



**Катедра по Фармакология,
токсикология и фармакотерапия**

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**STATE EXAMINATION TOPICS IN PHARMACOLOGY AND TOXICOLOGY
FOR PHARMACY STUDENTS ACADEMIC YEAR 2024/2025**

Part I. Pharmacology

1. Pharmacodynamics – types of receptors, receptor agonists and antagonists. Physiological targets for drug action - receptors, ion channels, enzymes, transport molecules.
2. Pharmacokinetics: routes of introduction, transmembrane transport, absorption, distribution and elimination of drugs.
3. Drug metabolism. Phases of metabolism – examples. Enzyme inducers and enzyme inhibitors of drug metabolism.
4. Genetic polymorphism of drug-metabolizing enzyme systems in cytochrome P-450.
5. Pharmacokinetic parameters: bioavailability, bioequivalence, volume of distribution, equilibrium plasma concentration of drugs, elimination clearance of drugs.
6. Factors influencing the action and kinetics of drugs: childhood, old age, pregnancy and lactation.
7. Combined administration of drugs and drug interactions – levels, mechanisms and examples.
8. Pharmacotherapeutic considerations in patients with renal and hepatic insufficiency.
9. Phases in preclinical and clinical testing of new drugs. Biomarkers and clinical-laboratory indicators for evaluating the drug effect.
10. Mediator systems in the CNS. Anxiolytics – classification, pharmacological characteristics, adverse drug reactions, therapeutic application.
11. Antipsychotic drugs – classification, pharmacological characteristics, adverse drug reactions, therapeutic application.
12. Antidepressants – classification, pharmacological characteristics, side effects, therapeutic application.

13. Psychostimulants and nootropic drugs – classification, pharmacological characteristics, adverse drug reactions, therapeutic application.
14. Antiepileptic drugs – classification, pharmacological characteristics, adverse drug reactions, therapeutic application.
15. Antiparkinsonian drugs – classification, pharmacological characteristics, adverse drug reactions, therapeutic application.
16. Sleeping pills and sedatives – classification, pharmacological characteristics, adverse drug reactions, therapeutic application.
17. Opioid analgesics – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
18. Non-opioid analgesics – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
19. Autocoids - definition, classification. Antihistamines – classification, pharmacological characteristics, adverse drug reactions, therapeutic application.
20. Inflammation and the arachidonic acid cycle possibilities for pharmacological influence: non-steroidal anti-inflammatory drugs – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
21. Cardiac glycosides – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
22. Peripheral vasodilators – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
23. Anti-anginal drugs – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
24. Antiarrhythmic drugs: classification, pharmacological characteristics, side effects and therapeutic application.
25. Antihypertensive drugs: classification, pharmacological effects, mechanism of action, adverse drug effects, application.
26. Drug treatment of arterial hypertension - rules and strategies for optimal control of arterial pressure, according to age, gender, physiological state, liver failure, kidney failure, combined treatment.
27. Diuretics – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
28. Antidyslipidemic drugs: classification, pharmacological characteristics, adverse drug reactions and therapeutic application.

29. Antiasthmatic drugs – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
30. Antitussive drugs and expectorants – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
31. Antiulcer agents - classification, pharmacological characteristics, adverse drug reactions, therapeutic application.
32. Agents acting on the digestive system: antiemetics, appetite suppressants and appetite stimulants – classification, pharmacological characteristics, adverse drug reactions, therapeutic application.
33. Chologogic, choloretic and hepatoprotective agents – classification, pharmacological characteristics, adverse drug reactions, therapeutic application.
34. Endocrine pancreas and drugs affecting carbohydrate metabolism: insulin-containing drugs – classification, pharmacological characteristics, adverse drug reactions, therapeutic application.
35. Drugs affecting carbohydrate metabolism: oral antidiabetic drugs – classification, pharmacological characteristics, adverse drug reactions, therapeutic application.
36. Hematopoietic system, anti-anemic drugs and drugs affecting erythropoiesis – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
37. Phases of blood coagulation and possibilities for pharmacological influence. Hemostatic agents – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
38. Antithrombotic agents: anticoagulants, fibrinolytics and platelet antiagregants – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
39. Mineral- and glucocorticosteroids – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
40. Medicines containing androgens, antiandrogens and anabolic agents – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
41. Medicines containing estrogens, anti-estrogens, hormonal contraceptives – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
42. Principles for the rational choice of antibiotic pharmacotherapy.
43. Beta lactam antibiotics – classification, antibacterial spectrum, pharmacokinetic features, side effects and therapeutic application.
44. Aminoglycoside and glycopeptide antibiotics – classification, antibacterial spectrum, pharmacokinetic features, adverse drug reactions, therapeutic application.
45. Tetracyclines, macrolides, lincosamides and amphenicols – classification, antibacterial spectrum, mechanism of action, pharmacokinetic features, adverse drug reactions, therapeutic application.

46. Quinolones and sulfonamides – classification, antibacterial spectrum, mechanism of action, pharmacokinetic features, adverse drug reactions, therapeutic application.
47. Antiviral drugs and immunomodulators – classification, pharmacological characteristics, adverse drug reactions, therapeutic application.
48. Antitumor drugs: classification, mechanism of action, adverse drug reactions and opportunities for chemoprotection and stimulation of leukopoiesis.
49. Medicines used in ophthalmology – classification, pharmacological characteristics, adverse drug reactions and therapeutic application.
50. Medicines used in dermatology – classification, pharmacological characteristics, side effects and therapeutic application.
51. Medicines used in otorhinolaryngology – classification, pharmacological characteristics, side effects and therapeutic application.

Part II. Toxicology

1. Basic concepts and processes - xenobiotics, toxins, poison, poisoning, acute and chronic poisoning, delayed toxicity. Classifications of the toxic substances.
2. Toxicity. Criteria for toxicity. Methods for evaluation of the toxic effects of chemical substances. Quantitative characteristics (LD50, ED50, TD50, TI).
3. The relation between the chemical and physical properties of substances, and their toxicity.
4. Factors, influencing the toxicity of the xenobiotics during the phases of absorption, distribution, metabolism, and excretion.
5. Absorption of xenobiotics in the organism - „gates of entrance” and absorption. Specifics related to the entrance route. The fate of the xenobiotics in the human body.
6. Distribution, biotransformation, and excretion of xenobiotics. Possibilities for pharmacological influence on the toxicity.
7. Mechanisms of the toxic action of xenobiotics – direct cytotoxicity and free-radical processes. Examples. Antioxidants.
8. Mechanisms of the toxic action of xenobiotics - sulfhydryl (-SH) groups, and specific receptor proteins. Enhancing the toxic effect. Cyanide intoxications - routes of entry, mechanism, manifestations and treatment.
9. Delayed toxicity – immunotoxicity, immunosuppression, and immune-mediated hypersensitivity. Xenobiotics and allergens.
10. Mutagenesis, and genotoxicity – mechanisms, effects, examples of toxicants.
11. Carcinogenesis – main processes and stages. Examples of carcinogenic toxicants.


12. Natural (physiological) antitoxic defense – components, types, and mechanisms.
13. Basic principles and approaches for treatment of acute and chronic poisonings. Basic detoxification methods – general and specific. Drugs, used for treatment of poisonings – solutions for infusion, organ-protective medications, symptomatic agents.
14. Drugs, used for treatment of poisonings - antidotes. Types, mechanism of action, examples.
15. Organ toxicity – liver toxicity, mechanisms of liver injury. Examples – drugs, chemicals, toxins of biological origin.
16. Intoxication with *Amanita phalloides* - manifestations and treatment. Toxicity of paracetamol - mechanism, manifestations and treatment.
17. Organ toxicity – neuronal toxicity. Types, mechanisms, examples. Drug poisonings - benzodiazepines, antipsychotics, opioid analgesics. General characteristics and principles of treatment.
18. Organ toxicity - poisons with primary cardiovascular toxicity. Types, mechanisms, examples of toxicants. ADR and toxicity of adrenomimetics, cardiac glycosides, beta blockers, Ca²⁺ channel blockers. Principles of treatment of intoxications.
19. Organ toxicity – poisons with primary gastrointestinal toxicity. Types, mechanisms, examples of toxicants. Drug poisonings - NSAIDs, salicylates, iron salts, etc. Manifestations, treatment and prevention.
20. Organ toxicity - hematological toxicity - xenobiotics, affecting the blood. Homeostasis disruption and safety profile of anticoagulants. Xenobiotics with hematopoietic inhibitory effect.
21. Organ toxicity - pulmonary toxicity. Mechanisms of pulmonary toxicity, examples. Poisonings with carbon monoxide, chlorine, nitric and sulfuric gases.
22. Organ toxicity - nephrotoxicity - types of kidney damage and nephrotoxic substances (metals, drugs).
23. Intoxications with opiates, psychostimulants and hallucinogens. Manifestations and treatment.
24. Intoxications with ethyl alcohol, methyl alcohol and ethylene glycol. Manifestations, treatment and prevention.
25. Teratogenesis – mechanisms, factors, examples. Pregnancy risk drug category (PRC) – definitions and examples.
26. Toxo-allergic/anaphylactic shock. Causes, physical signs and treatment. Intoxications caused by reptiles and insects – local and general manifestations.


