Antibiotics

ATB according to chemical structure

Antibiotics

- β-lactams
  - penams
  - cephems
  - monobactams
  - carbapenems
- amphenikols
- tetracyklines
- aminoglykosides
- makrolides
  - azalids
  - ketolids
- streptogramins
- oxazolidinones
- lincosamines
- glycopeptides

Chemoterapeutics

- sulphonamides
- pyrimidines
- chinolons
- (nitro)imidazoles
- nitrofuranes
- others

Specifics of ATB therapy

§ Selective toxicity

§ ATB spectrum

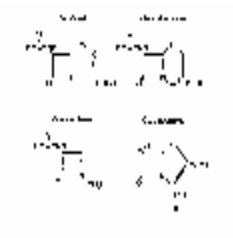
§ MIC, MBC, MAC

§ Postantibiotic effect

§ Resistance

BETA-LACTAMS

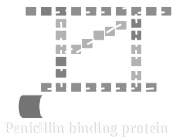
I. **PENICILLINES (Penams)**
II. **CEPHALOSPORINES + CEPHAMYCINES (Cephems)**
III. **MONOBACTAMS**
IV. **CARBAPENEMS**
V. **COMBINATIONS WITH b-LACTAMASE INHIBITORS**



BETA-LACTAMS

MoA:

- administration



AE:

Penicillines

- from *Penicillium chrysogeum*

- Basic structure: 6-aminopenicillanic acid
- semisyntetic – substitution in R position

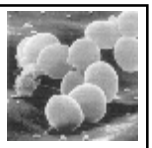
Classes: basic
beta-lactamase resistant (against Staphylococcus)
wide-spectrum

Basic penicillines

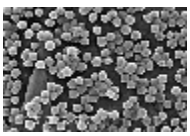
- **PNC G** =
- **PNC V =**
- **penamecillin** (acetoxymetylester PNC G)
  - acidostable
- depot preparations:

- Respiratory infections and others caused by G+ and G- cocci:
  - streptococci, pneumococci, gonococci, meningococci, aktinomykosis, anaerobic infections (gangrena emhysematosa), lues, borreliosis, gonnorrhoea…

Beta-lactamase resistant



- Beta-lactamase = penicillinase
- Infections by *S. aureus*



Wide-spectrum penicillines

- Aminopenicillines
- Carboxypenicillines
- Ureidopenicillines

- extended spectrum against G– (enterobac.) → *E.coli, Salmonela spp., Shigella spp., pseudomonády, Haemophilus spp., Enterococcus spp., Proteus*

PNC combined with beta-lactamase inhibitors

c.a. + amoxicillin(Augmentin)
+ tikarcillin
s. + ampicillin (Unasyn)
+ cephoperazon
t. + piperacillin

- § extended spectrum against G– (sulbakta
  - § *E. coli*, *Proteus*, *Salmonella*, *Haemophilus, ... catarrhalis, Klebsiella, Neisseria, Enterobacter, Bactoroides*
- § 1st choice in otitis media and sinusitis

CEPHALOSPORINES

- Derived from 7-aminocephalosporanic acid
- Better resistance against beta-lactamase
- **classification: 1. – 4. generation**

AE:

I. generation

- *G+ cocci* (*stafylococci, streptococci), E.coli, Proteus, Klebsiela, Neisserie*
- *G- mostly resistant*

Use:

- infections S. aureus, prophylaxis in surgery

II. generation

- *G+ and G-*
  - *H. influ, enterobakterie, Neisseria, Proteus, E. coli, Klebsiella, M. catarrhalis, anaerobs* and *B. fragilis*.
- Less effective against S. aureus than I. generation

III. and IV. generation

III:

enterobacteria, partially *pseudomonades*

- more stable, higher activity (best against G-)
- penetration into CNS

IV:

- The widest spectrum
- *G+ and G- bacteria (not anaerobes)*
- high stability, longer half-life

MONOBACTAMS

Narrow antibacterial spectrum

- aerobic G- bacilli
  - *H. influenzae, E. coli, Klebsiella, Proteus, Pseudomonas aerug.*
  - antipseudomonase activity ↑ than ureidoPNC

I: sepsis, infections in abdominal cavity

CARBAPENEMS

http://www.youtube.com/watch?v=Zy6XOwY3iJQ&feature=related

ATB except b-lactames

1) **Amphenicols**
2) **Tetracyklines**
3) **Macrolides**
4) **Lincosamines**
5) **Aminoglycosides**
6) **Glycopeptides**

1) AMPHENICOLS

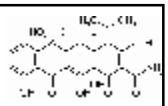
MoA:

- Wide-spectrum including anaerobes
  - Perfect tissue penetration, plasma leves after p.o and i.v. are identical
  - mtb. by glucuronidation in liver
  - important **AE**

I: bacteral meningitis, typhus and paratyphus, severe pneumonias, anaerobic, mixed, abdominal or sever hemophillus infections

It is not 1st choice in any indication!

2) TETRACYCLINES



MoA:

I: infections of airways and urinary tract, mycoplasma infections, chlamydia infections, borelliosis, leptospirosis, acne (minocyclin), gonorrhea, syphilis

- good penetration into tissues (placenta!!!, HEB 10%)
  - absorption is significantly reduced by antacides, milk and food rich with Ca^{2+}, Mg^{2+}, Al^{3+} -) **CHELÁTY!!!**

AE:

2) TETRACYCLINES

- Basic
- Modified
  - Glycylcyclines
- New (II.generation)

3) MACROLIDES

MoA:

- bacteriostatic
- **Wide spectrum**
  - G+ G- bakteria (mycoplasma, chlamydia, spirocheta (Borelia burgdorferi), neisseria, leptospira, campylobacter, legionella, Toxoplasma gondii, Helicobacter pylori
- increase in **resistance** in last years (4-46%)
  - **Streptococcus pyogenes (15 %) !!!,** Streptococcus pneumoniae, Staphylococcus aureus
- **AE:**

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3) MACROLIDES

- better tolerance, higher activity, lower toxicity
- better pharmacokinetics (interval of administration 12, resp. 24 h)

ATB related to macrolides

Azalids

Streptogramines

Ketolids

Oxazolidindiones

4) LINCOSAMINES

MoA:

Spectrum:

- G+ bakteria, anaerobes
  - S. aureus, Str. pyogenes, pneumoniae

I: alternative therapy in patient not tolerating β-lactams

AE:

4) LINCOSAMINES

AE: GIT problems, allergies, hematotox.

interactions: macrolides, chloramphenicol

I: anaerobic and staphylococcus infections
- osteomyelitis
- infections in pelvic and abdominal area
- bacterial vaginal infections
- endokarditis prophylaxis
- acne

5) AMINOGLYCOSIDES

MoA:

- rapid bactericidal effects against almost all G-
  - No effects on anaerobes, limited against streptococci
- parenteral application
- **postantibiotic effect** –1x day

I:

AE:

5) AMINOGLYCOSIDES

- **classic**
- **modern**

6) GLYCOPEPTIDES

MoA:

- bactericidal
- G+ flora – **stafylococci, streptococci, enterococci**

I: back-up ATB for severe and resistant G+ infections, locally (p.o.) intestine infections therapy

AE:

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Other ATBs

Rifampicin

Fusidic acid

Polymyxin B, kolistin (polymyxin E; natrium kolistimethate)

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