PHARM.D • YEAR 3

Advanced Pharmacology

CHAPTER 3.3

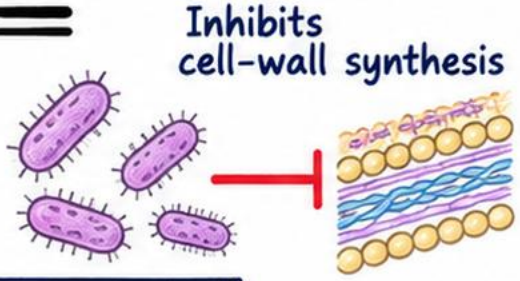
Penicillins and Cephalosporins

PPT CHAPTER COVER



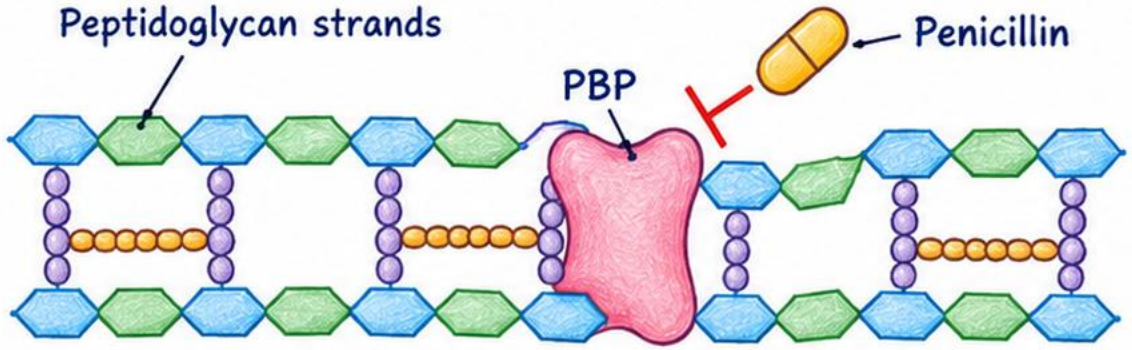
DOCTOR OF PHARMACY

Penicillins: groups and examples



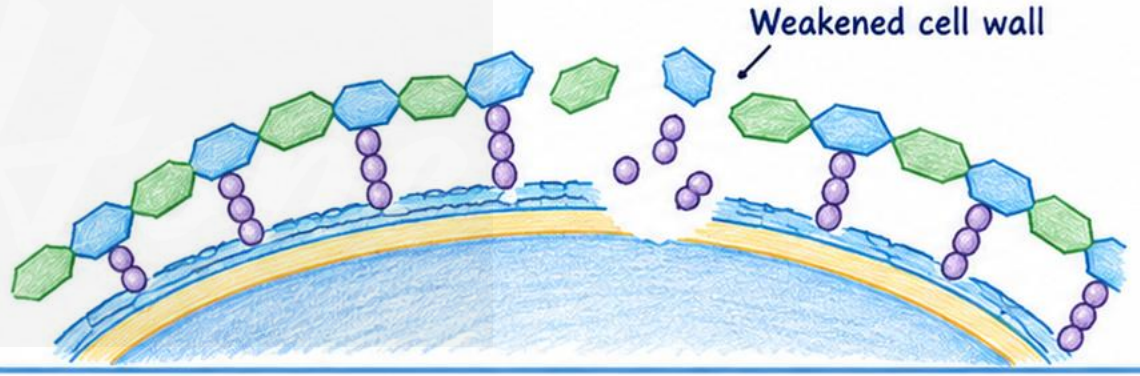
1. Penicillins are beta-lactam antibiotics that kill susceptible bacteria by impairing cell-wall synthesis.
2. Natural agents include penicillin G and oral penicillin V. Antistaphylococcal agents include cloxacillin, nafcillin and oxacillin.
3. Aminopenicillins include ampicillin and amoxicillin; piperacillin is an antipseudomonal penicillin.
4. Examples of inhibitor combinations are amoxicillin-clavulanate, ampicillin-sulbactam and piperacillin-tazobactam.
5. Spectrum depends on the individual drug and bacterial susceptibility. Methicillin is mainly a historical classification example, not a routine treatment choice.

