

Reading

How Drugs Are Studied

A

It takes years, and sometimes decades, for a drug to move from the **theoretical** stage to the pharmacy shelf. Of the thousands of drugs under **investigation** at any one time, only a small **fraction** will produce the desired result without unacceptable side effects.

B

First, scientists **target** a step in the disease process where they believe a drug can have an effect. Then they **manufacture** compounds or take them from organisms such as viruses and fungi and test them in laboratory **cultures**. Once scientists isolate a chemical that produces a **desirable** effect, they **analyze**¹ its structure and alter it as necessary to **enhance** the outcome.

C

The next step involves testing the drug in animals. Scientists look at how much drug is **absorbed** into the bloodstream, how it distributes to different organs, how quickly it is excreted or leaves the body, and whether it has any **toxic** effects or by-products. Researchers usually test at least two animal species because the same drug may affect species differently.

D

If a chemical passes laboratory and animal testing and is **deemed** appropriate to analyze in human volunteers, it is ready for clinical trials. Researchers follow a protocol that describes who may participate in the study, tests and procedures to follow, the length of the study, and **outcomes** to be measured. Drug trials may focus on treating a disease, preventing a disease from occurring or **recurring**, or **enhancing** the quality of life for people living with incurable, **chronic** conditions.

E

There are four phases of clinical trials; the first three phases study whether the drug is effective and can be safely administered to patients, and the fourth phase evaluates long-term safety and use once a drug is on the market.

F

Phase I clinical trials test a drug in small groups of healthy volunteers (fewer than 100) to **ascertain** its safety and the appropriate dose range. These studies last for six months to one year.

¹BrE: analyse

G

Phase II clinical trials test several hundred volunteers to determine how effectively the drug **combats** the disease being studied. These trials continue to evaluate safety, side effects, and optimal dose. Phase II studies also last for six months to one year.

H

Phase III trials test thousands of volunteers for several years, with researchers closely **monitoring** study participants at regular **intervals**. These studies typically compare the drug under **investigation** with a control: either a drug known to cure or **alleviate** a specific disease or, if one does not exist, a **substance** that has no medicinal effects, known as a placebo. Phase III trials are typically blind studies (participants do not know which drug they are receiving) or double-blind studies (neither participants nor researchers know which drug an individual is receiving until the trial is completed).

I

Once a drug passes the first three phases and is found to be safe and effective, drug companies may apply for the right to market the product. After a drug is approved and on the market, Phase IV trials may investigate longer-term effects, effects in different groups of patients such as the elderly, or use of the medication for a different condition such as using a cancer drug to treat AIDS.

Answer the questions about **How Drugs Are Studied**.

Questions 1-4

*The reading passage contains nine paragraphs, A-I.
Which paragraph discusses the following information?
Write the correct letter, A-I.*

- _____ 1. Drug tests that involve growing biological material in a laboratory
- _____ 2. Investigations of the effects of drugs on animals
- _____ 3. Studies to determine how safe a drug is and how much a patient should take
- _____ 4. Studies to monitor how well a drug fights a disease

Questions 5–7

Choose the correct letter, **A**, **B**, **C**, or **D**.

5. Drug tests on animals look at
 - A** how the drug is absorbed by the body.
 - B** how effective the drug is for chronic conditions.
 - C** how well the drug prevents a disease from recurring.
 - D** how quickly the drug alleviates the disease.

6. During Phase II clinical trials, study participants are monitored for
 - A** chronic conditions.
 - B** toxic doses.
 - C** speed of cure.
 - D** possible side effects.

7. After a drug is deemed safe and effective, a drug company may do further tests to ascertain
 - A** the best way to market it.
 - B** possible effects over time.
 - C** how it compares with other drugs.
 - D** the best group of people to use it.

My Words

Write the words that are new to you. Look them up in the dictionary and write their definitions.

Words	Definitions
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Word Families

noun	absorption	As part of their research, scientists look at the absorption of a drug into the bloodstream.
verb	absorb	The body absorbs some drugs very quickly.
adjective	absorbent	Cotton makes a good cleaning material because it is so absorbent.

noun	desire	The desire to help others attracts many people to medical professions.
verb	desire	Patients desire drugs that will treat their conditions effectively.
adjective	desirable	The most desirable type of drug is one that is effective and has no side effects.
adverb	desirably	The drug in the investigation had desirably few side effects.

noun	investigation	The investigation of a potential new drug costs a great deal of money and takes a long time.
noun	investigator	The investigator submitted a report about the crime.
verb	investigate	Researchers may investigate several possible uses of a new drug.
adjective	investigative	An investigative report showed the drug to be ineffective in fighting the disease.

noun	theory	The scientists set up the study to test the theory.
verb	theorize	Scientists theorize that a substance will have a certain medical effect, and then they set up a research study.
adjective	theoretical	Ideas are theoretical before they are tested.
adverb	theoretically	It was a good idea theoretically, so they decided to test it.

noun	toxin	Some substances can release toxins into the blood.
noun	toxicity	Potential drug toxicity is a part of every study.
adjective	toxic	Part of drug research involves testing for toxic effects.
adverb	toxically	If one drug reacts toxically with another, you cannot take them together.

Word Family Practice

Choose the correct word family member from the list below to complete each blank.

A good deal of time, effort, and money is required to thoroughly **1**..... a new drug before it can be put on the market. Scientists develop a **2**..... about the ability of a certain substance to combat a specific disease or medical condition. Then they have to test their idea. After manufacturing the drug in the laboratory, they test it first on animals and then on people. They monitor the **3**..... of the drug by the body, and they look for any **4**..... that may be produced as the drug moves through the body. Then they test the drug's ability to combat the disease. If they get the outcome that they **5**..... and the drug cures the disease or alleviates the condition, then it's time to work on marketing the product.

- | | | |
|------------------|--------------|-------------|
| 1. investigation | investigator | investigate |
| 2. theory | theorize | theoretical |
| 3. absorption | absorb | absorbent |
| 4. toxins | toxic | toxically |
| 5. desires | desire | desirably |

Dictionary Skill

Different Meanings

Many words have more than one meaning.

Read the definitions below. Then read the sentences and write the letter of the correct definition for each sentence.

cul-ture [KUL-cher]

A noun. the growing of organic materials in a laboratory setting

B noun. a shared system of beliefs, customs, and language

C noun. the arts

- _____ 1. It is always interesting to learn about the *culture* of another country.
- _____ 2. A clinic might use a *culture* from the patient to diagnose a disease.
- _____ 3. Because of their museums, theaters, and libraries, cities have a lot more to offer in terms of *culture* than small towns do.

Listening

CD 1
Track
16

Listen to the conversation. Complete the notes below.
Write **NO MORE THAN ONE WORD** for each answer.

Laboratory Research Project

Steps to follow:

- Grow **1** in the laboratory.
- Introduce different substances.
- **2**..... at regular intervals.
- **3**..... if there are changes.
- Describe the **4**..... in the final report.