop an **infection**, a condition that occurs when pathogens in the body multiply and damage body cells. **Figure 23.1** lists diseases caused by common pathogens, which include viruses, bacteria, fungi, protozoa, and rickettsias.



## Viruses

Two of the most common communicable diseases—the cold and the flu—are caused by viruses. A **virus** is a *piece of genetic material surrounded by a protein coat*. In order to reproduce, viruses invade the cells of living organisms.

Once a virus has penetrated a cell, it begins to multiply. The new viruses burst out of the cell and start taking over other cells. As the virus multiplies and spreads, disease sets in, and the body’s immune system jumps into action. Usually, the virus runs its course and is killed by the immune system. Antibiotics do not work against viruses, but can sometimes treat the symptoms of a virus.



### READING CHECK

**Describe** How does a virus affect the body?

## Bacteria

**Bacteria** are *single-celled microorganisms* that live almost everywhere on earth. Most bacteria are harmless. Some are even helpful, like the ones that help you digest food. Unfortunately, some bacteria do cause diseases.

Disease-causing bacteria can produce **toxins**, *substances that kill cells or interfere with their functions*. Unlike diseases caused by viruses, a bacterial disease can often be treated with antibiotics. However, because of the overuse of these drugs, some bacteria have become resistant to antibiotics as they have evolved.



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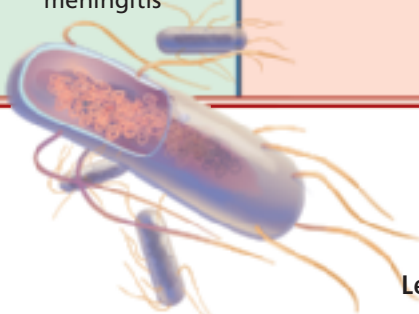
Visit [glencoe.com](http://glencoe.com) and use this code to complete the Student Web Activity on drug-resistant bacteria.

**Figure 23.1**

## Diseases by Type of Pathogen

Every common communicable disease can be traced to a particular type of pathogen. *Which of the diseases listed here have you experienced?*

Viruses	Bacteria	Fungi	Protozoa	Rickettsias
<ul style="list-style-type: none"> <li>• common cold</li> <li>• influenza (flu)</li> <li>• viral pneumonia</li> <li>• viral hepatitis</li> <li>• polio</li> <li>• mononucleosis</li> <li>• measles</li> <li>• AIDS</li> <li>• viral meningitis</li> <li>• chicken pox</li> <li>• herpes</li> <li>• rabies</li> <li>• smallpox</li> <li>• West Nile virus</li> </ul>	<ul style="list-style-type: none"> <li>• bacterial foodborne illness</li> <li>• strep throat</li> <li>• tuberculosis</li> <li>• diphtheria</li> <li>• gonorrhea</li> <li>• Lyme disease</li> <li>• bacterial pinkeye</li> <li>• bacterial pneumonia</li> <li>• bacterial meningitis</li> </ul>	<ul style="list-style-type: none"> <li>• athlete’s foot</li> <li>• ringworm</li> <li>• vaginal yeast infection</li> </ul>	<ul style="list-style-type: none"> <li>• malaria</li> <li>• amoebic dysentery</li> <li>• sleeping sickness</li> </ul>	<ul style="list-style-type: none"> <li>• typhus</li> <li>• Rocky Mountain spotted fever</li> </ul>





## Other Pathogens

Other types of organisms that can cause communicable diseases include the following:

- **Fungi** are plantlike organisms that can cause diseases of the lungs, the mucous membranes, and the skin. Athlete's foot is a common fungal disease.
- **Protozoa** are single-celled microorganisms that are larger and more complex than bacteria. Malaria is an example of a disease caused by protozoa.
- **Rickettsias**, which resemble bacteria, often enter the body through insect bites. Typhus is caused by rickettsias.

## How Diseases Spread

**Main Idea** Diseases can be transmitted in a variety of ways.

Pathogens infect humans and other living things in a variety of ways. Knowing how diseases are transmitted is your first line of defense against them.

### Direct Contact

Many pathogens are transmitted through direct contact with an infected person. This includes touching, biting, kissing, and sexual contact. Other transmission methods include

- **puncture wounds.** A person can get tetanus from stepping on a rusty nail.
- **childbirth.** A pregnant woman may transmit an infection to her unborn child through the placenta.
- **contact with infected animals.** Animal bites and scratches can sometimes transmit disease.

### Academic Vocabulary

**contact** (*noun*): union or touching of surfaces

### Indirect Contact

You don't have to be in direct **contact** with a person to become infected. Indirect contact can be just as dangerous.

**Contaminated Objects** If you touch a contaminated object (for example, a doorknob), you could pick up pathogens. The pathogens can enter your body if you then rub your eyes. To protect yourself, keep your hands away from your mouth, nose, and eyes, and wash your hands regularly.

**Vectors** Pathogens are often spread by a **vector**, *an organism that carries and transmits pathogens to humans or other animals*. Common vectors include flies, mosquitoes, and ticks. Diseases that spread this way, such as malaria, West Nile virus, and Lyme disease, are called *vector-borne* diseases.



**Contaminated Food and Water** When food is improperly handled or stored, harmful bacteria can develop. This is true not only for meat and fish but for fruits and vegetables as well. Water supplies that become contaminated with human or animal feces can also cause illnesses such as hepatitis A.



## READING CHECK

**Identify** List three ways communicable diseases can be spread.

## Airborne Transmission

When an infected person sneezes or coughs, pathogens are released into the air as tiny droplets that can travel as far as 10 feet. Even when the droplets evaporate, the pathogens may float on dust particles until they are inhaled. Other pathogens such as fungal spores are also small enough to spread this way. Diseases spread by airborne transmission include chicken pox, tuberculosis, influenza, and inhalation anthrax.

## Taking Precautions

**Main Idea** You can take steps to prevent infection.

There is no guaranteed way to avoid communicable diseases completely, but a few simple practices can dramatically reduce your risk. As you learn about these practices, think about how you can include them in your daily life.

## Wash Your Hands

Washing your hands regularly with soap and warm water is the single most effective way to protect yourself from catching or spreading disease. Always wash your hands

- before you eat.
- after you use the bathroom.
- after handling pets.
- before and after inserting contact lenses or applying makeup.
- after touching an object handled by an infected person.

■ **Figure 23.2** Japan is known for being a very polite society. People who have colds or the flu often wear masks when they go outdoors. *Why do you think people in some cultures wear masks when they are ill?*



## Protect Yourself from Vectors

Some vector-borne diseases, such as West Nile virus and bird flu, are on the rise. To protect yourself, follow these steps:

- Limit the time you spend outdoors at dawn and dusk, when mosquitoes are most active.
- Wear pants and long-sleeved shirts to avoid insect bites.
- Use insect repellent, and avoid contact with dead birds.

