

Lesson 14 B4.14 – Making New Drugs

Connection

Q1. Briefly describe how vaccinations work.

Q2. What is the role of antibodies?

Q3. What is the purpose of a mass vaccination programme?



Activation

LI: Recall some traditional drugs and describe how new drugs are developed.

<https://www.youtube.com/watch?v=hjBfbMuvPA>

1. Make a note of the title and the LI
2. Read pages 156-157
3. Define the key words: Dose, efficacy, placebo.
4. Copy and annotate fig. 4.47

Consolidation

Complete and self assess the relevant past paper question for this topic -
From the B4 DIP file

Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Demonstration

Attempt questions 1-7.

In 15 mins answer as many questions as you can.

Self mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9



Answers: B4.14- Making New Drugs

Connection

1. A small quantity of an unactive form of the pathogen is introduced to the body. Lymphocytes produce antibodies to fight the infection but the individual doesn't actually become ill. When the full form of the pathogen enters the body the immune system recognises it and responds immediately.
2. Lock onto antigens, neutralising them and marking them for lymphocytes.
3. To prevent the spread of disease through a population.

Demonstration

- 1 Digitalis – from foxgloves; aspirin – from willow bark; penicillin – from Penicillium mould
- 2 To ensure that they are effective, stable and safe
- 3 Stages are: preclinical testing in the lab and animals followed by clinical trials using volunteers: phase I tests for dosage and safety; phase II to monitor efficacy and side effects; phase III to monitor long term effects
- 4 Patients have a weaker immune system and these tests ensure that the drugs will be safe, the dose will be suitable, they will fight the infection and major side effects will have been determined.
- 5 So that the trials cannot be influenced by the people involved in them, (patients, doctors or employees of pharmaceutical companies)
- 6 When people feel better just because they think they will if they take a medicine
- 7 The doctor or researcher may give away clues to the volunteers/patients without realising it. This is called observer bias and can make the results unreproducible.

Lesson 15 B4.15 – Investigating Monoclonal Antibodies (higher)

Connection

Q1. What are the 3 main characteristics new drugs are tested for before being prescribed?

Q2. Describe preclinical testing.

Q3. Define placebo.



Activation

LI: Describe and evaluate the use of monoclonal antibodies. Explain how they are produced.

<https://www.youtube.com/watch?v=XrUW54Ea598>

1. Make a note of the title and the LI
2. Read pages 158 - 159
3. Define the Key words: hybridoma, monoclonal antibodies.
4. Draw and label fig. 4.49

Consolidation

Complete and self assess the relevant past paper question for this topic -
From the B4 DIP file

Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Demonstration

Attempt questions 1-6.

In 15 mins answer as many questions as you can.

Self mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9



Answers: B4.15- Investigating Monoclonal Antibodies (Higher)

Connection

1. Efficacy, safety and stability.
2. Laboratory testing, using cells, tissues and or live animals, to find out side effects and efficacy.
3. A treatment that does not contain a drug.

Demonstration

- 1 cells that are cloned from one cell.
- 2 Pregnancy tests, research, treatment of diseases and laboratory tests for hormones etc.
- 3 To stimulate lymphocytes that make specific antibodies
- 4 To break down the cell membranes to help them fuse
- 5 The hybridoma cells all come from the one specific lymphocyte cell so all produce the same antibody
- 6 Possibilities are endless as large amounts of antibodies can be produced very quickly. They are very specific and will not damage unaffected cells in e.g. in cancer treatment. BUT because they are produced in mice immune reactions occur due to the foreign proteins so the manufacturing technique needs to be improved.

Lesson 16 B4.16 – Looking at Plant Disease (Higher)

Connection

Q1. What are monoclonal antibodies?

Q2. Name 3 uses of monoclonal antibodies.

Q3. What are hybridoma cells?



Activation

LI: Recall the causes of plant disease and describe the symptoms and identification methods of plant disease.

<https://www.youtube.com/watch?v=05ITJlgPcR0>

1. Make a note of the title and the LI
2. Read pages 160-161
3. Define the Key words: chlorosis

Consolidation

Complete and self assess the relevant past paper question for this topic -
From the B4 DIP file

Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Demonstration

Attempt questions 1-5.

In 15 mins answer as many questions as you can.

