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## Understanding How Vaccines Work

*COVID-19 and the approaching flu season may have you wondering about how vaccines work. It can be confusing because there are different types of vaccines, routes of administration vary, and immunizations recommended for children are not the same as they are for teenagers and adults.*

### Vaccine Basics

Vaccination is the process of introducing a substance (antigen) into your body to stimulate the production of antibodies and provide immunity to contagious

diseases. Immunization is the process that protects, or inoculates, you against disease through vaccination.

In essence, vaccines imitate an infection. A vaccine trains your immune system to recognize and combat viruses or bacteria (pathogens). After vaccination, it takes about two weeks for your body to produce disease-fighting T-lymphocytes (memory cells) and B-lymphocytes (defensive white blood cells). During that time, it's possible to get the disease you are trying to prevent if you are exposed to someone who has it.

Vaccines are usually administered by injection, and in some cases taken orally or inhaled via nasal spray. Vaccines may be combined and/or given sequentially. In some cases, a booster shot is needed later because effectiveness gradually decreases.

Pain at an injection site and symptoms such as a low fever or achiness may occur as your body adapts. However, vaccination does not cause the illness it is intended to prevent. Evidence shows vaccines are safe and effective. Life-threatening reactions to vaccinations are rare. Providers follow established protocols in the event of an adverse response.

The more people who are vaccinated, the greater the protection a vaccine affords. This is called group or herd immunity.

### Vaccine Approvals

Vaccines administered in the U.S. are subject to [review and approval by the Food and Drug Administration \(FDA\)](#). Immunization schedules are established by the nation's [Advisory Committee on Immunization Practices \(ACIP\)](#).

The committee considers:

- How safe and effective a vaccine is when given at a specific age
- Severity of the disease the vaccine prevents
- How many people would get the disease if they are not vaccinated

- How well the vaccine helps the body produce immunity to the disease
- Number and timing of doses that should be administered
- Precautions and contraindications, such as underlying health conditions

The [Centers for Disease Control and Prevention \(CDC\)](#) publishes written recommendations for vaccinating U.S. children, adolescents and adults based on ACIP findings.

## Vaccine Types

Different types of vaccines target different types of infections. For example:

- **Live, attenuated vaccines** contain a weakened version of the targeted virus or bacteria. Examples include the measles, mumps, and rubella vaccine (MMR) and varicella (chickenpox) vaccines.
- **Inactivated vaccines** are made by inactivating, or killing, the targeted pathogen. The polio vaccine is a well-known example.
- **Weakened toxoid vaccines** prevent diseases caused by bacteria that produce toxins (poisons) in the body. For example, the DTaP vaccine contains diphtheria and tetanus toxoids.
- **Subunit vaccines** contain part of a virus or bacteria. The pertussis (whooping cough) component of the DTaP vaccine is an example.
- **Conjugate vaccines** fight bacteria with an outer coating of sugar-like substances called polysaccharides. Conjugate vaccines connect polysaccharides to antigens and help stimulate an immune response. An example is the Haemophilus influenzae type B (Hib) vaccine.
- **COVID-19 vaccines:** The vaccines approved for use in the U.S. deliver genetic material to your cells to help your body develop antibodies. Pfizer-BioNTech and Moderna are messenger RNA vaccines and Johnson & Johnson is an adenovirus or viral vector vaccine.

## Flu and Other Considerations

Flu vaccination is recommended annually for children over 6 months old and adults unless they have a condition that precludes it. The [inactivated influenza vaccine recommended for the 2021-22 flu season](#) is quadrivalent, meaning it fights the four influenza strains that are expected to be the most prevalent. Influenza vaccines available in the U.S. include inactivated, live attenuated and recombinant. Unlike other flu vaccines that are produced using an egg-based process, recombinant vaccine is made without eggs.

A combination flu/COVID-19 vaccine is not yet available. Public health officials strongly recommended getting both. If you got the COVID-19 vaccine more than eight months ago, a COVID booster is recommended (pending FDA and ACIP approval), or if you have a weak immune system. Check with your medical provider.

If you are a parent, consult with your pediatrician about child and adolescent immunization schedules and recommendations based on your child's health profile. Adults need vaccinations and booster shots, too.

About 50,000 U.S. adults die annually from vaccine-preventable diseases, according to the CDC. In addition to getting an annual flu shot, recommended adult vaccines include shingles after age 60; Tdap to protect against tetanus, diphtheria and pertussis; pneumococcal to prevent pneumonia, bacteremia and meningitis; human papillomavirus (HPV) to fight cervical and anal cancer; and a tetanus booster every 10 years. It's also recommended that adults be immunized against pertussis, commonly known as whooping cough, especially if you will be around children.

**To learn more about COVID-19 vaccines, here are some resources:**

[Understanding How COVID-19 Vaccines Work \(CDC\)](#)

[Learn More About COVID-19 Vaccines \(FDA\)](#)

[COVID-19 Vaccine: What You Need to Know \(Johns Hopkins Medicine\)](#)

[Different Types of COVID-19 Vaccines: How They Work \(Mayo Clinic\)](#)