



Work for individual students not attending school

Half Term 3: January – February 2021

Pupils who are absent should select the lesson activity that they are up to

- Click the link and watch the video.
- Complete the tasks as you watch. Write your answers on paper for all the tasks set.
- Complete the exit quiz by clicking the green circles at the bottom of the screen. ●●●●●
- Submit your work to your teacher when you return to school.

Date (week commencing)	Lesson	Focus/Topic/Theme	Hyper link to Activity
4/1/21	1	Non-communicable disease	Non-Communicable disease (thenational.academy)
	2	Review: Circulation	Review (Part 1) (thenational.academy)
11/2/21	3	Infectious disease	Infectious disease (thenational.academy)
	4	Viral and bacterial disease	Viral and bacterial disease (thenational.academy)
18/2/21	5	Fungal and protist disease	Fungal and protist disease (thenational.academy)
	6	Immunity	Immunity (thenational.academy)
25/1/21	7	Vaccines	Vaccines (thenational.academy)
	8	Antibiotics	Antibiotics (thenational.academy)
1/2/21	9	Numeracy	Maths skills (thenational.academy)
	10	Review	Review (Part 1) (thenational.academy)
8/2/21	11	<p>Revision: Select and complete revision activities below.</p> <p>GCSE Bitesize: Using the web link read the revision notes and watch the video. video Pathogens - Communicable diseases - AQA - GCSE Combined Science Revision - AQA Trilogy - BBC Bitesize</p> <p>SENECA: Use the web link to work through the revision notes and attempt questions at the end of the topic. Seneca - Learn 2x Faster (senecalearning.com)</p>	



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Year 10 Defences and Treatments

Keyword	Definition
Antibiotic	A medicine (such as penicillin or its derivatives) that inhibits the growth of or destroys bacteria.
Antibody	A blood protein produced in response to and countering a specific antigen.
Antigen	A toxin or other foreign substance which induces an immune response in the body, especially the production of antibodies.
Antitoxin	An antibody that counteracts a toxin.
Lymphocytes	A white blood cell that detects pathogens within your body and produces antibodies.
Macrophage	These white blood cells carry out phagocytosis.
Painkiller	A drug or a medicine for relieving pain.
Pathogen	A bacterium, virus, or other microorganism that can cause disease.
Phagocyte	A type of white blood cell within the body capable of engulfing and absorbing bacteria and other small cells and particles.
Phagocytosis	The ingestion of bacteria or other material by phagocytes.
Placebo	A medicine or procedure prescribed for the psychological benefit to the patient rather than for any physiological effect. A substance that has no therapeutic effect, used as a control in testing new drugs.
Vaccination	The treatment with a vaccine to produce immunity against a disease; inoculation.

Human Defence System

Non-specific defences prevent any type of pathogen from causing illness

- Nose – nose hairs, sticky **mucus** and **cilia** prevent pathogens entering through the nostrils
- Trachea & Bronchus – Mucus, trap dust and pathogens. Cilia moves mucus upwards
- Stomach acid – kills pathogens
- Skin
- White blood cells – **antiquil & digest**

Specific defences

White blood cells (lymphocytes) Respond to a specific pathogen in two ways.

- **Antibody** production – specific shaped γ -proteins that attach to **antigens** on the surface of the pathogen – stops reproduction or cell division
- **Anti-toxin** production – **neutralise** specific bacterial toxins

Treatments

- **Antibiotics** – only work on bacteria, kill bacteria. Specific antibiotics used on specific bacteria. e.g. penicillin
- **Painkillers** – only treat the symptoms of the disease e.g. paracetamol & ibuprofen

Prevention

- **Vaccinations** – small amount of dead or inactive form of the pathogen. Contains **antigens** that stimulate an active immune response
- 1st infection – WBC detect the **antigens** on the pathogen and make **antibodies** (blood)
- **White blood cells form memory cells**
- **Re-infection** – Antibodies made faster and in large amounts (memory cells)

Clinical Trials

New drugs tested for:

- **Efficacy** – make sure it works
- **Toxicity** – not poisonous or have any side effects
- **Dosage** – Minimum amount for maximum effect

Pre-clinical Cells, tissues, live animals, before testing on humans

Clinical – Healthy volunteers (small dose), small number of patients, larger number of patients, double-blind trial (drug vs placebo)

Year 10 Monoclonal Antibodies Unit 8

Keyword	Definition
Lymphocyte	White blood cell that produces antibodies
Antibody	Blood protein (Y-shaped) produced in response to and countering a specific antigen
Antigen	Protein on the surface of cells
Clone	Genetically identical cell to the parent cell
Monoclonal antibody	Monoclonal antibodies are proteins that are artificially produced to target particular cells or chemicals in the body.
Tumour	Cannot produce antibodies but can divide to produce a clone of themselves
Hybridoma	Combination of a lymphocyte and a tumour cell that can divide and make a large number of identical cells that all produce the same antibodies

Evaluation of the uses of monoclonal antibodies

Advantages	Disadvantages
They only bind to specific diseased or damaged cells that need treatment.	Not widely used as hoped.
Healthy cells aren't affected at all.	Difficult to produce
Because they are so specific they can treat a variety of diseases.	Expensive treatment.

