

## Lesson 3

# Allergies, Asthma, Diabetes, and Arthritis

### VOCABULARY

allergy  
histamines  
asthma  
diabetes  
autoimmune disease  
arthritis  
osteoarthritis  
rheumatoid arthritis

### YOU'LL LEARN TO

- Examine the characteristics, symptoms, causes, and treatments of noncommunicable diseases.
- Describe the importance of taking responsibility for health maintenance to prevent or manage noncommunicable diseases.
- Develop and analyze strategies related to the prevention and management of noncommunicable diseases.



Think of a family member or someone you know who has one of the diseases discussed in this lesson. What does this person do to manage the disease or its symptoms?

Cardiovascular diseases and cancer are two of the most deadly noncommunicable diseases. Other noncommunicable diseases are chronic, meaning that they are present continuously or recur frequently over a long period time. Allergies, asthma, diabetes, and arthritis are chronic diseases that affect millions of people. Some, such as allergies, asthma, and certain types of diabetes, are caused by a response of the immune system. Others, such as osteoarthritis (ahs-tee-oh-ahr-THRY-tus), cause the breakdown of body cells and tissues.

## Allergies

The sneezing and runny nose often associated with a cold are sometimes a response to substances in the air. An **allergy** is a specific reaction of the immune system to a foreign and frequently harmless substance. Allergies are among the common causes of illness and disability in the United States, affecting 40 to 50 million people.

- An allergy to pollen, called hay fever, is one of the most common chronic diseases in the United States. Experts estimate that 35 million people suffer from hay fever.

Pollen, foods, dust, mold spores, chemicals, insect venom, and medicines are some of the more common *allergens*, substances that cause allergies. The body treats these allergens as foreign invaders. Antigens on the surface of allergens bind to special immune cells in the linings of the nasal passages. These cells release **histamines**, chemicals that can stimulate mucus and fluid production in an area.

Histamines produce the sneezing, itchy eyes, runny nose, and other symptoms that make a person with allergies uncomfortable. Some people have an allergic reaction that produces hives—itchy raised bumps on the skin. Others have serious reactions to allergens that can sometimes be life threatening. Severe symptoms include hives, itching or swelling of the stung area or the mouth, difficulty breathing or swallowing. Other severe symptoms might be a raspy voice or swelling of the tongue, or a sharp drop in blood pressure, which can cause dizziness.

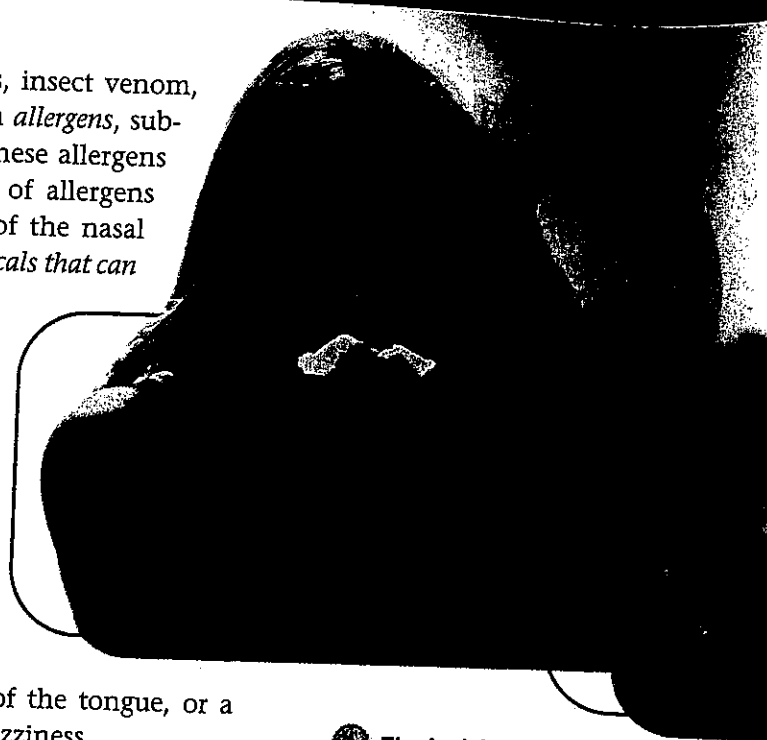
If someone you know experiences any of these symptoms after eating foods such as peanuts or shellfish or after being stung by a bee or wasp, seek medical attention immediately.

