



**Discuss** the impact of inventions / discoveries

# Antibiotics

Today, vaccines can prevent some of the infectious diseases that in the past resulted in serious illness and death. Fortunately, for diseases caused by bacteria (tiny organisms that can only be seen by microscope), vaccines can make the difference between life and death.

## What are antibiotics?

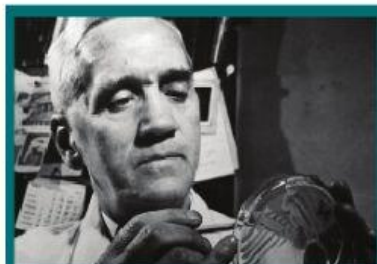
Antibiotics are substances that work in one of two ways. Some antibiotics, such as penicillin, kill disease-causing bacteria. Others, such as tetracycline, stop them from multiplying.

## History

In 1675, Dutch scientist Antonie Van Leeuwenhoek, using a microscope, discovered the existence of microorganisms. However, it wasn't known that they could cause disease until French scientist Louis Pasteur

confirmed that approximately 200 years later. Finally, in 1928, British scientist Alexander Fleming noticed that a mold, penicillium, growing in one of his petri dishes, was capable of killing bacteria, and the development of antibiotics became possible. Fleming named the active agent in the mold "penicillin" but was unable to create a drug from it.

In 1940, during the Second World War, two scientists working at Oxford University, Ernst Chain and Howard Florey, were able to make an antibacterial powder from penicillin that was safe to use on humans. Penicillin was mass-produced for use on soldiers in the war. If there had been no penicillin, many would have died from bacterial

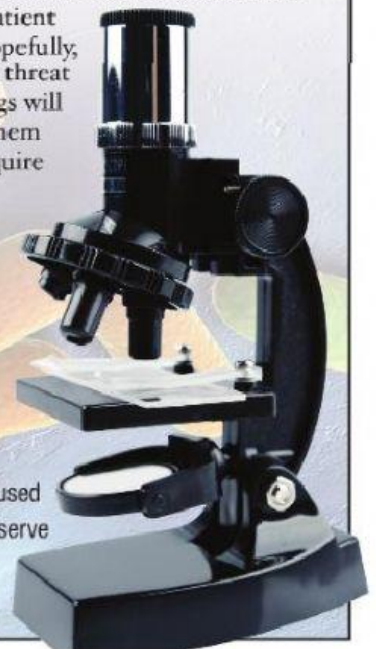


Fleming examines the behavior of penicillium in a petri dish.

infections caused by their injuries and wounds. Soon penicillin was used for serious diseases such as pneumonia and tuberculosis, which had always caused many deaths. Fleming, Florey, and Chain received the Nobel Prize in 1945. Antibiotics changed medicine and continue today to enable people to survive conditions that would have killed them before the antibiotic age.

## Overuse of antibiotics

Since their discovery and widespread use, antibiotics have been considered a wonder drug. Many common diseases, however, are caused by viruses, not bacteria, and antibiotics are not effective against them. Nevertheless, too many people use antibiotics regularly, believing they will cure viral illnesses such as common upper respiratory infections, colds, and sore throats. Why is this a problem? First, it is a waste of money to use antibiotics to treat viruses. Our body's immune system eventually combats most viruses, and we recover without treatment. But more importantly, bacteria exposed to an antibiotic can become resistant to it, making the antibiotic less effective, or even useless. If antibiotics no longer work against infections and diseases, people will begin to die from them again. If scientists had recognized that bacteria could develop resistance, perhaps they would have warned doctors not to use antibiotics unless a patient has a bacterial infection. Hopefully, worldwide awareness of this threat to an important class of drugs will convince us to avoid using them for conditions that don't require them.



Van Leeuwenhoek used a microscope to observe microorganisms.

### Some diseases caused by bacteria

Tuberculosis
Plague
Pertussis
Streptococcal sore throat (or "strep throat")

### Some diseases caused by viruses

Influenza (or "the flu")
Polio
AIDS
The common cold
Hepatitis

## COMPREHENSION QUESTIONS

A. Based on the Reading, complete each statement by matching a phrase on the left with a phrase on the right.

- |                                                |                              |
|------------------------------------------------|------------------------------|
| 1. Strep throat is caused by _____             | a. an antibiotic.            |
| 2. AIDS is caused by _____                     | b. bacteria.                 |
| 3. Antibiotics are not effective against _____ | c. our body's immune system. |
| 4. Bacteria can become resistant to _____      | d. the common cold.          |
| 5. Most viruses are combated by _____          | e. a virus.                  |

## CRITICAL THINKING

B. Number these events 1 through 5 in the order they occurred. Use "1" for the event that happened first.

- \_\_\_\_\_ Pasteur confirmed that microorganisms could cause disease.
- \_\_\_\_\_ Fleming discovered that penicillium could kill bacteria.
- \_\_\_\_\_ Fleming, Florey, and Chain won the Nobel Prize.
- \_\_\_\_\_ The existence of microorganisms was discovered.
- \_\_\_\_\_ The antibiotic penicillin was created and used on soldiers in World War II.

**FIND SUPPORTING DETAILS** Answer the questions in your own words.

Explain your answers, based on information in the Reading.

- |                                                              |                                                       |
|--------------------------------------------------------------|-------------------------------------------------------|
| 1 What is the benefit of antibiotics?                        | 3 Why are antibiotics effective against strep throat? |
| 2 Why are antibiotics not effective against the common cold? | 4 What problem has overuse of antibiotics caused?     |