



Introduction, definition, characteristics of ideal antibiotics, history of antibiotics, terminologies

The word *antibiotic* originates from the term *antibiosis*, meaning “against life.” Antibiotics are chemical compounds produced by certain microorganisms, such as **bacteria**, **fungi**, and **actinomycetes**, that inhibit the growth of other microorganisms and may ultimately kill them. Antibiotics were originally referred to as *antibiosis* and were defined as drugs that act against bacteria. The word *antibiosis*, meaning “against life,” was introduced by the French bacteriologist **Vuillemin** to describe the effect of these drugs.

Antimicrobial agents such as sulphonamides and the 4-quinolones, produced solely by synthetic means, are often referred to as **antibiotics**.

History of Antibiotics

Penicillin, the first natural antibiotic discovered by Alexander Fleming in 1928. Many treatments for infections prior to the beginning of the twentieth century were based on medicinal folklore. Treatments for infection in ancient Chinese medicine using plants with antimicrobial properties were described over 2,500 years ago. Many other ancient cultures, including the ancient Egyptians and ancient Greeks used molds and plants to treat infections. The discovery of the natural antibiotics produced by microorganisms stemmed from earlier work on the observation of antibiosis between microorganisms.

The science of synthetic antibiotic chemotherapy began in Germany with the German scientist Paul Ehrlich in the late 1880s. Scientists worked to understand the causes of infectious diseases and to develop synthetic antibiotics, as well as to discover and isolate natural antibiotics. These efforts represented important milestones in the development of antibiotics.

Antibiosis was first described in 1877 in bacteria when Louis Pasteur and Robert Koch observed that an airborne bacillus could inhibit the growth of *Bacillus anthracis*). These drugs were later renamed antibiotics by Selman Waksman, an American microbiologist in 1942.

Antimicrobial drugs can be classified based on their effect on bacterial populations into two main types.

Bactericidal agents directly kill bacteria, such as penicillins, cephalosporins, and aminoglycosides.

Bacteriostatic agents inhibit the growth and reproduction of pathogens without killing them immediately; examples include sulphonamides, tetracyclines, and chloramphenicol.

Terminology

Chemotherapeutic drug: are chemical agents used for the treatment, relief or prophylaxis of a disease

Prophylaxis: use of drug to prevent infections which are about to happen for a person at risk

Antimicrobial compounds: include antibacterial , antiviral ,antifungal and antiprotozoal agents

Antibiotics: substances produced by the natural processes of some microorganisms that kills or inhibits the growth of other microorganisms

Semi synthetic drugs: drugs which are chemically modified in the lab after being isolated from natural sources .

Synthetic drugs: the use of chemical reactions to synthesize antimicrobial agents

Characterization of Ideal Antibiotics :

An ideal antibiotic should:

1. **Have selective toxicity** – kill bacteria without harming human cells.
2. **Target the right bacteria** – broad or narrow spectrum depending on the infection.
3. **Be bactericidal or bacteriostatic** – kill or stop bacteria from growing.
4. **Have low resistance potential** – bacteria should not easily become resistant.
5. **Reach the infection site effectively** – good absorption, distribution, metabolism, and excretion.
6. **Cause minimal side effects** – safe for patient and preserve normal flora.
7. **Be stable, affordable, and accessible** – easy to store and widely available.
8. **Be easy to use** – convenient dosing and compatible with other drugs.

In short: An ideal antibiotic is **safe, effective, stable, and targets bacteria efficiently** while minimizing side effects and resistance