



First stage
Lab. 3

Microbiology

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Antibiotic

Antibiotics: Is a chemical substance produced by a microorganisms or synthetically that inhibits the growth or kills other microorganisms at very low concentration.

Classification of antibiotics:

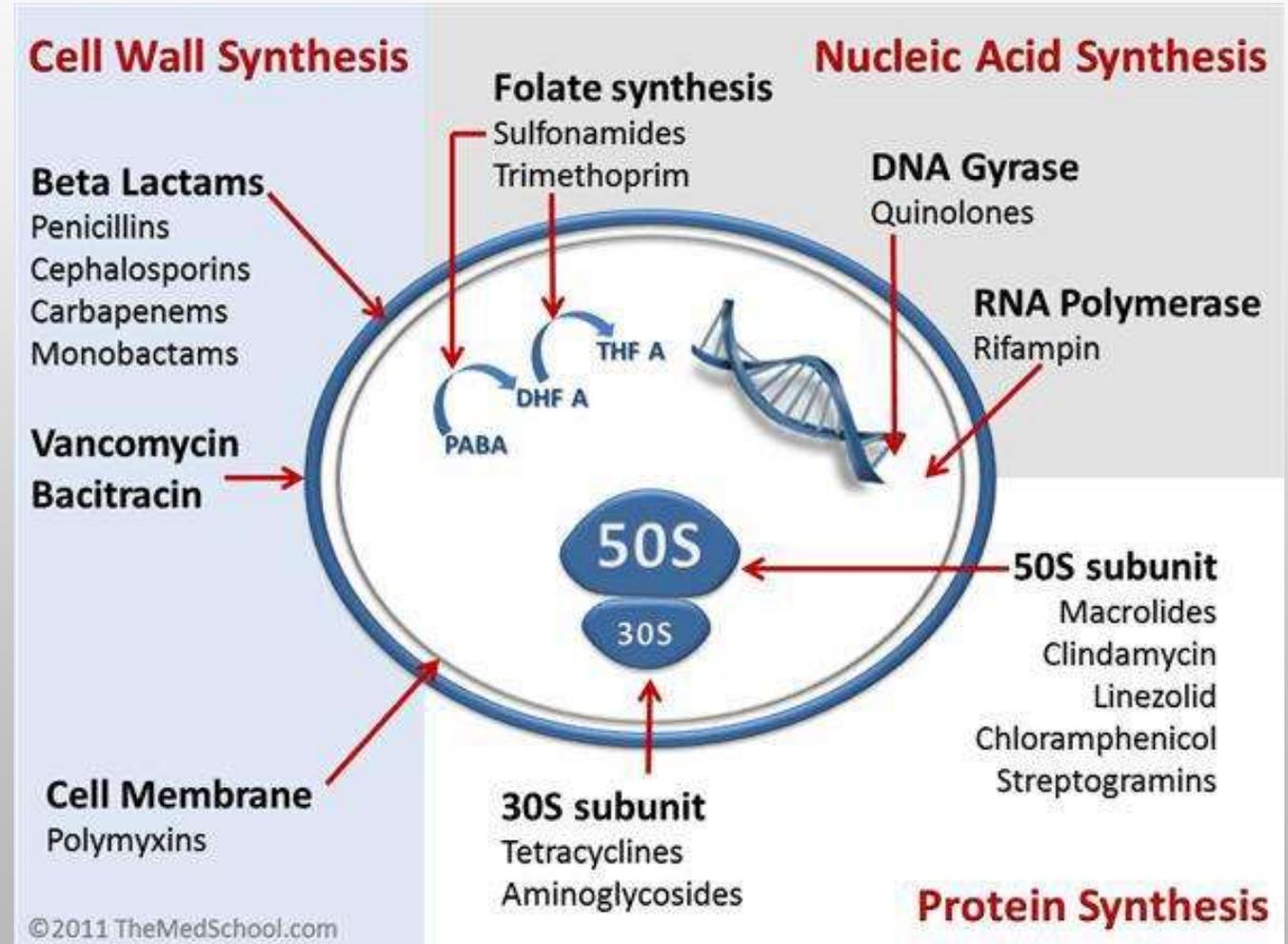
Antibiotics are classified in several ways

- On the basis of mechanism of action
- On the basis of spectrum of activity
- On the basis of mode of action



1. On the basis of mechanism of action

- Inhibition of protein synthesis.
- Inhibition of cell membrane synthesis.
- Inhibition of cell wall synthesis.
- Inhibition of DNA synthesis.
- Inhibition of RNA synthesis.
- Inhibition of folic acid synthesis.