## Other Prevention Strategies

These additional strategies will also help reduce your risk of getting or spreading communicable diseases:

- Avoid sharing personal items, such as eating utensils.
- Handle food properly. (See Chapter 10, Lesson 4.)
- Eat well and exercise. Getting the nutrients your body needs and staying fit will help you fight against infection.
- Avoid tobacco, alcohol, and other drugs.
- Abstain from sexual contact.
- Cover your mouth when you cough or sneeze, and wash your hands after using a tissue.



### READING CHECK

**Explain** How do a healthful diet and regular physical activity help you avoid communicable diseases?

## LESSON 1 ASSESSMENT



Visit [glencoe.com](http://glencoe.com) and use this code to complete the Interactive Study Guide for this lesson.



### After You Read

#### Reviewing Facts and Vocabulary

1. Define the word *communicable*.
2. List three ways that communicable diseases are spread through indirect contact.
3. How is a virus different from bacteria?

#### Thinking Critically

4. **Analyze.** The fungus that causes athlete's foot lives in warm, moist places. What can you do to reduce your risk of infection when you are in gym locker rooms or other public places?
5. **Synthesize.** If you had a cold, what actions would you take to prevent spreading the illness to other people?

#### Applying Health Skills

##### 6. Practicing Healthful Behaviors.

Create an e-mail announcement that your school could send to parents at the beginning of the school year. In your e-mail, give strategies for avoiding communicable diseases such as the flu or the common cold.

#### Writing Critically

7. **Narrative.** Write a short story from the point of view of bacteria or a virus. Describe how the bacteria or virus finds its way into someone's body, and what happens when it gets there.

#### Real Life Issues .....

After completing the lesson, review and analyze your response to the Real Life Issues question on page 628.



# Common Communicable Diseases

GUIDE TO READING 

**BIG Idea** You can lower your chances of catching a communicable disease by learning about the causes and symptoms of these diseases, and how to avoid them.

**Real Life Issues** .....

**Passing It On.**

Students miss nearly 22 million school days each year due to the common cold.

More than 200,000 people in the U.S. are hospitalized for the flu each year.

Source: Centers for Disease Control and Prevention, Seasonal Flu Information for Schools & Childcare Providers.

**Writing** Write a paragraph explaining how you can protect yourself and others from the spread of illnesses.

**Before You Read**

**Create a K-W-L Chart.** Make a three-column chart. In the left column, write what you know about common communicable diseases. In the middle column, write what you want to know about these diseases. As you read, use the third column to summarize what you learned.

K	W	L

## Respiratory Infections

**Main Idea** Many diseases begin as respiratory infections.

Many communicable diseases occur in the **respiratory tract**, the passageway that makes breathing possible. This passageway includes the nose, throat, and lungs. The respiratory tract connects the outside world to the inside of your body. However, a few habits can help you avoid getting sick:

- Avoid close contact with sick people. If you're ill, stay home.
- Wash your hands often.
- Avoid touching your mouth, eyes, and nose.
- Eat right and get physical activity to strengthen your immune system.
- Abstain from smoking.

Colds, influenza, pneumonia, strep throat, and tuberculosis are the most common respiratory infections.

**New Vocabulary**

- ▶ respiratory tract
- ▶ mucous membrane
- ▶ pneumonia
- ▶ jaundice
- ▶ cirrhosis



I'm always on the go . . . even when I'm sick. I had a bad cold two weeks ago, but I didn't let that stop me from working out. Unfortunately, it made me feel worse. My doctor says that when you're sick, exercise puts extra stress on the body and the immune system. This may drag out illnesses. Next time I get sick, I'm going to rest until I feel better. For more fitness tips, visit the Online Fitness Zone at [glencoe.com](http://glencoe.com).

## Common Cold

The common cold is a viral infection that causes inflammation of the **mucous membrane**, *the lining of various body cavities, including the nose, ears, and mouth*. Sneezing, a sore throat, and a runny nose are the most common symptoms. Cold germs spread through direct contact with an infected person, indirect contact with contaminated objects, or airborne transmission.

Because a cold is caused by a virus, there is no cure. Your body has to fight off the infection. The best treatment is to get plenty of rest and drink liquids.

## Influenza

Influenza, or the flu, is a viral infection of the respiratory tract. Symptoms include high fever, fatigue, headache, muscle aches, and coughing. Like the common cold, the flu can spread through the air or through direct or indirect contact.

Because the flu is a viral infection, antibiotics can't cure it. Antiviral drugs may be effective in treating flu symptoms if taken early enough. Usually, though, most people treat the flu with proper nutrition, plenty of rest, and lots of liquids. Many people choose to get a flu vaccination once a year. This shot protects you from one type of flu virus that may be common that year. Getting a yearly flu vaccine is especially important for older adults and people with chronic health problems.

## Pneumonia

In severe cases, the flu can lead to **pneumonia**, *an infection of the lungs in which the air sacs fill with pus and other liquids*. Its symptoms are similar to those of the flu, which means that sometimes people can have pneumonia without realizing it. People who are vulnerable to pneumonia include older adults and those who already have the flu.

Pneumonia can be caused by a virus or by bacteria. Viral pneumonia is sometimes treated with antiviral drugs. Bacterial pneumonia, if diagnosed early enough, can be treated with antibiotics. Pneumonia can be fatal, especially when it strikes older adults and people with lung or heart problems.

## Strep Throat

Strep throat is a bacterial infection spread by direct contact with an infected person or through airborne transmission. Symptoms include sore throat, fever, and enlarged lymph nodes in the neck. Left untreated, strep throat can lead to serious conditions, including heart damage. Strep throat can be treated with antibiotics.



### READING CHECK

**Identify** Name at least three respiratory infections.





■ **Figure 23.3** There are many methods of spreading communicable diseases. *What can you do every day to reduce your risk of infection?*

## Tuberculosis

Tuberculosis, or TB, is a bacterial disease that usually attacks the lungs. It spreads through the air and typically affects people with weak immune systems. Symptoms include fatigue, coughing, fever, weight loss, and night sweats.

TB is treated with antibiotics. Because some strains have become resistant, doctors sometimes have to prescribe several antibiotics at one time to see which kind will work for an individual. TB infections have dropped significantly in the United States during the last 60 years due to the development of antibiotics. Most people who are infected with TB bacteria never actually develop the disease because their immune systems prevent the bacteria from multiplying and spreading. However, the disease continues to be a serious health problem worldwide, especially among people with other viral infections such as HIV.



Explore [glencoe.com](http://glencoe.com) and use this code to complete the Student Web Activity on germ transmission and prevention strategies.

## Hepatitis

**Main Idea** There are three common types of hepatitis.

Hepatitis is a viral infection that causes inflammation of the liver. There are at least five different kinds of hepatitis, but the most common are types A, B, and C. Symptoms include **jaundice**, a yellowing of the skin and eyes. Some people also develop **cirrhosis**, or scarring of the liver. Vaccines are available for hepatitis A and B, but because the disease comes from a virus, there is no cure.

