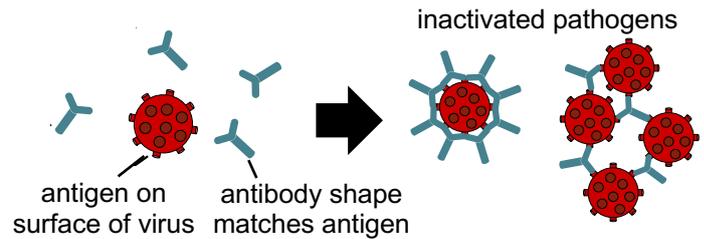


Immunisation

Having a disease can make you **immune** to it because the pathogen causes the body to create **memory lymphocytes**. If the **pathogen**

infects you again, these cells quickly become active and produce **antibodies** with a specific shape that fits onto the **antigens** on the pathogen. The antibodies help to inactivate the pathogens.



Vaccines

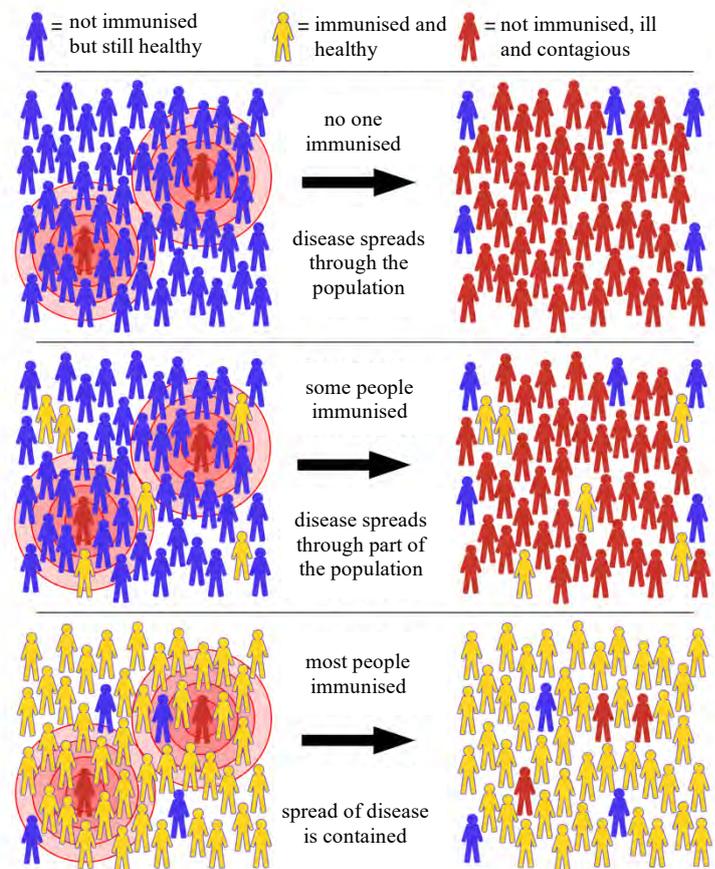
A **vaccine** is used for **immunisation** - making people immune to a **contagious disease** (one that can be spread). One of the first vaccines was against smallpox. It killed 30% of people who got it.

In the 1790s, Dr Edward Jenner noticed that people who looked after cows often got cowpox (a mild disease) but did not get smallpox. He developed a hypothesis that cowpox protected against smallpox. He tested this in 1796, when he squeezed pus from a cowpox spot into a cut on a boy's arm. The boy caught cowpox. Eight weeks later, Jenner repeated this using smallpox pus. The boy did not get smallpox. Jenner used the Latin for cow (*vacca*) to make up a word for his discovery.

In 1959, the World Health Organisation set out to eradicate smallpox using vaccines. The last person to catch its serious form was a three-year-old Bangladeshi girl in 1975. She was isolated, and health workers visited all homes within 5 miles to vaccinate people and search for other cases. Smallpox no longer exists.

Today, we inject many different types of vaccine. An 'attenuated vaccine' is a very weak form of the pathogen that does not cause disease. A few people with very weak immune systems cannot have these vaccines. However, if most people around them are immunised they are still protected. This is **herd immunity** (see the graphic on the right).

Over 80 groups of scientists are now searching for an effective COVID-19 vaccine. Many are developing 'subunit vaccines', which only contain the pathogen antigen molecules.



Find out

- I.
 1. a. Find out the name of the smallpox virus. _____
 - b. Who was the last person to get the milder form of smallpox? _____
 - c. Who was the last person to die from smallpox? _____
 - d. How did this person get the disease? _____
2. Find out the name of a vaccine used today that is:
 - a. attenuated _____
 - b. subunit _____
 - c. killed (the pathogen has been treated so that it is totally inactive) _____
3. Do some research to link each scientist with what they discovered and when.

Scientist	What they discovered	When
Edward Jenner	Having a disease gives you immunity.	1796
Louis Pasteur	Cowpox prevents smallpox.	1955
Peter Panum	One of first to invent a COVID-19 vaccine.	1846
Jonas Salk	Developed successful killed polio vaccine.	2020
Kizzmekia Corbett	Developed first subunit vaccine.	1981
Maurice Hilleman	Weakened viruses can cause immunity.	1880

Test yourself

4. Explain how immunisation can help people who are unable to have a vaccine.

5. The hepatitis B vaccine is a subunit vaccine. Explain how this can make people immune.

Check-up

- I. Check your answers.
- II. Doctors often use models to help explain things to patients. Use plastic modelling bricks (e.g. LEGO®) to model how antibody shapes fit antigens.