2- On the basis of spectrum of activity

a- **Broad-spectrum antibiotic:** Are affect a wide range of bacteria. Ex: Tetracycline

b- **Narrow-spectrum antibiotic:** Are active against a selected group of bacterial. Ex: Vancomycin

3- On the basis of mode of action

a. **Bacteriostatic agent:** Is a chemical agent that inhibition growth of bacteria. Ex: Azithromycin

b. **Bactericidal:** Is a chemical agent that kills the bacteria. Ex: gentamicin.

Type of resistance

1- **Intrinsic Resistance:** It is the innate ability of a bacterium to resist a class of antibiotic

2- **Acquired Resistance:** When microorganism acquires ways to resist of drug.

Types of acquired resistance:

1- Mutation.

2- Horizontal gene transfer.

A. Transformation.

B. Transduction.

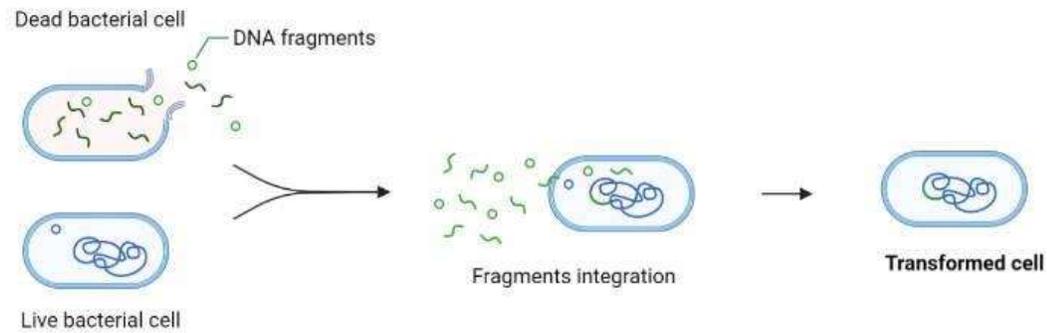
C- Conjugation.



