Learning unit: Antimicrobial drugs

Impact of the learning unit

This learning unit aims to teach students to characterize and distinguish the basic classes of antibacterial drugs and basic principles of antimicrobial chemotherapy. Knowledge of the mechanisms of action of individual representatives, their adverse effects, antimicrobial spectrum and specifics of rational use of antimicrobial agents is within the competence of each practitioner. It is the basic knowledge of every student of medicine.

Important terms

spectrum of antibacterial activity (bacterial susceptibility)
resistance to antibacterial drugs
post-antibiotic effect
minimum inhibitory concentration (MIC)
minimum bactericidal concentration (MBC)
minimum antibacterial concentration (MAC)
time-dependent antimicrobial effect
concentration dependent antimicrobial effect
beta-lactams
- peni**cillin**s
  - benzylpeni**cillin**
  - phenoxymethylpeni**cillin**
  - oxa**cillin**
  - aminopenicillins
    - ampi**cillin**/ampicillin-sulbactam (sultamicillin)
    - amoxi**cillin**/co-amoxicillin (co-amoxiclav)
  - pipera**cillin**/piperacillin-ticarcillin

- cephalosporins
  - first-generation cephalosporins
    - **cefa**zolin
    - **cefa**droxil
  - second-generation cephalosporins
    - **cefu**roxime
  - third-generation cephalosporins
    - **cef**otaxime
    - **cef**tazidime
    - **cef**triaxone
    - **cef**ixime
    - **cef**operazone/cefoperazone-sulbactam (sulperazone)
    - **cef**tazidime/ceftazidime-avibactam

- fourth-generation cephalosporins
  - **cefe**pime
- fifth-generation cephalosporins
  - **ceft**aroline
  - **ceft**olozane-tazobactam
- carba**penem**s
  - mero**penem**
  - imi**penem**-cilastatin
  - erta**penem**
- monobactams
  - aztreonam

- glycopeptides
  - vancomycin
  - teicoplanin
- lipoglycopeptides
  - dalbavancin
- polymyxins
  - polymyxin B
  - colistimethate
- tetra**cycline**s
  - doxy**cycline**
  - tige**cycline**
- aminoglycosides
  - gentamicin
  - amikacin
  - kanamycin
  - tobramycin
  - neomycin
- macrolides
  - clarithromycin
  - spiramycin
  - azithromycin
  - erythromycin
- oxazolidinones
  - linezolid
- lincosamides
  - clindamycin
- amphenicols
  - chloramphenicol
- quinolones
  - ciprо**floxacin**
  - o**floxacin** / levofloxacin
  - nor**floxacin**
  - prulifloxacin

moxi**floxacin**

sulfonamides

sulfadiazine

sulfathiazole

sulfamethoxazole / co-trimoxazole

trimethoprim

nitroimidazoles

metronidazole

nitrofurans

nitrofurantoin

nifuratel

nifuroxazide

ansamycins

rifampicin

rifaximin

fosfomycin

local antibiotics

neomycin + bacitracin

fusidic acid

mupirocin

systemic antibiotics used topically (clindamycin, tetracycline, erythromycin, azithromycin, chloramphenicol, kanamycin, tobramycin, ofloxacin, sulfacetamide, metronidazole)

antituberculotics

isoniazid

rifampicin

rifabutin

ethambutol

pyrazinamide

capreomycin

cycloserine

(streptomycin)

Learning outcomes

Student knows the basic pharmacological profile (mechanism of action, side effects, indications and contraindications) of individual classes of antibacterial drugs.

Student knows the basic pharmacological profile (mechanism of action, side effects, indications and contraindications) of antituberculotics.

Student knows basic principles of rational antimicrobial therapy.

The student knows important interactions of antibiotics with other drugs.

The student describes and explains the mechanisms of resistance of important microbial organisms to antibacterial drugs.

Study literature

Rang & Dale's Pharmacology E - Book, Humphrey Rang 8th edition, 2016, chapter 50 and 51 (pages 615 – 641).

Study materials to subjects aVLFA0822c and aVLFA0822p.

Exam questions

Special pharmacology: 42. Aminoglycosides; 43. Principles of antibacterial therapy – overview, modes of action, resistance, MIC, MBC; 44. Lincosamides, glycopeptides, polymyxins; 45. Tetracyclines + related ATBs, amphenicoles; 46. Cephalosporines, monobactams; 47. Penicillins, carbapenems; 48. Sulphonamides, nitrofurans and nitroimidazoles; 49. Macrolides and related ATBs; 50. Quinolones, antituberculotics

"Essential" drugs: 94. doxycycline, 95. co-amoxicilin, 96. phenoxymethylpenicilin, 97. piperacilin, 98. meropenem, 99. cefuroxim, 100. cotrimoxazol, 101. clarithromycin, 102. azithromycin, 103. gentamicin, 104. ciprofloxacin, 105. vankomycin, 106. rifampicin