

GCSE Biology (Separate Science)

Success Criteria: Communicable Disease



<i>I can...</i>	
Explain that health is affected by disease. good health = no disease. Diseases can affect mental health as well as physical health.	
Categorise diseases as communicable and non-communicable.	
Define the term communicable disease as a disease caused by a pathogen (harmful microorganism including bacteria, viruses, fungi and protist) that can be passed between individuals.	
Understand that not all microorganisms are harmful, and that some are even beneficial, to human health.	
Define non-communicable disease as a disease that can not be spread between organisms.	
Describe how communicable diseases can be spread between animals (pathogens gaining entry to the body via cuts in the skin, animal bites, bites by insects (vectors), ingesting contaminated food/drink, inhaling and sexual contact)	
Explain how the spread of communicable diseases between animals can be reduced/prevented (including coughing/sneezing hygienically, thoroughly cooking food/ drinking clean (boiled/chemically treated) water, washing hands with antiseptic, using condoms, not sharing needles, protection from animal/insect bites)	
Describe generally how pathogens cause disease (including gain entry into body, rapidly multiply, produce toxins/waste products, damage host cells) Understand that there may be an incubation period following infection before symptoms appear, during which time pathogens reproduce to significant numbers.	
Describe the method of reproduction for bacteria (binary fission=splitting in two) and viruses (inject viral DNA into host cell, host cell then produces lots of new viruses, viruses then burst out of host cell destroying it and each new virus goes on to infect other cells)	
Identify examples of human diseases caused by each type of pathogen. Describe the general symptoms of each disease and how the pathogen is spread. <ul style="list-style-type: none"> • Measles- virus. fever and a red skin rash, serious illness that can be fatal if complications arise, spread by inhalation of droplets from sneezes and coughs. • HIV- virus. Initially flu like symptoms, attacks body's immune system, leads to AIDs. Spread by sexual contact/exchange of body fluids • Salmonella- bacterial. Fever, abdominal cramps, vomiting and diarrhoea. Spread by contaminated food • Gonorrhoea- bacteria. Thick yellow discharge from vagina or penis, pain when urinating. Spread by sexual contact. • Athlete's foot- fungi. Scaly itchy rash often between toes. Spread by direct contact or contact with contaminated surfaces • Malaria- protist. fever, tiredness, vomiting, and headaches. Spread by mosquitos (vector) 	
Identify the main non-specific (primary) defence mechanisms of the body to pathogen invasion (including skin barrier, stomach acid, mucus in airways and enzymes in tears and ear wax.)	
Describe the role of platelets in forming a scab at a wound site. (platelets form network of fibres to trap RBCs and form a clot to seal the wound)	

Identify the two main types of WBC and describe their function. (phagocytes engulf and digest invading pathogens, lymphocytes produce specific proteins to attack pathogens (antibodies) and neutralise toxins (antitoxins))	
Explain that WBCs recognise pathogens as 'foreign' or 'non-self' by the shape of the antigen proteins on the surface of the pathogen.	
Describe the stages of an immune response (including time to identify the lymphocyte that makes the correct shaped antibody for the foreign antigen, cloning the lymphocyte to enable large amounts of the antibody to be produced, antibodies released into blood to attach to antigens and prevent pathogens from functioning, phagocytes engulfing the pathogens)	
Explain how immunity is gained following initial infection (correct lymphocyte found more quickly and correct antibodies made to destroy pathogens BEFORE they can make you ill)	
Describe a vaccine as a treatment containing dead/weakened pathogens to expose your immune system to the antigen without making you ill.	
Explain how a vaccine provides immunity (initial immune response to the harmless pathogen in vaccine means that upon exposure to harmful pathogen in future correct antibodies produced quickly so you do not get ill)	
Explain the idea of 'herd immunity' ie. the importance of most of population being immune to prevent spread of disease/outbreaks (epidemics) and to protect few that are not.	
Describe treatments available for communicable diseases eg. antibiotics, antivirals and antifungals. Recognise that antibiotics are only effective for bacterial infections (damage bacterial cell wall synthesis so bacteria burst). Explain that viruses are harder to treat due to viruses residing inside host cells.	
Understand that occasionally bacteria mutate and become RESISTANT to an antibiotic. Describe how overuse of antibiotics is encouraging the selection of resistant bacteria.	
Understand that scientist look at nature, such as plants and fungi, to try to find new antimicrobial substances	
Describe the process of developing a new drug/medical treatment including laboratory/pre-clinical tests (testing on cells, tissues and animals- ethical concern) and clinical tests (testing on human volunteers-stating with healthy volunteers first). Use of key terms including placebo and double blind)	
Explain the purpose of, and importance of, thorough testing of new drugs (to identify toxicity, effectiveness, dosage and side effects)	

Monoclonal antibodies (Separate Sciences GCSE ONLY)

Define 'monoclonal antibodies' as antibodies of one type produced in a laboratory by artificially cloning a single lymphocyte.	
Describe how monoclonal antibodies are produced (injection of antigen in to animal, selection of required lymphocyte from spleen of animal, fusion of lymphocyte with cancer cell to form hybridoma, rapid division of hybridoma creating lots of antibody-producing cells)	
Describe some of the ways in which monoclonal antibodies can be used including possible cancer treatments (antibodies to highlight cancer cells to immune system or modified antibodies to carry drugs/radioactive substances directly to cancer cells. Also use of monoclonal antibodies in diagnostic tests eg. pregnancy tests or disease diagnosis.)	

