

NAME

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Vaccines & Immunization

Vaccines are designed to stimulate the body to develop immunity against a particular pathogen and are often made with a weakened or dead form of a pathogen (an agent, such as a virus, that causes illness) or a small piece, or protein, from a pathogen. An agent that is similar to the real pathogen can create an immune response without making the person sick. When the vaccine is administered, the immune system mounts a defense against the foreign invader, develops antibodies to fight it, and then makes memory cells to remember the antibodies. If the person is exposed to the same pathogen in the future, the immune system will recognize it and, because it already knows how to produce the proper antibodies, it will be able to fight off the pathogen quickly and prevent infection.

The terms *vaccine* and *vaccination* are attributed to an 18th century English doctor, Edward Jenner, who used cow pox to induce immunity to smallpox. Cow pox causes much milder disease compared to smallpox, and it was noticed that people who got sick with cow pox did not later succumb to smallpox. Jenner was not the first person to use cow pox to induce immunity to smallpox, but the publication of his work led to widespread interest and adoption of his method, and eventually led to the worldwide eradication of smallpox. Jenner coined the term *vaccination* (derived from the Latin name for cow pox, *Variolae vaccinae*) to distinguish it from other methods of smallpox immunizations. Immunization is biological protection against infection by a particular pathogen. Vaccination is a form of immunization. Louis Pasteur adopted generic use of the terms in the 19th century so that they applied to vaccinations for any disease.

Prior to Jenner, other techniques to induce immunity to smallpox had long been in practice. There is evidence that, thousands of years ago, people in countries, such as China and India used inoculation, or variolation, to immunize people against smallpox. In this practice, materials, such as scabs or fluid from pustules from a person sick with smallpox would be used to deliberately infect a person through superficial scratches in the skin. Another method involved blowing powdered smallpox scabs up a person's nose to expose them to the disease. After exposure, the person would develop symptoms of illness, but would not get as sick as if he had been infected with smallpox naturally. After recovering from the relatively mild illness, he would then have immunity to smallpox. Although there was risk to the procedure, the rate of death was much lower than that of naturally occurring smallpox.

Modern vaccines are safe and have very little risk of serious side effects. Vaccines are a great achievement in modern medicine, and vaccines now exist for dozens of diseases. Rates of diseases that were once common, such as measles, mumps, diphtheria, and polio are much lower than they once were, and average life expectancy has increased. However, although side-effects from vaccines are rare, some people are choosing not to vaccinate. As a result, outbreaks of vaccine-preventable diseases are becoming more common as more people choose not to be vaccinated.

Now that we have vaccines people are less likely to get sick from them, and are more immune.