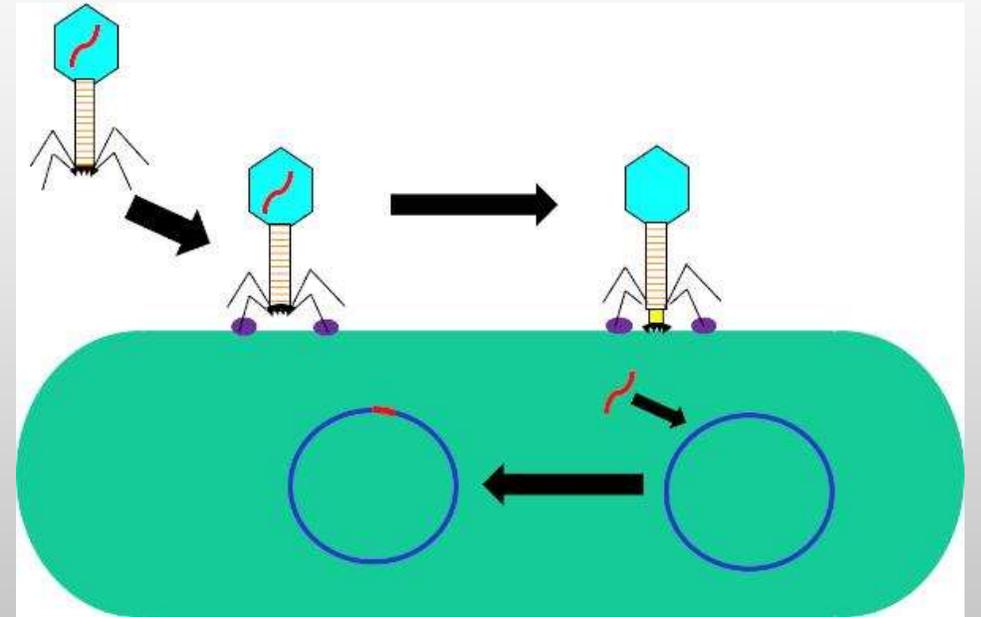
Mutation

Bacterial Transformation

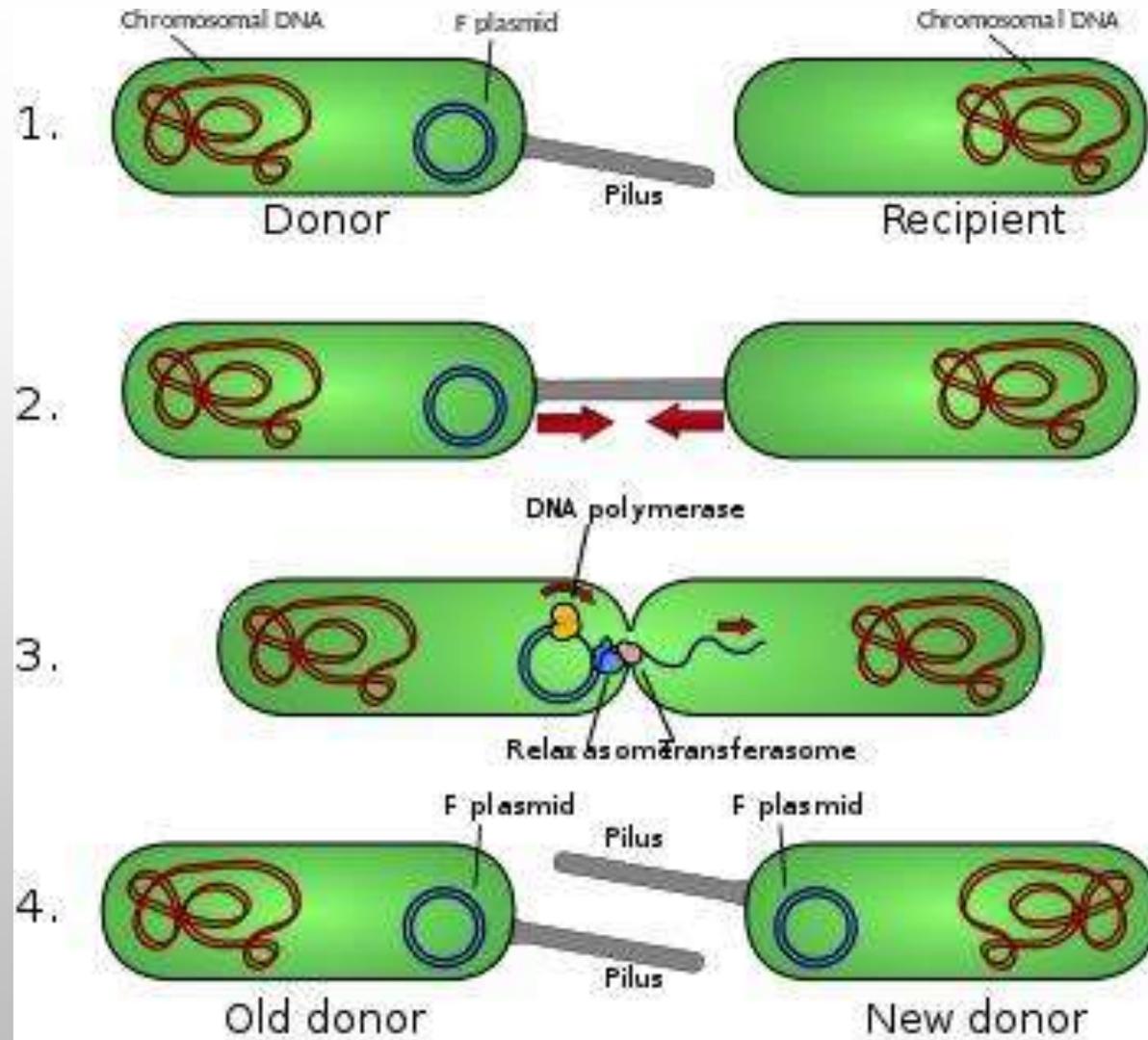
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Transformation



