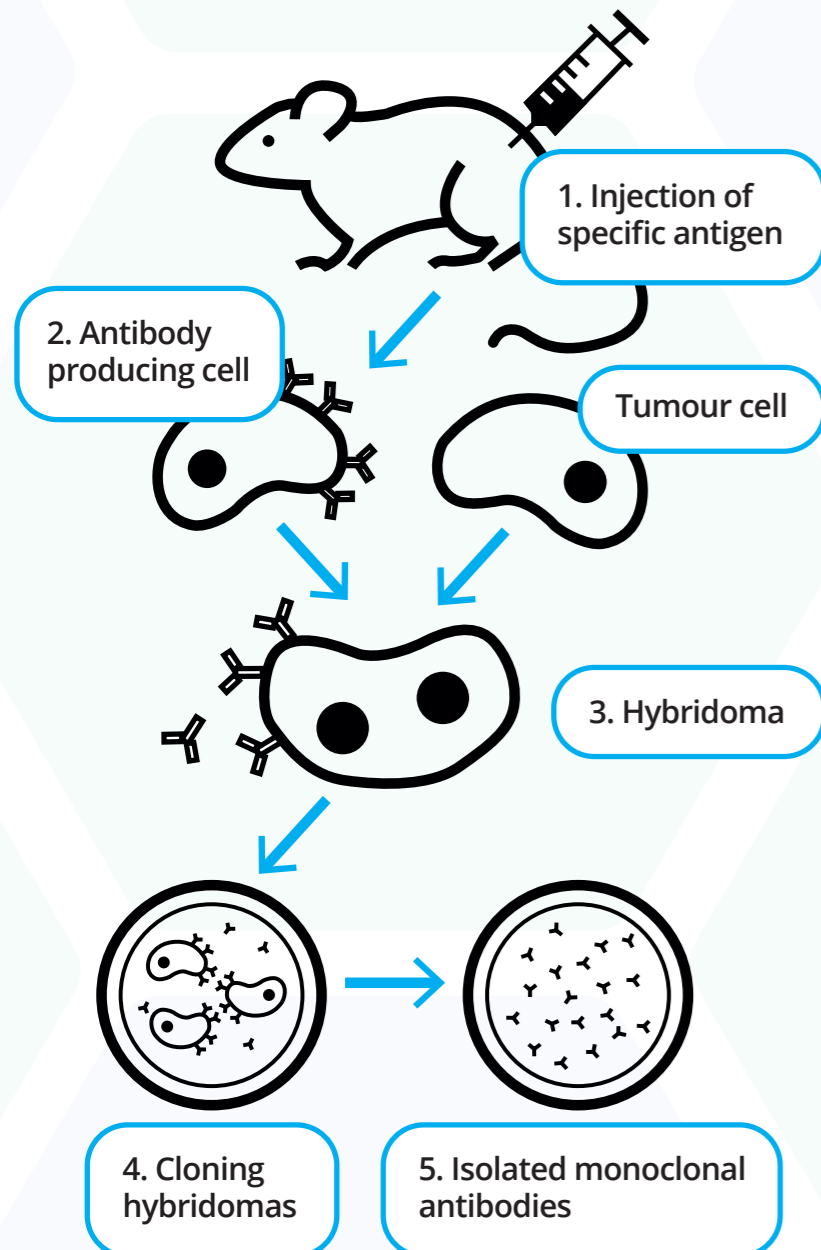


Diseases- Biology Only

	Causative agent	Effect	Treatment	Prevent spreading
AIDS	HIV (Human Immunodeficiency Virus)	Infects lymphocytes leading to lack of immunity to other infections.	Antiviral drugs taken for life.	Spread by blood to blood contact - Use disposable gloves. Sexually transmitted, use condoms to prevent spread.
Chlamydia	Chlamydia trachomatis (bacteria)	Causes infertility in adults, conjunctivitis and lung problems in babies.	Antibiotics like tetracycline/erythromycin.	Sexually transmitted, use condoms to prevent spread.
Malaria	Plasmodium (Protist)	Destroys red blood cells causing fever.	Antimalarial drugs paludrine or daraprim to kill the plasmodium.	Spread by female Anopheles mosquitos. Prevent the mosquitos biting and infecting people by: <ul style="list-style-type: none"> • killing mosquitoes with insecticide • releasing large numbers of infertile male mosquitoes • biological control of mosquitoes • use of mosquito nets and repellents.