A treatment with many possibilities. Can be used to attach drugs to target specific cells – mago bullets.

Because mice were used there have been some side effects to the treatment.

Monoclonal antibodies

- Dr Milstein and Dr Kohler discovered a way of making pure antibodies in a test tube.
- Artificially made in a laboratory
- A pure monoclonal antibody will attach itself to only one antigen on one kind of bacterium or virus, antibodies are then used to diagnose infectious diseases with unprecedented speed and certainty.

Production of monoclonal antibodies

- Produced from a single clone of cells.
- Antibodies are specific to one binding site on one protein antigen and so are able to target a specific, chemical or specific cells in the body.
- Produced by stimulating mouse lymphocytes to make a particular antibody.
- The lymphocytes are combined with a tumour cell to make a cell called a hybridoma cell.
- The hybridoma cell can both divide and make the antibody.
- Single hybridoma cells are cloned to produce many identical cells that all produce the same antibody.
- A large amount of the antibody can be collected and purified

Uses of monoclonal antibodies

- Diagnosis such as in pregnancy tests
- Laboratories to measure the levels of hormones and other chemicals in blood, or to detect pathogens
- Research to locate or identify specific molecules in a cell or tissue (fluorescent dye)
- Treatment of diseases: for cancer the monoclonal antibody can be bound to a radioactive substance, a toxic drug or a chemical which stops cell growing and dividing

Year 10 Pathogens and Diseases

Keyword	Definition
Bacteria	a member of a large group of unicellular microorganisms which have cell walls but lack organelles and an organised nucleus, including some which can cause disease.
Communicable Disease	an infectious disease transmissible by direct contact with an affected individual or the individual's discharges or by indirect means
Fungi	any of a group of spore-producing organisms feeding on organic matter
Non-Communicable Disease	A non-communicable disease (NCD) is a disease that is not transmissible directly from one person to another. Not caused by a pathogen
Pathogen	A bacterium, virus, or other microorganism that can cause disease.
Protist	a single-celled organism of the kingdom Protista, such as a protozoan or single alga
Toxin	a poison of plant or animal origin
Vector	an organism, typically a biting insect or tick, that transmits a disease or parasite from one animal or plant to another.
Virus	an infective agent that typically consists of a nucleic acid molecule in a protein coat, is too small to be seen by light microscopy, and is able to multiply only within the living cells of a host.

Pathogens

Micro-organisms that cause disease

- Viruses – reproduce inside the cells and **damage cells** e.g. HIV, measles
- Bacteria – prokaryote, release **toxins** that cause illness
- Protist – eukaryote
- Fungi – eukaryote

Communicable Diseases – transmitted by pathogens

Pathogen	Disease	Symptoms	Method of transmission	Control of spread
Virus	Measles	Fever, red skin rash.	Druglet infection from sneezes and coughs.	Vaccination as a child.
Virus	HIV	Initially flu like symptoms, serious damage to immune system.	Sexual contact and exchange of body fluids.	Anti-retroviral drugs and use of condoms.
Virus	Tobacco mosaic virus	Mosaic pattern on leaves.	Enters via wounds in epidermis caused by pests.	Remove infected leaves and control pests that damage the leaves.
Bacteria	Salmonella	Fever, cramp, vomiting, diarrhoea.	Food prepared in unhygienic conditions or not cooked properly.	Improve food hygiene, wash hands, vaccinate poultry, cook food thoroughly.
Bacteria	Gonorrhoea	Green discharge from penis or vagina.	Direct sexual contact or exchange of body fluids.	Use condoms. Treatment using antibiotics.
Protista	Malaria	Recurrent fever.	By an animal vector (mosquitoes).	Prevent breeding of mosquitoes. Use of nets to prevent bites.
Fungus	Rose black spot	Purple black spots on leaves.	Spores carried via wind or water.	Remove infected leaves. Spray with fungicide.

Non-Communicable Diseases – not caused by a pathogen

Risk factor – increases the likelihood of developing a specific disease

- Obesity – poor diet and lack of exercise e.g. type 2 diabetes (blood sugar regulation)
- Alcohol – scar tissue formed in the liver, disrupts function e.g. liver cirrhosis
- Smoking – effect of chemicals on cell functioning e.g. lung/mouth cancer

Contact

You can email **your class teacher** if you have any questions about the activities set.

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