- **Hepatitis A** usually attacks the digestive system through contact with the feces of an infected person. Common symptoms include fever, vomiting, fatigue, abdominal pain, and jaundice. The best ways to avoid hepatitis are to stay away from people already infected and to wash your hands thoroughly after using any public restroom.



## READING CHECK

**Identify** Which of the body's organs is affected by hepatitis?

- **Hepatitis B** has symptoms similar to those of hepatitis A, but it can cause liver failure and cirrhosis. This virus can be spread through sexual contact or contact with an infected person's blood. You can avoid getting hepatitis B by not sharing personal care items such as razors and toothbrushes, by abstaining from sexual activity and use of illegal drugs, and by not getting tattoos and body piercings.
- **Hepatitis C** is the most common blood-borne infection in the United States. Symptoms include jaundice, dark urine, fatigue, abdominal pain, and loss of appetite. Hepatitis C can lead to chronic liver disease, liver cancer, and liver failure. The disease is most often spread by direct contact with needles that are contaminated with infected blood. You can lower your chances of infection by not sharing personal care items and abstaining from illegal drug use and sexual activity.

## Other Communicable Diseases

**Main Idea** Stay informed about communicable diseases.

Respiratory infections and hepatitis are the most common communicable diseases, but there are many more. The more you know about these diseases and how they are transmitted, the better your chances of not getting them. **Figure 23.4** provides information about additional communicable diseases.

Figure 23.4

### Common Communicable Diseases

	Mononucleosis	Measles	Encephalitis	Meningitis	Chicken pox
Type/ Transmission	Virus; spread by direct contact, including sharing eating utensils and kissing	Virus; spread by coughs, sneezes, or a person talking	Virus; carried by mosquitoes	Virus or bacteria; spread by direct or indirect contact	Virus; spread through air or contact with fluid from blisters
Symptoms	Chills, fever, sore throat, fatigue, swollen lymph nodes	High fever, red eyes, runny nose, cough, bumpy red rash	Headache; fever; hallucinations; confusion; paralysis; disturbances of speech, memory, behavior, and eye movement	Fever, severe headache, nausea, vomiting, sensitivity to light, stiff neck	Rash, itching, fever, fatigue
Treatment/ Prevention	Rest if tired	No definite treatment; vaccine for prevention	If caused by herpes simplex virus, antiviral medicine; if caused by another virus, no known treatment	Viral meningitis: antiviral medicine if severe; bacterial meningitis: antibiotics; vaccine available	Rest, stay home so others aren't infected; vaccine available



## Decision Making

### Caring for Your Immune System

It's Friday night, and Zoë is at home trying to rest. She feels feverish and fatigued. Her phone rings. She blows her nose and answers it.

"Hey, Zoë! It's Elisabeth. Your birthday's tomorrow—are we all still going to the Ice Cream Company for one of those 12-person sundaes? That was so fun last year!"



"I don't know, Elisabeth," Zoë says. "I feel terrible, and I don't want to spread my germs around. I should stay home."

Elisabeth doesn't give up. "But it's your birthday! Nobody's going to get sick. Come on, we're counting on you!"

"I'll think about it," Zoë replies. "Let me call you back later."

**Writing** Write a paragraph in which Zoë explains her decision to Elisabeth. Use the six steps of decision making as a guideline:

1. State the situation.
2. List the available options.
3. Weigh the possible outcomes of each option.
4. Consider your values.
5. Make a decision, and act on it.
6. Evaluate the decision.

## LESSON 2 ASSESSMENT



Visit [glencoe.com](http://glencoe.com) and use this code to complete the Interactive Study Guide for this lesson.

### After You Read

#### Reviewing Facts and Vocabulary

1. How is a common cold different from the flu?
2. What are three ways to prevent a respiratory tract infection?
3. Can hepatitis be treated successfully with antibiotics? Explain.

#### Thinking Critically

4. **Explain.** Why do you think the respiratory tract is where most infections from communicable diseases occur?
5. **Cause and Effect.** How does hepatitis spread from one illegal drug user to another?

#### Applying Health Skills

6. **Accessing Information.** Research the Web site for your state's Health Department. Write a brief summary of the information you find about communicable diseases in your state.

#### Writing Critically

7. **Persuasive.** Create a handout for elementary school students about the importance of washing your hands regularly. The handout should convince young people that hand washing is one of the best ways to avoid catching communicable diseases.

#### Real Life Issues .....

After completing the lesson, review and analyze your response to the Real Life Issues question on page 633.

# LESSON 3

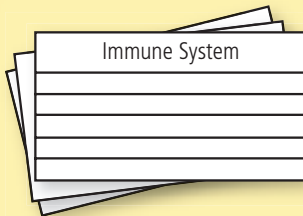


## GUIDE TO READING

**BIG Idea** *By learning about and practicing prevention strategies, you can help your body stay healthy.*

### Before You Read

**Create Vocabulary Cards.** Write each new vocabulary term on a separate note card. For each term, write a definition based on your current knowledge. As you read, fill in additional information related to each term.



### New Vocabulary

- ▶ immune system
- ▶ inflammatory response
- ▶ phagocytes
- ▶ antigens
- ▶ immunity
- ▶ lymphocyte
- ▶ antibody
- ▶ vaccine

# Fighting Communicable Diseases

## Real Life Issues

**Too Busy to Stay Healthy.** Sang's friend Ashley always seems to have a cold. Ashley complains that she's tired all the time because her schedule is so busy. In addition to school, Ashley has a part-time job and also volunteers at a local animal shelter. Sang has also noticed that Ashley frequently skips lunch.



**Writing** *Write a dialogue between Sang and Ashley in which they discuss how Ashley's behavior may be contributing to her colds. The girls should come up with ideas for Ashley that will help her avoid catching colds so often.*

## Physical and Chemical Barriers

**Main Idea** Physical and chemical barriers make up your body's first line of defense against pathogens.

You wear a coat or sweater to stay warm, a hat to keep the sun off your head and face, and a helmet during many sports activities. Your coat, sweater, hat, and helmet are all barriers that protect your body, but have you ever stopped to think about how your body deals with invasion from microscopic pathogens? Your body has its own built-in barriers to handle these tiny invaders.

There are two kinds of barriers that help protect you: physical and chemical. Physical barriers, such as the skin, block pathogens from invading your body. Chemical barriers, such as the enzymes in tears, destroy those invaders. See **Figure 23.5** for more examples of physical and chemical barriers that defend you against pathogens.

Figure 23.5

## Physical and Chemical Barriers

Your body uses physical and chemical barriers to fight pathogens. *Which barriers are physical? Which are chemical?*

Tears and saliva contain enzymes that disable and even destroy pathogens.

Mucous membranes form a protective lining for your mouth, nose, and many other parts of your body. These membranes produce mucus, a sticky substance that traps pathogens before they can cause infection, then carries the trapped pathogens to other parts of the body for disposal.



Skin is like a personal coat of armor, stopping most pathogens in their tracks as they try to enter the body.

