

**Science: GCSE Infection and Response**

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| 1. Key Words | |
| **Key word** | **Definition** |
| Communicable disease | Disease than can be passed spread by a pathogen |
| Pathogen | Microbe that causes a disease |
| Protist | Group of microbes that have features of plants, animals and fungi. |
| Transmission | The method by which a pathogen is spread |
| Vector | Type of transmission where an organism that carries a pathogen but is not affected by it. e.g. rats |

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| 1. Communicable diseases | | | | |
| Pathogen | Disease | Symptoms | Treatment | Prevention |
| Bacteria | Salmonella (food poisoning) | Vomiting, diarrhoea, fever | Antibiotics | Good hygiene, cook food thoroughly |
| Gonorrhoea | Yellow mucus from penis or vagina, pain when urinating | Antibiotics | Use a condom when having sex |
| Virus | HIV | Flue like symptoms, decreased immunity, lesions | Anti-retroviral drugs | Use a condom when having sex, do not share needles |
| Measles | Fever, red rash on chest and face | Painkillers | Vaccination |
| Tobacco Mosaic Virus (TMV) - Plants | Yellowing leaves stunted growth | Remove infected leaves and burn | Keep away from infected plants |
| Fungi | Rose Black Spot - Plants | Black spots on leaves and stunted growth | Fungicides | Keep away from infected plants |

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| 1. Malaria | |
| * Malaria is a disease caused by the protist *Plasmodium* * It is transmitted by female mosquitos when they bite a human * It causes a fever and flu like symptoms that can be fatal. * It can be treated using drugs that kill the parasite. | |
| **Method of prevention** | **How it works** |
| Mosquito Nets | Meshing is too small for mosquitoes to pass through |
| Draining swamp land | Reduces breeding grounds for mosquitoes and therefore reduces the mosquito population |
| Anti-malarial drugs | Kills the parasite during its developmental stage in the liver and red blood cells |
| Insect repellent | Discourages mosquitoes from biting the person |

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| 1. External body defences (non specific) | | |
| 1 | Skin | Layers of dead skill cells provide a barrier. Antiseptic oils are secreted on to the skin that kill pathogens |
| 2 | Nose | Cilia cells line the nose, throat and lungs. Mucus covering these cells traps the pathogens and the hairs on the upper surface of the cells sway back and forth to sweep the mucus to the nose or to the throat to be swallowed |
| 3 | Mouth | The stomach contains strong hydrochloric acid, this kills pathogens that are swallowed. |
| 4 | Cuts | Platelets in the blood clump together at the site of a cut, these for a carrier at the cut called a scab. |



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| 1. Internal body defences (specific) | |
| Lymphocyte | White blood cell that makes and releases antibodies |
| Phagocyte | White blood cell that engulf and digests pathogens |
| Antigen | Unique protein marker on the pathogen |
| Antibody | Protein that attaches to an antigen to prevent growth and the release of toxins |
| Toxin | Poison released by a pathogen that induces symptoms |
| Antitoxin | Protein that binds to toxins to prevent them from being absorbed in to the body tissues |

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| 1. Vaccines | |
| Vaccines are used to provide immunity against viral infections | |
| Stage | Description |
| 1 | Small amount of WEAKENED or DEAD pathogen is injected in to the blood |
| 2 | White blood cells respond and start to make antibodies to kill the pathogen |
| 3 | Antibodies remain in the blood |
| 4 | If re-infected the levels of antibodies drop and the white blood cells make the antibodies QUICKLY to fight of the pathogen |

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| 1. Antibiotics and Painkillers | |
| Antibiotics | ONLY used to treat bacterial infections. Interferes with the bacterial production or attacks the cell walls of the cell |
| Painkillers | ONLY treats the symptoms of a disease, it does not kill the pathogen |
| Antibiotic resistance | Where a bacteria evolves to no longer be killed by an antibiotic |

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| 1. Drug development | |
| Drug | Chemical that has a physiological effect on the body |
| Toxicity | How poisonous or deadly the drug is |
| Efficacy | How well a drug works |
| Dose | The volume or mass of a drug that is needed to cause an effect |
| Placebo | A pill or liquid that does not contain the drug, e.g a sugar pill |
| Double blind trials | A method of testing a drug where neither the doctors nor the patients know who has taken the drug or placebo. (Prevents bias) |
| **Why are drug trials conducted?** | |
| 1. To ensure the drug is not toxic 2. To check for the side effects of the drug 3. To establish an effective dose 4. To assess the effectiveness of a drug compared to those currently on the market. | |
| **Stages of a drug trial** | |
| Pre-clinical | Drugs are tested on tissues and animals to check for toxicity |
| Clinical trials stage 1 | Small group of healthy volunteers (<10) with a small dose compared to the placebo. Check for toxicity and side effects |
| Clinical trials stage 2 | Group of 100 – 300 healthy volunteers taking a range of doses compared to a placebo. Check for side effects and possible dose |
| Clinical trials stage 3 | Group of 1000-3000 patients. Compared against drugs already available. Check the efficacy of the drug for its intended purpose. |

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| Challenge Questions | |
| 1 | Why can’t measles be treated using antibiotics? |
| 2 | Why is it important that a drug development trial is carried out by an independent company? |
| 3 | Suggest how the development of antibiotic resistant bacteria can be reduced. |
| 4 | Evaluate the use of unlicensed vaccines or drugs to treat COVID-19. |