Pathogens and disease

Task 1:

Have a go at completing the exam questions for 35 minutes.

Task 2:

Review the mark scheme and touch up on the areas we need to work on.

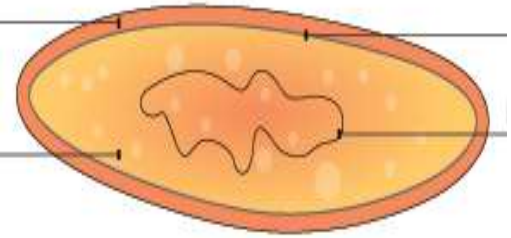
Pathogens and disease

Pathogens: Microorganisms that cause disease

Infectious: the microorganism can be passed on

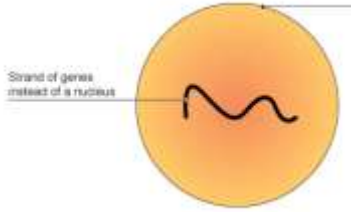
Semmelweis
Many women used to die after childbirth 'childbed fever'. He noticed doctors would go from dead body to baby delivery without washing hands. A doctor had a cut and died from the same symptoms. He told doctors to wash their hands but they were angry he was blaming them for deaths – they didn't know about viruses /bacteria and thought it was God's punishment to women

Bacteria:
Single-celled living organisms.
Used in yogurts, medicine

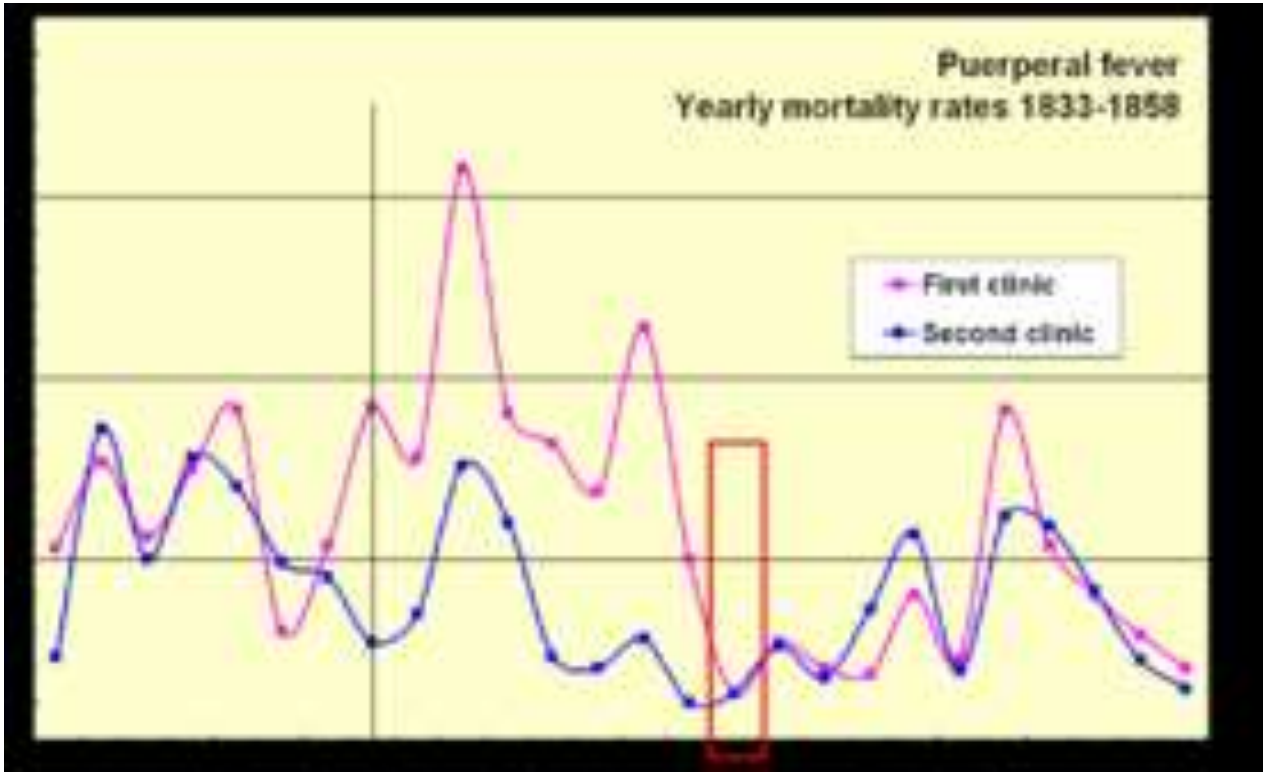


Reproduce asexually inside the body, produce toxins and damage cells
Symptoms are your body responding to this

viruses:
Very small, cause diseases in every type of living organisms
They take over body cells, damage and destroy them



Viruses and bacteria had never been seen before. It was hard to believe disease was spread by something that was invisible!



