

## CONCEPT 1

# The immune system helps protect us from pathogens and infection.

### Activity

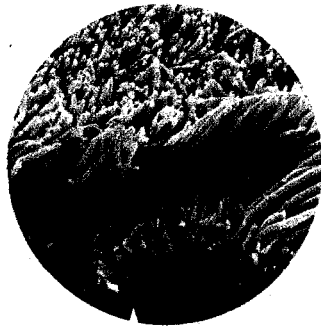
#### Introducing the Immune System

Most microbes are harmless to us and many are helpful. However, some cause disease, and we are constantly exposed to them. Why, then, are we not always sick? How does the body protect us? Share and discuss your ideas.



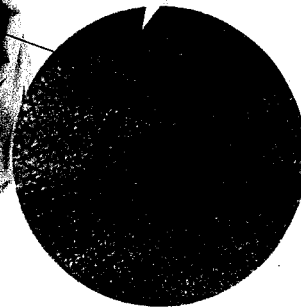
**immune system** the body system that defends against pathogens and infection

**T**he **immune system** has several lines of defence that help protect us from pathogens. The first line of defence is the skin and the linings of internal body systems. **Figure 1.18** shows how different body systems work together to fight against pathogens.



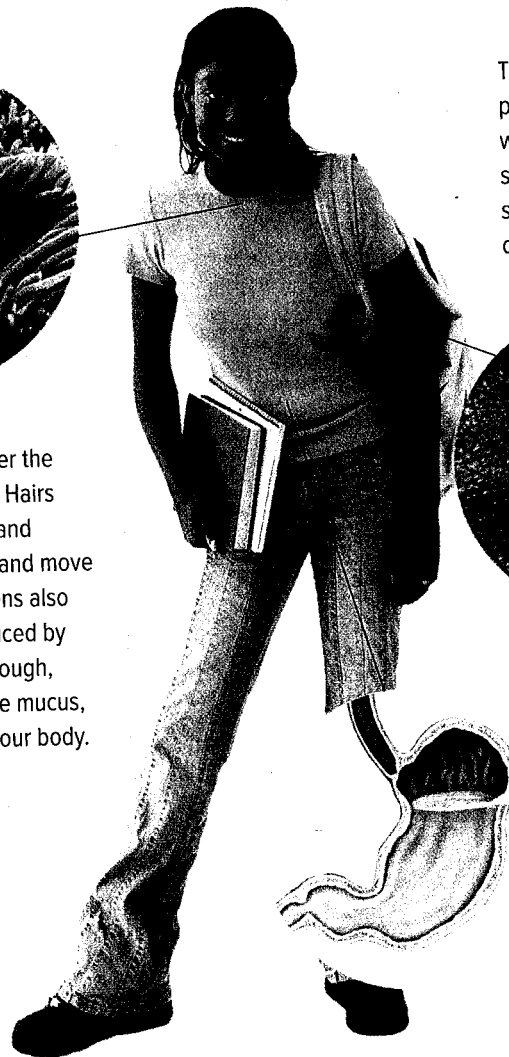
The skin is a physical barrier to keep pathogens from entering the body. As well, sweat and natural body acids kill some pathogens on the surface of the skin. Your skin is waterproof, so you can easily wash pathogens from it.

As you breathe, some pathogens enter the body through the respiratory system. Hairs and hair-like structures in your nose and throat work to trap some pathogens and move them back out of your body. Pathogens also get caught in the sticky mucus produced by your respiratory system. When you cough, sneeze, and swallow, you remove the mucus, and therefore the pathogens, from your body.



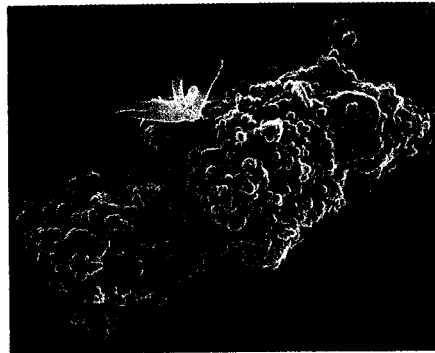
If you eat food that contains pathogens, your digestive system can help stop you from getting sick. Strong acids in your stomach kill many types of pathogens. Mucus in the digestive system traps pathogens, and vomiting removes them from the body.

**Figure 1.18** Other body systems work with the immune system to help protect us from infection.



## The Second and Third Lines of Defence

The immune system has ways to attack pathogens that get by the first line of defence. White blood cells can surround and kill them (**Figure 1.19**). Some white blood cells release chemicals that make it easier for other white blood cells to kill pathogens.

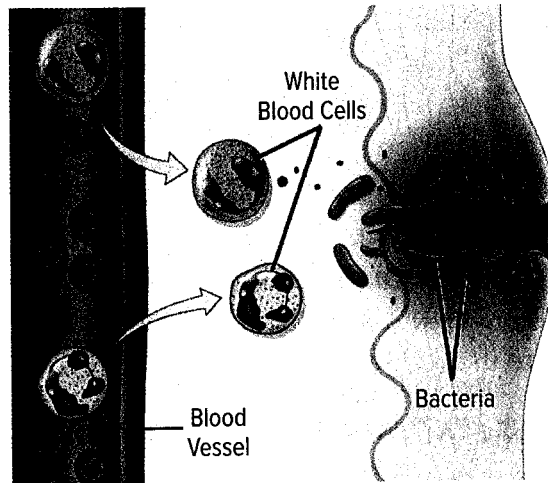


**Figure 1.19** A white blood cell (coloured blue) engulfs bacteria (coloured yellow) that have made it past the first line of defence.

If you have an injury or infection, your body responds by getting inflamed. **Inflammation** causes the affected area to become red and swollen like the cut finger in **Figure 1.20**. White blood cells move to the area, killing pathogens and keeping infection from spreading.

**inflammation** a process that causes a part of the body to become red and swollen

A third line of defence uses specialized white blood cells to fight a pathogen. In future, if the same pathogen enters the body, these cells can respond quickly so you don't get sick again.



**Figure 1.20** When a part of the body is inflamed, it becomes hot and red as blood flow increases. It becomes swollen as fluid floods the tissues. And it becomes painful as nerve endings are stimulated.

## Extending the Connections

### Exploring the Third Line

Find out about the third line of defence of the immune system. Some keywords to use as a starting point are *antigen*, *antibody*, *B cells*, and *T cells*.

### Before you leave this page . . .

1. Trace the path of a pathogen that encounters and gets by the first line of defence but is successfully killed by the second line of defence.
2. How could washing your hands regularly protect you from pathogens?