

The Antibiotics that have β lactam Ring are:

- Penicillins
- cephalosporins
- Monobactams
- Carbapenems

source Penicillin Notatum of *Corynebacterium*:

PENCILLIN:

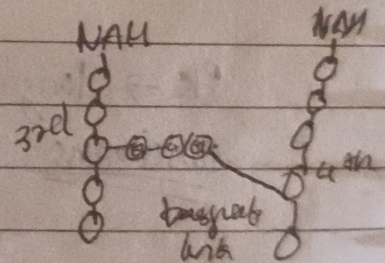
Bac. cell wall synthesis Inhibitor
cell wall consist of peptidoglycans

N-Acetyl Glucosamine And
N-Acetyl Glucosamine

- Pentapeptide chain - Cross linking.

Rigidity of stability to cell wall (3rd lysine is linked to 4th D-Alanine)

transpeptidase subunit



- Penicillin Inhibit Transpeptidase

Inhibit cell wall synthesis

Defective cell wall - fluid enter cell

cell Burst - Die

The susceptible bacteria divide in the presence of β lactam

Antibiotics - cell wall deficient forms are produced. Because the env. of the Bac is hypotonic $\rightarrow$ swell & burst $\rightarrow$ lysis occurs. This is how β lactam Antibiotics exert bactericidal effect.

Why not toxic to human:

cause peptidoglycan layer is unique to bacteria.

MRSA is highly susceptible to PGBs due thick peptidoglycan layer.

Natural Penicillins

↓
And resistant penicillins

- Phenoxy methyl Pn
- Phenoxy ethyl Pn

Oxacillin

Methicillin

Amidopenicillins

Ampicillin

• Bacampicillin

• Pivampicillin

• Amoxicillin

Carboxypenicillins

• Carbenicillin

• Ticarcillin

• Azlocillin

PENCILLIN G

is a NARROW spectrum Antibiotics

Gram +ve cocci - Pneumococci, streptococci

Gram +ve bacilli - B. Anthrax, C. diphtheriae, Listeria

Gram +ve Anaerobes - Clostridium

Gram -ve cocci - Gonococci, Meningococci, spirochetes, Actinomyces

Note
VIR

GN Bacilli Resistance to PnG - Mycobacterium Tuberculosis, Pseudomonas, Rickettsia

Bar
1) Resistance:

Penicillinase: narrow spectrum bacteria which open beta lactam ring.
inactivate PnG.

Eg: Staphylococci, Neisseria, gonorrhoea, Haemophilus

- 2) Altered Penicillin binding Protein (PBP)
eg.: MRSA (Methicillin Resistant Staph Aureus)
with low affinity for β lactams ('drug PBP')
- They Acquire Penicillin plasmid by conjugation, transduction.

- 3) Diffused permeability via "porin" channel
→ GNB ^{have "porin"} located in outer membrane,
→ permeability of various β lactam Antibiotics diffuses through this channel.
- Ampicillin & other cross porins better than "PnG"

PHARMACOKINETICS:

- Acid labile
- distributed extracellularly
- $t_{1/2} = 30 \text{ min}$
- neonates long life
- Tubular secretion of PnG can be blocked by probenecid.

ADR:

- Local Irritation & direct toxicity.
(Toxicity of Brain can be manifested as mental confusion, muscular twitching, convulsion, etc.)
- Hypersensitivity - edema, serum sickness, wheezing
fatal Anaphylaxis

Uses:

- Streptococcal infections: scarlet fever, Rheumatic fever, pharyngitis, etc.

Pneumococcal infections - pneumonia, meningitis

meningococcal infections

Gonorrhoea

Syphilis → DOC

Leptospirosis : PnG 1.5 MU injected iv 6 hourly for 7 days

Tetanus & Gas gangrene

Bac endocarditis