Transduction

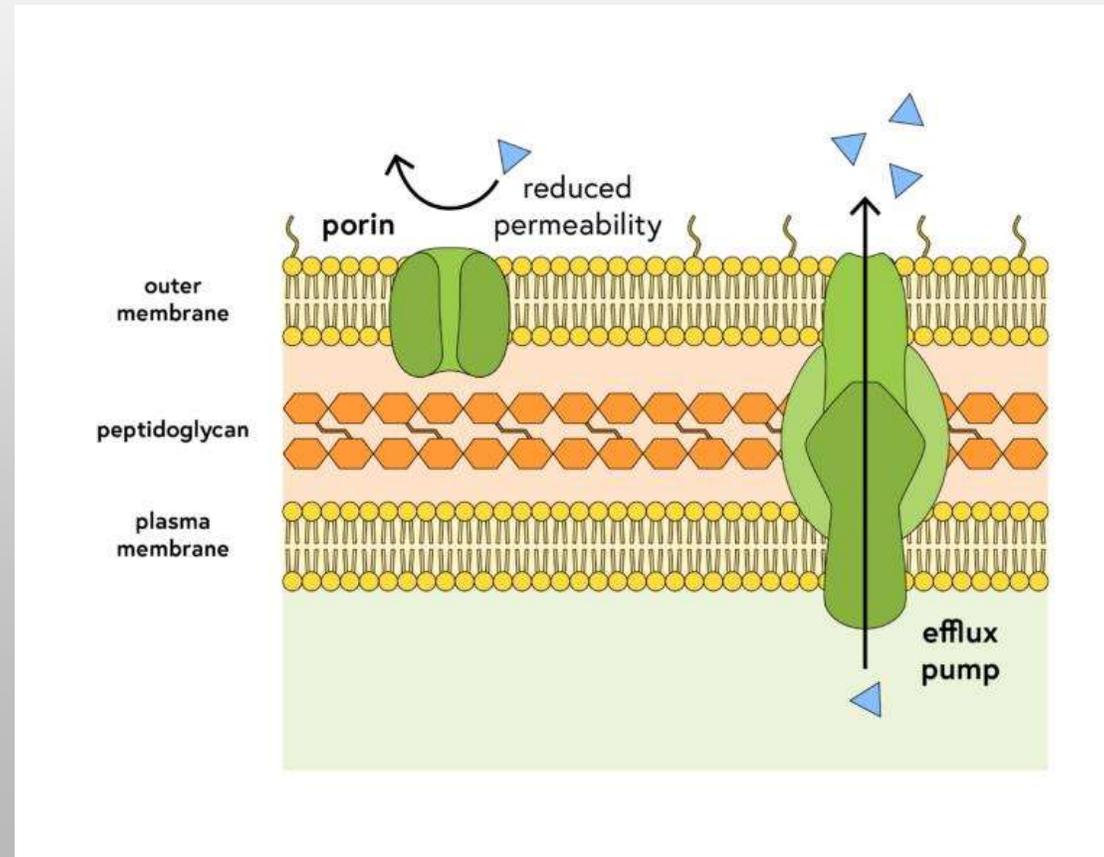


Conjugation

Mechanisms of Resistance

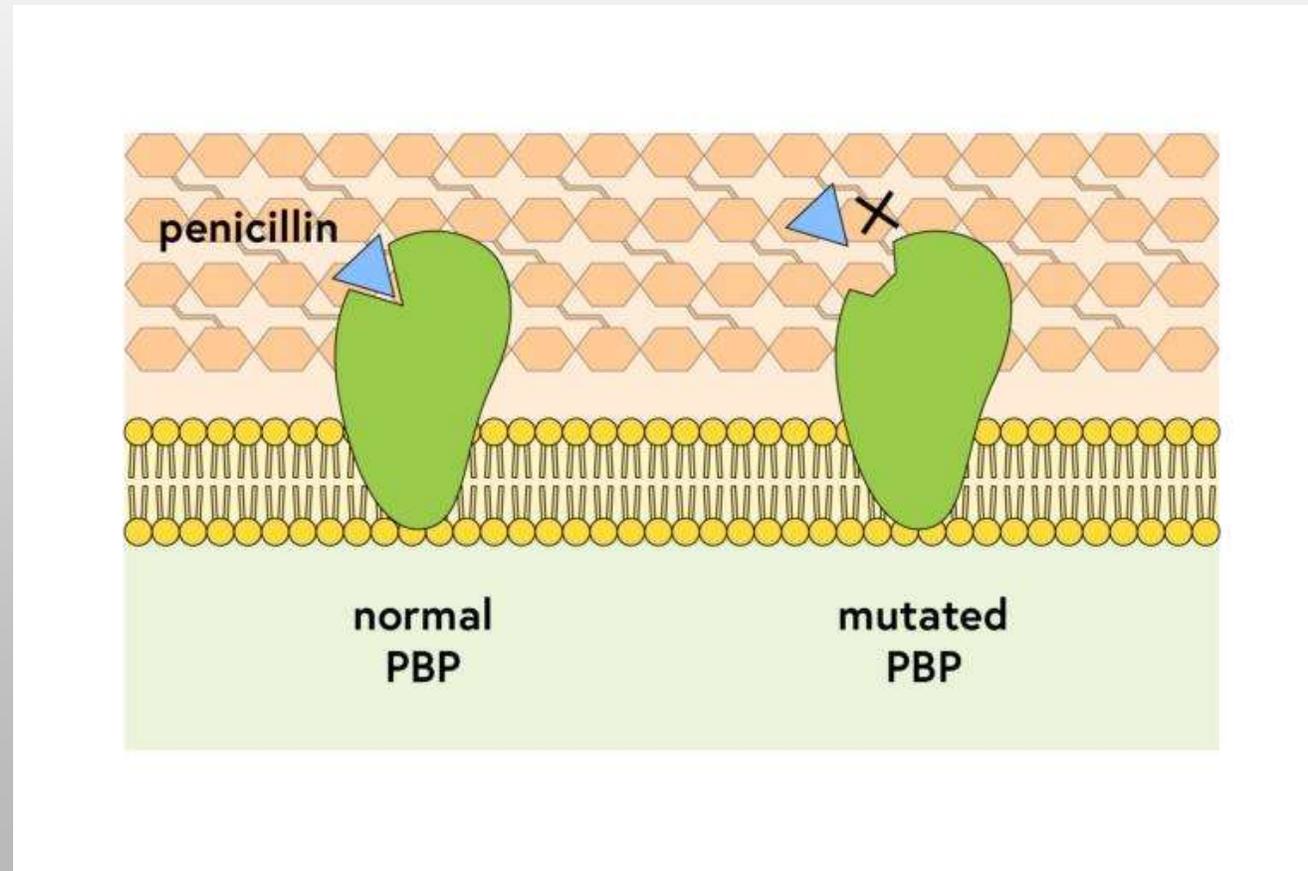
1. Decreased uptake (Porin loss):