Cilia are small hairs that line parts of your respiratory system. Cilia sweep mucus and pathogens to the throat, where they can be swallowed or coughed out.

Gastric juice in the stomach destroys many pathogens that enter your body through the nose or mouth.

## The Immune System

**Main Idea** Your body's immune system is your best ally in the fight against communicable diseases.

Although your body's physical and chemical barriers stop many pathogens before they can cause infection or disease, pathogens can—and do—sneak past these defenses. That's when your **immune system**, a network of cells, tissues, organs, and chemicals that fights off pathogens, goes to work. The immune system fights pathogens using two major strategies: the inflammatory response and specific defenses.

### The Inflammatory Response

Have you ever gotten a splinter or a cut? If so, you probably remember that the affected area became red and swollen. These are symptoms of the **inflammatory response**, a reaction to tissue damage caused by injury or infection. This response prevents further injury to the tissue and stops the invading pathogens. Your immune system knows a foreign object such as a wood splinter might have pathogens on it. It also knows that a cut could allow pathogens to get into your body. That's why it triggers the inflammatory response.



The inflammatory response, which works against all types of pathogens, includes the following actions.

1. In response to tissue damage and invading microorganisms, blood vessels near the injury expand. This allows more blood to flow to the area and begin fighting the invading pathogens.
2. Fluid and cells from the bloodstream cause swelling and pain because of pressure on the nerve endings.
3. **Phagocytes**, *white blood cells that attack invading pathogens*, surround the pathogens and destroy them with special chemicals. Pus, a mass of dead white blood cells and damaged tissue, may build up at the site of inflammation as a response to bacteria.
4. With the pathogens killed and tissue damage under control, the body begins to repair the tissue.



Visit [glencoe.com](http://glencoe.com) and use this code to complete the Interactive Study Guide for this lesson.

## Specific Defenses

Although the inflammatory response kills many pathogens, some may survive. So, in addition to the inflammatory response, the immune system triggers specific defenses in reaction to certain pathogens. This process is called the *immune response*. When the immune system recognizes a particular pathogen, it activates specific defenses in an attempt to prevent this type of infection from occurring again.

**Figure 23.6** describes the immune response. During this process, your immune system reacts quickly to **antigens**, *substances that can trigger an immune response*. Antigens are found in toxins and on the surfaces of pathogens. Macrophages, a type of phagocyte, make antigens recognizable to white blood cells. This **enables** the white blood cells to destroy the pathogens. The result of this type of immune response is known as **immunity**, *the state of being protected against a particular disease*.

### Academic Vocabulary

**enable** (verb): to make possible

## Lymphocytes

The **lymphocyte**, *a specialized white blood cell that coordinates and performs many functions of specific immunity*, plays an important role in the immune response. There are two types of lymphocytes: T cells and B cells.

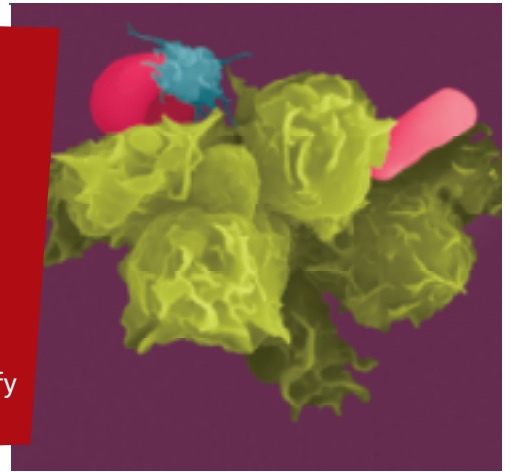
**T Cells** This type of lymphocyte has a variety of functions:

- **Helper T cells** trigger the production of B cells and killer T cells.
- **Killer T cells** attack and destroy infected body cells. These cells don't attack the pathogens, only the infected cells.
- **Suppressor T cells** coordinate the actions of other T cells. They suppress, or "turn off," helper T cells when the infection has been cleared.

**Figure 23.6**

## The Immune Response

1. Pathogens invade the body.
2. Macrophages engulf the pathogen.
3. Macrophages digest the pathogen, and T cells recognize antigens of the pathogen as invaders.
4. T cells bind to the antigens.
5. B cells bind to antigens and helper T cells.
6. B cells divide to produce plasma cells.
7. Plasma cells release antibodies into the bloodstream.
8. Antibodies bind to antigens to help other cells identify and destroy the pathogens.



**B Cells** These lymphocytes have just one job: producing antibodies. An **antibody** is *a protein that acts against a specific antigen*. Each B cell is programmed to make one type of antibody that is specific to a certain pathogen. The different purposes of antibodies include

- attaching to antigens to mark them for destruction.
- destroying invading pathogens.
- blocking viruses from entering body cells.

### Immune System Memory

Your immune system also “remembers” the antigens it has dealt with in the past. When antigens activate certain T cells and B cells, the cells become *memory lymphocytes*. These special memory cells circulate in your bloodstream and through the lymphatic system, shown in **Figure 23.7** on page 642. When memory cells recognize a former invader, the immune system sends antibodies and killer T cells to stop the invasion. For example, if you’ve had measles or been vaccinated against it, your immune system remembers and will attack the antigens for the measles virus.

Your immune system’s memory not only identifies invading pathogens. It also helps you develop immunity from certain diseases. There are two types of immunity: active and passive.

**Active Immunity** This type of immunity develops from natural or artificial processes. Your body develops naturally acquired active immunity when it is exposed to antigens from invading pathogens. Artificially acquired active immunity is developed from a **vaccine**, *a preparation of dead or weakened pathogens that are introduced into the body to stimulate an immune response*.