Doctors believed it was God punishing women.

Doctors didn't like being told that they might have been causing the deaths.

Defence mechanisms

- Droplet infection – *mucus*
- Direct contact – *skin barrier*
- Contaminated food and drink – *stomach acid*
- Break in the skin – *scabs*

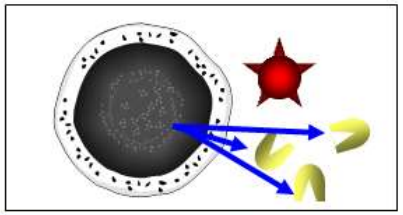
White blood cells of the immune system

❖Ingest microorganisms

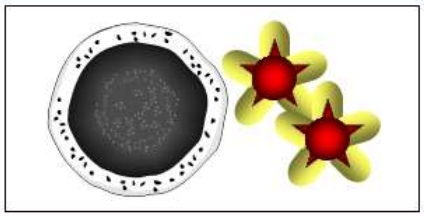
❖Produce specific antibodies

❖Produce antitoxins

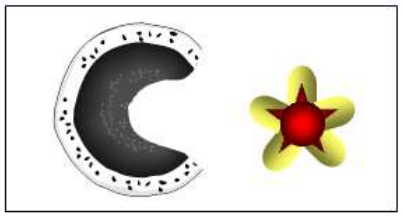
Step 1: The white blood cell "sees" the antigen (microbe)



Step 2: The cell produces antibodies to "fit" the antigen



Step 3: The antibodies fit onto the antigens and cause them to "clump"

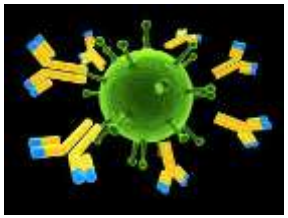


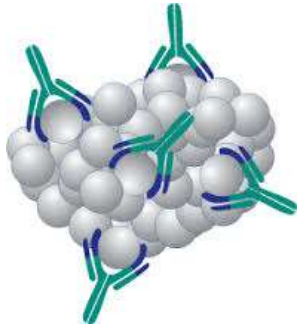
Step 4: The antigens are "eaten" by the white blood cells

White blood cells

- Engulf the pathogen

- Makes antibodies to attach themselves to the pathogen and kill it





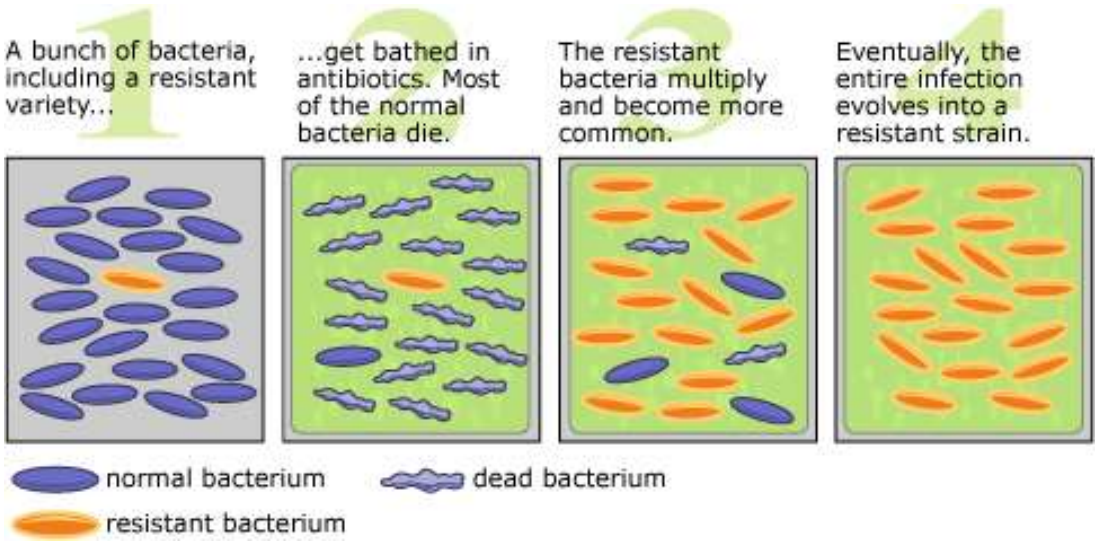
- Make antitoxins to destroy the toxins the pathogen makes

