

## SYLLABUS

### PHARMACOLOGY

normative

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(normative / selective discipline)

|                                                                |                                                   |
|----------------------------------------------------------------|---------------------------------------------------|
| academic and professional level                                | the second (master's) level of higher education   |
| field of knowledge                                             | 22 «Healthcare»                                   |
| Specialty                                                      | 222 «Medicine»                                    |
| academic qualification                                         | Master of Medicine                                |
| professional qualification                                     | Medical Doctor                                    |
| academic and professional program                              | «Medicine»                                        |
| mode of study                                                  | daily                                             |
| Year(s) of training and semester(s) of study of the discipline | 3 <sup>rd</sup> year of training<br>5-6 semesters |

## INFORMATION ABOUT LECTURERS WHO DELIVER THE ACADEMIC DISCIPLINE

|                                                                                          |                                                                                                                                                                          |
|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Surname, name, patronymic of the lecturer (lecturers), scientific degree, academic title | Vazhnycha Olena Mytrofanivna, Doctor of Medical Sciences, Professor<br>Kapustnik Yuri Oleksiiiovych, PhD, Associate Professor<br>Gryshko Yulia, PhD, Associate Professor |
| Profile lecturers                                                                        | <a href="https://pharmacology.pdmu.edu.ua/team">https://pharmacology.pdmu.edu.ua/team</a>                                                                                |
| Contact phone                                                                            | (0532) 56-20-59                                                                                                                                                          |
| E-mail:                                                                                  | <a href="mailto:pharmacology@pdmu.edu.ua">pharmacology@pdmu.edu.ua</a>                                                                                                   |
| Department page at the website of PSMU                                                   | <a href="https://pharmacology.pdmu.edu.ua/">https://pharmacology.pdmu.edu.ua/</a>                                                                                        |

## MAIN CHARACTERISTICS OF THE ACADEMIC DISCIPLINE

### **The scope of the academic discipline**

The number of credits / hours 7,0 / 210 of which:

Lectures (hours) 28

Seminar classes (hours.) 84

Self-directed work (hours) 98

Type of control – Exam (Semester final certification)

### **The policy of the academic discipline**

The organization of the educational process under the educational component «Pharmacology» is implemented at the Department of Pharmacology of the Poltava State Medical University in accordance with the «Regulations on the Organization of the Educational Process at the Poltava State Medical University» and other current regulatory documents <https://www.pdmu.edu.ua/n-process/department-npr/normativni-dokumenty>

Conducting the educational process under the educational component "Pharmacology" in special conditions (martial law, quarantine during a pandemic, etc) takes place with the help of distance learning technologies, in particular, lectures are conducted using the Zoom, Google Meet, Google Classroom platforms.

General requirements for higher education seekers include: attending classes (inadmissibility of absences, delays); rules of conduct in pharmacology classes (active participation in the topic, culture of behavior); rules of preparation for practical classes (writing medical prescriptions in a notebook, pharmacological characteristics of drugs according to the list of integrated licensing exam «Step 1», solving test tasks on the topic of the lesson).

### **Description of the academic discipline (summary)**

Pharmacology is a theoretical discipline, in the study of which students acquire the basic knowledge of the pharmacological groups of drugs, classifications of drugs, pharmacokinetics, pharmacological effects, mechanisms of action, indications and contraindications to the use of drugs, side effects of drugs and interactions between drugs in complex treatment regimens. The study of the discipline Pharmacology provides for the acquisition by each applicant of knowledge about medicines in general, the ability to use the acquired knowledge in the further study of other sciences of practical medicine and in the practice of a doctor. The study of pediatric Pharmacology involves the deduction of doses of drugs for children of different ages and the particular effects of pharmacological drugs on the children's body.

Due to the constant changes in the assortment of drugs on the global pharmaceutical market, new groups of drugs have been added to the program in accordance with the Anatomical, Chemical and Therapeutic Classification (ATC) of the latest revision (Anatomical Therapeutic Chemical classification system, WHO, 2016). The assimilation of theoretical material is accompanied by the acquisition of appropriate integral, general and professional competencies.

The working curriculum of the discipline consists of 2 modules, which include 8 semantic modules.

**The subject of the study** of the discipline is the theoretical foundations of pharmacodynamics, pharmacokinetics and the use of drugs for treatment and for prophylactic purposes. The study of the "organism-drug" system in interaction with the environment is the methodological basis of modern pharmacology.

### **Pre-requisites and post-requisites of the academic discipline (interdisciplinary links)**

#### **Pre-requisites.**

The study of Pharmacology is based on the knowledge gained by students in the study of Latin and medical terminology, human anatomy, medical biology, medical chemistry, biological and bioorganic chemistry, medical biology, medical and biological physics, physiology, microbiology, virology and immunology, pathomorphology, pathophysiology, propaedeutics of internal medicine, propaedeutics of pediatrics, general surgery and integrates with these disciplines.