### Diagnosing Allergies

Sometimes you can diagnose an allergy yourself. You may notice that when you are near certain kinds of plants you sneeze or that eating particular foods makes you break out in a rash. In some cases tests are required to determine the cause. Three common methods are used to identify the source of an allergic reaction—a blood test, a food elimination diet, and a skin test. During a skin test, the skin is scratched and small amounts of possible allergens are applied. If a person is allergic to any of the allergens, the skin in the area of the scratch swells and turns red because of the **inflammatory response**.

### Treating Allergies

Sometimes allergy treatment can be as simple as avoiding the allergen. This is the best treatment for severe food and insect sting allergies. When avoidance is not possible, medicines, including **antihistamines** that help control the symptoms triggered by histamines, may be suggested. People with long-lasting or severe allergies should seek medical attention. Allergies can irritate the respiratory tract and lead to other health problems, such as asthma. People with severe allergies may receive *immunotherapy*, a series of shots that contain small amounts of the allergen to which the person is sensitive. The injections cause the immune system to become less sensitive to the allergens.



**1** The body's response to allergens can cause a variety of symptoms. What should you do if you experience more serious allergic reactions?

### hotlink

**inflammatory response**  
For more information about the inflammatory response, see Chapter 24, page 628.

Experiencing an unpleasant reaction to something you eat does not necessarily mean that you have a food allergy. For example, lactose intolerance is not an allergy. Because symptoms are similar, it is a common misconception. In reality, only a very small percentage of people actually have proven food allergies. For those who do, the main method of treatment is avoiding the food that causes the allergic reaction. This usually requires diligently reading ingredient labels.

## Asthma


Some allergic reactions can lead to **asthma**, an inflammatory condition in which the small airways in the lungs become narrowed, causing difficulty in breathing. More than 17 million people in the United States have asthma, and each year more than 5,000 Americans die of this disease. Asthma can develop at any age; however, about one-third of those with asthma are under the age of 18.

The bronchial tubes of people with asthma are sensitive to certain substances called *triggers*. Common asthma triggers include air pollution, pet dander, and tobacco smoke, as well as microorganisms such as mold, pollen, and dust mites, shown on this page. In an asthma attack, the asthma triggers cause the muscles of the bronchial walls to tighten and produce extra mucus. The respiratory passages narrow. The result can range from minor wheezing—breathing with a whistling sound—to severe difficulty breathing. In some cases, the condition becomes life threatening.

### Managing Asthma

Although asthma has no cure, most people with the condition can lead normal lives by behavior changes and the proper use of medication. People with asthma can lead normal, active lives with proper management that includes the following strategies:

- ▶ **Monitor the condition.** Recognize the warning signs of an asthma attack: shortness of breath, chest tightness or pain, coughing, or sneezing. Treating these symptoms quickly can help prevent attacks or keep an attack from worsening.
- ▶ **Manage the environment.** Reduce asthma triggers in the environment. Avoid exposure to tobacco smoke, eliminate carpets and rugs when possible, and wash bedding frequently.
- ▶ **Manage stress.** Stress can trigger an asthma attack. Relaxation and stress-management techniques can be helpful.
- ▶ **Take medication.** Medications can be used to relieve symptoms, prevent flare-ups, and make air passages less sensitive to asthma triggers. *Bronchodilators* are a type of medication, taken with an inhaler, that relaxes and widens respiratory passages.



⚠ People with asthma can be active if they manage the disease and use proper precautions. What precautions should a person with asthma take to avoid an attack?

## Diabetes

**D**iabetes is a chronic disease that affects the way body cells convert food into energy. Each year approximately one million new cases are diagnosed. There is no cure for diabetes.

