

How Vaccines Work and Three Phases of Vaccination

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Editorial

Vaccines contain tiny fragments of the disease-causing organism or the blueprints for creating the small fragments. They also contain other ingredients to stay the vaccine safe and effective. These latter ingredients are included in most vaccines and are used for many years in billions of doses of vaccine.

How Vaccines Work?

Vaccines work by mimicking infectious bacteria or viruses that cause disease. Vaccines stimulate the body's systems to build defences against infectious bacteria or viruses (organisms) that do not cause disease. The parts of the infectious organism that the system recognizes are foreign to the body and are called antigens. Vaccination exposes the body to those antigens.

Some vaccines contain weakened versions of a bacteria or virus; other vaccines contain only a part of the bacteria or virus. Some vaccines contain only the genetic material for a selected protein and direct the body to supply a little amount of that protein. The body's system reacts defensively once it detects this protein.

After vaccination, the system is ready to reply quickly and forcefully when the body encounters the important disease-causing organism.

Most vaccines have been in use for many years, and many people are safely given them each year. Like all medicines, each vaccine undergoes rigorous and extensive testing to ensure that it is safe before it is generally included in a country's immunization program.

Each vaccine in development must first undergo screening and evaluation to find out which antigens will not elicit an immune response. This preclinical trial was performed without human trials. An investigational vaccine is being tested on animals for the first time to assess its safety and ability to prevent disease.

If the vaccine triggers an immune reaction, it's then tested in human clinical trials in three phases.

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Phase 1: The vaccine was given to a large number of volunteers to assess its safety, confirm that it was producing an immune response and determine the appropriate dose. Usually, during this time, vaccines are tested on young, healthy adult volunteers.

Phase 2: The vaccine was then administered to several hundred volunteers to further evaluate its safety and ability to trigger an immune response. Participants in this phase had comparable characteristics (such as age, sex) as those intended to receive the vaccine. There are usually several trials at this stage to evaluate different age groups and different vaccine formulations. A group that did not receive the vaccine is usually included at this stage as a comparison group to determine whether changes in the vaccinated group are due to the vaccine or are accidental.

Phase 3: The vaccine is next given to thousands of volunteers – and compared to an identical group of individuals who didn't get the vaccine, but received a comparator product – to work out if the vaccine is effective against the disease it's designed to guard against and to review its safety during a much larger group of individuals. Most of the time phase three trials are conducted across multiple countries and multiple sites within a rustic to assure the findings of the vaccine performance apply to several different populations.