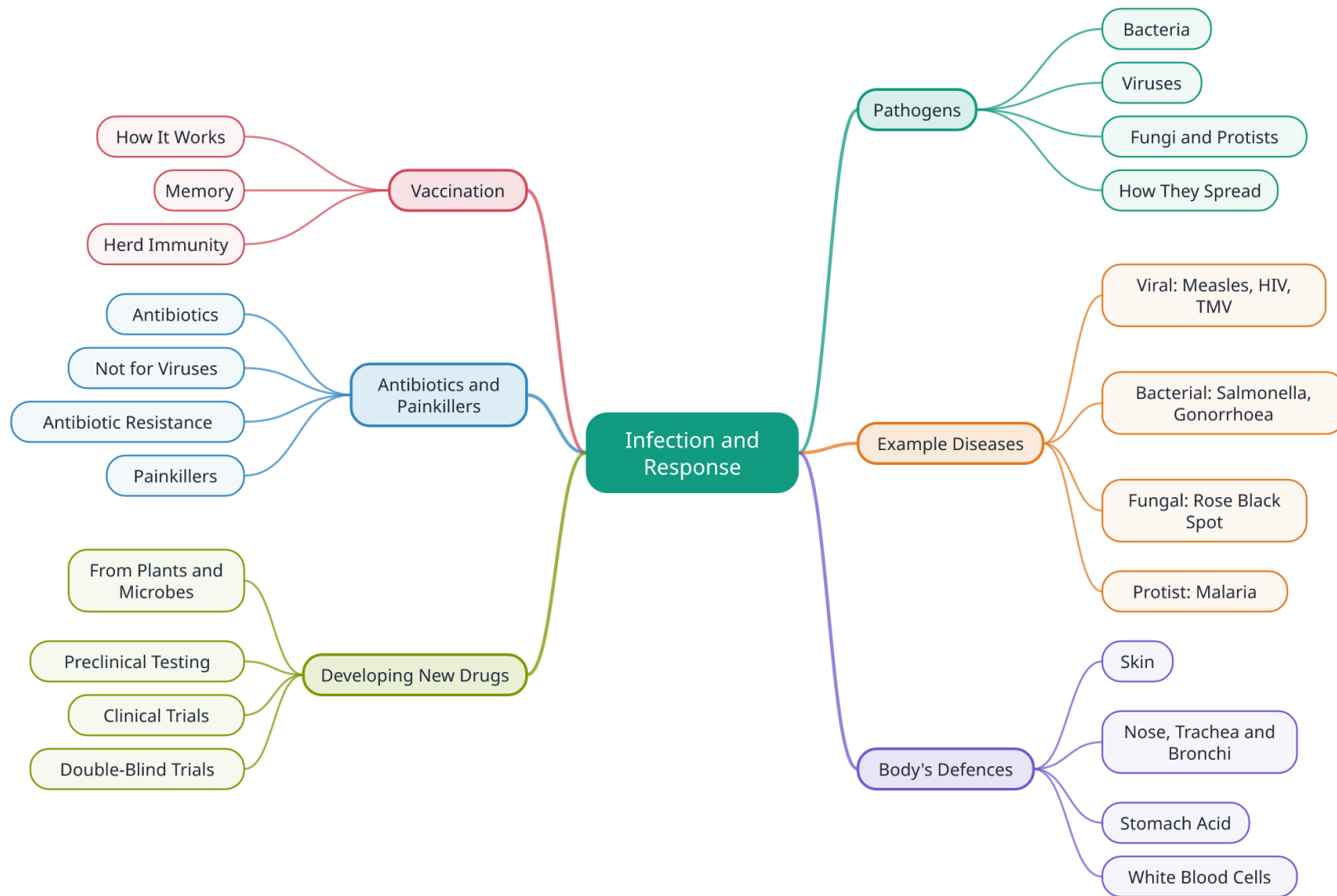


Infection and Response Mind Map (GCSE)

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Infection and Response mind map explained

Pathogens

Pathogens are microorganisms that cause infectious disease. They can infect plants and animals.

Bacteria

Reproduce rapidly inside the body and may produce poisons, called toxins, that damage tissues and make us feel ill.

Viruses

Live and reproduce inside cells, causing cell damage.

