**What are Antibiotics?**

Antibiotics, also known as antibacterials, are medications that destroy or slow down the growth of bacteria.

They include a range of powerful drugs and are used to treat diseases caused by bacteria.

Antibiotics cannot treat viral infections, such as cold, flu, and most coughs.

**Fast facts on antibiotics**

* Alexander Fleming discovered penicillin, the first natural antibiotic, in 1928.
* Antibiotics cannot fight viral infections.
* Fleming predicted the rise of antibiotic resistance.
* Antibiotics either kill or slow the growth of bacteria.
* Side effects can include [diarrhea](https://www.medicalnewstoday.com/articles/158634.php), an [upset stomach](https://www.medicalnewstoday.com/articles/163484.php), and nausea.

Antibiotics are powerful medicines that fight certain infections and can save lives when used properly. They either stop bacteria from reproducing or destroy them.

Before bacteria can multiply and cause symptoms, the immune system can typically kill them. White blood cells (WBCs) attack harmful bacteria and, even if symptoms do occur, the immune system can usually cope and fight off the infection.

Sometimes, however, the number of harmful bacteria is excessive, and the immune system cannot fight them all. Antibiotics are useful in this scenario.

The first antibiotic was penicillin. Penicillin-based antibiotics, such as ampicillin, amoxicillin, and penicillin G, are still available to treat a variety of infections and have been around for a long time.

Several types of modern antibiotics are available, and they are usually only available with a prescription in most countries. Topical antibiotics are available in over-the-counter (OTC) creams and ointments.

**Resistance**

Some medical professionals have concerns that people are overusing antibiotics. They also believe that this overuse contributes toward the growing number of bacterial infections that are becoming resistant to antibacterial medications.

According to the Centers for Disease Control (CDC), outpatient antibiotic overuse is a particular problem. Antibiotic use appears to be higher in some regions, such as the Southeast.

Use of carbapenems, a major class of last-line antibiotics, increased significantly from 2007 to 2010.

Alexander Fleming, speaking in his Nobel Prize acceptance speech in 1945, said:

“Then there is the danger that the ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug, make them resistant.”

As the man who discovered the first antibiotic almost 70 years ago predicted, drug resistance is starting to become commonplace.

**How do antibiotics work?**

There are different types of antibiotic, which work in one of two ways:

* A bactericidal antibiotic, such as penicillin, kills the bacteria. These drugs usually interfere with either the formation of the bacterial cell wall or its cell contents.
* A bacteriostatic stops bacteria from multiplying.

**Vaccine:**

**Vaccine**, suspension of weakened, killed, or fragmented microorganisms or toxins or of antibodies or lymphocytes that is administered primarily to prevent disease.

A vaccine can confer active immunity against a specific harmful agent by stimulating the immune system to attack the agent. Once stimulated by a vaccine, the antibody-producing cells, called B cells (or B lymphocytes), remain sensitized and ready to respond to the agent should it ever gain entry to the body. A vaccine may also confer passive immunity by providing antibodies or lymphocytes already made by an animal or human donor. Vaccines are usually administered by injection (parenteral administration), but some are given orally or even nasally (in the case of flu vaccine). Vaccines applied to mucosal surfaces, such as those lining the gut or nasal passages, seem to stimulate a greater antibody response and may be the most effective route of administration.

## The First Vaccines

The first vaccine was introduced by British physician Edward Jenner, who in 1796 used the cowpox virus (vaccinia) to confer protection against smallpox, a related virus, in humans. Prior to that use, however, the principle of vaccination was applied by Asian physicians who gave children dried crusts from the lesions of people suffering from smallpox to protect against the disease. While some developed immunity, others developed the disease. Jenner’s contribution was to use a substance similar to, but safer than, smallpox to confer immunity. He thus exploited the relatively rare situation in which immunity to one virus confers protection against another viral disease. In 1881 French microbiologist Louis Pasteur demonstrated immunization against anthrax by injecting sheep with a preparation containing [attenuated](https://www.merriam-webster.com/dictionary/attenuated) forms of the bacillus that causes the disease. Four years later he developed a protective suspension against rabies.

## Vaccine Effectiveness

After Pasteur’s time, a widespread and intensive search for new vaccines was conducted, and vaccines against both bacteria and viruses were produced, as well as vaccines against venoms and other toxins. Through vaccination, smallpox was [eradicated](https://www.merriam-webster.com/dictionary/eradicated) worldwide by 1980, and polio cases declined by 99 percent. Other examples of diseases for which vaccines have been developed include mumps, measles, typhoid fever, cholera, plague, tuberculosis, tularemia, pneumococcal infection, tetanus, influenza, yellow fever, hepatitis A, hepatitis B, some types of encephalitis, and typhus—although some of those vaccines are less than 100 percent effective or are used only in populations at high risk. Vaccines against viruses provide especially important immune protection, since, unlike bacterial infections, viral infections do not respond to antibiotics.

# Benefits Of Vaccination

In addition to the development of memory B cells, which are capable of triggering a secondary immune response upon exposure to the pathogen targeted by a vaccine, vaccination is also beneficial at the population level. When a sufficient number of individuals in a population are immune to a disease, as would occur if a large proportion of a population were vaccinated, herd immunity is achieved. That means that if there is random mixing of individuals within the population, then the pathogen cannot be spread throughout the population. Herd immunity acts by breaking the transmission of infection or by lessening the chances of susceptible individuals coming in contact with a person who is infectious. Herd immunity provides a measure of protection to individuals who are not personally immune to the disease—for instance, individuals who, because of their age or underlying medical conditions, cannot receive vaccines or individuals who received vaccines but remain susceptible. Herd immunity played an important role in the successful eradication of smallpox, and it is vital in preventing the spread of diseases such as polio and measles.

## Adverse Reactions

Vaccination carries some risk of reaction, though adverse effects typically are very rare and very mild. The most common reactions to vaccines include redness and soreness around the vaccination site. More severe adverse reactions, such as vomiting, high fever, seizure, brain damage, or death, are possible for some vaccines. Such reactions are exceptionally rare, however—occurring in less than one in a million people for most vaccines. Severe reactions also tend to affect only certain populations, such as persons whose immune systems are compromised by preexisting disease (e.g., HIV/AIDS) or who are undergoing chemotherapy.