

The Immune System

Textbook pages 100–109

Before You Read

If you have a cold or the flu, you can spread the sickness to someone else. How does the sickness spread? Write your ideas on the lines below.



Mark the Text

Create a Chart

Highlight the text that describes the body's two main lines of defence. In a different colour, highlight text that describes how the immune system attacks pathogens. Use the highlighted text to create a chart about how the immune system protects the body.



Reading Check

1. What are the immune system's two lines of defence?

What is the immune system?

Viruses and some kinds of bacteria can cause disease. Living things and substances that cause disease are called **pathogens**. They are found in the air, water, and soil—everywhere around you. Many of the diseases caused by pathogens are infectious. This means that the diseases can be passed on to other people through:

- ◆ direct contact, such as shaking hands or sharing drink containers
- ◆ indirect contact, such as sneezing without covering your mouth
- ◆ eating infected food or drinking infected water
- ◆ animal bites

How does the immune system protect the body?

The **immune system** is the body's defence system. It guards against pathogens and the diseases they cause.

The immune system's first line of defence is to keep pathogens out of the body. The skin stops many pathogens from entering the body. As well, the sweat and oils on your skin can kill pathogens. Gastric juice can destroy pathogens that enter the stomach. The mucus in your nose can help keep pathogens out of your respiratory system.

The immune system's second line of defence is to respond to pathogens by attacking them. There are two ways the immune system attacks pathogens. One way is an innate immune response. The other way is an acquired immune response. ●

What is an innate immune response?

An innate immune response is a quick, general response that all living things are born with. When pathogens attack the human body, the body makes more white blood cells. **White blood cells** are cells that are carried in the blood to fight infections in the body. The white blood cells are sent to the part of the body that is infected by the pathogens. The white blood cells swallow up the invading pathogens.

What is an acquired immune response?

Normally, the immune system recognizes tissues and cells of the body as things that belong to the body. When the body is invaded by a foreign substance, the immune system recognizes it as *not* belonging. It can take up to a week to develop the response needed to defeat the invader.

Any non-living substance that is foreign to the body and that triggers an immune response is called an **antigen**. A splinter, plant pollen, and a virus are all antigens. ✓

How does the body start an acquired immune response against invaders?

One way that the body starts an acquired immune response involves white blood cells called B cells. B cells make substances called **antibodies**. Antibodies bind to antigens to make them harmless or mark them for destruction by other white blood cells.

The other way that the body starts an acquired immune response involves white blood cells called helper T cells. Helper T cells find antigens and signal B cells to produce antibodies to attack them.

When antigens are destroyed, some of the antibodies stay in the body. The antibodies provide active immunity. In other words, they can protect the body from future infections.

Killer T cells are another type of white blood cell. These cells wipe out antigens and pathogens on their own.

✓ Reading Check

2. What is the difference between a pathogen and an antigen?

Use with textbook pages 100–109.

The immune system

Match each Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.

Term	Descriptor
1. _____ first line of defence	A. sneezing without covering your mouth
2. _____ second line of defence	B. blood cells fight infection
3. _____ direct contact	C. a substance that triggers an immune response
4. _____ indirect contact	D. specific particles created by the immune system to destroy specific disease-causing invaders
5. _____ antigen	E. keeps pathogens out of the body
6. _____ pathogen	F. living things that cause disease
	G. shaking hands or sharing drink containers with an infected person

Circle the letter of the best answer.

7. Pathogens are kept out of your respiratory system by
- mucus
 - sweat
 - oils on your skin
 - gastric juice
8. Pathogens on the skin can be killed by
- sweat
 - oils on your skin
 - A and B
 - neither A nor B

9. The body's second line of defence is to
- attack pathogens
 - recognize pathogens
 - keep pathogens out of the body
 - wait a week to develop a response to pathogens

10. Why are white blood cells sent to the part of the body that is infected by pathogens?

- to heal the infection
- to supply blood to the infected area
- to provide immunity
- to destroy the pathogens

11. What are the two types of immune response?

- first line and second line
- innate and acquired
- pathogen and antigen
- direct and indirect

12. What is the role of antibodies?

I.	bind to antigens to make them harmless
II.	mark antigens for later destruction
III.	protect the body from future infections
IV.	wipe out antigens on their own

- I, II, and III only
- II, III, and IV only
- I, III, and IV only
- I, II, III, and IV

13. The role of helper T cells is

- find antigens and signal B cells to produce antibodies
- wipe out antigens and pathogens on their own
- both A and B
- neither A nor B

Use with textbook pages 112-114.

