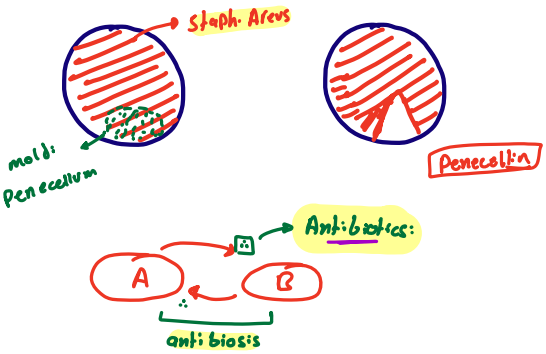
Antibiotics

Discovery:

- Alexander Fleming

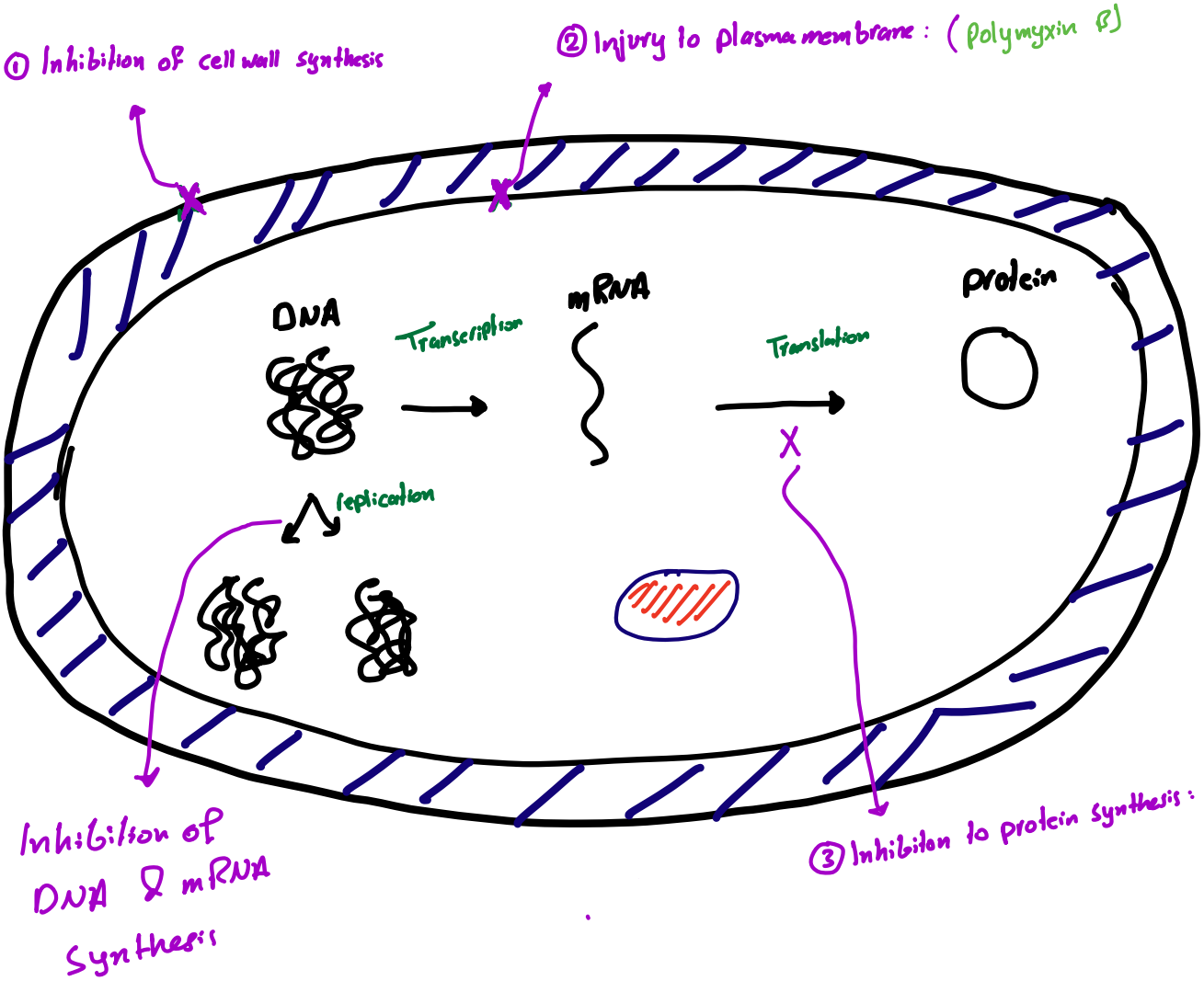


classifications:

Spectrum of Activity
- wide spectrum: For G+ve And G-ve.
- Narrow spectrum: For G+ve OR G-ve.

