

# Preventing Infectious Diseases

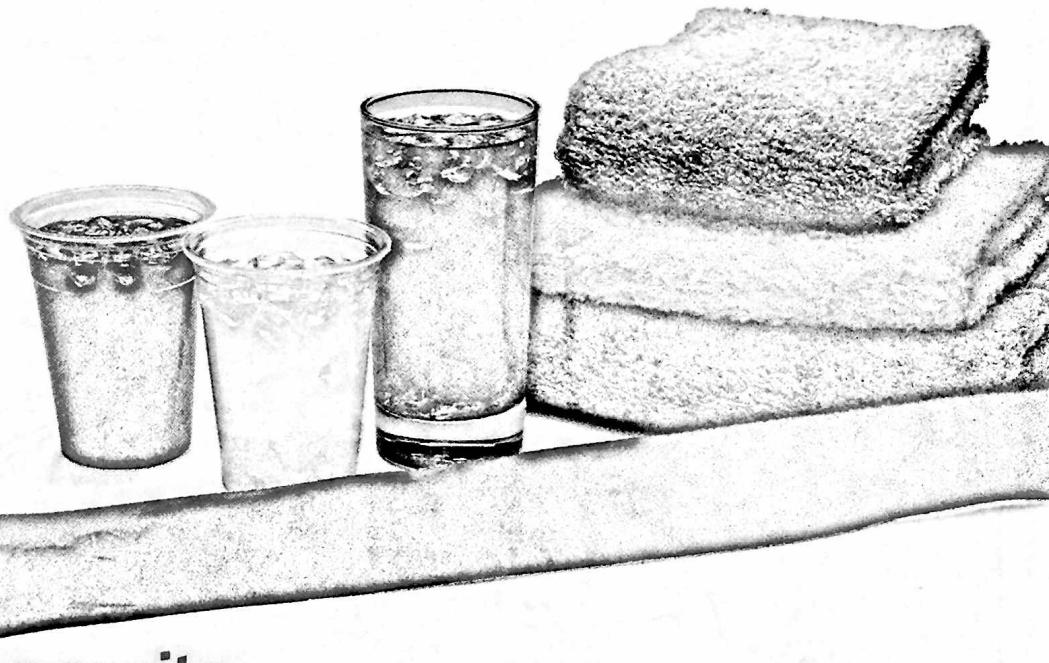
**B**etween the years 1347 and 1351, bubonic plague raged through western Europe, killing nearly half the population. In 1918, an outbreak of influenza affected 2 billion people worldwide and killed more than 22 million of them! Medical science has come a long way toward preventing such disasters.

## HEALTH TERMS

**active immunity**  
**passive immunity**

## HEALTH CONCEPTS

- Science has developed strategies to help combat infectious diseases.
- Some common sense measures can be used to help prevent the spread of infectious diseases.



## Immunity

**A**s noted in Lesson 2, your body creates lines of defenses against disease. Immunity is the body's natural resistance to many pathogens. Certain pathogens cannot live in the body, whereas others are quickly destroyed when they enter the body.

### Active Immunity

One important feature of the body's immune system is that it remembers the pathogens it meets. This gives the body long-term protection—immunity—against many infectious diseases. For example, if you had chicken pox, your immune system remembers the chicken pox virus. If the virus enters your system again, cells designed specifically to combat the chicken pox virus will attack it

immediately. In most cases, the virus does not get a chance to make you sick again.

This *immunity your body develops to protect you from disease* is called **active immunity**. Some types of immunity last a lifetime. Others last only a short period of time. A single virus causes chicken pox, so once a person has had the disease, the body is usually protected against chicken pox for life. Many different kinds of virus cause the common cold. Because the body is continually exposed to different pathogens, immunity to colds is limited.

## Passive Immunity

At birth, babies carry in their blood small amounts of the antibodies that protected their mothers. Babies are thus protected from the same diseases as their mothers. This immunity lasts for a few months after birth until the baby can produce antibodies of its own. *The temporary immunity that an infant acquires from its mother* is called **passive immunity**.

