

Everything you wanted to know about viruses, vaccines, bacteria and antibiotics, but were afraid to ask ...

Germs

Micro-organisms are tiny living things that can only be seen with a microscope. Micro-organisms that cause diseases are usually called germs. Germs are divided into two main groups – bacteria and viruses. Both types are infectious.

Viruses

Viruses can't survive outside your body. But once they get inside, they use your body to produce more viruses. Diseases caused by viruses include the cold, flu and chickenpox.

When your body is attacked by a virus, your immune system immediately begins to produce antibodies to fight it. If the virus attacks your body again, your immune system recognises it and quickly makes the same antibodies to fight it. You have therefore built up resistance – or immunity – to that disease.

Vaccination

Vaccination makes you immune to certain diseases by using the principle outlined above. A small amount of the weakened disease is introduced into your body (usually by injection). This triggers the immune system to produce antibodies to fight the disease. If the disease attacks again, your immune system recognises it and produces the same antibodies to fight it.

Edward Jenner

Edward Jenner pioneered the concept of vaccination in 1796. He noticed that dairymaids who had contracted cowpox and recovered from it did not catch smallpox – a much more serious disease that killed one in four children at that time.

He tried out an experiment where he cut and infected the arm of James Phipps (an eight-year-old boy) with cowpox pus from the sores of a dairymaid infected with the disease. James caught cowpox and recovered from it. Jenner then cut and infected James' arm with smallpox pus and waited to see what would happen.

The boy did not catch the disease because the cowpox infection helped him to make antibodies to successfully fight off the smallpox infection.

Jenner published a paper about his experiment in 1798. Thanks to Jenner's work, vaccinations have been developed for numerous diseases and have saved countless lives.

Bacteria

Good and bad bacteria are found throughout your body. Bad bacteria make you ill by multiplying rapidly and producing toxins. They cause illnesses such as throat and ear infections and tuberculosis. These illnesses can be treated by antibiotics. The most famous of these is penicillin, which was discovered by Alexander Fleming.

Antibiotics and Alexander Fleming

In 1928, Fleming made an exciting discovery while working at St Mary's Hospital in London. He was tidying up a batch of test tubes and mouldy culture plates when he noticed something unusual. One of the plates was covered with colonies of bacteria, but where a two-week-old droplet of mucus had fallen from Fleming's nose, there was no bacteria at all. Whatever was in the mucus had wiped them out. Fleming had stumbled on a way of destroying bacteria.

Fleming worked with Howard Florey and Ernst Chain to isolate penicillin and develop it into an antibiotic. It was called the 'wonder drug' during the Second World War because it saved the lives of many soldiers. Previously, hospitals were crawling with germs and people often died from bacterial infections while they were there.

But the story continues because germs always fight back – many have developed immunity to current antibiotics, and scientists are working on ways to overcome this...