

Bacteria

- 1/100th the size of body cells
- Invade cells and produce toxins
- Example:
- **Salmonella** = food poisoning,
Symptoms: fever, stomach cramps, vomiting, diarrhoea
Reduced: most poultry vaccinate against it
- **Gonorrhoea** = STD – sexual contact
Symptoms: painful urinating, thick yellow/green discharge
Reduced: antibiotics, barrier methods of contraception

How they spread

- **Water** = drinking/bathing in dirty water
Example:
Cholera = bacterial infection spread by drinking contaminated water.
- **Air** = pathogens carried in the air and then breathed in. Some are carried in droplets produced when you sneeze/cough.
Example:
Influenza virus = causes flu and is spread via air
- **Direct contact** = touching contaminated surfaces like the skin.
Example:
Athletes foot = fungus makes skin itch and flake off, spread by touching same things like shower floors/towels

Vaccination

- ❖ Injecting small amounts of dead/inactive pathogens
- ❖ Which causes lymphocytes to produce antibodies to bind to the antigen
- ❖ If individual catches the same disease again, the white blood cells have the antibodies ready to produce rapidly.

Advantages

- Sometimes provides immunity
- Smallpox no longer occurs at all

Disadvantages

- Sometimes doesn't provide immunity
- Some can have a bad reaction to a vaccine but it's very rare

Virus

- 1/100th the size of bacterium
- Invades healthy cells and replicates rapidly causing cell to burst and replicated viruses to be set free
- Example:
- **Measles** = droplets from infected sneeze/cough
Symptoms: red skin rash, fever
Reduced: vaccinated when young
- **HIV** = sexual contact/ exchange of bodily fluids
Symptoms: flu-like symptoms then no symptoms for several years
Reduced: antiretroviral drugs (stop replicating)
- **TMV** = leaves rubbing against each other
Symptoms: mosaic pattern on leaves, discolouration
Reduced: destroy the plant

Biology Diseases

Prevention

- **Being hygienic** = washing your hands
- **Destroying vectors** = getting rid of the organisms that spread the disease.
Can be killed using insecticides or destroy their habitat
- **Isolate infected individuals** = isolation prevents them from passing the disease onto anyone else
- **Vaccination** = so they can't develop the infection and the body has antibodies prepared

Body Defence System

1st Defence = phagocytes engulf the pathogens, absorb them into the vacuole then unleash enzymes to break it down. Process called phagocytosis

2nd Defence = B-lymphocytes identify a foreign antigen and produce antibodies that bind to the antigen. The antibodies are complementary to its antigen. The lymphocyte will remember the antibodies for that particular antigen.

3rd Defence = lymphocyte will produce antitoxins that counteract against the toxins produced by invading bacteria

Fungus

- Some are single celled
- Some have body made of hyphae which can grow and penetrate skin and plants and produce spores which spread
- Example:
- **Rose Black Spot** = fungus spreading through water or wind
Symptoms: purple/black spots on leaves, stunted growth, discoloration
Reduced: fungicides, stripping and destroying affected leaves

Drugs

- **Painkillers** = relieve pain
 - **Antibiotics** = kill bacteria but don't kill viruses
- Bacteria can become resistant to antibiotics as they can mutate which makes them a lot harder to destroy. Doctors need to avoid over-prescribing antibiotics and patients need to finish the whole course.
- Most came from plants
- Aspirin came from willow
 - Digitalis came from foxgloves
- Testing
- Preclinical testing** = testing on human cells and tissues and live animals
Test is to find out whether the drug works, how harmful it is and the best dosage.
If passed then it is tested on human volunteers in clinical trials.
- Clinical trials are blind** = 2 groups. 1 group is given the drug, other group is given a **placebo** (substance like the drug but does nothing) the patients don't know what they were given.
- Double blind** clinical test means the doctor as well as the patients are blind. Both don't know who has the drug. This is so that the doctors are not influenced by knowledge.

Monoclonal Antibodies

What are they?

Identical antibodies

They are when you get a B-lymphocyte from mouse that has antibodies for a specific antigen and fuse it with a myeloma cell (tumour cell). This is because tumour cells replicate themselves very rapidly. This creates a hybridoma cell.

These can be cloned so that lots of identical cells produce identical antibodies.

What are they used for?

- **Pregnancy test** = when a woman is pregnant she produces a hormone called **HCG**. Some will be excreted in her urine. So once she has urinated on the pregnancy test the urine travels across 3 zones. At the **reaction zone** Y shaped antibodies will grab onto the HCG, attached to the antibodies is an enzyme that can turn on coloured dye. Then urine goes to the **test zone** where the results show up. Here more Y shaped antibodies will also attach to the HCG, this allows the attached dye activating enzyme to create a visible pattern. Finally at the **control zone** it confirms if the test is working properly. All the unbound enzymes will activate more dye. So if no pattern appears it means the test was false.
- **Treat diseases** = cancer cells have unique antigens called **tumour markers**. In labs you can make monoclonal antibodies that will bind to them. An anti-cancer drug can be attached to them. It kills the cancer cells but not the normal body cells.

Disadvantages = cause more **side-effects** than were expected. E.g. fever, vomit, low blood pressure. So they are not as widely used as much as people thought.

Protist

- Eukaryotes
- Single celled
- Some are parasites that are transferred by a vector to an organism that it will live in and damage.
- Examples:
- **Malaria** = protist within mosquito
Symptoms: fatal fevers
Reduced: destroying the mosquitoes, insecticides, mosquito nets

Plants

Nitrate deficiency = need for protein and growth so causes **stunted growth**

Magnesium deficiency = need to make chlorophyll so causes less photosynthesis and yellow leaves

Signs of disease = spots, decay, malformed stems or leaves, **discolouration**, stunted growth

Identification: Google, books, labs, testing kit

Physical defence = barriers e.g. waxy layers, cell wall, layers of dead cells

Chemical defence = substances that kill e.g. antibacterial chemicals, poisons

Mechanical defence = doing something e.g. thorns, hairs, mimicking, leaf curling