## Immunization

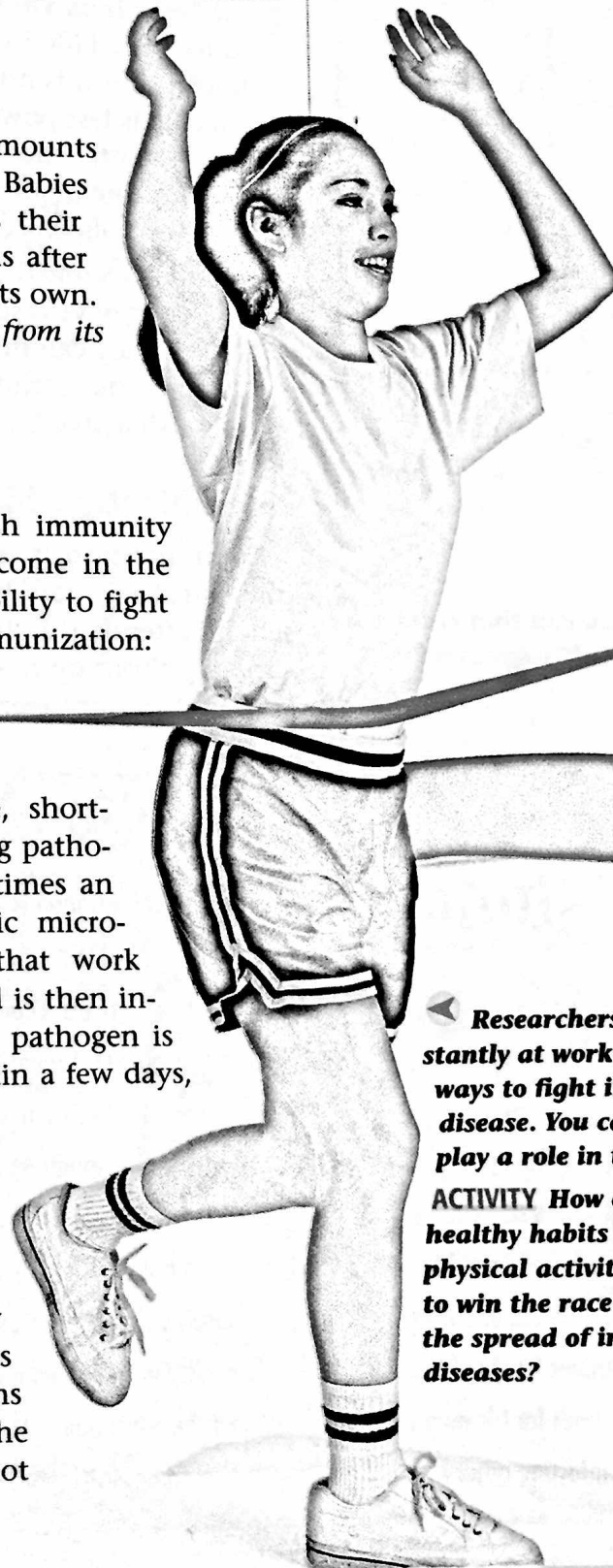
**S**ometimes the body needs help to establish immunity against specific pathogens. This help can come in the form of immunization to give the body the ability to fight off the disease. There are two main types of immunization: passive and active.

### Passive Immunization

Passive immunization provides immediate, short-lived protection against specific disease-causing pathogens. Blood is taken from a person (or sometimes an animal) that has been exposed to a specific microorganism. The blood contains antibodies that work against that organism. An extract of the blood is then injected into the person to be protected. If the pathogen is present in the person's blood or enters it within a few days, the antibodies help destroy it.

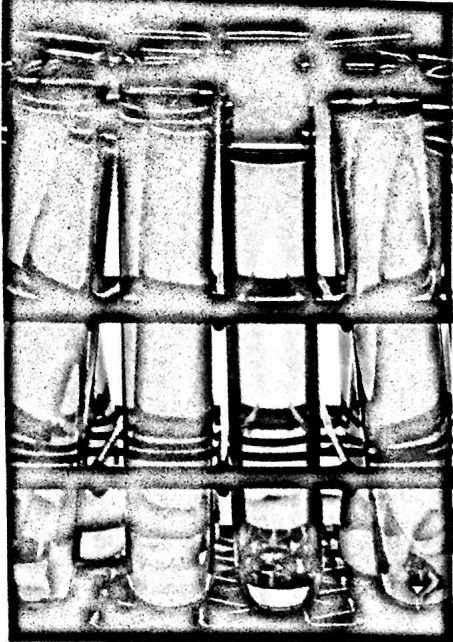
### Active Immunization

Also known as *vaccination*, active immunization involves the introduction into the body of a vaccine. Vaccines provide immunity by causing the body to produce antibodies against the pathogen. Each vaccine contains substances that are strong enough to cause the production of the desired antibodies but not strong enough to cause the disease.