Main literature sources:

1. Pharmacology and Drug Toxicology, Volume I and Volume II, ed. R. Nikolov and S. Surcheva. Arbilis 2022; 1219 p.

2. Pharmacotherapy, ed. S. Konstantinov, G. Momekov, Softtrade, 2019, 908 p.
3. Pharmacology for assistant pharmacists, nurses and midwives. Ed.: L. Peychev. I. Kostadinova, Ed. Exact 93 Ltd., 2019; 298 p.
4. Drug interactions. Ts. Karaivanova, L. Peychev, S. Georgiev. TEA Design Ltd., 2018, 460 p.
5. Pharmacology and toxicology. Ed.: N. Boyadzhieva. Sofia: ARSO, 2017. - 750 p.
6. Drug reference book 2016. M. Karaivanova, L. Peychev, S. Georgiev. Sofia: TEA Design OOD, 2016; 496 p.
7. Pharmacology. Ed.: M. Karaivanova. Sofia: Softtrade, 2016. - 504 p.
8. Propaedeutics of clinical toxicology. Ya. Iliev. ed. Laksbuk, Plovdiv, 2014. 189 p.
9. Illustrated pharmacology. N. Boyadzhieva. Sofia: ARSO, 2014. - 552 p.
10. Drug reference book. Art. Milenkov. ed. Plovdiv: Lax Book, 2014. - 1120 p.
11. Pharmacotherapy and problems of clinical pharmacy. In 2 parts. Ed.: M. Karaivanova, Sofia: Softtrade, 2014; Part 1. – 228 p.; Part 2. – 502 p.
12. Toxicology for pharmacy students (ed. V. Tsankova and A. Astrug), FF of MU- Sofia Sofia, 2014.
13. Propaedeutics of clinical toxicology. Ya. Iliev. ed. Laksbuk, Plovdiv, 1014.
14. Clinical pharmacology: for medical students. D. Terziivanov and others. - Sofia: UI "St. Kliment Ohridski", 2013. - 429 p.
15. Pharmacokinetics. A textbook for students of pharmacy. Ed.: I. Doichinova and others. – Sofia, MI "ARSO", 2012. - 178 p.
16. Narcotics. Medico-biological and social aspects. N. Danchev, M. Micheva, R. Ovcharov (ed.) ed. TEMPTO, Sofia, 2006.
17. Medicines, pregnancy and breastfeeding, N. Boyadzhieva, I. Lambrev and others. Ed. Arso, Sofia, 2006.
18. The selection and use of essential medicines: Report of the WHO Expert committee, 2013 (including the 18th WHO model list of essential medicines and the 4th WHO model list of essential medicines for children). Geneva: WHO, 2014, - 219 p. - (WHO technical report series ; 985).
19. Nanopharmaceutical carriers for targeted delivery of anticancer drugs: Recent advances and rationale for future developments. G. Momekov et al. - Plovdiv: Makros, 2013. - 95 p.
20. Basic and clinical pharmacology with toxicology. Edit.: N. Boyadjieva, Sofia: ARSO, 2012. - 372 p.

21. Clinical pharmacology. Peter N. Bennett et al. - 11th ed. - Edinburgh : Saunders & Elsevier, 2012. - 667 p.
22. Pharmacology / Ed. Michael A. Clark et al. - 5th ed. - Balingen : Lippincott Williams & Wilkins, 2012. - 612 p.
23. Principles of clinical pharmacology. Arthur J. Atkinson et al. - 3rd ed. - San Diego : Elsevier, 2012. - 626 p.
24. Clinical Pharmacy and Therapeutics. Edit.: R. Walker, C. Whittlesea, Churchill Livingstone, Elsevier 2012, 983 p.
25. The international pharmacopoeia [CD-ROM]. - 4th ed. - Geneva : WHO, 2011.
26. Goodman and Gilman pharmacological basis of therapeutics / Ed. Laurence L. Brunton et al.– 12th ed. New York: McGraw-Hill, 2011. 2084 p. + DVD.
27. Basic & Clinical Pharmacology, 13e, 2015; Bertram G. Katzung, Anthony J. Trevor.
28. Katzung & Trevor's Pharmacology: Examination & Board Review, 11e, 2015; Anthony J. Trevor, Bertram G. Katzung, Marieke Kruidering-Hall.
29. Goodman & Gilman's: The Pharmacological Basis of Therapeutics, 12e, 2011; Laurence L. Brunton, Bruce A. Chabner, Björn C. Knollmann.
30. Harrison's Manual of Medicine, 19e, 2016; Dennis L. Kasper, Anthony S. Fauci, Stephen L. Hauser, Dan L. Longo, J. Larry Jameson, Joseph Loscalzo; Chapter 5: Principles of Clinical Pharmacology; Dan M. Roden.
31. Casarett & Doull's Essentials of Toxicology, 4e, **2021** Curtis D. Klaassen, John B. Watkins III.
32. Goldfrank's Toxicologic Emergencies, 11e, **2019** Lewis S. Nelson, Mary Ann Howland, Neal A. Lewin, Silas W. Smith, Lewis R. Goldfrank, Robert S. Hoffman.
33. Basic and clinical pharmacology with toxicology / Nadka Boyadjieva, Delyan Delev, Damianka Getova, Iliya Kostadinov, Lyudmil Peychev et al.; Ed. Nadka Boyadjieva. - 3rd ed.- Sofia : ARSO, 2021.
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