



Communicable diseases:

Pathogens = disease causing microorganisms

Diseases spread

Bacteria:

Tiny, living cells

Produce toxins that poison cells

Viruses:

Tinier than bacteria but not living

Attach to host cells & replicate using their DNA until cells burst

Protists:

Eukaryotes e.g. parasites

Live on organisms & transferred via vectors (e.g. mosquitos carry malaria)

Fungi:

Hyphae or single celled

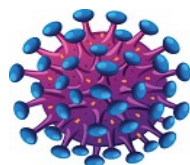
Grow & penetrate skin/plants + produce spores

Pathogen transmission:

Water: drinking contaminated H₂O

Air: airborne viruses carried in droplets (sneezing & coughing)

Direct contact: sexual or sharing needles



HIV



Hepatitis B



Ebola Virus



Adenovirus



Influenza



Bacteriophage

Disease examples:

Viruses:

Measles:

Spread via droplets

Symptoms: red rash & fever, can lead 2 pneumonia/ encephalitis

Most vaccinated young

HIV:

Spread via sexual contact or sharing needles (mixing of bodily fluids)

Symptoms: flu-like for months (use antiretroviral drugs 2 prevent virus replication)

Immune cells are attacked so person cannot cope with other illnesses = AIDS

TMV:

Symptoms: spots on leaves & discolouration

Discolouration = no photosynthesis so stunts growth

Bacteria:

Salmonella:

Symptoms: stomach cramps, fever & vomiting

Contracted by consuming contaminated meats/ prepared in unhygienic conditions

UK: chicken vaccinated against salmonella

Gonorrhoea:

STI

Symptoms: pain urinating & discharge

Antibiotics treat the STI but resistant strains affect effectiveness

Use condoms for no STIs & treat with full course of antibiotics

Fungus:

Rose black spot:

Spread via water & wind

Symptoms: purple & black spots on leaves (turn yellow & drop off)

Gardeners use: fungicides/ remove infected leaves before destroying them to prevent further infection

Protist:

Malaria:

Mosquitos = vectors so transmit protist onto human (inserts it into blood vessels)

Symptoms: fever, fatal sometimes

Prevention via mosquito nets & insecticides & ban mosquito breeding

Fighting disease:

Body's defence system:

Skin: barrier, secretes anti microbial substances 2 kill pathogens

Hairs & mucus in nose: trap pathogens

Trachea & bronchi lined with cilia: waft mucus to back of throat to be swallowed

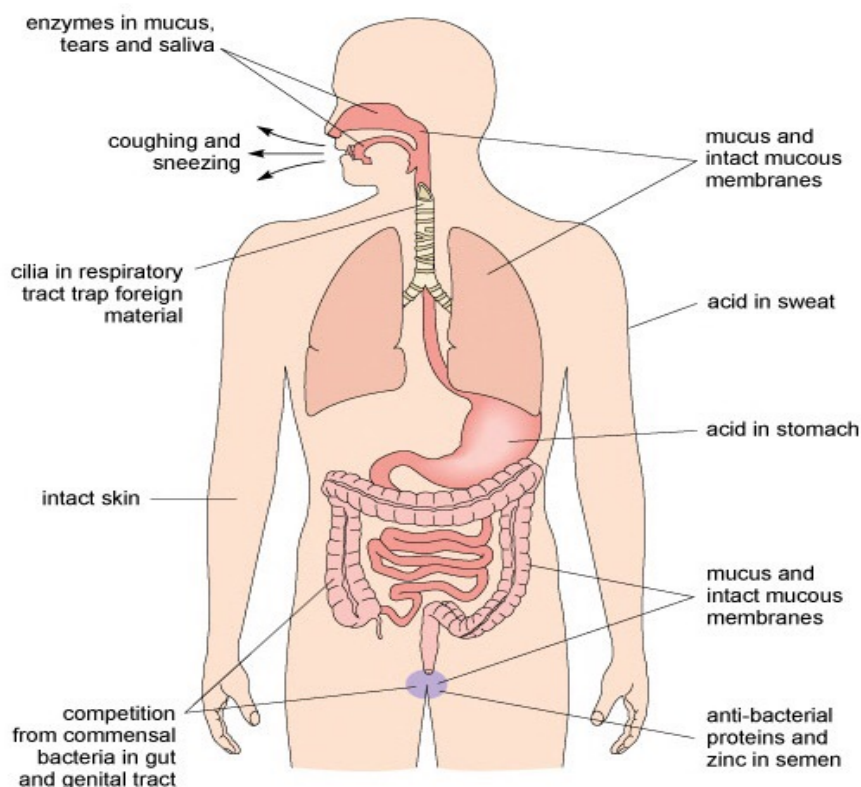
Stomach: hydrochloric acid to kill pathogens

