

The terms *antimicrobial* and *antibiotic* encompass a wide variety of pharmaceutical agents that include antibacterial, antifungal, antiviral, and antiparasitic drugs. But what is the difference between antibiotic and antimicrobial substances?

Antimicrobial agent : it is a large variety of chemical compounds and physical agents that are used to destroy microorganisms or to prevent their development .

Antibiotics : are substance produced by living organism which are active against other living organism .

These organic compounds have been isolated from numerous sources but principally from bacteria like *Streptomycin* (tetracycline) and Fungi like *Penicillium* (Penicillin) .

Sterilization : is the complete destruction or removal of all living cells, spores, viruses by filtration, heat or radiation .

Disinfectant : is a chemical substance used to kill , inhibit or removal all microbes that may cause diseases by disinfectant like phenol and phenolic compound . Disinfectants should be used only on inanimate objects.

Antiseptics : are mild forms of disinfectants that are used externally on living tissues to kill microorganisms, on the surface of skin and mucous membranes.

Mode of action :

Different antibiotics have different modes of action, owing to the nature of their structure and degree of affinity to certain target sites within bacterial cells.

1. **Inhibitors of cell wall synthesis.** While the cells of humans and animals do not have cell walls, this structure is critical for the life and survival of bacterial species. A drug that targets cell walls can therefore selectively kill or inhibit bacterial organisms. Examples: penicillins, cephalosporins, bacitracin and vancomycin.
2. **Inhibitors of cell membrane function.** Cell membranes are important barriers that segregate and regulate the intra- and extracellular flow of substances. A disruption or damage to this structure could result in leakage of important solutes essential for the cell's survival. Because this structure is found in both eukaryotic and prokaryotic cells, the action of this class of antibiotic are often poorly selective and can often be toxic for systemic use in the mammalian host. Most clinical usage is therefore limited to topical applications. Examples: polymixin B and colistin.
3. **Inhibitors of protein synthesis.** Enzymes and cellular structures are primarily made of proteins. Protein synthesis is an essential process necessary for the multiplication and survival of all bacterial cells. Several types of antibacterial agents target bacterial protein synthesis by binding to either the 30S or 50S subunits of the intracellular ribosomes. This activity then results in the disruption of the normal cellular metabolism of the bacteria, and consequently leads to the death of the organism or the inhibition of its growth and multiplication. Examples: Aminoglycosides, macrolides, lincosamides, streptogramins, chloramphenicol, tetracyclines.

4. **Inhibitors of nucleic acid synthesis.** DNA and RNA are keys to the replication of all living forms, including bacteria. Some antibiotics work by binding to components involved in the process of DNA or RNA synthesis, which causes interference of the normal cellular processes which will ultimately compromise bacterial multiplication and survival. Examples: quinolones, metronidazole, and rifampin.
5. **Inhibitors of other metabolic processes.** Other antibiotics act on selected cellular processes essential for the survival of the bacterial pathogens. For example, both sulfonamides and trimethoprim disrupt the folic acid pathway, which is a necessary step for bacteria to produce precursors important for DNA synthesis. Sulfonamides target and bind to dihydropteroate synthase, trimethoprim inhibit dihydrofolate reductase; both of these enzymes are essential for the production of folic acid, a vitamin synthesized by bacteria, but not humans.