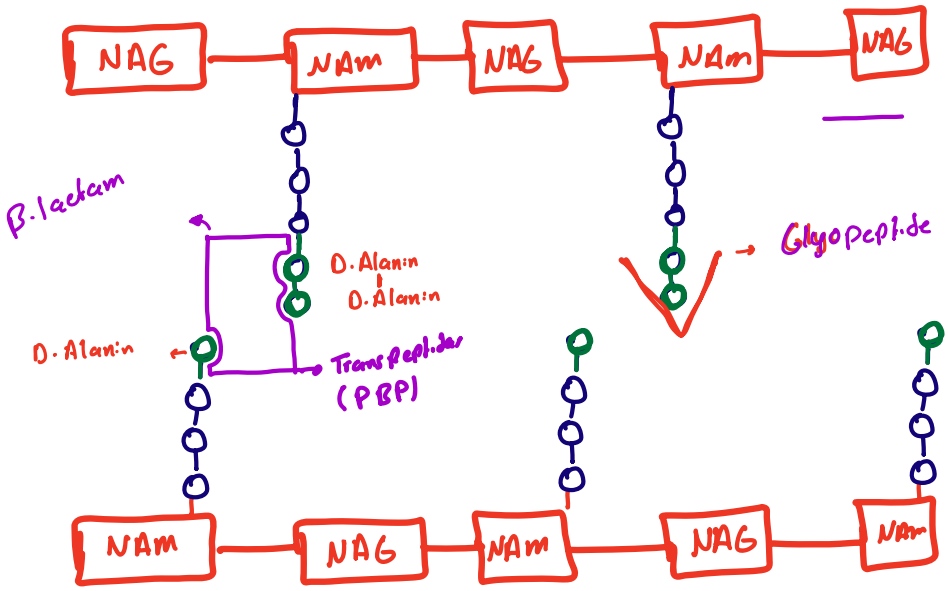
Action
- Bacteri cidal: Kill the Bacteria
- Bacterio static: prevent Growth of Bacteria

