How do painkillers work?

KS3 Ages 11-14 ⏰ 2 min read

You bang your knee, it throbs horribly, you take a painkiller, and half an hour later it's just a dull ache. Something in that tablet has somehow talked your body out of hurting quite so much. But how? It's not magic — it's chemistry.

How pain actually works

Pain starts with **nociceptors** — tiny nerve endings dotted all over your body that detect damage. When you injure yourself, damaged cells release chemical signals (including one called **prostaglandin**) that activate these nerve endings. The nerve then fires a message up through your spinal cord to your brain, which interprets it as pain.

Pain is actually your body being helpful. It's a warning system — "something is wrong here, please stop doing that." The problem is sometimes the alarm keeps ringing even when you already know about the problem and just need to get on with your day.

What ibuprofen does

Drugs like **ibuprofen** are called **anti-inflammatories**. They block the enzymes (tiny biological machines) that your body uses to make prostaglandins. Fewer prostaglandins means the nociceptors calm down, which means fewer pain signals reach the brain. The pain doesn't vanish — the injury is still there — but the alarm gets turned down.

Imagine the pain signal is a fire alarm blaring in a building. Ibuprofen doesn't put out the fire — it disconnects the alarm's power supply so the noise stops. The fire brigade (your immune system) is still dealing with the actual problem.

What paracetamol does

Paracetamol (called acetaminophen in some countries) works differently, and honestly, scientists are still working out exactly how. It seems to act more on the brain itself, changing how the brain processes pain signals rather than stopping them at the

source. It's also very good at reducing fever by acting on the part of the brain that controls body temperature.

What about stronger painkillers?

Opioids — drugs like morphine — work in a completely different way. They bind to special receptors in the brain and spinal cord and essentially block pain signals from being processed at all. They're extremely effective, but the brain can become dependent on them quickly, which is why they're only used under strict medical supervision.

Most of the time, though, a couple of paracetamol and a sit-down does the job perfectly well.

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