

3.1.9 Discovery and development of drugs

AQA GCSE Biology (Higher) Question and answer notes

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How to use these notes

These notes cover everything you need to know for this part of the specification. They have been written in question-answer format to make them easier for you to study from.

In order to study successfully, I recommend you do the following for each question and answer:

- Read it carefully and make sure you **understand** it.
- **Memorise** the answer.
- **Practice** applying your understanding to past exam questions.

A good way to memorise information is to use **retrieval practice**. This is when you practise retrieving information from your memory. You could do this by making a flashcard for each question with the question on one side and the answer on the other. Or you could use a flashcard app. Alternatively, use a sheet of paper to cover up the answer so you can only see the question. Try to answer the question and then check how you did.

You should practise retrieving each answer from your memory until you can do it perfectly. Even once you can retrieve the answer perfectly, your ability to retrieve it will probably fade as time passes without practising. Therefore you will need to keep going back to the questions that you have previously mastered and practising them again. However, each time you re-learn the answer, the memory will be stronger and will last longer than the time before.

How were new drugs traditionally obtained?

New drugs were traditionally extracted from plants and microorganisms.

What are two examples of drugs that come from plants?

Digitalis, a heart drug, originates from foxgloves.

Aspirin, a painkiller, originates from willow.

What is an example of a drug that comes from a microorganism?

Penicillin, an antibiotic, comes from *Penicillium*, which is a mould (a type of fungus).

Who discovered penicillin?

Penicillin was discovered by Alexander Fleming.

How are new drugs developed today?

Most new drugs are synthesised by chemists in the pharmaceutical industry. However, the starting point may still be a chemical extracted from a plant or microorganism.

Why must new drugs be tested before they are approved for use?

New drugs must be tested for the following reasons:

- To find out whether they are safe.
- To find out whether they are effective (this is called testing the 'efficacy' of the drug).
- To find out what dose should be used.

What is the first kind of testing that must be done on a new drug?

The first kind of testing that must be done on a new drug is preclinical testing. This involves testing the drug on cells, tissues and non-human animals in a laboratory. If the drug is found to be too dangerous at this stage then it will not be tested on humans.

If a drug passes preclinical testing, what type of testing must be done next?

If a drug passes preclinical testing, then clinical trials will be carried out. This involves giving the drug to humans. To begin with, very low doses of the drug are given to check for any harmful effects. If the drug is found to be safe, then larger doses will be given in order to find out whether the drug is effective and what the optimum dose is.

What is a placebo?

A placebo is a fake version of a drug or treatment. It is designed to have no real effect on the body.

What is the placebo effect?

Sometimes when a person believes they have been given a treatment, their symptoms improve simply due to their expectation that they will get better, even if the treatment has no real effect on their body. This is called the placebo effect.

What is a placebo-controlled clinical trial?

A placebo-controlled clinical trial is a clinical trial in which one group of patients are given the real drug and another group are given a placebo. By comparing the outcomes of the two groups of patients, the researchers can see whether any improvements in the group given the real drug were actually due to the drug or were simply due to the placebo effect.

What is a double-blind clinical trial?

A double-blind clinical trial is a clinical trial in which neither the patients nor the people giving them the treatment know who is receiving the real treatment and who is receiving the placebo. This ensures that no one's psychological expectations can affect the results.