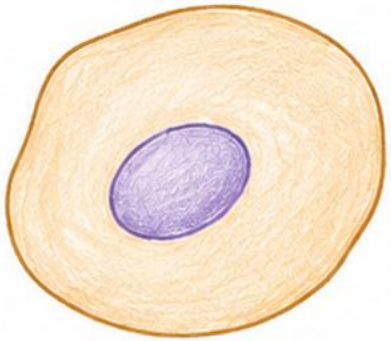
Penicillins: cell-wall mechanism



Penicillins bind penicillin-binding proteins, including enzymes responsible for peptidoglycan cross-linking.

Inhibition of transpeptidation weakens the developing bacterial cell wall. Susceptible growing bacteria can then undergo lysis.

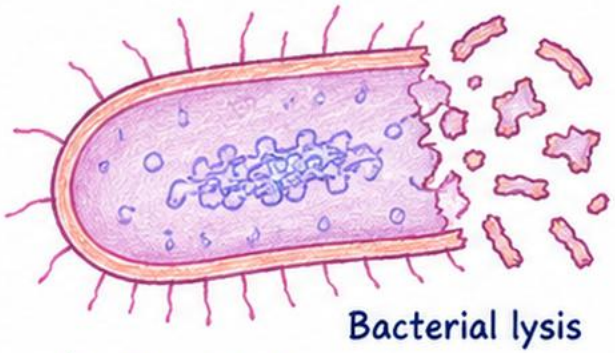




Human cell
(no peptidoglycan)

The effect is bactericidal; activity is generally related to time above the minimum inhibitory concentration.

Human cells lack peptidoglycan, providing a basis for selective toxicity, although allergic and other adverse reactions remain possible.

