AQA Trilogy-Biology key terms – Infection and Response

Health, disease and development of medicines	
Health is the state of **physical** and **mental wellbeing**	**Communicable diseases** (e.g. flu) are infectious diseases (can be spread). **Non-communicable** diseases (e.g. heart disease) cannot be spread.
Different types of disease can **interact**. • Defects in the immune system mean that an individual is more likely to suffer from infectious diseases. • Viruses living in cells can be the trigger for cancers. • Immune reactions initially caused by a pathogen can trigger allergies such as skin rashes and asthma. • Severe physical ill health can lead to depression and other mental illness.	**Risk factors** are linked to an increased rate of disease. For heart disease = lack of exercise, smoking, high blood pressure etc. With some risk factors, we know they **cause** a condition, with others, we just know there is a **correlation** (i.e. A link)
Lifestyle factors (e.g. smoking, alcohol, lack of exercise) can increase the chance of someone suffering from a non-communicable disease	You need to also know the heart disease/treatments key terms found on the transport key terms sheet
Pathogen- a micro-organism (virus, bacteria, fungi protist) that **causes an infectious disease.**	Bacteria and viruses can **reproduce rapidly** in our bodies. Bacteria make **toxins** that **destroy tissues**, so they make us feel ill. Viruses live and reproduce **inside cells,** causing cell damage.
Measles→ Caused by a virus. **Symptoms**- red rash and fever. Can be fatal (i.e. kill) **Spread by** → inhalation of droplets (by sneezes, coughs) **Prevention** → kids can now be vaccinated	**HIV**→ Caused by a virus (which attacks body cells) **Symptoms**- flu like symptoms to start with. Develops into AIDS. At this point, the immune system is very damaged and cannot deal with other infections. **Spread by** → exchange of body fluids- unprotected sex or drug users sharing needles **Prevention** → condoms.
Tobacco mosaic virus→ Caused by a virus **in plants** (e.g. tomatoes) **Symptoms**- mosaic pattern of discolouration of the leaves (which affects plant growth as they cannot photosynthesise)	**Salmonella**→ caused by bacteria found in food **Symptoms**→ fever, cramps, vomiting, diarrhoea (caused by toxins) **Spread by** → food- especially if prepared in unhygienic conditions **Prevention**- chickens vaccinated against this, so less likely to pass to us in eggs etc. Prepare food safely.
Gonorrhoea→ caused by bacteria **Symptoms**→ thick yellow/green discharge from penis/vagina and pain on urinating. **Spread by** →sexual contact **Prevention** → condoms. Spread controlled by antibiotics	**Rose black spot**→ caused by fungi **in plants** **Symptoms**→ black/purple spots on leaves (which affects plant growth as they cannot photosynthesise) **Treatment** → using fungicides and/or destroying affected leaves.
Malaria→ caused by protists **Symptoms**→ fever(can be fatal) **Spread by** →mosquitos **Prevention** → stop mosquitos breeding. Mosquito nets to stop being bitten.	We can only **estimate deaths** from a certain disease as the causes of death are not all recorded.
Non-specific defences against pathogens in **humans**: -**skin** -dead layer difficult to penetrate -**nose-** hairs keep out dust and microbes **-trachea/bronchi-** mucus traps microbes/ cilia moves mucus out of trachea	**White blood cells** help to defend against pathogens if they do manage to enter the body by: 1. *phagocytosis* (engulfing pathogens) 2. *antibody* production 3. *Antitoxin* production.

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-**stomach-** acid kills bacteria	
Vaccines (jabs) can **reduce the spread** of a disease: -some people will become immune to the disease -if less people have the disease, there is less chance it can be passed on	**Vaccinations** 1.inject dead or **inactive** pathogens in to the blood. 2. The white blood cells produces **antibodies** against them. 3.When infected with the real live pathogen the body can make the specific **antibodies rapidly and in larger quantities** (which then kill the pathogens).
Antibiotics (e.g. penicillin) can be used to **destroy bacteria** (not viruses, as they live inside cells so are inaccessible and thus hard to treat). Specific antibiotics must be used to kill specific bacteria. The mass production of antibiotics has saved many lives.	Effectiveness of antibiotics can be tested on bacterial plates. Bigger the area on the bacterial plate around the antibiotic shows the more effective an antibiotic is.
Bacteria can become **resistant** to antibiotics through **mutations e.g. MRSA.** Becoming more common.	**Things that increase antibiotic resistance**: -Giving them for colds/flu -Not finishing a course of antibioitics -Giving them to en masse to cattle etc
-New antibiotics are being made at a slower rate than resistant bacteria are happening -Scientists are worried as we cannot treat resistant strains with antibiotics	**Painkillers**- help treat symptoms of disease, but **don't kill pathogen.**
In the past, drugs were extracted from plants and microorganisms. • The heart drug **digitalis** originates from **foxgloves**. • The painkiller **aspirin** originates from **willow**. • **Penicillin** was discovered by Alexander Fleming from the ***Penicillium*** **mould.**	Most new drugs are synthesised by **chemists** in the **pharmaceutical industry**. However, the starting point may still be a chemical extracted from a plant.
When new drugs are developed, they have to be tested to check they are **safe** and **effective**. New drugs are constantly tested for toxicity, efficacy and dose,	**Dose**= The concentration of the drug and how often it should be given **Efficacy**= Whether the drug works **Toxicity** = Side effects that may make people ill
Clinical trials 1. **Use healthy volunteers first** Very low doses of the drug are given at the start of the clinical trial to test if it is safe. 2. **Next = Patients**- to test how effective it is and if it is safe. In *double blind trials*, some patients are given a **placebo**. 3. **Large number of patients**- to check it is effective and to decide on dose 4. **Before it is licensed-**analyse the results by other scientists (peer review) to check they are valid/not biased	
Double blind trial is when neither the volunteers/patients nor doctors know which group has had the test drug and which the **placebo** (in a clinical trial)**.** The placebo group is the **control**.	A **placebo drug** is **packaged exactly the same** as a trial drug e.g. injection/tablet. Except it does **not** contain the **active ingredient** so may be salt or water.