### READING CHECK

**Identify** Name three ways that your immune system helps protect you against pathogens.

**Figure 23.7**

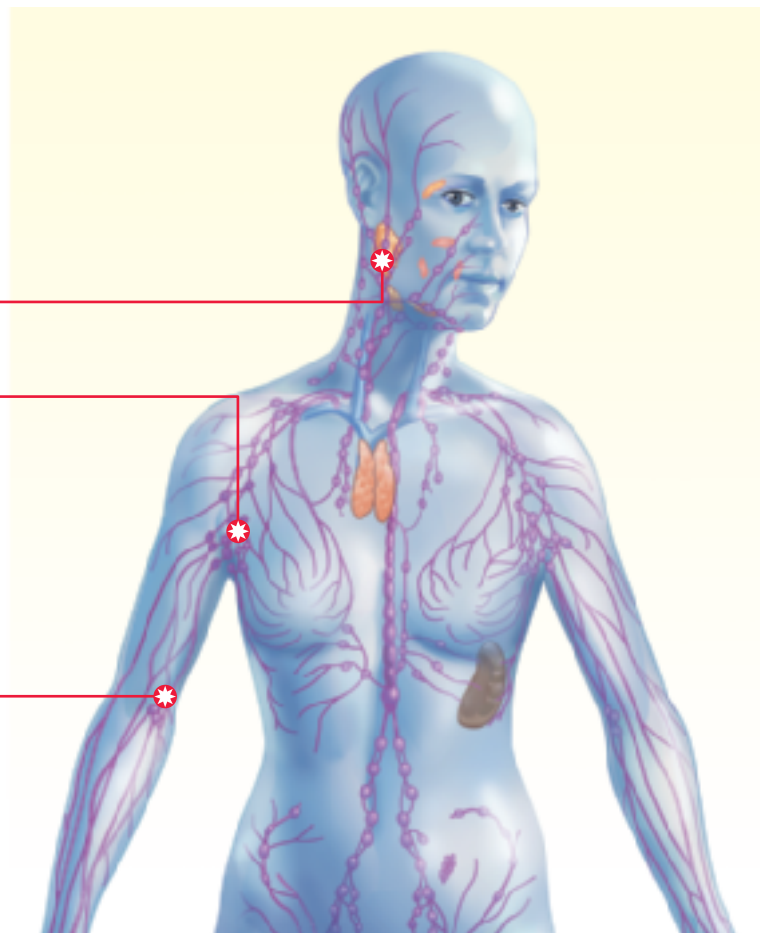
## Immunity and the Lymphatic System

The lymphatic system circulates antibodies to give you protection against many diseases. This protection can last throughout your life. *What role do lymphocytes play in fighting disease?*

The **lymphatic system** is part of your immune system. It includes your tonsils, lymph nodes, and a network of vessels, similar to blood vessels, that transport lymph, or tissue fluid.

**Lymph nodes** can become enlarged when your body is fighting an infection because of the increased number of lymphocytes. If swelling lasts for three days, see your health care professional.

**Lymphocytes** are produced by lymph nodes. These nodes occur in groups and are concentrated in the head and neck, armpits, chest, abdomen, and groin.



Vaccines cause your immune system to produce disease-fighting antibodies without causing the disease itself. Today, more than 20 serious human diseases can be prevented by vaccination. For some diseases, you need to be vaccinated only once in your life. For other diseases, such as measles, tetanus, and influenza, you may need to be vaccinated at regular intervals.

**Passive Immunity** You acquire passive immunity when your body receives antibodies from another person or an animal. This type of immunity is temporary, usually lasting only a few weeks or months. Like active immunity, passive immunity can be either natural or artificial.

Natural passive immunity occurs when antibodies pass from mother to child during pregnancy or while nursing. Artificial passive immunity happens when you receive an injection prepared with antibodies that are produced by an animal or a human immune to the disease.



# Prevention Strategies

**Main Idea** Strategies for preventing the spread of disease include practicing healthful behaviors, tracking diseases, and getting vaccinations.

The immune system is a powerful fighter against infection, and you can keep it tuned up and in good working order by eating a nutritious, well-balanced diet and getting regular physical activity. In addition, you can take preventive measures to avoid disease and stay healthy. These include frequent hand washing, handling food properly, avoiding insect bites, and abstaining from sexual contact.

## Tracking Reportable Diseases

Community, national, and global efforts also play a crucial role in fighting communicable diseases. Agencies such as the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) keep a constant watch on the spread of diseases around the world. By tracking infections such as hepatitis, influenza, and yellow fever, they can often predict where the diseases might strike next. This information helps countries prepare and develop their own prevention strategies.



### READING CHECK

**Explain** Why is it important to track communicable diseases?

## Vaccinations

In the past, smallpox killed hundreds of millions of people. Today, thanks to the smallpox vaccine, the disease has been essentially wiped out. Scientists and health care workers are always trying to stay one step ahead of communicable diseases and develop new vaccines. Vaccines fall into four categories:

- **Live-virus vaccines** are made from pathogens grown in laboratories. This process removes most of the pathogens' disease-causing characteristics. The pathogens are weak, but they can still stimulate the immune system to produce antibodies. The vaccine for measles, mumps, and rubella (MMR) and the vaccine for chicken pox are produced this way.
- **Killed-virus vaccines** use dead pathogens. Even though the pathogens are no longer active, they still stimulate an immune response. Flu shots, the Salk vaccine for polio, and the vaccines for hepatitis A, rabies, cholera, and plague are all killed-virus vaccines.
- **Toxoids** are inactivated toxins from pathogens. They are used to stimulate the production of antibodies. Tetanus and diphtheria immunizations use toxoids.

- **New and second-generation viruses** are on the cutting edge of disease-fighting technology. One example is the vaccine for hepatitis B, which is made from genetically altered yeast cells.

**Immunization for All** When you receive a vaccine, you are not only keeping yourself healthy, but you are also helping to protect everyone around you. Vaccination reduces the number of people who are at risk for a communicable disease. That’s why it’s important to keep your immunizations up-to-date.

To find out which immunizations you need, ask your family physician or local health department. Maintaining a record of your vaccinations will help you keep track of when you need “booster” shots.

Most schools and preschools require students to show proof of current immunizations before admission. Each state also has its own laws about immunization and school attendance. Make sure you know and follow the public health policies and government regulations in your community. Remember, everyone can play an active role in preventing the spread of communicable diseases.

## LESSON 3 ASSESSMENT



Visit [glencoe.com](http://glencoe.com) and use this code to complete the Interactive Study Guide for this lesson.



### After You Read

#### Reviewing Facts and Vocabulary

1. What is the purpose of the inflammatory response?
2. What is the difference between *active immunity* and *passive immunity*?
3. What is a *phagocyte*?

#### Thinking Critically

4. **Analyze.** Discuss the meaning of *memory* as it applies to the immune system. How is it similar to your brain’s memory?
5. **Synthesize.** You could say that your good health is the result of a successful partnership between you and your body. Support this statement using facts from the lesson.

#### Applying Health Skills

6. **Analyzing Influences.** A healthy immune system depends on a healthful diet and regular physical activity. Consider the influences that might affect your ability to practice these habits. In what ways do these influences make it easier for you to stay healthy? In what ways do they make it more difficult?

#### Writing Critically

7. **Expository.** Write a paragraph explaining why keeping your own vaccinations up to date is a duty not only to yourself but also to the people around you.

#### Real Life Issues .....

After completing the lesson, review and analyze your response to the Real Life Issues question on page 638.

# Emerging Diseases and Pandemics

GUIDE TO READING 

**BIG Idea** Today, infectious diseases have the potential to spread quickly throughout the world.

**Before You Read**

**Organize Information.** Make a table and label the columns "Disease," "How It's Spread," and "Prevention Strategies." As you read, fill in the chart with information about the emerging infections discussed in this lesson.

Disease	How It's Spread	Prevention Strategies

**New Vocabulary**

- ▶ emerging infections
- ▶ giardia
- ▶ epidemic
- ▶ pandemic

**Real Life Issues** .....

**Bacteria in Your Food.**

**In 2007, there were 1,397,187 reported cases of Salmonella contamination in the U.S.**

**At least 400 people die each year from severe cases of Salmonella contamination.**

Source: Centers for Disease Control and Prevention, Division of Foodborne, Bacterial and Mycotic Diseases.

