

## **GCSE Biology – Vaccinations - Transcript**

Over the course of our lifetime, our bodies are exposed to potentially dangerous pathogens. Most can be dealt with by a healthy immune system, but vaccinations can help protect us and reduce our risk of getting ill.

Vaccines are designed to combat diseases caused by pathogens. So how do they work?

Well, pathogens are microbes that cause disease. On the surface of each pathogen are specific antigens, proteins that are recognised by the body as foreign. And so the body responds.

Lymphocytes, a kind of white blood cell, produce chemicals that target specific antigens and help in their destruction. These are called antibodies. Each antibody is specific, or complementary to, the antigen on a particular pathogen. Lymphocytes release their complementary antibodies when a specific pathogen enters the body.

These antibodies attach to the pathogen and are recognised by another kind of white blood cell, phagocytes. They engulf and destroy the pathogen in a process called phagocytosis.

When the body is vaccinated, it triggers an immune response similar to what happens during an actual infection. Vaccinations are often dead or inactive versions of the

pathogen that will not cause disease. More recent vaccines are small sections of the virus's genetic information, so RNA or DNA.

The body can make lots of antibodies as the white blood cells divide by Mitosis, producing copies of themselves.

Some of these copies become 'memory lymphocytes'. If the same pathogen enters the body again, the memory lymphocytes recognise the antigen and produce antibodies quickly, destroying the pathogen before it causes an illness.

They can remain in the body for decades, and the person is then said to be immune.

This antibody concentration graph shows that the first, or primary, infection, in this case the vaccination, the body takes time to produce antibodies, the antibody concentration levels rise slowly, reach a maximum after about ten days, and then fall again.

When the body is exposed to the same pathogen a second time, the white blood cells respond much faster, making a large amount of the right antibody quickly, which helps stop a person from becoming ill.

So, vaccines trick your body into responding to a dead or inactive version of a pathogen, enabling it to react quickly when it encounters them for real in everyday life.