

The history of vaccination

Smallpox, anthrax, tuberculosis, cholera, diphtheria, tetanus, and rabies: All these diseases were feared for thousands of years. They are the reason why many people did not grow very old or had irreversible damage to health if they survived an illness. Especially children very often died of these diseases, many of them while they were still babies. The fact that child mortality is a fraction of what it was in the past is largely thanks to vaccination.

Inoculation/variolation

As early as 1500 BC, attempts were made in Asia and Europe to protect people from the dreadful smallpox disease. In India, the fluid from the smallpox blisters of mildly sick people was introduced into wounds of healthy people. Persons infected in this manner did become sick, but usually less severely, and afterwards they were protected from the disease (immune). In other countries, the scabs of smallpox blisters were dried and ground. Healthy people were then expected to inhale the powder like snuff and become immune in this way. This transfer of pathogens to healthy people is called inoculation or variolation. Even though many people survived this inoculation because the risk of death was lower than in the case of natural infection, smallpox outbreaks still occurred repeatedly.

Vaccination comes from vacca

Centuries later, in 1796, the British physician Edward Jenner conducted an experiment that became famous. For the experiment, he used the fluid from the blisters that appeared on cows with cowpox. He applied this fluid to the scarified skin of an 8-year-old boy named James Phipps, the son of his gardener. Unlike with inoculation, the boy became only mildly sick because cowpox is not dangerous for people. Several weeks later, Jenner applied the pus of a person with smallpox to a wound on the boy. The boy remained healthy. Edward Jenner then repeated the experiment on his own son Robert with the same result. Through infection with cowpox, Robert had also become immune to smallpox. Edward Jenner called his method vaccination after the Latin word for cow: vacca.

Vaccine milestones

Just a few months after these initial experiments, vaccination of many people began in England. Vaccination then spread around the world step by step, and in 1980 the World Health Organization (WHO) declared smallpox eradicated. Vaccines have also been developed to fight other diseases and great medical progress has been made. In 1864, Louis Pasteur understood how infectious diseases spread. With the germ theory, Pasteur proved that diseases are caused by microscopic organisms. Shortly thereafter, Robert Koch discovered the pathogens that cause anthrax and tuberculosis. These two diseases are caused by bacteria. This discovery was followed by Emile Roux's discovery of the immune response principle. Based on this new knowledge, Emil von Behring then developed passive vaccination. In this method, the pathogens themselves are not used for vaccination, but rather antibodies, which the body must normally first produce itself to fight the pathogens. In 1928, Alexander Fleming discovered the first antibiotic and called it penicillin. In 1935, Wendell Stanley discovered viruses.

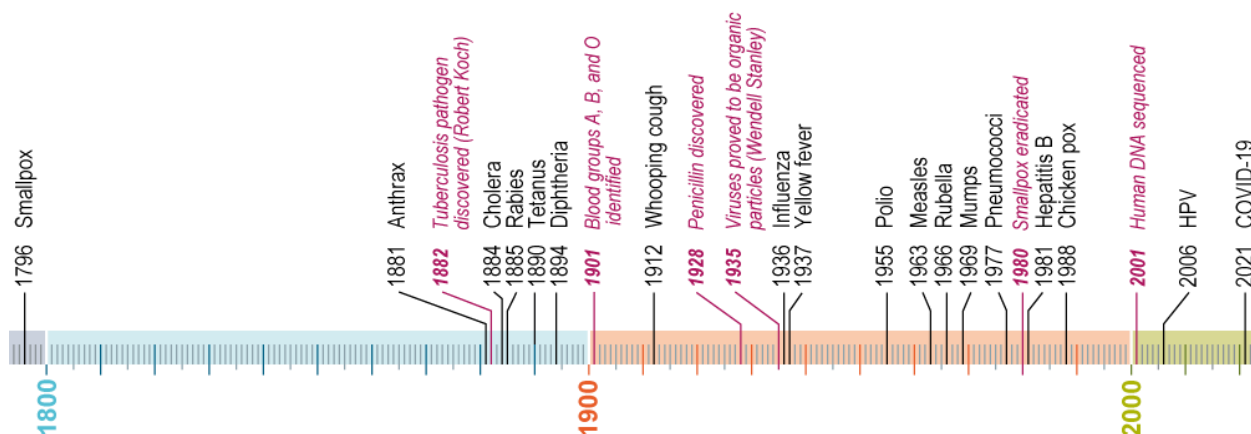


Fig. 1 When were various vaccinations carried out for the first time?

Outlook – Modern vaccines

In the early stages of vaccine development, people applied disease-causing fluids to the wounds of healthy people and hoped that this exposure would make the recipients immune. Today, dead or weakened pathogens that can no longer cause disease are used. These dead or weakened pathogens also enable the body's immune system to defend against the actual pathogens. With the COVID-19 mRNA vaccine, only the blueprint for a single pathogen protein is shown to the body's cells and even with this, a vaccinated person can build up immunity. Despite all this progress, diseases still exist today for which a vaccine still has not been found, for example, HIV and malaria.