Immune response (white blood cells):

Phagocytosis: engulf & ingest pathogens

Antibodies bind 2 antigens to destroy pathogens, memory lymphocytes act rapidly during secondary response

Antitoxins neutralise toxins (that bacteria produce)



Disease prevention:

Hygiene: washing hands before/after preparing food or sneezing

Destroying vectors: destroying mosquito's habitats/ using insecticides

Isolation: prevents transmission

Vaccines: promotes herd immunity

Vaccines:

Inactive pathogen injected into blood
Stimulates antibody response (specific to the antigen)

Upon reinfection, memory lymphocytes coordinate RAPID response

Primary response: slower upon 1st infection

Secondary response: rapid as memory lymphocytes are ready

E.g. MMR vaccine

Pros: eradicate diseases e.g. smallpox, prevent epidemics via herd immunity

Cons: not 100% effective, bad reactions (e.g. seizures but rare)

Drugs:

Painkillers block pain receptors in brain so relieve symptoms

Antibiotics actually kill BACTERIA but NOT viruses (viruses attach to host cells so would damage healthy cell too)

Antibiotic resistance:

Not taking full course of meds means strong ones reproduce rapidly (via natural selection) = strains of antibiotic resistant bacteria that cannot be killed = sepsis = death

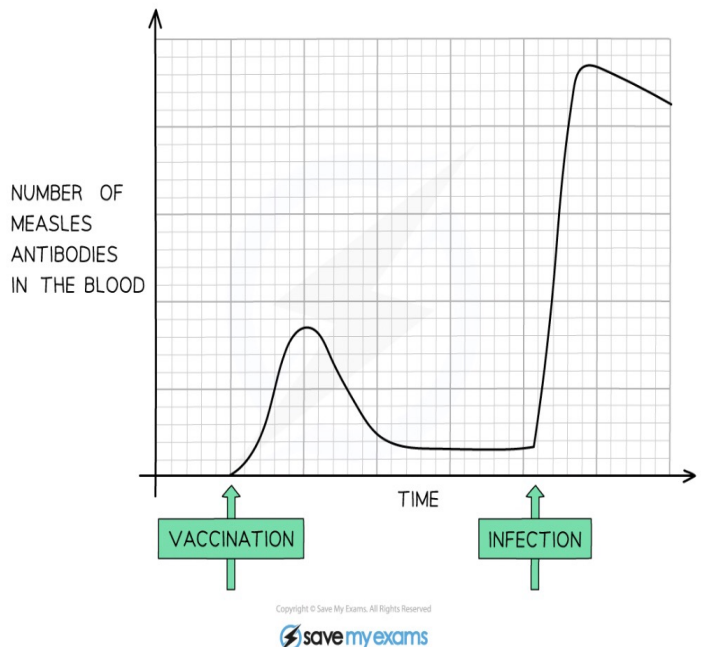
Plants:

Aspirin from willow

Digitalis from foxgloves

Fleming created penicillin: fungus killed bacteria colonies in Petri dish = 1st antibiotic

Pharmaceutical industries cannot keep up with the rate of antibiotic resistant bacteria strain emergence so have to: not over prescribe antibiotics & complete full courses!!!



Plant defences:

Mineral deficiencies:

Nitrates + glucose → proteins for growth

Lack of nitrates = stunted growth

Magnesium ions make chlorophyll for photosynthesis, without it = chlorosis + yellow leaves

Disease symptoms in plants:

Stunted growth, spots on leaves, decay, abnormal growth, malformed stems + leaves, discolouration

Disease type identified via:

Gardening manual & websites

Lab sample tests

Monoclonal antibodies

Plant natural defences:

Physical: waxy cuticles, cell walls & cellulose, dead cells = BARRIERS against pathogens

Chemical: antibacterial chemicals (witch hazel & mint), poisons (deter herbivores)

Mechanical: thorns & hairs, droop & curl when touched by insects, mimicking organisms to deter from being consumed



Monoclonal antibodies:

Produced by b-lymphocytes

Are clones that rapidly reproduce to target specific antigens

1. Inject mouse with antigen
2. Take B-lymphocyte from mouse & fuse with tumour cell = HYBRIDOMA
3. Rapidly divide & are purified

Uses:

Pregnancy tests:

HCG found in urine when pregnant

On pregnancy sticks: HCG binds to antibodies on blue beads, urine moves up & test strip is blue if positive

Disease treatment:

Bind to tumour markers (antigens on cancer cells), radiation attached to antibody & delivered to tumour (stops divisions)

Lab research:

Bind to hormones to measure levels

Blood tests for pathogens (antibodies dyed fluorescently & bind to substance to be observed)

Objections:

Side effects e.g. low BP & vomiting but better than chemo & radio therapies for cancer treatment