Monoclonal antibodies- Biology only

A monoclonal antibody is produced from **cloned** hybridomas which makes them identical.



1. The antigen that will stimulate the specific antibody production is injected into a mouse.
2. The mouse's immune system (B-lymphocytes) begins to produce antibodies specific to the antigen.
3. One of these antibody producing B-lymphocytes is fused with a tumour cell forming a hybridoma.
4. The hybridoma divides repeatedly producing many clones which all produce the same antibodies (monoclonal antibodies).
5. These Monoclonal antibodies (MAb) can then be isolated and used for many things.

Medical uses of monoclonal antibodies:

Immunoassays	Monoclonal antibodies are made for the specific antigens on disease causing agents such as Chlamydia trachomatis bacteria, HIV and Plasmodium. These monoclonal antibodies are labelled (with radioactivity or fluorescence) and added to body fluids to be tested. The extent of labelling detected indicated the extent of the infection.
Tissue Typing	The concentration of non-self-antigens in tissues is assessed. Monoclonal antibodies can be used against helper T-cells (T-lymphocytes) so B-lymphocytes, normally causing rejection, are prevented from functioning.
Treating cancers with chemotherapy	Monoclonal antibodies can be made for cancer cell antigens (tumour markers) and carry anti-cancer drugs directly to the cells.
Monitoring the spread of malaria	Monoclonal antibodies specific to Plasmodium antigens are used to test blood samples from a community. This detects Plasmodium living or dead and can show the spread of Malaria and give an indication the effectiveness of anti-malaria drugs.

Antibiotics

Penicillin, an antibiotic, was discovered by Alexander Fleming. It was made by a **fungus**. Now antibiotics are chemically modified and synthetic.

Antibiotics like Penicillin **destroy bacteria** or **stop their growth**.

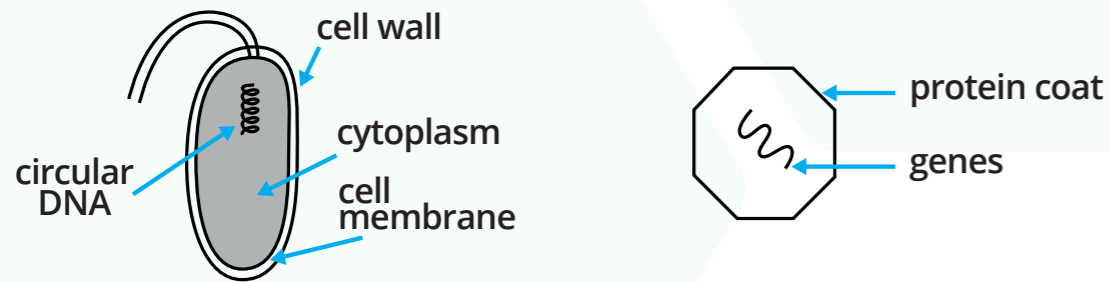
Antibiotics work only on bacteria and fungi. **They do not kill viruses**.

Some **antibiotic resistant** bacteria such as **MRSA** are causing problems in hospitals. This may have developed from over-use of antibiotics. Good hygiene like **hand washing**, alcohol gels, effective cleaning of hospital wards etc. need to be used to prevent the spread.

Microorganisms

Most microorganisms are harmless, some even useful.

Microorganisms that cause diseases are called **pathogens**. **Fungi, protists, bacteria and viruses** can all cause disease.



Pathogens are communicable, they can be spread by:

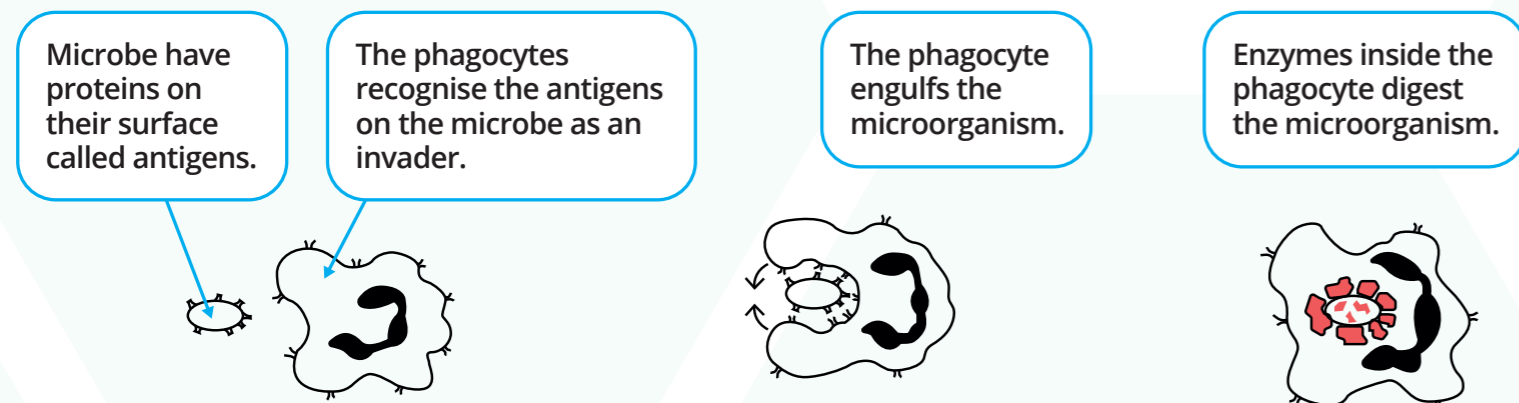
- contact
- aerosol
- body fluids
- water
- insects
- contaminated food.

Body defences - Our bodies are adapted to resist infection by microorganisms:

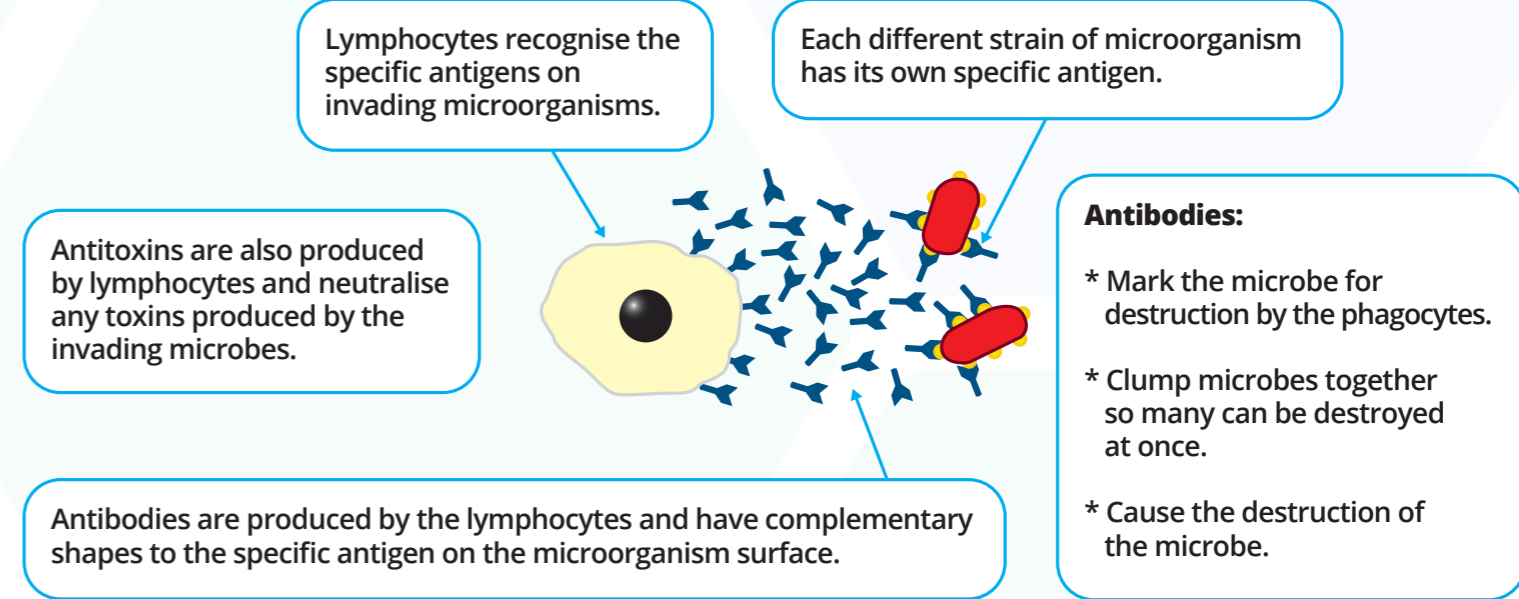
- Skin flora- bacteria that make it difficult for pathogens to become established.
- Intact skin is a barrier and blood clots immediately around wounds.
- Stomach acid and lysozyme in tears protect where skin is not present.

