Biology

Fighting diseases

Your body first defence system (non specific defense)

- Your body has ways to stop germs from entering in the first place

Skin

- Skin acts like a barrier to stop pathogens from entering
- It also make anti microbial substances that kills the germs

Nose

- Nose has hair and mucus that traps the dust and the germs

Trachea and bronchie windpipe

- It makes the mucus to trap germs
- They also have tiny hair called Celia which push mucus up to the throat which where it is swallowed

Stomach

- It make hydrochloric acid which kills germs that enter with food and mucus

These are called non specific defense because they protect Us Against all kind of pathogens not just one

Immune system second defence

- **If pathogens get inside your body then immune system fights with them**
- **The main fighters are called white blood cells**
- **They move in your blood searching for the germs**
- **they fight in 3 ways**

Eating the germs - phagocytosis

White blood cells swallows the microbes and digest them

Making antibodies

- **Every germ has unique molecule on it surface called antigen**
- **White blood cells have lymphocytes**
- **see the foreign antigen and make antibodies to fit that antigen**
- **these antibodies Lock on to the germs so other white blood cells can destroy them**
- **the antibodies are specific they only fit the that one type of antigen**
- **if you get the same disease again your white blood cells remember and make the antibody**

Vaccination

- Vaccination prevent illness before it happens
- When a new germ attack your body it takes time to make antibody so you can become ill
- Vaccination helps your body prepare in advance
- A vaccine contains small dead or inactive pathogens
- These have antigens but cannot cause disease
- Your white blood cells make antibodies to this harmless antigen
- Later if the real germs enters your body quickly makes the antibodies to kill it so you don't get sick
- The MMR vaccine protect against the measles mumps
- Example question

Alia is vaccinated and Fatima isn't, and both meet the flu virus

- Fatima can get sick because Her body takes time to make antibodies
- Alia doesn't get disease because her body already has the antibodies from the vaccine

Pros and cons of vaccination

Pros

- vaccine have controlled or removed many diseases like polio measles tetanus
- smallpox is completely gone and polio cases dropped by 99%
- If many people are vaccinated big outbreaks are prevented
- Even unvaccinated people stay safe because few people spread the disease

Cons

- Sometimes vaccines don't work they don't give full Immunity
- Rarely people may have bad reactions such as swelling fever but these are very rare

Remember

- the risk of catching a dangerous disease is much higher than the risk of getting the side effects from a vaccine
- For example one in 15 people with measles get serious complications
- only in 500 may die
- only one in 10 lakh has problem with vaccine

Fighting diseases with the drugs

- Symptoms revealing drugs
- painkillers like Aspirin reduce pain but does not kill the germs
- Cold remedies may help symptoms but don't cure the infection

Antibodies

- Antibodies kill or stop the growth of bacteria
- without harming body cells
- different antibodies killed different bacterias
- they don't work on viruses like cold or flu because virus is living inside body cells

Antibiotic resistance

Sometime bacteria mutate and become resistance to antibodies

- In an infection some bacteria may already be resistant
- when treated normal bacteria die but resistant one survive
- the resistant one reproduces and soon the whole population is resisted
- this is called natural selection

Example MRSA is a dangerous bacteria resistance to many anti biotics

To prevent resistance

- doctor should not over prescribe antibiotics for example short thoughts
- patient must finish the full course even they feel better

Discovery of the drugs

- medicines originally come from plants and microorganisms
- Plants make Chemicals to defend themselves human use them as medicines
- aspirin is made from willow tree and it is a pain relief medicine
- Digitalis it is from the foxglow and it is a heart medicine
- Penicillin was discovered by Alexander Fleming in 1928 ,he saw mold killing bacteria on a Petri dish
- Today drugs are made by chemists in the lab but may still start from natural substances

Testing and developing the new drugs

- before new medicines can be used they must be tested carefully to check
- if they work
- or if they are saved to use

There are the three main stages to launch a medicine

Stage one, pre clinical testing

- Tested on cells and tissues in the labs
- if the drug affects the whole systems like blood pressure it is tested on live animals to check how well it works how harmful it is
- In UK all new drugs must be tested on two different animals

Stage 2 clinical trials

- Tested on human volunteers
- first on healthy people small those to check side effects
- then on ill patients to find the optimum dose like the best amount with the few side effect
- patients are divided into two groups
- one gets the real drug
- one gets the placebo fake drugs with no effects
- this help see if the drug actually works or if improvement is just due to the Plasbo effect

Stage 3 double blind trials

neither the doctor not the patient knows who gets the real drug or fake drug

stage 4 peer review

before publishing results other scientist check if the results were done properly and it will prevent the fall screen