**Writing** Think about foods that you or your family have purchased or prepared. Write a paragraph describing how bacteria can be found in foods, which can lead to a foodborne illness.

## Emerging Infections

**Main Idea** Some diseases are becoming more dangerous and widespread.

Vaccines and modern technology have saved millions of lives, but communicable diseases continue to be the top cause of deaths worldwide. Health experts label some communicable diseases as **emerging infections**, *communicable diseases whose occurrence in humans has increased within the past two decades or threatens to increase in the near future.*

Scientists now believe that some diseases once thought to be noncommunicable may, in fact, be caused by infectious pathogens. Such diseases include Alzheimer's, diabetes, and coronary artery disease. Many factors are involved in the development and spread of these diseases. See **Figure 23.8** on page 646 to learn more about how emerging infections spread.



Emerging infections spread in several ways. *Why is Lyme disease increasing today?*

The Factor	How It Happens	Examples
Transport across borders	Infected people and animals carry pathogens from one area to another; sometimes spread by insect carriers such as mosquitoes.	Dengue fever, found mostly in South and Central America and Asia, has now appeared in the southwestern United States. West Nile encephalitis has spread from Asia and Africa to Europe and the Americas. Both diseases are carried by mosquitoes.
Population movement	As residential areas expand, people move closer to wooded areas.	Lyme disease in the United States
Resistance to antibiotics	Widespread use of antibiotics gives rise to drug-resistant pathogens.	The pathogens that cause tuberculosis, gonorrhea, and a type of pneumonia are resistant to one or more antibiotics.
Changes in food technology	Mass production and distribution of food mean that a small amount of pathogens can infect a great number of people.	<i>E. coli</i> and <i>Salmonella</i> have been responsible for widespread outbreaks of illness.
Agents of bioterrorism	Some pathogens are deadly even in tiny amounts, and they can be dispersed over a large area.	In 2001, envelopes containing anthrax spores were sent to government and media figures in the United States.



### READING CHECK

**Explain** Why are health organizations so worried about avian influenza?

## Avian Influenza

Avian influenza is caused by a virus that occurs naturally among birds. Wild birds carry the virus in their intestines and usually do not get sick from it. However, the virus has spread to domesticated birds, such as chickens, ducks, and turkeys, through contact with water, feed, cages, or dirt infected by wild birds. Avian flu is passed to humans if there is direct contact with infected birds or contaminated surfaces. In rare cases, mostly in Asia, people have died from avian influenza. Because there is no vaccine and no cure, health authorities are watching this disease very carefully.

## H1N1 Virus

The H1N1 virus is a respiratory virus normally found in pigs. It is a combination of human, pig, and avian flu viruses, and can spread from human to human. Symptoms include fever, sore throat, runny nose, body aches, and fatigue. More than 70 countries, including the United States, have reported human cases of the H1N1 virus. In June 2009 the World Health Organization (WHO) declared this disease a pandemic. Vaccines are being developed to help fight it.

## Salmonella and E. coli

*Salmonella* and *E. coli* are bacteria that sometimes live in animals' intestinal tracts. If people come in contact with these bacteria by eating contaminated food produced by these animals, they may become ill. Illnesses can spread quickly to large areas if contamination occurs in central agricultural or food-processing facilities and contaminated food products are distributed to cities and towns all over the world. Storing foods carefully and cooking meat to proper temperatures will kill *Salmonella* and *E. coli* bacteria. For more tips on avoiding foodborne illness, see Chapter 10, Lesson 4.

## Recreational Water Illnesses

Swimming is a fun activity, but if the water is not regularly treated with disinfectants, chlorine, or other chemicals, you run the risk of getting a *recreational water illness*, or RWI. RWIs can occur when water is contaminated by harmful strains of bacteria such as *E. coli* or by **giardia**, a microorganism that infects the digestive system.

RWIs are most commonly spread through swallowing or having contact with water contaminated with untreated sewage or feces from humans or animals. RWIs are on the rise throughout the world, particularly in areas where raw sewage is dumped in untreated waterways. To help prevent RWIs, don't swim when you have diarrhea. Try not to let water in your mouth, and definitely try not to swallow it. Also, remember to practice good hygiene: take a shower before swimming, and wash your hands after using the bathroom.

## Other Emerging Infections

Other emerging infections with serious health concerns include HIV/AIDS, Lyme disease, West Nile Virus, SARS, and mad cow disease. As with other highly communicable diseases, awareness is the first step toward prevention.

**HIV/AIDS** is not a new disease, but it is spreading quickly and has become a global health threat. You will learn more about HIV and AIDS in Chapter 24.



■ **Figure 23.9** Swimming is a fun way to stay fit, but it can pose a risk of getting an RWI. *What actions can you take to avoid RWIs?*

## Academic Vocabulary

**community** (noun): a population of individuals in a common location

**Lyme Disease** This disease is transmitted to humans through tick bites. Lyme disease is on the rise because, as suburban **communities** grow, people build their homes ever closer to heavily wooded areas, where ticks thrive. To protect yourself, avoid bushy areas with high grass. When you go hiking, use insect repellent and cover skin.

**West Nile Virus** Mosquitoes sometimes feed on birds carrying the West Nile virus, a pathogen commonly found in Africa, the Middle East, and West Asia. When infected mosquitoes bite humans, they often transfer the virus. About 20 percent of those bitten will develop West Nile fever, a potentially severe illness.

**SARS** Severe Acute Respiratory Syndrome, or SARS, is a viral illness first reported in Asia in 2003. The illness spread to more than two dozen countries, killing almost 800 people. Health and government agencies were able to contain the virus and stop the spread of illness.

**Mad Cow Disease** This is also known as *bovine spongiform encephalopathy*, or BSE. This disease, which affects the brain functions of cattle, has reached epidemic proportions in Great Britain. An **epidemic** is *a disease outbreak that affects many people in the same place and at the same time*. Scientists are worried that BSE could spread to humans.

## How Diseases Affect the World

**Main Idea** Diseases can spread with amazing speed.

The world's countries are connected through trade and travel. These connections make it easy for infectious diseases to spread. Sometimes a disease becomes a **pandemic**—*a global outbreak of an infectious disease*. An outbreak of avian flu or *E. coli* in a small area of the globe can quickly spread and threaten the health of entire countries, even continents.

Medical treatment and prevention requires constant research to find the causes and the cures for emerging diseases. The U.S. government has launched programs that will educate the public about flu pandemics. Health agencies plan for pandemics and develop rapid-response strategies to reduce their impact.



### READING CHECK

**Explain** Why can pandemics spread so quickly throughout the world?

### The Impact of Travel

The mobility of people in our globalized world contributes to the spread of disease. For example, an American tourist can pick up an infection in another country, return home, and spread it to his family, friends, and coworkers.