Bacteria can develop mutations lead to a loss of porins, resulting in the antibiotics having a lower permeability or stops entering.



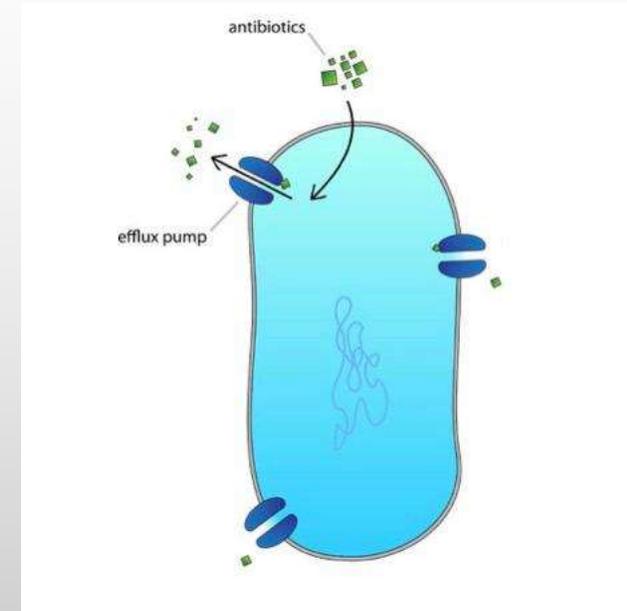
2. Modification of the antibiotic target site

A common mechanism that bacteria use to become resistant to antibiotics is by modifying the target of the antibiotic.



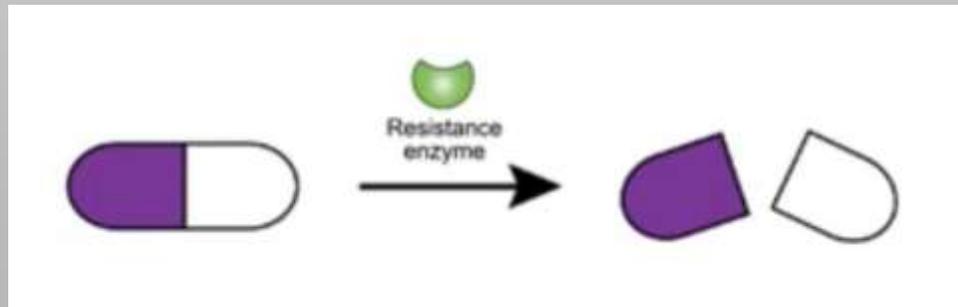
3. Efflux pumps:

The efflux pumps act as the moving of different compounds out of cells, such as antibiotics, heavy metals and toxic.



4. enzyme Inactivation:

β -Lactamases are one of the most common and important hydrolytic enzymes that inactivate penicillin, cephalosporins, carbapenems. Ex: *S. aureus*.



Characteristics of an ideal antibiotic

1. Kill or inhibit the growth of pathogens
2. Selectivity toxic
3. Non allergenic
4. Stable
5. Low cost



THANK YOU FOR
LISTENING

