

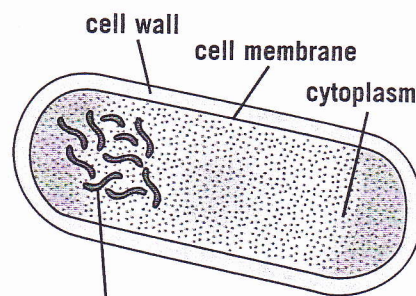
Fighting disease

Microorganisms are bacteria, viruses and fungi. Not all microorganisms cause disease; some are useful.

Disease can affect conception, growth, development, behaviour and health.

Bacteria

- **Bacteria** reproduce rapidly.
- Bacteria can produce poisons, called toxins. For example, food poisoning is caused by bacteria releasing toxins.
- Most bacteria are killed by antibiotics.
- Chlamydia is a sexually-transmitted disease. It can cause fertility problems in women.



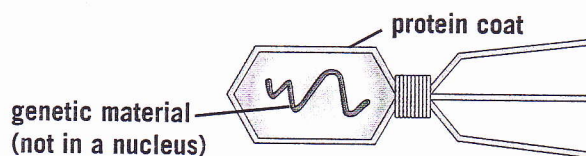
bacterial cells have no nucleus but do have genes in the cytoplasm

Fungi

- **Fungi** cause diseases such as athlete's foot and ringworm.
- Fungi reproduce by making spores that can be carried from person to person.
- Most fungi are useful as decomposers. Yeast is a fungus that is used when making bread, beer and wine.

Viruses

Viruses consist of a few genes surrounded by a protein coat.



- Viruses are much smaller than bacteria.
- Viruses don't feed, move, respire or grow; they just reproduce.
- Viruses can only reproduce inside the cells of a living organism releasing thousands of new viruses to infect new cells and killing the cell in the process.
- Examples of diseases caused by viruses are AIDS (caused by the HIV virus), flu, chicken pox and measles.

Defence against disease

- Infectious diseases are spread in various ways; through the air, via food and water, or contact with infected people.
- **Microorganisms** – bacteria, viruses and fungi – have to enter our body before they can do any harm.
- The body has many ways of preventing microorganisms from entering including the skin, which provides a physical barrier, and various bodily fluids (such as tears) that kill some microorganisms.
- Stomach acid kills some microorganisms that are swallowed.
- If microorganisms do pass the barriers then your immune system springs into action.

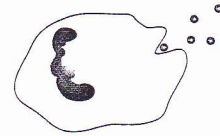
The immune system response

If microorganisms get into the body then white blood cells travelling around in your blood spring into action.

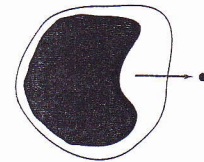
- White blood cells can make chemicals called **antitoxins** that destroy the toxins produced by bacteria.
- White blood cells engulf bacteria or viruses before they have a chance to do any harm.
- However, if microorganisms are there in large numbers then another type of white blood cell produces **antibodies** to fight them.

Microorganisms have foreign antigens on their surface.


Antibodies attach to the microorganisms' antigens and clump the microorganisms together, so they can be engulfed and destroyed.



this type of white blood cell kills microorganisms by engulfing them



this type of white blood cell sends out antibodies which kill microorganisms


 **Learn how the white blood cells fight infection.**

Natural immunity

- Making antibodies takes time, which is why you feel ill at first and then get better.
- Once a particular antibody is made it stays in your body. If the same disease enters your body later the antibodies are much quicker at destroying it and you feel no symptoms. **You are now immune to that disease.**
- HIV causes AIDS, a condition in which the body's immune system begins to fail so the sufferer becomes more susceptible to further microorganism attack.

Artificial immunity

- Artificial immunity involves the use of vaccines.
- A **vaccine** contains dead or harmless microorganisms.
- These microorganisms still have antigens on them and your white blood cells respond to them as if they were alive by multiplying and producing antibodies.
- A vaccine is an advance warning so that if the person is infected by the microorganism the white blood cells can respond immediately and kill them.

 **Make sure you know the difference between natural immunity and artificial immunity.**

KEY TERMS

Make sure you understand these terms before moving on!

- bacteria
- fungi
- vaccine
- foreign antigens
- microorganisms
- antitoxins
- antibodies
- viruses

QUICK TEST

- 1 Name the three main types of microorganisms.
- 2 What chemicals do white blood cells produce?
- 3 What are vaccines?
- 4 Name two diseases caused by viruses.
- 5 Name two diseases caused by bacteria.