■ **Figure 23.10** Travel is exciting, but it can also pose health risks. *How does air travel contribute to the spread of infection?*

## Mutation of Pathogens

The increased development of antibiotics has saved countless lives. However, because antibiotics are so widely used, some pathogens have mutated into new forms that are resistant to antibiotics. Pathogens become drug-resistant in a three-step process:

- Pathogens invade the body and cause illness.
- Antibiotics attack the pathogens.
- The pathogens that survive the antibiotics reproduce, creating a new generation of drug-resistant pathogens.

### LESSON 4 ASSESSMENT



Visit [glencoe.com](http://glencoe.com) and use this code to complete the Interactive Study Guide for this lesson.

#### After You Read

##### Reviewing Facts and Vocabulary

1. What is an *emerging infection*?
2. How are recreational water illnesses most commonly spread?
3. How is a *pandemic* different from an *epidemic*?

##### Thinking Critically

4. **Evaluate.** If a friend told you that you don't need to worry about infectious diseases because you can always take antibiotics, what would you say?
5. **Analyze.** In a Colorado meatpacking plant, a vat of hamburger meat has been infected with *E. coli* bacteria. Weeks later, people in a dozen American states get sick. How might the contamination have occurred over such a large area?

##### Applying Health Skills

6. **Accessing Information.** Choose one emerging disease from this lesson that you want to know more about. Research how the disease spreads, and find as many tips for avoiding the disease as you can.

##### Writing Critically

7. **Expository.** You have been asked to write a column for an airline magazine that explains emerging diseases to travelers. Think about what air travelers in particular need to know about how diseases spread, and what they can do to stop a disease from becoming a pandemic.

##### Real Life Issues .....

After completing the lesson, review and analyze your response to the Real Life Issues question on page 645.

# Hands-On HEALTH



## Keeping My Community Disease-Free and Healthy

Imagine that the people in a community next to yours have an undiagnosed communicable disease. Your goal is to create and present an emergency plan that will reduce the risk of contracting this disease in your community.

### What You'll Need

- textbook
- markers and one poster board per group
- Internet access

### What You'll Do

#### Step 1

Using the textbook and the Internet, research how to prevent the transmission of communicable diseases.

#### Step 2

Create a poster presentation that will educate your audience regarding lifestyle behaviors that will reduce the risk of contracting a communicable disease.

#### Step 3

Identify protective behaviors, listing the steps a person can take to reduce their risk of contracting the disease.

### Apply and Conclude

Present your poster which encourages your audience to make healthful choices.

### Checklist: Self-Management Skills

- ✓ Demonstrate healthful behaviors, habits, and/or techniques
- ✓ Identify protective behaviors (e.g., first-aid techniques, safety steps, strategies) to avoid/manage unhealthy or dangerous situations
- ✓ Listing steps in correct order





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**LESSON 1****Understanding Communicable Diseases****Key Concepts**

- ▶ Communicable diseases are caused by pathogens.
- ▶ Communicable diseases can spread through direct contact, indirect contact, and airborne transmissions.
- ▶ To reduce your risk of disease, wash your hands regularly, eat properly, exercise, and avoid contact with vectors.

**Vocabulary**

- ▶ communicable disease (p. 628)
- ▶ pathogens (p. 628)
- ▶ infection (p. 628)
- ▶ virus (p. 629)
- ▶ bacteria (p. 629)
- ▶ toxins (p. 629)
- ▶ vector (p. 630)

**LESSON 2****Common Communicable Diseases****Key Concepts**

- ▶ Many communicable diseases start in the respiratory tract.
- ▶ Hepatitis, a widespread viral disease, attacks the liver.
- ▶ Practicing good hygiene and avoiding risk behaviors can help protect you from some communicable diseases.

**Vocabulary**

- ▶ respiratory tract (p. 633)
- ▶ mucous membrane (p. 634)
- ▶ pneumonia (p. 634)
- ▶ jaundice (p. 635)
- ▶ cirrhosis (p. 635)

**LESSON 3****Fighting Communicable Diseases****Key Concepts**

- ▶ Physical and chemical barriers stop or destroy many pathogens before they can cause disease.
- ▶ Your body's immune system fights pathogens with the inflammatory response and specific defenses.
- ▶ Vaccinations protect you from specific communicable diseases.

**Vocabulary**

- ▶ immune system (p. 639)
- ▶ inflammatory response (p. 639)
- ▶ phagocytes (p. 640)
- ▶ antigens (p. 640)
- ▶ immunity (p. 640)
- ▶ lymphocyte (p. 640)
- ▶ antibody (p. 641)
- ▶ vaccine (p. 641)

**LESSON 4****Emerging Diseases and Pandemics****Key Concepts**

- ▶ Emerging infections, such as avian influenza, are on the rise.
- ▶ Infections spread more easily and quickly than in the past.
- ▶ Pathogens can mutate and become resistant to antibiotics.

**Vocabulary**

- ▶ emerging infections (p. 645)
- ▶ giardia (p. 647)
- ▶ epidemic (p. 648)
- ▶ pandemic (p. 648)



## Health eSpotlight



With the information you have learned from the chapter, go back and view the videos and discuss as a class.

## LESSON 1

## Vocabulary Review

Correct the sentences below by replacing the italicized term with the correct vocabulary term.

1. A(n) *infection* is an organism that causes disease.
2. A substance that kills cells or interferes with their functions is called a(n) *vector*.
3. When pathogens in the body multiply and damage body cells, a(n) *virus* results.

## Understanding Key Concepts

After reading the question or statement, select the correct answer.

4. The common cold and influenza are caused by
  - a. overeating.
  - b. viruses.
  - c. bacterial infection.
  - d. exposure to toxins.
5. Malaria, West Nile virus, and Lyme disease are examples of diseases that are spread by
  - a. vectors.
  - b. contaminated utensils.
  - c. sexual contact.
  - d. contaminated water.



## Thinking Critically

After reading the question or statement, write a short answer using complete sentences.

6. **Explain.** If the body's immune system cannot fight off an infection, what happens?
7. **Identify.** Name the process by which bacteria multiply themselves.

8. **Synthesize.** Describe at least three strategies for reducing your risk of getting or spreading communicable diseases.
9. **Evaluate.** Consider your role in preventing disease. How do your behaviors affect the health of your community as well as your own health?

## LESSON 2

## Vocabulary Review

Use the vocabulary terms listed on page 651 to complete the following statements.

10. The lining of body cavities (such as the mouth) is made of \_\_\_\_\_.
11. The passageway that makes breathing possible is the \_\_\_\_\_.
12. Influenza can lead to \_\_\_\_\_, a potentially fatal infection of the lungs.



## Understanding Key Concepts

After reading the question or statement, select the correct answer.

13. Which of the following habits probably will *not* help you avoid respiratory tract infections?
  - a. Rinsing with mouthwash
  - b. Frequent hand washing
  - c. Avoiding close contact with ill people
  - d. Abstaining from smoking
14. Some strains of tuberculosis have become resistant to which form of treatment?
  - a. Bed rest
  - b. Surgery
  - c. Dietary changes
  - d. Antibiotics
15. What is the most common blood-borne infection in the United States?
  - a. Hepatitis A
  - b. Hepatitis B
  - c. Hepatitis C
  - d. None of the above

## Thinking Critically

After reading the question or statement, write a short answer using complete sentences.

