

Pupil worksheet

Finding new drugs

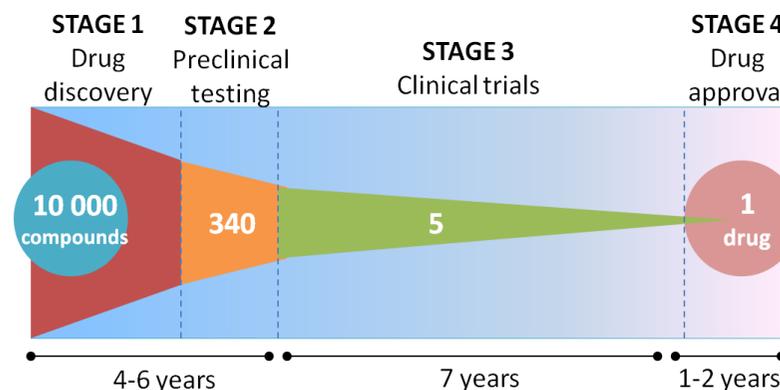
In the past, medical drugs were natural substances extracted from plants, animals and microorganisms. Finding out if they worked, the correct dose to use, or if they were safe was largely down to trial and error!



Most new medical drugs today are chemicals synthesised in a laboratory (although the starting point may still be a natural substance). They go through a series of scientific tests (drug trialling) before they are given to the public.

Stages of a drug trial

Stage	What happens	The purpose
Pre-clinical testing	Drugs tested in laboratories on human cells	To see if has the desired effect on human cells
	Drugs tested on live animals in laboratories	To check that it is non-toxic and it works in a whole organism
Clinical trials	Drugs given to human volunteers in clinical trials	To find the safest dose, most effective way to deliver the drug, identify side effects, to see how well it works against the disease (efficacy)



Optoporation

During preclinical testing drugs are added to cells to check that they have an effect on them. However, the cell membrane is very effective at keeping foreign molecules out of the cell so often drugs that could have a useful effect are being disregarded at this early stage of trials.

Researchers at The University of Oxford are using infrared lasers to puncture holes in the cell membrane to allow the drugs to enter the cell. This technique is called optoporation. If the drug does have a useful effect on the cell it can be redesigned to allow it to cross the membrane or a delivery system could be used to allow it to enter cells.

Your task

You are part of a research group working on optoporation. Your group has written a published paper proving that the technique works without destroying the cell. Now you need money (a grant) to fund the next stage of your project where you will study how it can be used to test the effectiveness of drugs on cells. You will write a grant application to a research council and then review another group's application.



Key Stage 4

Drug trials

Writing a grant application

Work in a group. Each person can be in charge of one or more of the sections listed below:

- Outline your project: What is the scientific problem to be addressed and why is it important? What are the innovative approaches that are being proposed?
- Describe previous projects to prove that you are experts in your field.
- Describe how your findings can be used to improve human health.
- Identify the potential positive economic impacts of your research (how can it bring in money to the country?).
- Suggest ideas for further research projects.

Reviewing a grant application

Grant applications are reviewed by a panel of experts. They decide if the researchers will get the money. In your group read another group's application and write feedback.

Use the scoring system below for each criteria. All scores need to be justified in the feedback column.

- 4 Very High Quality 2 Good Quality
- 3 High Quality 1 Poor Quality

<http://www.Oxfordsparks.ox.ac.uk/sheddinglight>

In the overall feedback:

- Give balanced feedback and constructive criticisms
- Where possible support criticism with examples
- Where appropriate suggest alternative approaches to improve the proposal
- Highlight any concerns with the proposal

Criterion	Score	Feedback
The research can be used to improve human health		
The findings will answer important questions or solve gaps in scientific knowledge		
The researchers have identified further ideas for projects		
The research could have positive economic effects		

Overall feedback:

