



Chapter 5: Macrolide Antibiotics


Macrolide: Erythromycin, Clarithromycin, Azithromycin

 Macrolide antibiotics are derived from *Streptomyces* and contains


- (i) a macrocyclic lactone ring.
- (ii) an aminosugar linked glycosidically.
- (iii) and a ketone group.


 All macrolide antibiotics are weak bases and slightly soluble in water.


 Macrolides are bacteriostatic in low concentration and bactericidal at higher concentration.

 They have excellent tissue penetration and antimicrobial activity, mainly against gram positive cocci and atypical pathogens.

 Erythromycin-A, a 14-membered macrolide, was isolated in 1950s from the soil bacterium *Streptomyces erythraeus*.

 Erythromycin was widely used as substitutes to penicillin were allergies to penicillin are there.

 1970-1980s synthetic derivatives like Clarithromycin and Azithromycin, were developed

 It is effective against gram positive (*Streptococcus pneumoniae*) and few gram negative bacteria (*Bordetella pertussis*, *H. influenzae*) and some soft tissue infection and RTI.

 It also effective against *Legionella pneumophila*, *Mycoplasma*, *Mycobacteria*, *Chlamydia*, and *Rickettsia*

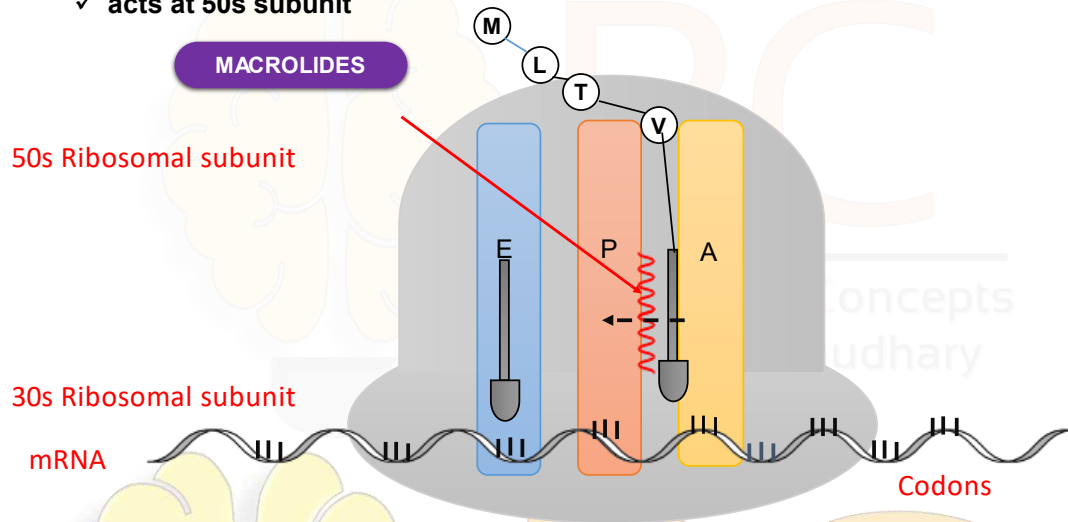
Drug Classification

- A) **14-membered ring:** Erythromycin, Roxithromycin, Clarithromycin
- B) **15-membered ring:** Azithromycin
- C) **16-membered ring:** Spiramycin, Rokitamycin

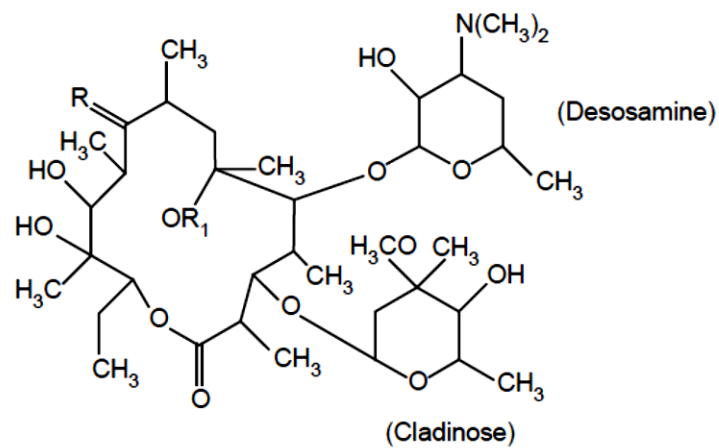
Mechanism of Action



- ✓ Inhibits the Translocation of tRNA from A to P site
- ✓ acts at 50s subunit



A) Erythromycin (Erythromycin A) And Clarithromycin



| | R | R2 |
|-----------------------|--|------------------|
| Erythromycin | =O | -H |
| Roxithromycin | CH ₃ OCH ₂ CH ₂ OCH ₂ O- | -H |
| Clarithromycin | =O | -CH ₃ |

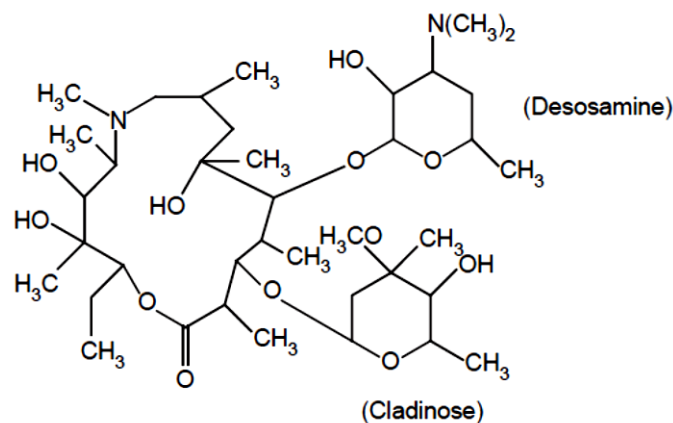
Uses:

- ✓ Used in *Streptococcal* and *Staphylococcal* infections, pertussis, diphtheria, gas gangrene, gonorrhoea, syphilis, chlamydial infection, acne, actinomycosis, pneumonia, pharyngitis, tonsillitis, etc.
- ✓ Used in combination with PPI for treatment of *H. pylori* induced ulcer.

B) Azithromycin

Azithromycin is an azalide antibiotic (subclass of a macrolide).

It is generally bacteriostatic but bactericidal for *Strep. pyogenes*, *Strep. pneumoniae*, and *H. influenzae*.



Antibacterial activity is similar to erythromycin, but has increased activity against gram negative organisms. It has greater acid stability than erythromycin.

Uses :

- ✓ Used in upper and lower respiratory tract infections, pneumonia, pharyngitis, tonsillitis skin & soft tissue infection and urogenital infections.
- ✓ Used in combination with PPI for treatment of *H. pylori* induced ulcer

Erythromycin and clarithromycin are cytochrome P450 3A4 inhibitors thus can potentiate actions of other drugs while no such interaction has been found with Azithromycin and Troleandomycin.