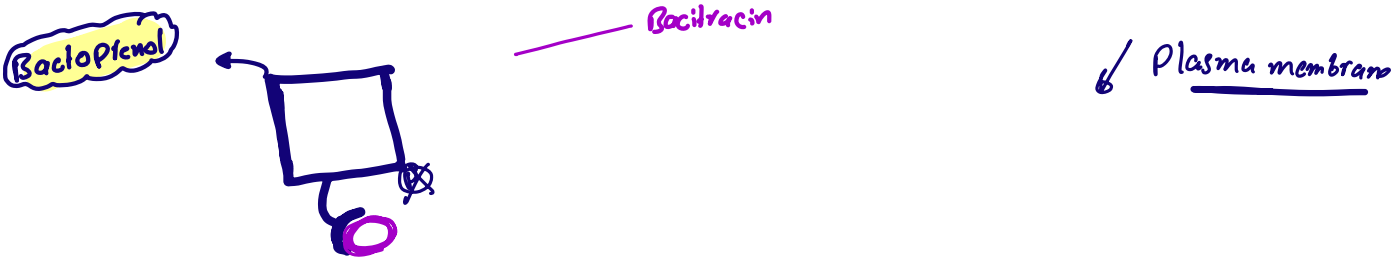
Targets of Antibiotics

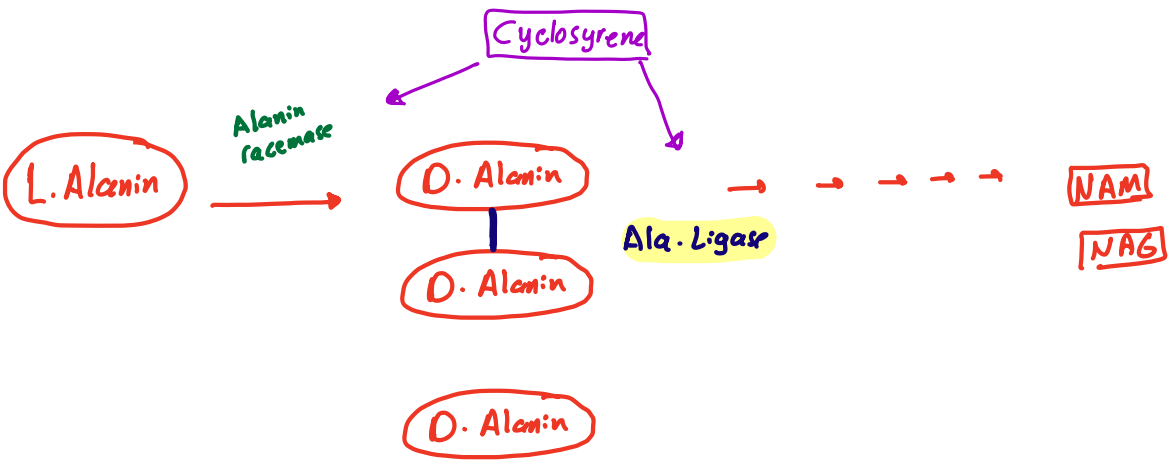


By:Mahmoud Melhem

NOVA







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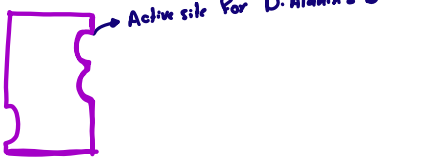
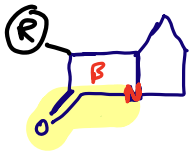
* Inhibition of cell wall synthesis:

① B. lactame:

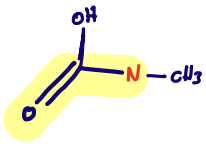


- Trans peptidase
- Penecillin Binding protein

B. lactame :



D-Alanine - D-Alanine:



Ex:
Penecillin
cephalosporine.

∴ B. lactam :

MoA: Mimic D-Ala - D-Ala structure ⟶ Bind to Penecillin Binding protein ⟶ Block Transpeptidase activity ↓ No cross linking ✗ cell wall synthesis.

but ⚠ ↴

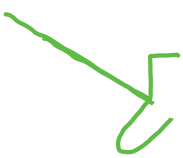
∴ B. lactamase:

?

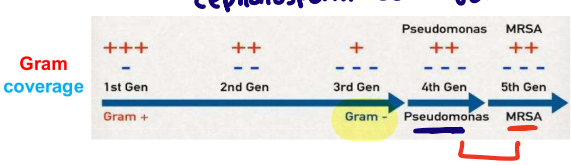
الحلول:

① R. Group : structural change

② Clavulanic Acid: ⊖ B. lactamase enzyme



Cephalosporin Coverage:



② Glycopeptide:

EX: Vancomycin.

MoA: Bind to D-Ala - D-Ala Termenal.

③ Bacitracin :

MoA: Bind to Baclo prenol (Prevent dephosphorylation)