Success Criteria: Non-communicable Disease

<i>I can...</i>	
Explain that health is affected by disease. good health = no disease. Diseases can affect mental health as well as physical health.	
Categorise diseases as communicable and non-communicable.	
Define the term non-communicable disease as a disease that is not caused by a pathogen and therefore cannot be passed between individuals.	
Recognise that different diseases can interact, such as; <ul style="list-style-type: none"> • Genetic defects in the immune system may 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.	
Identify coronary heart disease CHD as an example of a non-communicable disease.	
Describe what CHD is (build up of fatty material-bad cholesterol- in blood vessels supplying the heart muscle with oxygenated blood.	
Explain common risk factors for CHD eg. diet, exercise, smoking, stress and genetic factors	
Evaluate use of statins and stents for treating CHD.	
Identify other heart problems such as faulty heart valve (leaky valve) and evaluate the use of replacement hearts (valves)/transplants.	
Understand the difference between correlation and causation. (correlation means a link in data, causation means the mechanism to link on variable with another is known/understood).	
Understand that a causal mechanism has been proven for some risk factors, but not in others. <ul style="list-style-type: none"> • The effects of diet, smoking and exercise on cardiovascular disease. • Obesity as a risk factor for Type 2 diabetes. • The effect of alcohol on the liver and brain function. • The effect of smoking on lung disease and lung cancer. • The effects of smoking and alcohol on unborn babies. • Carcinogens, including ionising radiation, as risk factors in cancer. Many diseases are caused by the interaction of a number of factors.	
Describe cancer as the result of changes in cells that lead to uncontrolled growth and division (cell changes = changes in DNA/mutations)	
Define a tumour as a mass of abnormal cells formed by uncontrolled cell division.	
Describe tumours as benign (growths of abnormal cells which are contained in one area, usually within a membrane, that do not invade other parts of the body) or malignant (=cancers. Abnormal cells invade neighbouring tissues and may spread to different parts of the body in the blood where they form secondary tumours)	
Identify many lifestyle risk factors for various types of cancer. There are also genetic risk factors for some cancers.	

Plant Disease (Separate Sciences GCSE ONLY)

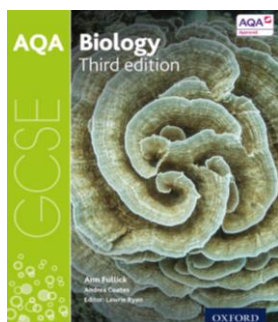
<i>I can...</i>	
Understand that communicable diseases affect plants as well as animals.	
Describe the different methods used by pathogens to find host cells (wind, water and insect vectors)	
Give Tobacco mosaic virus (TMV) as an example of a viral plant disease. causes a mosaic pattern of brown spots on the surface of leaves (no chloroplasts so affects photosynthesis)	
Give Rose black spot as an example of a plant fungal disease where purple or black spots develop on leaves, which often turn yellow and drop early (affecting the growth of the plant as photosynthesis is reduced)	
Describe physical plant defence responses to invading pathogens (including waxy leaf cuticle and thick cell walls)	
Describe chemical plant defence responses including production of antimicrobial substances (such as antibacterial and antifungal), and insecticide/insect repellent to ward off insect vectors that carry pathogens.	
Describe different ways plant diseases can be detected and identified, in the lab and in the field (including looking at symptoms in the plant, observing the pathogen with a microscope, analysing the DNA of the pathogen)	
Describe methods for preventing the spread of communicable diseases between plants (including disinfecting equipment, use of fungicide, burning diseased plants, use of pesticides to deter insect vectors.)	

AQA exam specification:

- 4.3- Infection and Response
- 4.2.2.4 Coronary Heart Disease
- 4.2.2.5 Health issues
- 4.2.2.6 The effect of lifestyle on some non-communicable diseases
- 4.2.2.7 Cancer

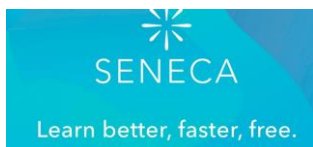
Additional support:

Access the appropriate textbook on [kerboodle.com](https://www.kerboodle.com), create your own revision notes of the key points of the topic and attempt the summary questions.



Separate Biology GCSE textbook
Pages 72-143

Utilise online revision resources to support your class notes, such as...



Attempt past paper questions using www.physicsandmathstutor.com and self-mark your answers using the official exam mark schemes.

Extension work/extra challenge:

Ask your teacher for extension tasks...

Pack 1 Topic 11- Viral Diseases – Ebola

Pack 1 Topic 12- The marvellous Tale of the Modified Mosquitoes

Pack 1 Topic 13- Influenza vs Humanity; The Fight Continues

Pack 1 Topic 14- The Dawn of the New Antibiotic

Pack 1 Topic 15- Dangerous Drugs and Synthetic Organs