In a person with diabetes, the pancreas produces too little or no insulin, a hormone that helps glucose enter the body's cells. In some diabetics adequate insulin is produced, but cells don't respond normally to it. For the cells in the body to function, they need a constant source of energy—glucose—from foods. If glucose is not converted to energy, it builds up in the blood, and cells do not get the glucose they need to function. The only way to diagnose diabetes is through a blood test. Early detection of diabetes can prevent serious side effects, such as blindness. Diabetes is the main cause of kidney failure, limb amputations, and blindness in adults, as well as a major cause of heart disease and stroke. These effects, however, are not inevitable. If diagnosed, the disease can be successfully managed with medication, a healthful diet, and regular moderate exercise. In many cases, diabetes is preventable.

### Type 1 Diabetes

Type 1 diabetes, which accounts for 5 to 10 percent of all diabetes cases, appears suddenly and progresses quickly. The body does not produce insulin, and glucose builds up in the blood, starving cells of the energy they need. Over time, the high blood-sugar level can cause damage to the eyes, kidneys, nerves, and heart.

The cause of type 1 diabetes is not clear. Some scientists suspect an environmental trigger—perhaps an as yet unidentified virus—that stimulates an immune response, destroying the insulin-producing cells of the pancreas in some individuals. For this reason, type 1 diabetes is known as an **autoimmune disease**, a condition in which the immune system mistakenly attacks itself, targeting the cells, tissues, and organs of a person's own body. People with type 1 diabetes must take daily doses of insulin, either through injections or through a special pump that is attached to the body by tubing or that is surgically implanted. Today, because of advanced treatment methods, many people with diabetes are able to live near-normal lives.

### Type 2 Diabetes

Type 2 diabetes accounts for 90 to 95 percent of all cases of this disease. It most often appears after age 40. However, type 2 diabetes is now being found at younger ages and is even being diagnosed among children and teens. In this form of diabetes, the body is unable to make enough insulin or to use insulin properly. Buildup of glucose in the blood causes many of the same symptoms as type 1 diabetes.

## Health Minute

### Symptoms of Diabetes

According to the American Diabetes Association, of the estimated 17 million people in the United States who have diabetes, almost 6 million of them don't know it.

#### Symptoms of diabetes include:

- ▶ Frequent urination
- ▶ Excessive thirst
- ▶ Unexplained weight loss
- ▶ Extreme hunger
- ▶ Sudden vision changes
- ▶ Tingling in hands or feet
- ▶ Frequent fatigue
- ▶ Very dry skin
- ▶ Sores that are slow to heal
- ▶ More infections than usual

**Y** People with diabetes need to work closely with health care professionals to manage their condition. Why is early detection of diabetes important?



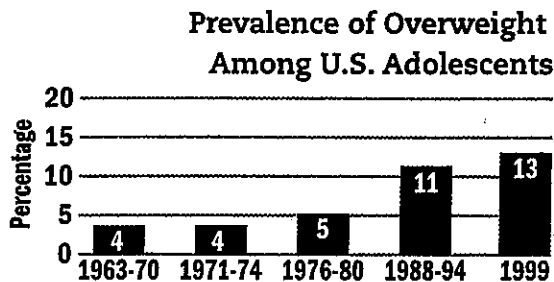
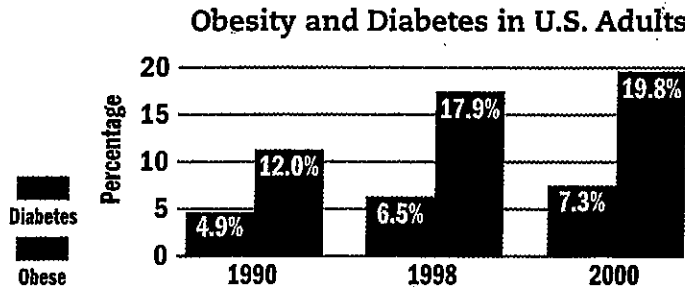
Type 2 diabetes is nearing epidemic proportions in the United States because of an increased number of older individuals in the population and a greater prevalence of obesity and sedentary lifestyles. A diet high in fat, calories, and cholesterol increases the risk of diabetes. Thus, choosing lower-fat, lower-calorie alternatives can help reduce the risk of this disease. Increased physical activity also reduces risk because it helps control weight and lower cholesterol levels.