Fungi and Protists

Fungi include rose black spot. Protists include the parasite that causes malaria.

How They Spread

- Through the air, in droplets from coughs and sneezes
- In water
- By direct contact
- By vectors, such as mosquitoes

Example Diseases

AQA's examples are below. Edexcel's examples are cholera, tuberculosis, Chalara ash dieback, malaria, HIV, stomach ulcers (*Helicobacter*) and Ebola.

Viral: Measles, HIV, TMV

- Measles: fever and a red skin rash, spread by droplets; prevented by vaccination
- HIV: flu-like illness at first, then attacks immune cells and can lead to AIDS; spread by sexual contact and body fluids; controlled by antiretroviral drugs
- Tobacco mosaic virus: a mosaic pattern on plant leaves, which reduces photosynthesis

Bacterial: Salmonella, Gonorrhoea

- Salmonella: food poisoning with fever, cramps, vomiting and diarrhoea; poultry in the UK is vaccinated against it
- Gonorrhoea: a sexually transmitted disease with a thick yellow or green discharge and pain when urinating; once treated with penicillin, but many strains are now resistant; condoms prevent spread

Fungal: Rose Black Spot

Purple or black spots on leaves, which turn yellow and drop early. Spread by water or wind; treated with fungicides and by removing affected leaves.

Protist: Malaria

Spread by mosquitoes, which are vectors. Causes repeated bouts of fever. Prevented by stopping mosquitoes breeding and using nets and insecticides.

Body's Defences

Non-specific defences stop pathogens getting in. The immune system destroys those that do.

Skin

A barrier to pathogens, which also produces antimicrobial secretions.

Nose, Trachea and Bronchi

Hairs and mucus trap particles. Cilia waft the mucus up to the throat to be swallowed.

Stomach Acid

Hydrochloric acid kills pathogens that are swallowed.

White Blood Cells

- Phagocytosis: engulfing and digesting pathogens
- Antibodies: made to target a specific pathogen
- Antitoxins: neutralise the toxins bacteria release

Vaccination

Vaccines make you immune to a disease before you ever catch it.

How It Works

A small amount of a dead or inactive form of the pathogen is put into the body. White blood cells produce antibodies against it.

Memory

If the real pathogen enters later, white blood cells quickly produce the right antibodies, so the infection is stopped before you become ill.

Herd Immunity

If a large proportion of a population is vaccinated, the disease is less likely to spread, which protects people who are not immune.

Antibiotics and Painkillers

Medicines either cure the disease or only relieve its symptoms.

Antibiotics

Kill bacteria inside the body, for example penicillin. Specific antibiotics are used for specific bacteria.

Not for Viruses

Antibiotics do not work on viruses, because viruses live inside cells. It is hard to make drugs that kill viruses without damaging body tissue.

Antibiotic Resistance

Strains of bacteria resistant to antibiotics are emerging, so doctors avoid prescribing antibiotics when they are not needed.

Painkillers

Painkillers such as paracetamol treat the symptoms but do not kill the pathogen.

Developing New Drugs

New drugs are tested for safety (toxicity), effectiveness (efficacy) and the right dose.

From Plants and Microbes

Digitalis, a heart drug, comes from foxgloves; aspirin from willow; penicillin was discovered by Alexander Fleming in *Penicillium* mould.

Preclinical Testing

Tested in the laboratory on cells, tissues and live animals.

Clinical Trials

Tested first on healthy volunteers at a very low dose, then on patients to find the best dose.

Double-Blind Trials

Some patients get a placebo. Neither the patients nor the doctors know who received the drug, so the results are not biased. Results are peer reviewed before publication.

How to revise with this mind map

1. Learn each disease as a set of four facts: its type of pathogen, its symptoms, how it spreads and how it is treated or prevented. Exam questions ask for exactly these.

2. Check your board's list. AQA and Edexcel use different example diseases, so make sure you know the ones in your specification.
3. Explain vaccination step by step: what is injected, what the white blood cells do, and why you do not become ill when the real pathogen arrives.
4. Be clear on antibiotics. They kill bacteria, not viruses, and overuse leads to resistant strains. This comes up almost every year.
5. Make it yours. Build your own infection and response map in Mindmapi from your class notes, and ask the AI about any branch you are unsure of. The answer is saved into that branch's notes for next time.