16. **Evaluate.** What is the best treatment for the common cold?
17. **Identify.** Receiving a flu vaccine once a year is especially important for which groups of people?
18. **Explain.** Why do doctors sometimes have to prescribe several antibiotics for a person in order to treat one disease?
19. **Synthesize.** Explain how peer pressure might contribute to the spread of hepatitis B.
24. If you receive antibodies from another person or an animal instead of producing them in your own body, it is called
  - a. communicable disease.
  - b. specific defense.
  - c. active immunity.
  - d. passive immunity.
25. Live-virus, killed-virus, toxoid, and second-generation virus are all categories of
  - a. vaccines.
  - b. antigens.
  - c. preventive strategies.
  - d. antibiotics.
26. To remain effective, some vaccinations
  - a. must have passive immunity.
  - b. contain amateur pathogens.
  - c. must be repeated at regular intervals.
  - d. are most successful if given when a person is young.

## LESSON 3

### Vocabulary Review

Choose the correct word in the sentences below.

20. *Antigens / Lymphocytes* are substances that are capable of triggering an immune response.
21. *Inflammation / Immunity* is the state of being protected against a particular disease.
22. A preparation of dead or weakened pathogens used to stimulate an immune response is called a(n) *vaccine / antibody*.

### Understanding Key Concepts

After reading the question or statement, select the correct answer.

23. What is the role of phagocytes in the inflammatory response?
  - a. They prevent pus from building up.
  - b. They surround and destroy pathogens.
  - c. They trigger the production of T cells.
  - d. They cause blood vessels to expand.

## Thinking Critically

After reading the question or statement, write a short answer using complete sentences.

27. **Identify.** What two major strategies does the immune system use to fight pathogens?
28. **Explain.** Why do health agencies like the CDC and WHO track and monitor the spread of diseases?
29. **Synthesize.** If you do not receive up-to-date immunizations, how might your future be affected?



## LESSON 4

### Vocabulary Review

Correct the sentences below by replacing the italicized term with the correct vocabulary term.

30. West Nile encephalitis is an example of a(n) *acute infection*.

# Assessment

31. A global outbreak of an infectious disease is called a(n) *mutation*.
32. *Antibody* is a microorganism that infects the digestive system.

## Understanding Key Concepts

After reading the question or statement, select the correct answer.

33. The incidence of emerging infections is
- decreasing.
  - increasing.
  - holding steady.
  - virtually nonexistent, thanks to modern medicine.
34. The most effective way to prevent infection from *Salmonella* and *E. coli* is to
- visually inspect food before eating.
  - avoid eating salmon.
  - cook meat thoroughly.
  - wash your hands after you eat.

35. Which of the following is *not* a strategy for preventing the spread of RWI?
- Relying on chlorine treatments
  - Staying out of the water when you have diarrhea
  - Keeping water from entering your mouth when you are swimming
  - Taking a shower before swimming

## Thinking Critically

After reading the question or statement, write a short answer using complete sentences.

36. **Explain.** How do emerging infections happen?
37. **Describe.** What are the three steps of pathogen mutation?
38. **Evaluate.** What is the impact of travel on the spread of diseases?



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## Technology

## PROJECT-BASED ASSESSMENT

### Victory for Vaccines

#### Background

Polio is a communicable disease caused by a virus. The disease can affect the brain and spinal cord and cause paralysis. In the early 1950s, a polio epidemic in the United States killed many people, mostly children. By 1975 the disease was almost completely eliminated in the United States.

#### Task

Conduct research on Dr. Jonas Salk and Dr. Albert Sabin, including their role in the near eradication of polio. Present your findings to the class by developing a Web site or video.

#### Audience

Students in your class

#### Purpose

Make people aware of the importance of vaccinations in controlling disease.

#### Procedure

- Use online resources to find articles about polio.
- Learn how the vaccines for polio were discovered.
- Tell how the two vaccines differ from each other.
- Explain why there are still some cases of polio in the United States.
- Describe the efforts that are being made to eliminate polio in the rest of the world. What health groups are involved in the effort?
- Prepare your Web site or video based on your research and present to your class.



## Math Practice

**Solve Problems.** Use the passage below to answer Questions 1–3.

*If you have ever had a bacterial infection, you have seen how quickly bacteria can multiply in your body. Bacteria reproduce by dividing in two in a process known as binary fission. Under ideal conditions, binary fission takes about 15 minutes. However, this time can vary from 10 minutes to 24 hours.*

*Starting with a single bacterium, how can you find out how many bacteria exist after a certain length of time? After one reproductive cycle, you have two bacteria, or  $2^1$ . After two cycles, you have four, or  $2^2$ . You can summarize this pattern with the formula  $B = 2^n$ , where  $B$  is the number of bacteria, and  $n$  is the number of reproductive cycles.*

1. One bacterium has a reproductive cycle of 30 minutes. How many bacteria will there be at the end of four hours?
  - A. 16
  - B. 120
  - C. 256
  - D. 512
2. How many bacteria exist after seven reproductive cycles?
  - A. 14
  - B. 64
  - C. 128
  - D. It depends on the length of the reproductive cycle.
3. What would be the shape of a graph on which time is plotted on the  $x$ -axis and number of bacteria is plotted on the  $y$ -axis? Where is the slope of the line the steepest?

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## Reading/Writing Practice

**Understand and Apply.** Read the passage below, and then answer the questions.

*I can't wait to go camping again with my family this summer. We always have a great time. Last year my best friend, Randy, came with us. I'm hoping he wants to go again, even after the argument we had last time.*

*It was late in the afternoon at the campsite, and we were walking along the river. I knew the mosquitoes would be coming out soon, so I took a bottle of insect repellent out of my backpack and sprayed it on my exposed skin. I told Randy he should do the same, but he just laughed. "You worry too much," he said.*

*I told him mosquitoes carry diseases that can spread to people, and that it's important to prevent insect bites. He put on the insect repellent, but he was annoyed. Things were tense between us for a while, but we got over it. Still, I wonder if it will happen again this year.*

1. When did the author decide it was time to apply insect repellent?
  - A. Noon
  - B. Late afternoon
  - C. Sunset
  - D. Before going to bed
2. What reason did the author give Randy as to why it's important to put on insect repellent?
  - A. Insect bites can be painful.
  - B. Mosquitoes are annoying.
  - C. Mosquitoes carry diseases that can spread to people.
  - D. Insect bites are the leading cause of infection among teens.
3. How do you think the author felt during this encounter? Do you think he handled the situation appropriately? Explain.

### National Education Standards

**Math:** Number and Operations, Problem Solving  
**Language Arts:** NCTE 1, NCTE 3, NCTE 4