# History of Antibiotics



History of antibiotics can be described in two segments early history and modern history. Most important is the discovery of pencillin by Alexander Fleming.



## Antibiotics - An Introduction

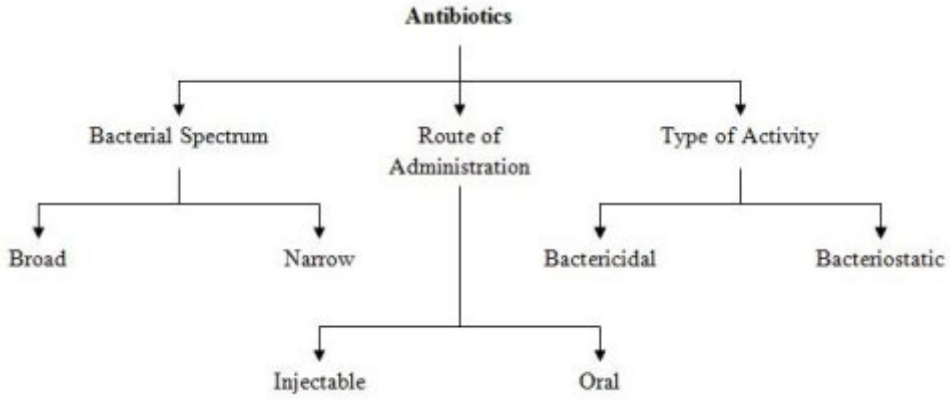
Infections are very common and responsible for a large number diseases adversely affecting human health. Most of the infectious diseases are caused by bacteria. Infections caused by bacteria can be prevented, managed and treated through anti-bacterial group of compounds known as antibiotics.

## Definition

Antibiotics can be loosely defined as the variety of substances derived from bacterial sources (microorganisms) that control the growth of or kill other bacteria. However, Synthetic antibiotics, usually chemically related to natural antibiotics, have since been produced that accomplish comparable tasks.

## Classifications

A common scheme of classifications for antibiotics is drawn below:




Antibiotics can also be classified based on their chemical structure. A similar level of effectiveness, toxicity and side-effects is rendered by the antibiotics of same structural group. Broad spectrum antibiotics are effective against a broad range of microorganisms in comparison to narrow spectrum antibiotics. Bactericidal antibiotics kill the bacteria whereas bacteriostatic antibiotics halt the growth of bacteria.

# History of Antibiotics

History of antibiotics can be described in two segments as under:

## Early History

During ancient times;

- Greeks and Indians used moulds and other plants to treat infections.
- In Greece and Serbia, mouldy bread was traditionally used to treat wounds and infections.
- Warm soil was used in Russia by peasants to cure infected wounds.
- Sumerian doctors gave patients beer soup mixed with turtle shells and snake skins.
- Babylonian doctors healed the eyes using a mixture of frog bile and sour milk.
- Sri Lankan army used oil cake (sweetmeat) to server both as desiccant and antibacterial.

MODERN HISTORY

| Year | Origin | Description |
|---|---|---|
| 1640 | England | John Parkington recommended using mold for treatment in his book on pharmacology |
| 1870 | England | Sir John Scott Burdon-Sanderson observed that culture fluid covered with mould did not produce bacteria |
| 1871 | England | Joseph Lister experimented with the antibacterial action on human tissue on what he called Penicillium glaucium |

| | | |
|---|---|---|
| 1875 | England | John Tyndall explained antibacterial action of the Penicillium fungus to the Royal Society |
| 1877 | France | Louis Pasteur postulated that bacteria could kill other bacteria (anthrax bacilli) |
| 1897 | France | Ernest Duchesne healed infected guinea pigs from typhoid using mould (Penicillium glaucium) |
| 1928 | England | Sir Alexander Fleming discovered enzyme lysozyme and the antibiotic substance penicillin from the fungus Penicillium notatum |
| 1932 | Germany | Gerhard Domagk discovered Sulfonamidochrysoidine (Prontosil ) |
| **During 1940's and 50's streptomycin, chloramphenicol, and tetracycline were discovered and Selman Waksman used the term "antibiotics" to describe them (1942)** | | |

## Sir Alexander Fleming

Sir Alexander Fleming, a Scottish biologist, defined new horizons for modern antibiotics with his discoveries of enzyme lysozyme (1921) and the antibiotic substance penicillin (1928). The discovery of penicillin from the fungus Penicillium notatum perfected the treatment of bacterial infections such as, syphilis, gangrene and tuberculosis. He also contributed immensely towards medical sciences with his writings on the subjects of bacteriology, immunology and chemotherapy.

Alexander Fleming was born in Loudon, Scotland on 6 August, 1881 in a farming family. He carried on his schooling at Regent Street Polytechnic after his family moved to London in 1895. He joined St. Mary's Medical School and became research assistant to renowned Sir Almroth Wright after he qualified with distinction in 1906. He completed his degree (M.B.B.S.) with gold medal in 1908 from the University of London and lectured at St. Mart till 1914. He served as Captain during the World War I and worked in battlefield hospitals in France. After the war he returned to St. Mary in 1918 and got elected Professor of Bacteriology in 1928.

## The Discovery of Antibiotics

> *"One sometimes finds what one is not looking for"*
>
> **(Sir Alexander Fleming)**

His research and study during his military career inspired him to discover naturally antiseptic enzyme in 1921, which he named lysozyme. This substance existed in tissues and secretions like mucus, tears and egg-white but it did not have much effect on the strongly harmful bacteria. Six years later; as a result of some intelligent serendipity, he stumbled on discovering penicillin. It was in 1928 when he observed while experimenting on influenza virus that a common fungus, Penicillium notatum had destroyed bacteria in a staphylococcus culture plate. Upon subsequent investigation, he found out that mould juice had developed a

bacteria-free zone which inhibited the growth of staphylococci. This newly discovered active substance was effective even when diluted up to 800 times. He named it penicillin.

He was knighted in 1944 and was given the Nobel Prize in Physiology or Medicine in 1945 for his extraordinary achievements which revolutionized the medical sciences.

## How Do Antibiotics Work?

Various types of antibiotics work in either of the following two ways:

1. A Bactericidal antibiotic kills the bacteria generally by either interfering with the formation of the bacterium's cell wall or its cell contents.

   Penicillin, daptomycin, fluoroquinolones, metronidazole, nitrofurantoin and co-trimoxazole are some example of Bactericidal antibiotics.

2. A Bacteriostatic antibiotic stops bacteria from multiplying by interfering with bacterial protein production, DNA replication, or other aspects of bacterial cellular metabolism.

   Some Bacteriostatic antibiotics are tetracyclines, sulphonamides, spectinomycin, trimethoprim, chloramphenicol, macrolides and lincosamides.

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