



BRITISH  
PHARMACOLOGICAL  
SOCIETY

# **How do medicines work?**



## **What is pharmacology?**

Pharmacologists are scientists who are fascinated by medicines. They work in the area of science called pharmacology, and they study how medicines work.

Pharmacologists make a difference to people every day. You can find pharmacology everywhere! It's there when you visit the dentist and have an injection to numb your mouth. It's there when you take medicine for a headache. Pharmacology created hayfever tablets, antibiotics, and many other medicines. How many medicines can you name?

Without pharmacologists we wouldn't be able to:

- Discover new medicines to help fight diseases
- Make sure medicines are safe
- Understand why some medicines work better for some people than others
- Understand why some drugs cause addiction

If you love science, you could become a pharmacologist and help make new medicines!

Today's science, tomorrow's medicines.



## **The nature of medicines**

**Many of our modern medicines were developed from nature.**

### **Foxglove**

“Digoxin” is a poison found in foxglove plants. But it is also a powerful medicine that can be used to treat people with heart problems.

### **Gila monster**

The Gila monster is a giant lizard. In its spit there is a special chemical that could help us to balance the sugar in our blood. People who have diabetes could soon use this chemical to help treat heart disease, kidney failure and blindness.

### **Quinine**

Quinine is a natural chemical found in tonic water. It reduces fever and pain, and was very important in treating malaria.

### **Clostridium Botulinum**

Clostridium Botulinum is a type of bacteria that makes our muscles stiff and frozen, so we can't move them. The toxin made by this bacteria is used as a medicine that you might have heard of, called botox.

### **Willow**

There is a chemical called Salicin in the bark and leaves of the willow tree. Salicin can be used to make a pain killer. In the 1800s pharmacologists created a version of this in the lab. We still use this today and call it aspirin!



## **When a pharmacologist creates a new medicine, it is just the beginning!**

Pharmacologists can work in many places, like hospitals and labs. They can also work in many different roles. Thanks to pharmacologists, we can find new treatments and know about the safety of medicines that people take every day.

Pharmacologists are so important today. When we discover new diseases, and medicines like antibiotics stop working, we need pharmacologists to find new and safer treatments.

Visit **[bps.ac.uk/careers](https://bps.ac.uk/careers)** to find out more about pharmacology and becoming a pharmacologist.



## What are medicines?

**Medicines can make people feel better.** They are liquids, tablets or pills. Inside medicines there is something called the 'active ingredient'. This is the tiny part (called a molecule) that works in your body to make you feel better! These molecules can come from nature, or be made in a lab.

Lots of medicines work on the cells in the body. In this way, they can stop pain or lower blood pressure. Other medicines work by killing germs to stop infections. These germs are called bacteria or viruses.

Throughout history, medicines have been discovered by scientists who were trying to make people feel better. Sometimes, this happened by chance! Let's look at an example:

Alexander Fleming was a famous scientist. He discovered a medicine called penicillin.

In 1928, he noticed something important. He was growing some bacteria in the lab, in a special dish called a petri dish. He saw that one of his petri dishes had mould on it. When he looked closer, he saw that the bacteria around the mould had died.



This was fascinating! Alexander grew some more of the mould in his lab. The liquid that the mould grew in killed lots of types of bacteria! The mould was a type called Penicillium. Alexander named the drug penicillin after it.

Today, doctors can treat infections using penicillin. It means that people can have operations without getting sick.

Scientists discover medicines by doing experiments. Every experiment gives an answer, and leads to more questions. It is like being an explorer, going into the unknown!

Do you want to be a scientific explorer? You can think about becoming a pharmacologist!

All medicines are drugs, but not all drugs are medicines!



## **How do medicines work?**

### **How does a medicine like aspirin work? Let's look!**

#### **1. Taking the medicine**

First we need to put the medicine into the body. This could be by swallowing a tablet, using a cream, having an injection, or using an inhaler. We usually swallow aspirin in a tablet.

#### **2. Breaking it down**

The medicine needs to move around the body to find its target. Aspirin dissolves in our stomach and gut. Then it is absorbed into our blood stream, which carries it around the body.

#### **3. Getting to work**

When we are in pain, our body releases signals. These signals are called prostaglandins, and they cause inflammation. This is good because it helps our bodies to repair. But inflammation can also cause more pain! To help us to feel better, once the aspirin reaches the target, it stops the prostaglandin signals from being made. this makes the pain better!

#### **4. Leaving the body**

After about an hour, the aspirin has made our pain better. It keeps travelling around in the blood stream. When it goes through our liver, the liver works to remove it. Each time it travels through, more is taken out. About 5 or 6 hours later, all of it will have been removed from the blood stream!