#### **Post-requisites.**

Pharmacology lays the foundation for students to study and develop skills to apply knowledge of Pharmacology in the further study of clinical disciplines (internal medicine, surgery, pediatrics, neurology, otorhinolaryngology, ophthalmology, phthisiology, obstetrics and gynecology, psychiatry, narcology, oncology and infectious diseases, emergency and urgent medical care) and in future professional activity.

### **The aim and tasks of the academic discipline:**

the aim of study of educational discipline is acquisition by every applicant of higher education of theoretical knowledge and practical skills in relation to basic principles of rational and safe for human's health application of medicinal facilities with the aim of treatment and prevention of diseases.

the main tasks of studying the discipline are granting for applicants of higher education of theoretical knowledge concerning determination of groups of drugs, their pharmacokinetics, pharmacodynamics, manifestation of possible adverse reactions, symptoms of an overdose, measures that prevent an occurrence and contribute to the elimination of adverse reactions, main indications for destination and interaction with other drugs and acquisition of practical skills, in particular writing prescriptions on drugs in different medical forms.

### **Competences and learning outcomes in accordance with the academic and professional program, the formation of which is facilitated by the discipline (integral, general, special)**

- **integral:** ability to decide intricate tasks and problems in industry of health protection after specialty of "Medicine" in professional activity or in the process of studies that envisages realization of researches and/or realization of innovations and it is characterized by the vagueness of terms and requirements.

#### **- general:**

1. Ability to abstract thinking, analysis and synthesis, the ability to learn and master modern knowledge.
2. Ability to apply knowledge in practical situations.
3. Knowledge and understanding of the subject area and understanding of professional activity.
4. Ability to adapt and act in a new situation.
5. Ability to make informed decisions; work in a team; interpersonal skills.
6. Ability to communicate in the state language both orally and in writing; ability to communicate in a foreign language. Ability to use international Greco-Latin terms, abbreviations and clichés in professional oral and written speech.

#### **- special (professional, subject):**

1. The ability to determine the compatibility of pharmacotherapy with nutrition in the treatment of diseases.
2. Ability to determine the principles and nature of treatment of diseases.
3. Ability to diagnose emergencies.
4. Ability to determine the tactics of emergency medical care with medicinal drugs.

5. Emergency care skills based on the use of drugs.
6. Ability to carry out pharmacological support of medical and evacuation measures.
7. Ability to determine the tactics of pharmacotherapy during physiological pregnancy, physiological labor and the puerperal period, provide family planning and contraceptive counseling.
8. Ability to keep medical records relating to pharmacotherapy.

**Programmatic results of studies forming of that is assisted by discipline:**

1. To know the structure and functions of individual organs, systems and the whole body in the norm, with the development of pathological processes or diseases as well as their changes under the influence of pharmacological agents; be able to use the acquired knowledge in further training and in the practice of the doctor.

2. Taking into account the pharmacotherapy, to prescribe the necessary diet in the treatment of the disease in a health care facility, at the patient's home and at the stages of medical evacuation on the basis of an advance clinical diagnosis, using knowledge about the person, his/her organs and systems, adhering to the relevant ethical and legal norms, by making an informed decision according to existing algorithms and standard schemes.

3. To determine the nature of treatment of the disease (conservative, operative) and its principles in the conditions of the health care institution, at the patient's home and at the stages of medical evacuation, including in the field on the basis of a advance clinical diagnosis, using knowledge about the person, his/her organs and systems, adhering to the relevant ethical and legal norms, by making an informed decision according to existing algorithms and standard schemes.

4. To diagnose emergencies and establish a diagnosis by making an informed decision and assessing the human condition under any circumstances (at home, on the street, in a health care facility), including in emergency situations, in field conditions, in conditions of lack of information and limited time, using standard methods of physical examination and possible anamnesis, knowledge about a person, his/her organs and systems, adhering to the relevant ethical and legal norms.

5. To determine the tactics of pharmacotherapy during emergency medical care, under any circumstances, using knowledge about the person, his/her organs and systems, adhering to the relevant ethical and legal norms, by making an informed decision, based on the diagnosis in a limited time using standard schemes.

6. To provide emergency medical care with pharmacological agents in all circumstances, using knowledge about the person, his/her organs and systems, adhering to the relevant ethical and legal norms, by making an informed decision, based on the diagnosis of emergency in a limited time according to certain tactics, using standard schemes.

7. To organize and conduct pharmacological support of medical and evacuation measures among the population and servicemen in emergency situations, including in the field, during the detailed stages of medical evacuation.

8. To determine the tactics of rational pharmacotherapy during physiological pregnancy, physiological childbirth and the postpartum period. Consult on family planning and contraceptive selection based on anamnestic data, general examination and gynecological examination of the woman, using knowledge of the woman's reproductive organs, adhering to the relevant ethical and legal norms.

9. Maintain medical records of the patient and the population on the basis of regulations, using standard technology. Prepare reports on personal production activities, using official accounting documents in the standard form.

