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QNO::

Discuss the mechanism of antibiotics according to different targets and classify them one by one ?

ANSWER ::

❖ ANTIBIOTICS ::

An antibiotic is a type of antimicrobial substances active against bacteria. They may either kill or inhibit the growth of bacteria. It is the most important type antibacterial agent for fighting bacterial infections, and antibiotic medications are widely used in the treatment and prevention of such infections.

❖ Mechanism of action ::

The mechanism of action is the biochemical way in which a drug is pharmacologically effective. This can be a specific target where the drug binds like an enzyme, as is the case with many antibiotics, or a receptor. Mechanism of action describes the biochemical process specifically at a molecular level.

❖ ANTIBIOTICS modes of action::

Antibacterial action generally falls within one of four mechanisms, three of which involves the inhibitions or regulations of enzymes involved in cell wall biosynthesis, nucleic acid metabolism and repair, or protein synthesis, respectively. The fourth mechanism involves the disruption of membrane structure. Many of these cellular functions targeted by antibiotics are most active in multiplying cells. Since there is often overlap in these functions between prokaryotic bacterial cells and eukaryotic mammalian cells, it is surprising that some antibiotics have also been found to be useful as anticancer agents.

❖ In principle, there are three main antibiotics target in bacteria :

- The cell wall or cell membranes that surrounds the bacterial cell.**
- The machinery that produce protein (the ribosome and associated proteins).**
- The machineries that make the nucleic acid DNA and RNA.**

❖ An antibacterial is an agent that inhibits bacterial growth or kills bacteria spectrum of antibacterial activities.

- Gram positive “ cell wall composed of thick layer of peptidoglycan”.**
- Gram negative “cell wall composed of thin layer of peptidoglycan”.**
- Broad spectrum antibiotics “effective against both gram positive and gram negative bacteria. For example:: Tetracycline.**

- Bacteriostatic “that limit the growth and proliferation of bacteria.
- Narrow spectrum antibiotics “effective against only specific type of bacteria such as isoniazid bacillus bacteria tuberculosis, macrolides, and penicillin G”.
- Bacteriocidal “agents that kill or destroy bacteria”.

❖ Five basic Mechanism of antibiotics action against bacterial cells.

- Inhibitions of cell wall synthesis (most common mechanism).
- Inhibitions of Nucleic Acid synthesis.
- Alteration of cell membranes.
- Antimetabolite Activity.
- Inhibitions of protein synthesis (Translation) (second largest class).

❖ Mechanism of action and various drugs used as antibiotics :

a) Cell wall:

- Beta lactams.
- Monobactam.
- Glycopeptide.
- Carbopenams.
- Vancomycin
- Penicillin.
- Bacitracin.
- Cephalosporins.

b) Plasmamembrane :

- Daptomycin.
- Colistin
- Polymyxins.
- Polymyxin B.
- Lipopeptide.

c) Ribosome.

- 30s subunits
- Tetracycline
- Aminoglycosides
- Oxazolidinones
- 50s subunits
- Macrolides

- Lincosamides
- Chloramphenicol.

d) Metabolic pathways :

- Folic acid synthesis
- Isoniazid
- Mycolic acid synthesis.
- Sulfones
- Trimethoprim
- Sulfonamides.

e) DNA synthesis :

- Moxifloxacin
- Ciprofloxacin.
- Levofloxacin.
- Fluoroquinolones.

f) RNA synthesis :

- Rifampin
- Rifampin

THE END ::

THANK YOU::