Treatment of type 2 diabetes includes weight management and regular physical activity. Individuals with this disease

## Real-Life Application

### Raising Teen Awareness of Diabetes

Over the last decade, diabetes and obesity have increased dramatically in both adults and teens. Examine the graph and answer the questions. Then use this information to create an advocacy message to encourage others to practice healthful behaviors to control their weight and reduce their risk of diabetes.



Source: CDC, Behavioral Risk Factor Surveillance System (1991-2000)

1. What do you observe about the relationship between the rates of diabetes and obesity in Graph 1?
2. What do you think would happen to the rate of diabetes if the rate of obesity began to decrease?
3. Look at Graph 2. What can you infer about the rate of diabetes in teens?
4. Why are healthful eating habits and physical activity lifestyle behaviors that reduce the risk of diabetes?

### ACTIVITY

In small groups, generate a list of lifestyle behaviors that people can practice to maintain a healthful weight and reduce their risk of diabetes. Create a 60-second public service announcement (PSA) to persuade teens to start good health habits early in life. Include at least one fact about diabetes and one lifestyle behavior that can reduce the risk of diabetes.

carefully monitor their diet in order to control their blood-sugar levels. In some cases oral medications or injections of insulin are required to manage the disease.

## Arthritis

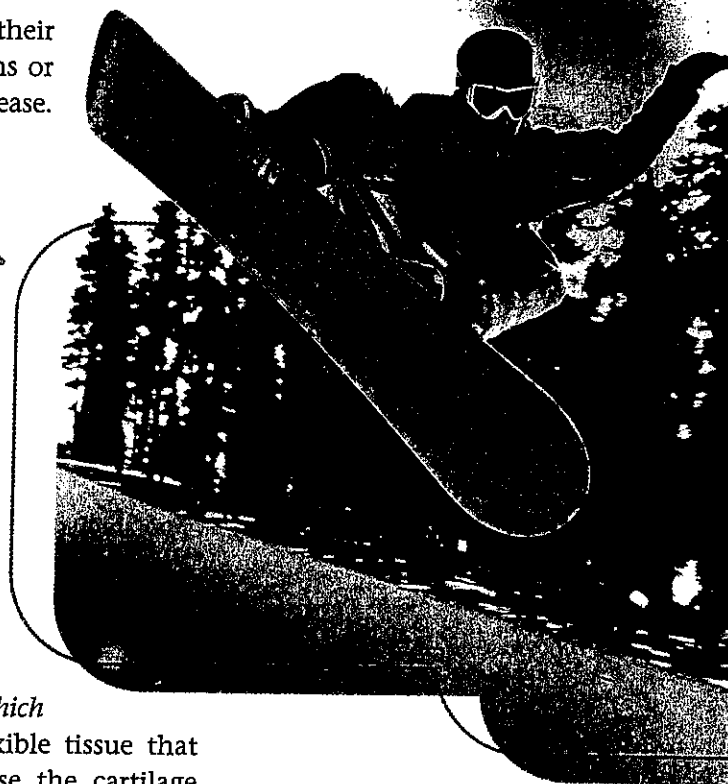
**A**rthritis is a group of more than 100 different diseases that cause pain and loss of movement in the joints. It is one of the most common medical problems in the world and the number one cause of disability in the United States—more than one in six people suffer from the disease. Arthritis is more common in older people, but it can affect anyone, including children and teens. In fact, 8.4 million people between the ages of 18 and 44 have arthritis and millions of others are at risk for it.

## Osteoarthritis

**Osteoarthritis** is a disease of the joints in which cartilage breaks down. Cartilage is the strong, flexible tissue that provides cushioning at the joints. In this disease the cartilage becomes pitted and frayed. In time it may wear away completely, and bones may rub against each other. Although osteoarthritis affects primarily the weight-bearing joints of the knees and hips, it can affect any joint—including in the fingers, lower back, and feet—causing aches and soreness, especially when moving.