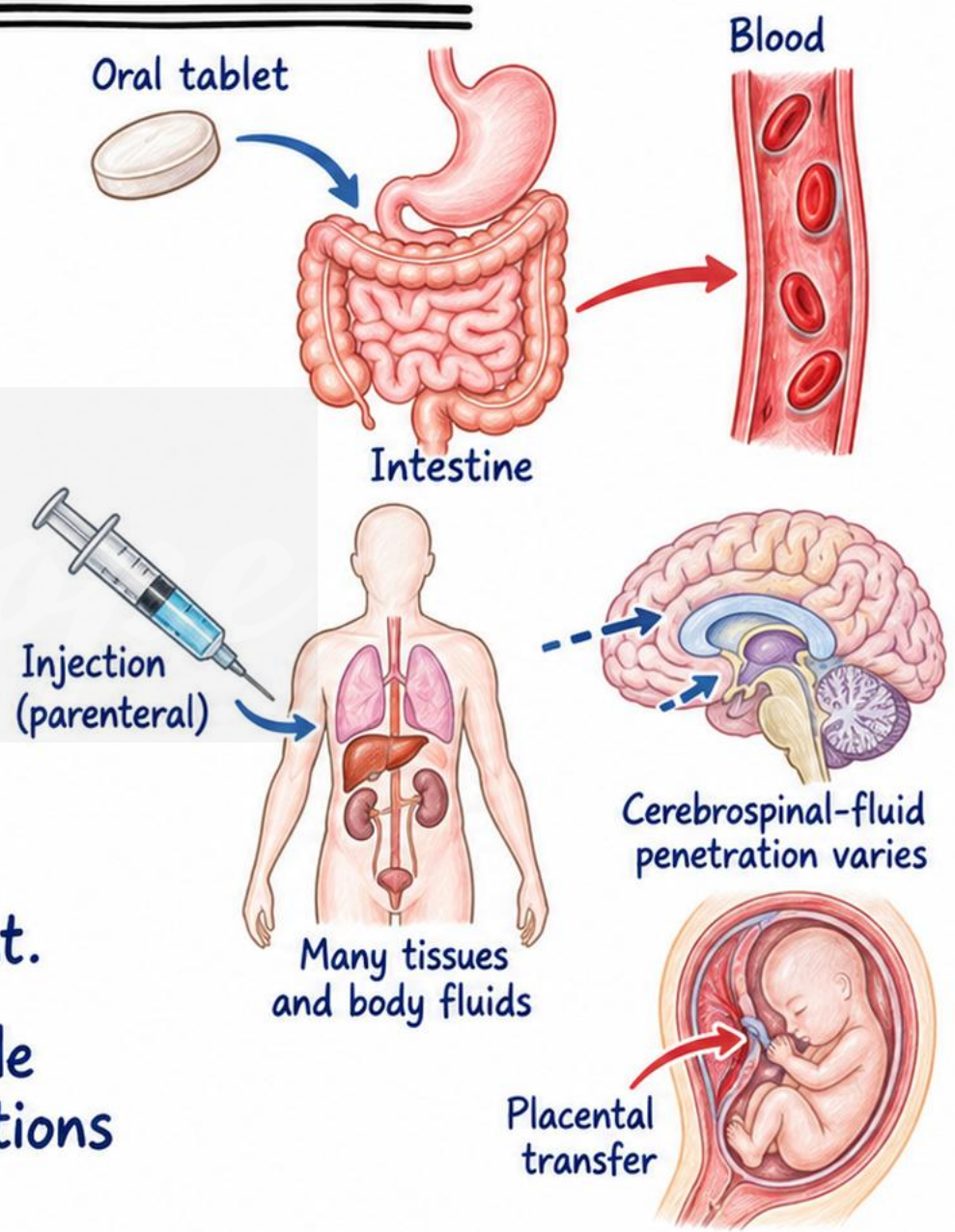


Bacterial lysis

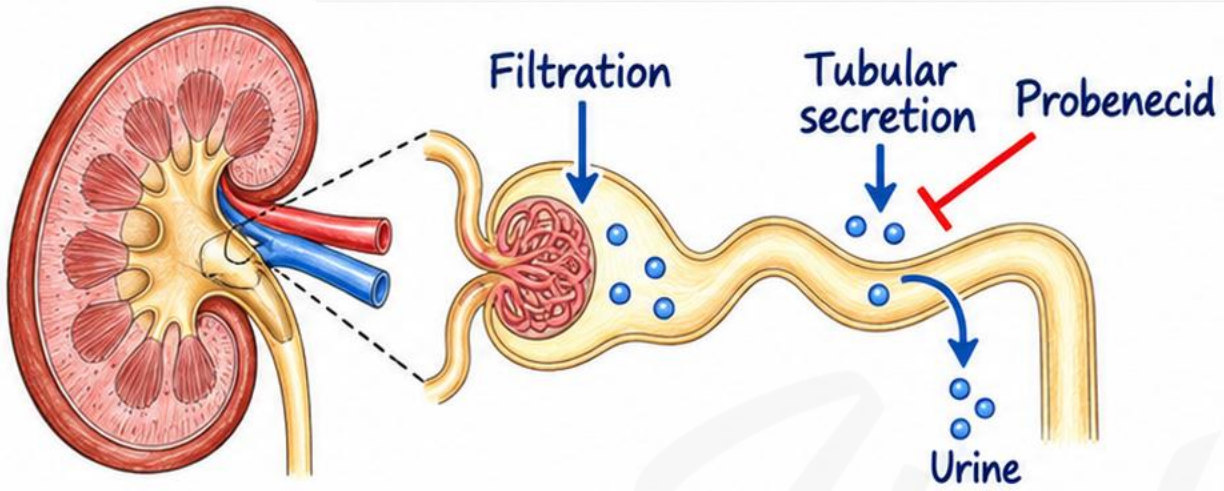
Beta-lactamase production, altered PBPs and reduced drug entry can limit activity. An inhibitor combination does not overcome every resistance mechanism.