The Immune System - White blood cells - If microbes manage to enter the body then white blood cells in the body will respond. There are 2 types of WBC.

Phagocytes



Lymphocytes



Drug development - Rigorous testing of new drugs is needed to avoid **side effects**.

1. Preclinical drug trials

- Testing on **human cells** grown in the laboratory.
- Testing **on animals**.
- Testing on healthy **human volunteers**.

2. Clinical trials

- Testing on small **groups of patients**.

Clinical trials

Placebo - Used instead of a drug in a drug trial.

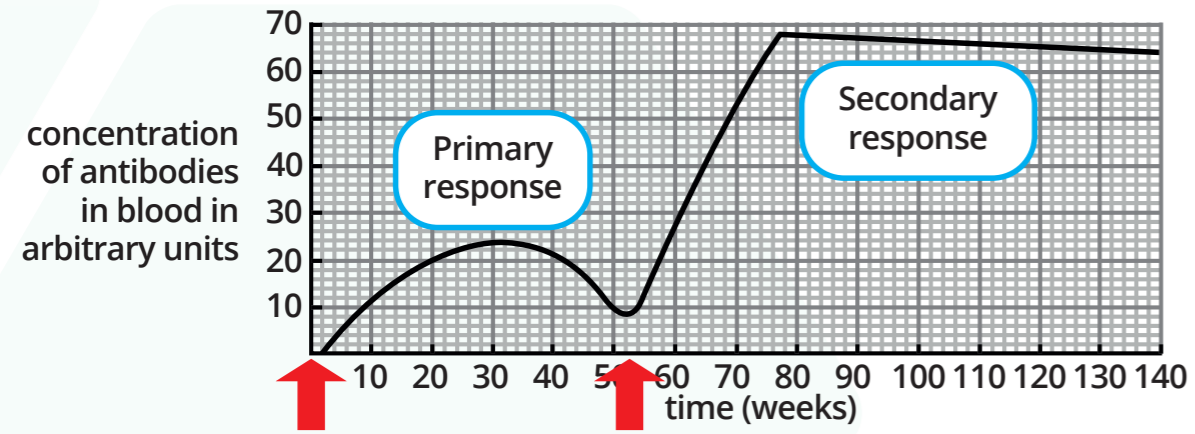
Blind trial - Patients do not know if they have been given the drug or placebo but the doctors know.

Double blind trial - Neither patients nor doctors know if the patient has been given the drug or the placebo, only the researchers know.

Immunity and Vaccinations

1. A lymphocyte recognises the antigen of an invading microorganism.
2. Lymphocyte produces the specific antibody to neutralise the microorganism.
3. The lymphocyte cell divides repeatedly producing many clones of the cell all producing the same specific antibody.
4. Once the microorganisms have been destroyed all the clone cells die off except a few. These cells are memory cells.
5. If the same microbe is encountered again the antibodies will be produced faster and in larger numbers, hopefully destroying the microbes before symptoms are felt. This is immunity!
6. Immunity can be developed if you have the disease or if you are given a vaccination. This is a dead, attenuated or part of the microbe with the antigen on.

Disease, Defence and Treatment



The first lymphocyte response takes longer and fewer antibodies are produced. If this is caused by catching the disease symptoms will be felt. However, this response can be initiated by a vaccination.

If the same microbe is encountered again, memory cells recognise them quickly and a large number of antibodies are produced in a short time. No symptoms are felt, and the person is immune to this disease.

Vaccinations are important for the community as if most people in society are immune then this prevents the spread of the disease those who are not yet vaccinated. This is called **herd immunity**. Parents need to decide whether or not to vaccinate their children and the media have a role to play in this.