Osteoarthritis is one of the most common types of arthritis; in fact, it accounts for half of all arthritis cases. It affects about 20 million people in the United States and is most common in women and in people over the age of 45. Many people think that arthritis is an inevitable part of aging. However, several strategies reduce the risk of osteoarthritis:

- ▶ **Controlling weight.** Maintaining an appropriate weight reduces stress on joints by lessening wear and tear on cartilage.
- ▶ **Preventing sports injuries.** Warming up before exercising; adding strength training to your physical activities, and using appropriate equipment (including wrist guards and knee pads when necessary) help avoid joint injuries and damage to ligaments and cartilage, thus decreasing the risk of osteoarthritis. Let injuries heal completely before playing again.
- ▶ **Protecting against Lyme disease.** Lyme disease (which is spread by the bite of infected deer ticks) if left untreated, can result in a rare form of osteoarthritis. Using insect repellents, wearing long-sleeved shirts and pants when walking outdoors or in wooded areas, and being educated on tick recognition and removal can help reduce this risk factor.



Ⓐ According to the Arthritis Foundation, an arthritis epidemic may result from the number of people who participate in adventure sports. What can you do to reduce your risk of developing osteoarthritis?

### Did You Know

Arthritis is the leading cause of disability among people age 15 and older. Arthritis and rheumatoid arthritis account for more than 15 percent of all disabilities in the United States.

## Rheumatoid Arthritis

Rheumatoid arthritis affects about 2.5 million people in the United States. It is three times more common in women than in men. Symptoms usually first appear between the ages of 20 and 40, but the disease also can affect young children. Juvenile rheumatoid arthritis is the most common form of arthritis in children.

**Rheumatoid arthritis** is a disease characterized by the ongoing destruction of the joints due to inflammation. Like type 1 diabetes, this type of arthritis is caused by an autoimmune disease for which there is no cure. Sufferers are likely to experience joint pain, inflammation, swelling, and stiffness. Eventually the joints may become deformed and cease to function normally. Rheumatoid arthritis affects mainly the joints in the hand, foot, elbow, shoulder, knee, hip, and ankle. Other effects include fever, fatigue, and swollen lymph glands. The effects of this disease are usually symmetrical—both sides of the body develop the same symptoms at the same time and in the same pattern.

Early diagnosis of rheumatoid arthritis is crucial. With the use of medication, in many cases the effects of the disease can be controlled. Treatment methods focus on relieving pain, reducing inflammation, and swelling, and keeping the joints moving as normally as possible. A combination of exercise, rest, joint protection, and physical and occupational therapy also can help manage the disease.

## Lesson 3 Review

### Reviewing Facts and Vocabulary

1. What are *histamines*, and what role do they play in allergies?
2. Define *asthma*. What are two strategies for managing this condition?
3. What is *osteoarthritis*? List two ways to reduce the risk of osteoarthritis.

### Thinking Critically

4. **Synthesizing.** Why is it difficult to avoid many allergens?
5. **Analyzing.** Why is it important for people with diabetes to take responsibility for managing their condition?

### Applying Health Skills

**Practicing Healthful Behaviors.** Make a table. In the first column, write the names of the noncommunicable diseases in this lesson. In the second column, identify risk factors for each disease. In the third column, describe and analyze strategies for healthful lifestyle behaviors that will reduce your risk for the disease.

### TECHNOLOGY CONNECTION

**SPREADSHEETS** Using a spreadsheet can help you organize and edit your table. For help using spreadsheets, go to [health.glencoe.com](http://health.glencoe.com).

**Activity 97****Guided Reading Activity**

FOR USE WITH CHAPTER 26, LESSON 3

Directions: Briefly answer the following questions in the space provided.

1. What is an allergy? *1 pt.*

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2. What role do histamines play in allergic reactions? *1 pt.*

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3. List five severe symptoms of allergies. *5 pts p. 687*

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4. Name three common methods used to identify the source of an allergic reaction. *3 pts*

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5. List four strategies for managing asthma. *4 pts p. 690*

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6. List three warning signs of an asthma attack. *3 pts p 690 1<sup>st</sup> bullet point.*

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7. List four common asthma triggers. *4 pts*

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8. Explain how insulin is related to the way your body uses energy. *1 pt.*

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9. How is diabetes diagnosed? *1 pt.*

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