◀ **Researchers are constantly at work to find ways to fight infectious disease. You can also play a role in this.**

**ACTIVITY** How can healthy habits and physical activity help you to win the race against the spread of infectious diseases?



▲ **Although vaccination may cause reactions ranging from a mild fever or rash to more serious responses, the risks from vaccines are far less than the risks from the diseases themselves.**

**ACTIVITY** *Name as many diseases as you can that children are commonly vaccinated against.*

There are three major types of vaccines:

- **Live-virus vaccines.** These are made from weakened viruses. Scientists develop live-virus vaccines by artificially altering the genetic material of the virus or by infecting laboratory animals over and over until the organisms can no longer cause the disease but can still stimulate the production of antibodies. Measles, rubella, and oral polio vaccines all contain live viruses.
- **Killed-virus vaccines.** These contain viruses that have been killed. The killed-virus vaccine causes the body to produce antibodies, but it is not as powerful as a live-virus vaccine. Because the vaccine is less powerful, people need booster shots from time to time. Booster shots are follow-up injections given to reinforce the effect of the first injection. Cholera, typhoid fever, rabies, and Salk injected polio vaccines contain killed viruses.
- **Toxoids.** Some diseases are caused by bacteria that release a toxin. Scientists have discovered that by chemically treating bacteria toxins, they can make very effective vaccines. The treated toxins, called toxoids, stimulate the production of antibodies and establish active immunity against these diseases.

## Immunization for All

Immunization is more than just a good idea—the law often requires it. Each state has its own laws governing immunizations and school attendance. In most states, students cannot enter kindergarten without up-to-date immunizations. Several states now enforce laws that prevent teenagers from attending school without complete

## Making Responsible

### Decisions

#### Letting the Team Down

**E**nrique woke up this morning with a bad cold. He is heavily congested, has a runny nose, and keeps coughing. He knows he should stay home and rest, both for his own sake and to avoid infecting other students.



However, Enrique is a key member of the school's wrestling team. There is an important meet this afternoon with one of their toughest opponents. If Enrique does not compete, his team will lose by default in his weight class. Enrique does not want to let the team down. What should he do?

#### What Would You Do?

Apply the six steps of the decision-making process to Enrique's problem.

1. **State the situation.**
2. **List the options.**
3. **Weigh the possible outcomes.**
4. **Consider your values.**
5. **Make a decision and act.**
6. **Evaluate the decision.**



immunization. Why do you think immunizations are important in the school setting?

Some infectious diseases are more common than others. Diseases that once were dreaded can now be controlled through immunization, and some have been totally eradicated. However, because some diseases are no longer the threat they used to be, people have become lax in obtaining immunization. Isolated cases of some diseases, such as polio, are being reported. An immunization program is essential to prevent the kinds of plagues and pestilences that wiped out entire populations in the past.

## Common Sense Measures

**W**hat can you do to protect yourself from being infected by disease? You have several choices. You can avoid contact with pathogens and you can avoid spreading pathogens to others. Follow these common sense guidelines to reduce the spread of infection.

- Keep your body healthy so that it can better resist infection. Good nutrition, regular exercise, adequate sleep, and good health care all contribute to prevention.
- Bathe or shower every day to keep your skin, hair, and nails clean.
- Avoid sharing eating or drinking utensils.
- Store and prepare food in a safe way to prevent food poisoning.
- Wash your hands after using the bathroom, after changing diapers, and before preparing, serving, or eating food.
- If you know you are sick, avoid giving your illness to someone else. Get medical treatment for your illness. Cover your mouth when you cough or sneeze to prevent spreading the pathogens. Use tissues only once and dispose of them in a waste container.
- If you are well, avoid contact with people who are sick.



▲ **Pathogens are expelled into the air when a person coughs or sneezes.**

**ACTIVITY** *Tell what this person should do to prevent the spread of pathogens.*