Tetracycline Mechanism

PLAY PICMONIC

Tetracyclines are a group of broad spectrum antibiotics named after their structure which contains a four hydrocarbon ring derivative. Drugs in this group include tetracycline, doxycycline, demeclocycline, and minocycline. Doxycycline is fecally eliminated and can therefore be used in patients with renal impairment. Demeclocyline is a specific tetracycline that is widely used in the treatment of hyponatremia caused by syndrome of inappropriate antidiuretic hormone when fluid restriction alone is not adequate. The use of demeclocycline in SIADH actually utilizes a side effect of the drug, which is an anti diuretic hormone antagonist. In individuals without SIADH, it can induce nephrogenic diabetes insipidus. These antibiotics are protein synthesis inhibitors that bind to the 30S prokaryotic ribosomal subunit in the mRNA translation complex. By doing so, these drugs prevent the binding aminoacyl tRNA to the mRNA ribosome complex. Because these drugs are relatively water soluble, they demonstrate limited CNS penetration. In addition, orally administered tetracyclines may chelate divalent cations like Ca2+, Mg2+, and Fe2+, and impair absorption. Therefore, oral administration of these drugs should be separated from the consumption of foods or supplements with high amounts of divalent cations like milk, antacids, or iron by at least one or two hours. Tetracyclines remain the treatment of choice for infections caused by Chlamydia, Rickettsia, and spirochetal infections like Borrelia burgdoferi. They are also sometimes used in a triple therapy regimen for Helicobacter pylori and used in the treatment of Mycoplasma pneumonia. Side effects from tetracyclines are not common but an important one to note is photosensitivity. Tetracyclines can increase the risk of sunburn under exposure to sunlight. These may also cause GI distress. Tetracyclines are also considered teratogens due to the strong association with teeth discoloration in the fetus and as they develop in infancy. These drugs are also associated with the inhibition of bone growth in children when given therapeutically high doses. Therefore, these drugs should not be administered to children under the age of 8.

Binds to 30 S to Prevent Attachment of Aminoacyl tRNA

Tetris-cycle binds to (30S) Dirty Thirty S Man and pulls him away to prevent attachment to (aminoacyl tRNA) Amino Amigo tRNA Rhino

These antibiotics are protein synthesis inhibitors that bind to the 30S prokaryotic ribosomal subunit in the mRNA translation complex. By doing so, these drugs prevent the binding aminoacyl tRNA to the mRNA ribosome complex. The role of aminoacyl tRNA is to deliver the amino acid to the ribosome where it will be incorporated into the polypeptide chain that is being produced. Therefore, if the binding of aminoacyl tRNA subunit is inhibited, protein synthesis will be affected.

Limited CNS Penetration

CNS-brain protected in glass case

Most tetracyclines are water soluble and demonstrate limited CNS penetration. Drugs that are most lipid soluble like minocycline have higher CNS penetration.

Divalent Cations Inhibit Absorption

Double Cat-ion like positive signs

Orally administered tetracyclines may chelate divalent cations like Ca2, Mg2, and Fe2, and impair absorption. Therefore, oral administration of these drugs should be separated from the consumption of foods or supplements with high amounts of divalent cations like milk, antacids, or iron by at least one or two hours.

Must Not Take with Milk, Antacids, Iron

Milk-carton, Ant-acid-bottle, and Iron

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