Self mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9



Answers: B4.16- Looking at Plant Disease (Higher)

Connection

1. Antibodies made from cells that are cloned from one cell and are specific to one binding site on an antigen.
2. -Diagnosis
-Research
-Treatment of disease
3. Cells made from combining tumour cells with lymphocytes, to give cells that can produce antibodies and divide (for the production of monoclonal antibodies)

Demonstration

- 1** viral, bacterial and fungal pathogens, as well as by pests such as insects.
- 2** Magnesium is needed to make chlorophyll for photosynthesis and nitrates are needed to make amino acids to make proteins for growth.
- 3** Symptoms are mottling or discoloured leaves, curled leaves, stunted growth, yellow streaks or spots on leaves. Identification of TMV is difficult because symptoms are similar to other plant diseases. May need lab analysis
- 4** Magnesium is needed to make chlorophyll and If plants do not have sufficient chlorophyll they cannot produce the glucose they need for respiration to release the energy needed for chemical reactions in cells
- 5** mABs are produced by injecting e.g. a rabbit with the plant virus or an antigen of the virus to produce the antibodies. The mABs are then used to identify plant diseases.

Lesson 17 B4.17 – Learning About Plant Defences (Higher)

Connection

Q1. Why is plant disease an important issue for all life?

Q2. Name and describe a mineral deficiency that effects plants.

Q3. Name 3 action and control methods for reducing the occurrence of tobacco mosaic virus.



Activation

LI: Recall and describe some of the plant defence systems.

<https://www.youtube.com/watch?v=T4FIGsp9uFI>

1. Make a note of the title and the LI
2. Read pages 162-163
3. Define the key words: antibacterial chemicals, mimicry, rust
4. Draw and label diagrams to illustrate the physical defence systems some plants poses

Consolidation

Complete and self assess the relevant past paper question for this topic -
From the B4 DIP file

Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Demonstration

Attempt questions 1-6.

In 15 mins answer as many questions as you can.

Self mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9



Answers: B4.17- Learning About Plant Defences (Higher)

Connection

1. Plants are producers for the food chains. If they die off in large numbers this is felt right up the chain.
2. Nitrate deficiency – needed for amino acids, protein synthesis and growth.
Magnesium deficiency – Needed to make chlorophyll
3. Removal of weeds, removal of infected plants, disinfection of tools.

Demonstration

- 1 They prevent pathogens from entering the epidermis
- 2 They prevent pests/pathogens from entering the living cells underneath
- 3 layers of dead cells around stems and bark prevent pests from entering the living cells underneath tough waxy leaf cuticles prevent pathogens from entering the epidermis and reaching internal cells cellulose cell walls prevent pathogens from entering cells.
- 4 Thorns impale insects and prevent egg laying and stop herbivores grazing Hairs prevent larvae reaching the epidermis to feed. Some leaves droop or curl when touched to protect them Mimicry – features trick animals into not feeding or not laying eggs. Some grasses have anthers that look like aphids and hollyhocks have stem markings that look like aphids; both help prevent aphid attacks.
- 5 Antibacterial chemicals are produced when the plant is attacked by herbivores or pathogens Production of poisons which taste bad to deter herbivores.
- 6 Physical defences only prevent entry by small insects, fungi, bacteria and viruses. If leaves are damaged in any way, no matter how small the wound, these pests can all enter through the wounds. Chemical defences attack the pathogens once they have gained entry to the leaves The two systems work together to protect the plant

B4 - Revision

Connection

Review the topic summary page and identify what you now know and what you still need to learn.

Activation

LI: Create a topic summary sheet

1. Fold an A3 sheet so it is divided into 8 sections
2. Look back over your lesson and group them into 8 main headings
3. Summarise the key points into each section, use keywords and diagrams and symbols rather than sentences



Consolidation

Look through the relevant past paper questions for this topic - From the B4 DIP file – see if you can complete any additional questions

Demonstration

Test yourself by working with the person sitting next to you by talking through each box on your summary sheet and seeing how many key facts you can remember



Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



DART B4: Microorganisms and disease



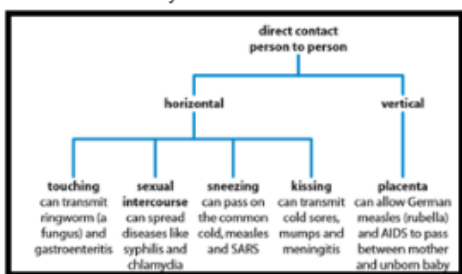
Maria is 12 years old. She lives in Peru. She shares her bedroom with six brothers and sisters and her grandma. Maria has TB. The World Bank estimates that there are about 1.2 billion people like Maria living on less than \$1 per day. That's less than 60p. This is called poverty. You do not get enough to eat, and the food is of poor quality. Poor nutrition and an inadequate diet weaken your immune system. This means you have a greater chance of infection and

developing active TB. Overcrowded conditions make it easy for TB to be passed between people.

TB is caused by bacteria. Bacteria are microscopic organisms, sometimes called microbes or microorganisms. Microorganisms like the TB bacterium are called pathogens. This means disease-causing. Not all microorganisms are pathogens. The vast majority do not cause disease, and some are even helpful.