Disorders of the immune system

Vocabulary

AIDS	dead
allergy	helper T cells
allergen	histamine
allergic reaction	HIV
antibodies	killer T cells
antigens	live
antihistamine	memory
B cells	vaccine
bodily fluids	

Use the terms in the vocabulary box to fill in the blanks. Use each term only once. You will not have to use every term.

1. A(n) _____ is a weakened or _____ form of a disease pathogen that is given to a person by needle or by mouth.
2. Once the vaccine is in the body, the immune system makes _____ against the _____ in the vaccine.
3. Antibodies made to fight the dead form of a pathogen will defend you if you are exposed to the _____ form of the pathogen.
4. Sometimes, you are given additional vaccines later in life to help extend the immune system's _____ for that antigen.
5. If your immune system is too sensitive you may have a(n) _____ to a substance, such as dust or mould.
6. In a(n) _____, the immune system releases a chemical called _____ to combat allergens.
7. A(n) _____ drug can help reduce the effects of histamine.
8. Any substance that causes an allergic reaction is called a(n) _____.
9. AIDS is caused by a dangerous pathogen called _____ which attacks the _____.
10. Without the helper T cells, the body cannot trigger the action of the _____ or the _____.

Use with textbook page 114.

True or false?

Read the statements about your immune system given below. If the statement is true, write "T" on the line in front of the statement. If it is false, write "F" and rewrite the statement to make it a true statement.

1. _____ If you have already been vaccinated, you do not need to be vaccinated again.

2. _____ HIV is transmitted only by semen.

3. _____ A vaccine is a live form of a disease pathogen.

4. _____ An antigen causes an allergic reaction.

5. _____ Histamine makes the nose run and the eyes water.

6. _____ AIDS is caused by a bacteria called HIV.

7. _____ There is no known cure for AIDS.

8. _____ HIV attacks the helper T cells.

Use with textbook pages 110–117.

Factors affecting the immune system

Match each Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.

Term	Descriptor
1. _____ allergy	A. chemical produced by the body
2. _____ allergen	B. weakened form of pathogen
3. _____ antibodies	C. fight against antigens
4. _____ histamine	D. high sensitivity to a substance
5. _____ vaccine	E. reduces runny nose and watering eyes
	F. causes allergic reaction

Circle the letter of the best answer.

6. As of 2006, all Grade 9 students in British Columbia receive booster shots for

- A. tetanus, diphtheria, and pertussis
- B. tetanus, diphtheria, and smallpox
- C. tetanus, smallpox, and pertussis
- D. polio, smallpox, and diphtheria

7. A vaccine works by stimulating your immune system to

- A. produce more antigens
- B. reduce the number of T cells
- C. reduce the number of B cells
- D. produce more antibodies

8. HIV is not transmitted by

- A. blood
- B. semen
- C. dirty needles
- D. shaking hands

9. AIDS is caused by

- A. bacteria
- B. virus
- C. semen
- D. blood

10. How can you take care of your immune system?

I.	get plenty of rest and exercise
II.	avoid tobacco
III.	never share bodily fluids with other people
IV.	wash your hands often

A. I, II, and III only

B. II, III, and IV only

C. I, III, and IV only

D. I, II, III, and IV

11. In a severe allergic reaction

- A. a person may have great trouble breathing
- B. the immune system needs to make more antibodies
- C. a person could die from infection
- D. the immune system cannot trigger the B cells

12. HIV attacks

- A. the helper T cells
- B. the killer T cells
- C. the blood
- D. the semen