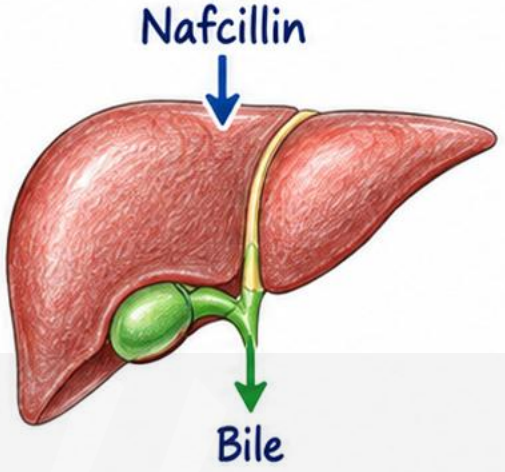
Penicillins: absorption and distribution

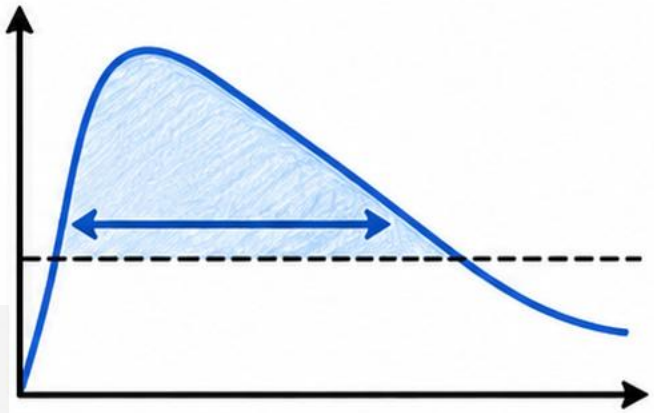
1. Penicillin G is acid-labile and is generally given parenterally; penicillin V is suitable for oral administration.
2. Amoxicillin is well absorbed orally. Food and formulation affect absorption of some agents, including ampicillin.
3. Penicillins distribute into many tissues and body fluids, but cerebrospinal-fluid penetration varies and often improves with inflamed meninges.
4. Placental transfer occurs; treatment selection still requires an indication-specific pregnancy assessment.
5. Salt, formulation and route are important. Injectable aqueous, procaine and benzathine penicillin preparations must not be treated as interchangeable products.



Penicillins: clearance and exposure







- Most penicillins undergo limited metabolism and leave the body through renal filtration and tubular secretion.
- Kidney impairment can prolong exposure and requires drug-specific dose or interval assessment. Nafcillin has predominantly nonrenal clearance; oxacillin has mixed elimination.
- Probenecid inhibits tubular secretion and can increase penicillin concentrations. Reduced methotrexate clearance can increase methotrexate toxicity.
- Time above MIC helps explain the importance of maintaining adequate exposure.
- Dose, interval and infusion strategy depend on the infection, pathogen, formulation and kidney function rather than one universal class regimen.

First Hope

FREE PREVIEW

Click here to visit our website

PHARMACY PREMIUM NOTES

Complete subject and semesters are available on FirstHope app only.

Scan or click here

Click here to get the app >

Available on Google Play

JOIN THE FIRSTHOPE COMMUNITY

Join our Telegram channel

Click here to join Telegram >

Scan or click here

@FirstHopeNotes

Instagram

@firsthope.official

Click here to follow >

YouTube channel

FirstHope-Pharmacy / Live streams

Click here to watch >

WhatsApp channel

Follow FirstHope on WhatsApp

Click here to join >

FirstHope website

firsthope.co.in

Click here to visit >

B.Pharm / D.Pharm / M.Pharm / Pharm.D

Preview notes. Complete subjects and semesters in the FirstHope app.