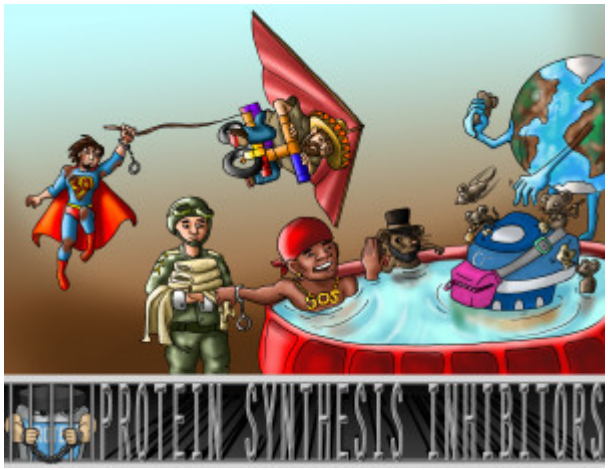
Protein Synthesis Inhibitors

Protein synthesis inhibitors are a class of antibiotics that stops or slows the growth or proliferation of cells by disrupting the generation of new proteins, usually at the ribosome level. These drugs take advantage of major differences between prokaryotic and eukaryotic ribosome structures, allowing bacterial protein synthesis to be affected while human protein synthesis is relatively unaffected. These drugs can be categorized according to which subunit the antibiotic binds to. Aminoglycosides and tetracyclines bind to the 30S subunit while chloramphenicol, clindamycin, erythromycin, lincomycin, and linezolid bind to the 50S subunit.



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Drug Names

30S inhibitors
(30) Dirty S-man Inhibited-in-handcuffs
30S inhibitors bind to the 30S ribosomal subunit. This is the smaller subunit of the 70S prokaryotic ribosome that functions in mRNA translation. This subunit is the site of inhibition for the antibiotics tetracycline and aminoglycosides.

Aminoglycosides
Amigo-glider
Amingolycosides are a class of bactericidal antibiotics that bind to the 30S subunit to inhibit generation of new proteins. These antibiotics inhibit formation of the initiation complex and cause misreading of mRNA. They require oxygen for uptake and are ineffective against anaerobes and are typically used for severe gram negative rod infections.

Tetracyclines
Tetris-cycle
Tetracyclines are a class of bacteriostatic antibiotics that bind to the 30S subunit and prevent attachment of aminoacyl-tRNA. Examples of tetracyclines include doxycycline, demeclocycline, and minocycline. They are clinically used for Lyme disease, H. pylori, and M. pneumoniae as well as Rickettsia and Chlamydia.

50S inhibitors
50S-rapper Inhibited with handcuffs
This is the larger subunit of the 70S prokaryotic ribosome that functions in mRNA translation. It is the site of inhibition for antibiotics like chloramphenicol, clindamycin, erythromycin, lincomycin, and linezolid. This subunit includes activity that catalyzes peptide bond formation, prevents premature polypeptide hydrolysis and helps protein folding.

Chloramphenicol
Chlorine fanny pack
Chloramphenicol is a bacteriostatic antibiotic that inhibits 50S peptidyltransferase. This drug is associated with severe toxicities including anemia, aplastic anemia and gray baby syndrome and is therefore used conservatively in the United States for meningitis. However, it is often still used in developing countries due to relatively low cost.

Clindamycin
Cleaning-mice
Clindamycin is a bacteriostatic antibiotic that blocks peptide bond formation at the 50S ribosomal subunit. It is used principally for anaerobic infections like Bacteroides fragilis and Clostridium perfringens above the diaphragm.

Erythromycin
Earth-throw-mice
Erythromycin is a macrolide antibiotic that inhibits protein synthesis by binding to the 23S rRNA of the 50S ribosomal subunit and blocking translocation. This antibiotic is commonly used for atypical pneumonia caused by Mycoplasma, Chlamydia, and Legionella as well as URIs and STDs.

Lincomycin

Lincoln-mice

Lincomycin is an antibiotic that binds to the 50S subunit of prokaryotic ribosomes. This antibiotic is similar in structure and antibacterial spectrum to macrolides. However, because of its adverse effects and toxicity, it is rarely used today and specifically reserved for patients with pencillin allergies and bacteria highly resistant to other antibiotics.

Linezolid

Linen-soldier

Linezolid is a synthetic antibiotic that binds to the 50S subunit of prokaryotic ribosomes. It is used in the treatment of serious gram positive infections that are resistant to several other antibiotics including streptococci, vancomycin-resistant enterococci, and methicillin-resistant Staphylococcus aureus. The main indications for use include: infections of the skin, soft tissues, and hospital acquired pneumonia.