Antibiotics

Painkillers relieve symptoms but do not affect the microorganism

Antibiotics work inside the body to kill bacteria that cause diseases by damaging the bacterial cells – they don't work on viruses as they live inside body cells

Some bacteria may **mutate** by natural selection
They are **antibiotic resistant**
The flu virus mutates very easily so the immune system wont recognise it



To reduce this we should... Only use antibiotics when necessary, treat with specific antibiotics, medical staff wash hands, isolate some patients, clean hospitals

***MRSA**: a result of natural selection in hospitals where many bacteria and antibiotics used to treat*

Antibiotics and Viruses...

How do viruses harm your cells?

Viruses reproduce inside our body's cells and therefore antibiotics don't work. It is extremely difficult to create antiviral drugs as if they kill the virus, they'll be killing our body's cells too!

Fleming discovered Penicillin by noticing that bacteria were unable to grow around a patch of mould.

Immunity

- ***Antigens*** – unique proteins on a cell surface
- White blood cells produce ***antibodies*** to join up with antigens on a pathogen
- White blood memory cells – ***immunity***

Vaccination – dead or weakened version of the pathogen introduced to body so white blood cells can develop antibodies – immune
e.g. MMR, tetanus, smallpox wiped out

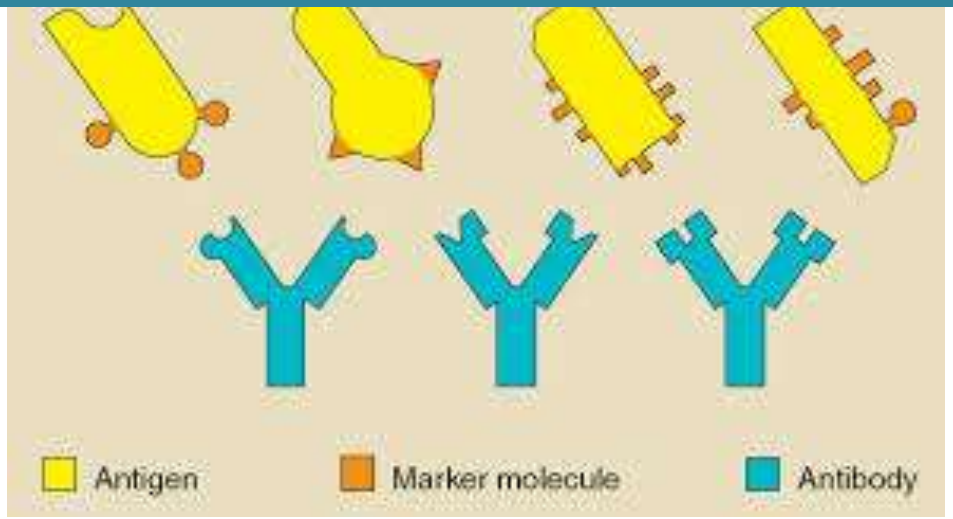
Vaccination debate: no medicine is risk free and some have rare side effects but it is important to vaccinate to protect the population from disease
e.g. MMR, Whooping cough – parents told could be dangerous but the disease itself poses more risk – brain damage etc

Pathogens

Pathogens has structures on their surface called antigens. Each type of pathogen has a

Once it's worked out the right antibody the white blood cells can remember it. So next time you get the disease you can fight it a lot quicker as your white blood cells already know which antibody to use.

The first time your body gets a pathogen, our white blood cells have to work out a new antibody to fit the antigen.



Did you get the 3 key steps?

1. Dead, weakened or inactive pathogen injected into bloodstream.
2. White blood cells create the right antibodies against the pathogen without you getting ill.
3. If the live pathogen enters the body the white blood cells already know which antibody to make and rapidly produced these antibodies to fight the disease.

Don't Wait... Vaccinate

You are protected!