Microorganisms are transmitted from one person to another in lots of ways. These methods of transmission fall into two groups: direct contact and indirect contact.

Direct contact means that microorganisms are passed by actual body contact. Direct contact can be by two different methods: horizontal and vertical transmission.



Horizontal transmission means microbes passed on by touching, sexual intercourse, kissing and sneezing. Vertical transmission is when microorganisms pass through the placenta from mother to unborn baby.

Indirect contact means that other humans are not involved. There are two main ways indirect contact can spread disease: vehicle-borne and vector-borne.

Borne means 'carried by' For example:

TB and influenza are both air borne because they are carried in the air: you breathe them in. Your food can carry microorganisms. Gastroenteritis and Salmonella can be transmitted in food. This is why proper storage and cooking are so important.

Some microorganisms are carried in water. Cholera is spread when human faeces get into drinking water. Objects like needles, thorns and splinters can penetrate the skin and then any disease-causing microorganisms can enter your body. Tetanus and HIV can enter the body in this way.

Vector-borne means that the microorganisms are carried by another animal, often an insect. This might be microorganisms transferred to your food on the feet of flies. Microorganisms can be injected into your blood in the saliva of mosquitoes.

Questions

- 1a. State why the rest of Maria's family are at risk from TB?
- 1b. Which type of microorganism causes TB?
- 1c. What is a pathogen?

- 2a. Describe 2 ways that microorganisms are transmitted from one organism to another.
- 2b. Explain why it is important that food is cooked and stored properly.
- 2c. Describe how vertical transmission of disease works.

- 3a. Explain the difference between direct and indirect contact.
- 3b. Describe the difference between vertical and horizontal transmission.
- 3c. Make a table with two columns. Label them Direct contact and Indirect contact. Complete the table by putting all the ways that microorganisms can be transmitted into the correct column.

Answers

- 1a. Maria lives in overcrowded conditions sharing one room with 7 family members making it easier for the virus to transmit.
- 1b. the TB bacteria pathogen causes the disease
- 1c. Disease-causing microorganisms are called pathogens
- 2a. Some microorganisms like TB can be air-borne and breathed in. Some like malaria can enter our body through the bite of a mosquito carrying the microorganism. (or any of the many examples in the text)
- 2b. Diseases like Salmonella and gastroenteritis can enter the body through improperly cooked or stored food.
- 2c. Vertical transmission is when microorganisms pass through the placenta from mother to unborn baby.
- 3a. Direct contact means that microorganisms are passed by actual body contact e.g. touching, kissing etc. Indirect contact means that other humans are not involved. E.g. water borne or air borne transmission.
- 3b. Horizontal transmission means microbes passed on by touching, sexual intercourse, kissing and sneezing. Vertical transmission is when microorganisms pass through the placenta from mother to unborn baby.
- 3c.

DIRECT TRANSMISSION		INDIRECT TRANSMISSION	
HORIZONTAL		VERTICAL	

E.G of a table. Students can use the chart or text to complete the model or produce their own version.



Attainment Band :	B4 Health matters (AQA) Knowledge and Understanding
<p>Yellow</p> <p>Yellow Plus/</p>	<p>Evaluate graphical data about lifestyle and health.</p> <p>Evaluate evidence linking risk factors and increased rates of disease.</p> <p>Evaluate evidence linking smoking and cancer.</p> <p>Compare and contrast bacterial and viral diseases.</p> <p>Evaluate control measures for malaria.</p> <p>Explain the specificity of antibodies.</p> <p>Explain the impact of antibiotic-resistant bacteria.</p> <p>Evaluate the global use of vaccinations.</p> <p>Explain the limitations of antibiotics.</p>
<p>Blue</p>	<p>Explain how diseases and lifestyle factors affect health.</p> <p>Explain how risk factors are linked to an increased rate of some non-communicable diseases.</p> <p>Describe lifestyle changes to reduce cancer risk.</p> <p>Describe the transmission and control of different diseases.</p> <p>Explain the role of the immune system.</p> <p>Explain how vaccinations trigger an immune response.</p> <p>Explain how antibiotics and painkillers treat disease.</p>
<p>Green</p>	<p>Describe the major causes of ill health.</p> <p>Recall a number of interacting factors which cause different diseases.</p> <p>Describe different types of tumours.</p> <p>Describe the symptoms of some viral, bacterial, fungal and protist diseases.</p> <p>Describe how the body protects itself from pathogens.</p> <p>Recall why vaccinations are used.</p> <p>Describe the use of antibiotics and painkillers.</p>
<p>White</p>	<p>Some elements of the above have been achieved</p>