↓

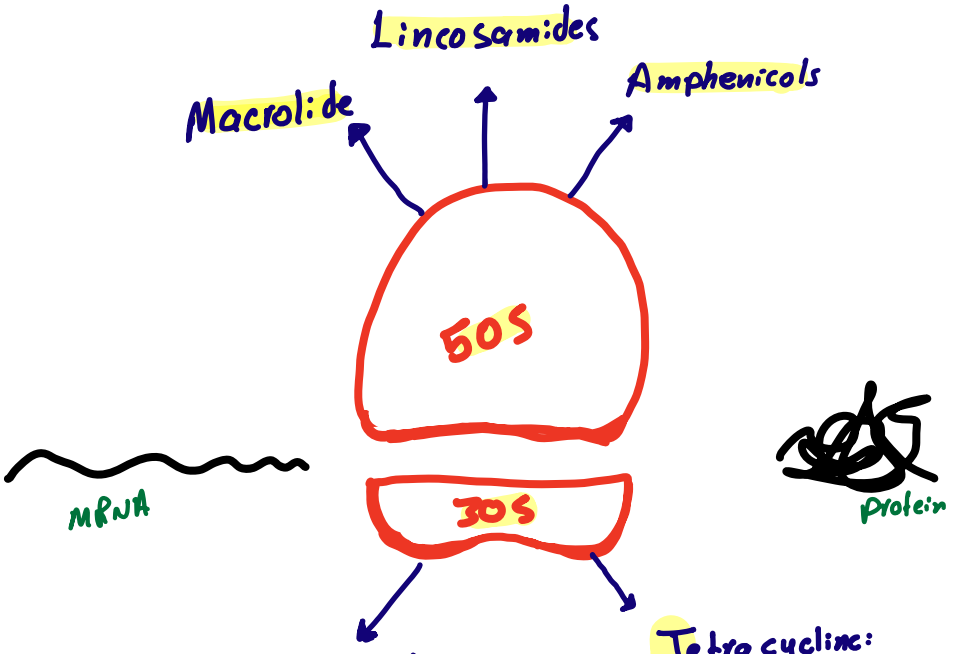
No Transport of NAM & NAG.

④ Cycloserine:

Inhibit :

Alanine racemase
Alanine ligase

* Inhibition of protein synthesis:



Amino Glycoside:

- Impair proof reading
- Irreversible Binding to 30S

Tetracycline:

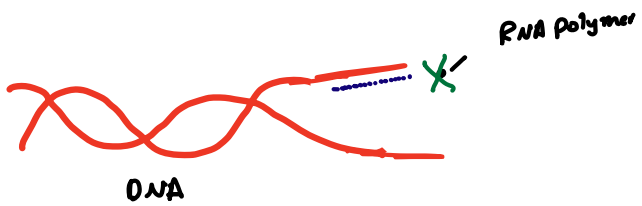
- Block the Binding of tRNA to mRNA
- reversible
- Broad spectrum.

* Inhibitors of mRNA synthesis

*** Rifamycin:**

Ex: Rifampicin

MOA: Bind to DNA-dep RNA Polymerase
↓
Inhibit mRNA synthesis

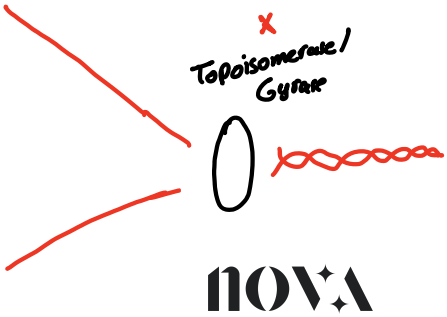


* Inhibitors of DNA synthesis

Fluro Quinolones:

Ex: Nalidixic Acid, ciprofloxacin, Norfloxacin, levofloxacin

MOA: Bind to DNA Gyrase (subunit A) or Topoisomerase II.
↓
Prevent DNA supercoiling.



NOVA

* Inhibitors of Nucleic Acid synthesis

Folic Acid
↓
p. Amino Benzoic Acid (PABA)
← Sulfonamide — PABA analogue
↓
Dihydrofolic Acid
← Trimethoprim → DHF. reductase ⊖
Dihydrofolate reductase
↓
Tetrahydrofolic Acid
↓
Purine & P

* Injury to plasma membrane:

Polymyxin B:

MOA: change permeability of Grame -ve Bacteria → Leakage → Death.

Antibiotic Resistance:

- **Acquired** ?
  - Efflux
  - Target site modification
    - mutations of PBP
    - ↓ affinity of β-lactams.
  - Enzymatic Inactivation
    - Ex: Staphylococcus & β-lactamase
- **Intrinsic** (Innate, Natural) ?
  - Impermeability
    - ex: Vancomycin R G-ve Bacteria
  - Enzyme Inactivation:
    - β-lactamase on Pseudomonas & enterobacter

Important:

① → Bacteria that lack cell wall is called: spheroplast
↳ Autolysis X.

② → β-lactam is not effective for mycoplasma?
mycoplasma Dont Have cell wall