



Explaining How Vaccines Work

For Everyone
AUGUST 10, 2024

The content of this page is being revised to reflect [updated childhood immunization recommendations](#) recently made by the CDC.

KEY POINTS

- Vaccines work by imitating an infection to engage the body's natural defenses.
- Vaccines help the body learn how to defend itself from disease without the dangers of a full-blown infection.
- Everyone should get all recommended vaccines at the recommended times.



Getting vaccinated is safer than getting sick

Understanding COVID-19 Vaccines

There are different types of COVID-19 vaccines.

[Learn how they work.](#)

Vaccines help the body learn how to defend itself from disease without the dangers of a full-blown infection. The immune response to a vaccine might cause tiredness and discomfort for a day or two, but the resulting protection can last a lifetime.

Infections are unpredictable and can have long-term consequences. Even mild or symptom-less infections can be deadly. For example, most people infected with the [human papillomavirus \(HPV\)](#) never show any sign of infection. But for some, the sign appears years later as an aggressive, life-threatening cancer. By then, it's too late to get vaccinated.

Vaccines work by imitating an infection

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Vaccines work by imitating an infection

Vaccines work by imitating an **infection**—the presence of a disease-causing organism in the body—to engage the body's natural defenses. The active ingredient in all vaccines is an **antigen**, the name for any substance that causes the immune system to begin producing antibodies. In a vaccine, the antigen could be either

- Weakened or killed bacteria or viruses
- Bits of their exterior surface or genetic material, or
- Bacterial toxin treated to make it non-toxic.

How does your body fight an infection?

Antibodies are proteins produced by white blood cells to identify and neutralize foreign substances. **White blood cells** are created in the bone marrow but dispersed throughout the body in low numbers, ready to begin multiplying and attacking microbes and substances not native to the body. After they have eliminated an infection, white blood cells stop multiplying and their numbers dwindle until only a few are left to keep watch. At that point, a person is considered immunized.

Can you still get infected after being vaccinated?

Because immunity can take weeks to develop after vaccination, it is possible to become infected in the weeks immediately following vaccination. Even after that, vaccinated people can and sometimes do get infected. But a vaccinated person is far less likely to die or become seriously ill than someone whose immune system is unprepared to fight an infection.

Many vaccines require more than one dose

A single dose of vaccine provides only partial protection. The number of doses needed to achieve immunity depends on whether the antigen in a vaccine is alive or not. Because they contain living bacteria or viruses, **live-attenuated** vaccines can provide enduring protection with only two doses. By contrast, **non-live vaccines** typically require at least three doses to achieve protection that fades over time and must be restored with booster doses.

Live-attenuated vaccines

- Offer long-lasting, even lifetime protection.
- Could cause a life-threatening infection in someone with a weak or suppressed immune system.

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Live-attenuated vaccines

- Offer long-lasting, even lifetime protection.
- Could cause a life-threatening infection in someone with a weak or suppressed immune system.
- Require two doses to achieve maximum immunity.
- Examples include the [chickenpox vaccine](#) and the [MMR \(measles, mumps, and rubella\) combined vaccine](#), which children should receive around their first and fifth birthdays.

Non-live vaccines

- Protection fades over time.
- Safer for people with weak immune systems.
- Require three or more doses to achieve maximum immunity.
- For example, the [DTaP vaccine](#) requires repeated doses to achieve and maintain protection from diphtheria, tetanus, and pertussis (whooping cough):
 - Infants receive doses at 2 months, 4 months, 6 months, and 18 months of age.
 - Children get one booster dose around the time they first enter school and another when they begin middle school.
 - Adults should get a [tetanus booster](#) once every 10 years or during each pregnancy.

Certain vaccines must be updated periodically to protect against mutation-prone viruses that cause waves of infections months or years apart. To stay protected, people must get the updated vaccines even if they got an earlier version.

- The [seasonal flu vaccine](#) is reformulated each year to target the four strains expected to be most common and most dangerous.
- The [updated COVID-19 vaccines](#) were developed to deal both with fading immunity and a fast-evolving virus.

Everyone should get recommended vaccines on schedule

History shows that vaccines are the **safest, most effective way** to protect yourself and your family from many preventable diseases.

Everyone should get all recommended vaccines at the recommended times. It is especially important for children and adolescents to get catch-up doses of any missed vaccines or vaccine doses as soon as they can. Adults should get all recommended vaccines for their age or other risk factors such as health condition or occupation. All adults should get tetanus boosters, seasonal flu and COVID-19 vaccines, and any vaccines missed in childhood.

Vaccines strengthen the body's

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Vaccines strengthen the body's natural defenses

To be **immune** is to be partially or fully resistant to a specific infectious disease or disease-causing organism. A person who is immune can resist the bacteria or viruses that cause a disease, but the protection is never perfect.

Immunization is the process of being made resistant to an infectious disease, usually by means of a vaccine.

Immunity is protection against a disease, and it can be passive or active, natural or vaccine induced.

Active immunity comes from being exposed to a disease-causing organism.

- **Natural immunity** results from being infected by a disease-causing organism, whether the infection is symptomatic or not.
- **Vaccine-induced immunity** results from being exposed to killed or weakened bacteria or viruses—or even just important pieces of them—through vaccination.

Either way, active immunity takes longer to develop but lasts longer than passive immunity.

Passive immunity is provided by antibodies produced by another human being or animal.

- Full-term babies acquire passive immunity from their mother's antibodies during the final months of pregnancy.
- Patients can acquire passive immunity through antibody-containing blood products derived from human or animal sources.

Passive immunity provides protection that is immediate but fades within weeks or months.

For Health Care Providers

Additional information on how to improve your clinic's practices to encourage vaccination is available.

[Learn how to foster support.](#)

For more information on vaccines call 800-CDC-INFO (800-232-4636) or visit www.cdc.gov/vaccines.

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