

PHARMACOKINETIC AND PHARMACODYNAMIC PRINCIPLES FOR THE RATIONAL USE OF ANTIBIOTICS

A. Actuality

At present, when the number of patients with serious infectious pathologies increases and multidrug resistant microbial strains occur, the problem of effective and correct antibiotic therapy is very relevant. Knowledge of their pharmacokinetics and pharmacodynamics will allow their rational selection, association with other preparations and setting of optimal dosing regimen in the treatment of infectious diseases.

B. Training aim

Acquiring clinical and pharmacological principles to justify the prescription, use, dosing regimen of drug preparations in the given antibiotics groups, and to assess their efficacy and harmlessness.

C. Teaching objectives

The student should be able to:

- a) choose a minimal complex of investigative methods, in order to assess the pharmacodynamic effect of the chosen drug;
- b) analyze and assess the results of pharmacodynamic study of antibiotics obtained by laboratory and instrumental methods;
- c) predict the possible complications and adverse reactions of antibiotic drugs;
- d) predict the dependence of the adverse reactions on the dosage regimen and the functional state of the organs and body systems.

D. Knowledge from previously studied disciplines and related subjects

Histology, morphopathology, pathophysiology and microbiology

Cell structure of pathogens. Classification of pathogenic germs. Pathogenesis of septic states.

Clinical disciplines. Etiology, pathogenesis of the main nosological forms of infectious pathologies. Functional and laboratory tests applied in pulmonology, septic surgery, urology, etc. Clinical manifestations of infectious diseases.

Pharmacology. Classification of antibiotics by chemical structure, mechanism of action. Characterization of antibiotic groups by action spectrum, generations. Adverse reactions of antibiotics.

Questions for self-training

I. Clinical and pharmacological characteristics of antimicrobial, antiviral, antifungal and antiprotozoal drugs

1. Classification of antibiotics according to spectrum and mechanism of action, antibacterial effect.
2. Clinical pharmacology of penicillins: classification, spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
3. Cephalosporins: classification according to generations and mode of administration, spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
4. Carbapenems: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
5. Monobactams: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
6. Aminoglycosides: classification, spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
7. Tetracyclines: classification, spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.

8. Amphenicols: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
9. Macrolides: classification, spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
10. Lincosamides: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
11. Rifampicins: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
12. Glycopeptides: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
13. Polypeptides: spectrum and mechanism of actions, peculiarities, indications and principles of selection, typical side effects and their prophylaxis, pharmacokinetics.
14. Indications and principles of antibiotics association (according to mechanism, spectrum of actions, and side effects).
15. Bacterial resistance to antibiotics (forms, development mechanisms, causes, ways of fighting).
16. Pharmacokinetic and pharmacodynamic peculiarities of antibiotics in children. Dosing principles. Side effects of antibiotics in children. Peculiarities of antibiotic administration during pregnancy and lactation period.

II. Clinical and pharmacological selection and use of drugs in some pathological conditions and diseases:

Principles of antibiotic selection and use in staphylococcal infections.

Principles of antibiotic selection and use in infections with gram-negative bacteria.

Principles of antibiotic selection and use in anaerobic infections.

Principles of antibiotic selection and use in difficult Clostridium infections

Principles of antibiotic selection and use in infections with atypical agents.

Principles of rational use of antibiotics (empirical and targeted selection).

F. Individual work

1. Brief characterization of main drugs

vertically – **International Nonproprietary Name (INN) of drug,**

horizontally – **synonyms, forms of delivery, mode of administration, (therapeutic, maximal) doses, mechanisms of action, indications, contraindications, side effects:**

doxycycline, vancomycin, azithromycin, meropenem, ceftobiprole.

2. Exercises on medical prescription (see methodological instructions for practical works on pharmacology for the 3rd year):

sodium benzylpenicillin, benzatinbenzylpenicillin, Bicillin-5, phenoxymethylpenicillin, ampicillin, amoxicillin, augmentin, imipenem, aztreonam, carbenicillin, carfecillin, cefuroxim, cefixim, ceftriaxon, cefalexine, cefotimycin, rifomycomycin, lincomycin, clindamycin, chloramphenicol.

3. Indicate the drugs used in (for):

pneumonias caused by benzilpenicillin-resistant staphylococci; methicillin-resistant staphylococcal infections; follicular angina; acute pyelonephritis; antibacterial treatment in gastric and duodenal ulcers; nosocomial infections caused by Bac. fragilis; nosocomial infections caused by piocyanic bacillus (Rs.aeruginosa); oral cavity infections; infections of the skin and soft tissues; bone infections; urinary tract infections; infections caused by chlamydias, mycoplasmas; meningitis caused by H. influenzae; pseudomembranous colitis; bacterial dysentery; tetanus; cholera; typhus abdominal; exanthematous typhus; prophylaxis of anaerobic infections in surgical interventions; intestinal infections; topical treatment of wounds, burns, trophic ulcers.

4. Tests on Clinical Pharmacology (for faculty of medicine), Chisinau-2004, page 103.

5. Clinical cases in Clinical Pharmacology (Clinical Cases Guide), Chisinau-2017, page 141.

6. Virtual situations.

7. Personal Drug (P-Drug) Selection and P-Treatment (Personal Treatment) according to the criteria of effectacy, safety, acceptability and cost for inclusion in the personal form (P drugs).