

Biology Knowledge Organiser

infection and response

Health and disease

Health is the state of physical and mental wellbeing. So, 'good health' involves good physical and mental wellbeing. 'Poor health' involves problems with one or both aspects. Diseases are major causes of ill-health. Diseases can be classified as **communicable** (can be passed on, as they are caused by **pathogens**) and **non-communicable** (cannot be passed on).

Viral diseases

Viruses are single structures that can not "survive" outside of a living host. They require living cells to copy their information. i.e. HIV

Bacterial diseases

Bacteria are single celled organisms that replicate very rapidly in or on a organism, they make you ill because of the products that they give out. i.e. Gonorrhoea

Fungal diseases

Fungal disease tend to live on other living things and feed of their materials. i.e. athletes foot

Protist diseases

Protists are single celled organisms that live in other living things as parasites. They use your nutrients and stable conditions to survive, they can also live inside your cells. i.e. Malaria

Human defence systems

Non specific responses

Pathogens are all over the place, so humans have evolved defence systems to deal with them. The **skin!** The **nose** has hairs and mucus to trap microorganisms. The **trachea** and **bronchi** also contain mucus. The **stomach** produces hydrochloric acid.

Specific responses

The immune system responds if pathogens enter the body properly – i.e. if they get into the bloodstream. The most important cells in the immune system are the white blood cells. They help defend against pathogens by:

Phagocytosis. Antibody production. Antitoxin production.

Vaccination

1. A vaccine contains a small quantity of a **dead or inactive** form of a **pathogen** (usually a virus, such as the measles virus – see graph).
2. Delivering a vaccine stimulates a primary immune response. White blood cells produce antibodies to destroy the pathogen. Your body is then prepared for when it encounters the actual pathogen.

Treating disease with drugs

Antibiotics

Antibiotics have only been produced since the 1940s, but they have changed the world in that time. The first antibiotic was discovered (not made – it was produced by a fungus!) by Alexander Fleming. He found that a fungus called *Penicillium* worked to kill bacteria he was growing in an agar plate. Antibiotics treat **bacterial** diseases **only**. Antibiotics CANNOT kill viruses,

Painkillers

Painkillers are examples of medical drugs that treat the **symptoms** of disease, without actually getting to the cause and killing the pathogens.

Discovering new drugs

There is a constant demand for new drugs – for better treatments, to treat diseases without any current cures, to deal with antibiotic resistance. However, any of these newly discovered/made chemicals must be thoroughly tested before they can be used in humans.

Development and testing of new drugs

New chemicals, potential medical drugs, are tested to find out if they are **safe** and **effective** (they actually treat the disease they are supposed to!). There are many stages to this testing. We refer to the part before giving the drug to humans as '**preclinical testing**' and to the stages where humans received the drugs as '**clinical trials**'. Together, these stages tell us about the drug **toxicity, efficacy** and information about the **dose** that should be given. Here's the sequence:

In any clinical trial, **double blind** testing is often used. Some patients are given a **placebo** (fake version of the drug), and neither scientist/doctor or patient know who has the placebo and who has the real drug until afterwards.