10. Follow the requirements of ethics, bioethics and deontology in their professional activities.

*Learning outcomes of the academic discipline:*

upon completing their study in the academic discipline, students' must

**know:**

1. The main ways of pharmacological correction of diseases, disorders of organs and systems.
2. Nomenclature and classification of drugs.
3. Pharmacological characteristics of the main drugs: group affiliation of the drug, features of pharmacokinetics, its mechanism of action, pharmacological effects (main, side), indications and contraindications to use.

4. Manifestations of possible side effects of drugs, symptoms of overdose of potent and toxic drugs, methods of their prevention and principles of treatment.

5. Rules for prescribing drugs in various dosage forms in accordance with modern legislation of Ukraine.

**be able to:**

1. Write prescriptions for drugs in different forms in accordance with modern legislation of Ukraine.

2. Determine the group belonging of drugs according to modern classifications.

3. Select the dose of a drug.

4. Determine, depending on the pharmacokinetics of drugs, the frequency of drug administration, its daily, course dose in patients of different ages in accordance with concomitant somatic pathologies and the application of other drugs.

5. Justify the adequate dosage form and routes of administration of drugs.

6. Predict the consequences of drug interactions in their combined administration.

7. Evaluate the benefit / risk of application of drugs.

8. Determine the manifestations of possible side effects of drugs, symptoms of the overdose of drastic and poisonous drugs, methods of their prevention and principles of treatment.

9. Determine the principles of pharmacotherapy of diseases by making an informed decision according to existing algorithms and standard schemes.

10. Provide a comparative description of drugs in terms of efficacy, safety, mechanism of action, indications for use, etc.

11. Create an algorithm to help patients with acute drug poisoning using antidotes in each case.

12. Determine the possibilities of using medicines in the provision of assistance in emergency conditions, conditions of martial law, lack of information and limited time.

13. Use pharmacotherapy of major emergencies.

14. Conduct analysis of pharmacological and medical information using standard approaches and computer information technology.

**Thematic plan of lectures specifying the basic issues which are considered at the lecture**

| Seq. № | Title of the topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Number of hours |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 1      | <b>General pharmacology. Pharmacokinetics. Pharmacodynamics. Side effects of drugs</b><br>History of Pharmacology. The state of modern Pharmacology. Law of Ukraine "About Medicines". General pharmacology.<br>The generalization of knowledge about the place of Pharmacology among other sciences and the contribution of domestic and foreign scientists to its development. The acquaintance with routes of administration of drugs, mechanisms of their absorption, transportation through membranes, barriers, distribution in an organism. The summarizing the differences in the transformation of drugs in the body and the mechanisms of their excretion from the body. The interpretation the relationship between the pharmacokinetics of drugs with their pharmacological effects.<br>Knowledge of the place of Pharmacology among other sciences and the contribution of domestic and foreign scientists to its development (Cherkes AI, Anichkov SV, Trinus FP, Komissarov IV). Representation of the general mechanisms of action of drugs, neurotransmitters, principles of pharmacological classification. The generalization the differences between the types of drug action, the types of drug interaction with receptors. The interpretation the relationship between the elements of the chemical structure of drugs and the types of neurotransmitters. The interpretation the relationship between the mechanisms of action of drugs with their pharmacological effects. | 2               |
| 2      | <b>Cholinergic agonists and antagonists</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2               |

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|   | Modern ideas about the structure of the sympathetic and parasympathetic divisions of the autonomic nervous system, pharmacological regulation of their functions, with pharmacokinetics, pharmacodynamics, mechanisms of action and the use of cholinomimetics and cholinoblockers. Side effects of cholinergic drugs, the state of poisoning of OPC, alkaloids poisoning and help with this. The use of cholinergic blockers in terminal conditions and therapy (in cardiology, as components of modern combined anesthesia in surgery, traumatology, anticonvulsant therapy).                                                                                                                                                                                                                                                                                       |   |
| 3 | <b>Adrenergic agonists and antagonists</b><br>Classification of drugs that affect adrenergic inhibition. Pharmacokinetics, pharmacodynamics of epinephrine hydrochloride. Indications for use. Comparative characteristics of adrenomimetics. Antiadrenergic drugs. Adrenoblocking drugs. Features of the use of $\alpha$ -adrenergic blockers<br>Features of their use in terminal conditions (shocks, including anaphylactic), collapse, bronchospasm, the threat of premature birth, hypoglycemic coma, etc).                                                                                                                                                                                                                                                                                                                                                      |   |
| 4 | <b>Pharmacology of substances that affect the CNS. Analgesics</b><br>Characteristics of pain and antinociceptive system. The concept of opiate receptors. Classification and pharmacology of narcotic analgesics. Neuroleptanalgesia. Poisoning by narcotic analgesics, help, antidotes. Addiction. Classification of non-opiate analgesics by chemical structure. General characteristics of the group. Mechanisms of action and side effects of non-opiate analgesics, ways of prevention.<br>Classifications and pharmacological characteristics of neuroleptics, tranquilizers and sedatives. Combined use. Hypnotics. The main types of insomnia. Classification of hypnotics by chemical structure and their general characteristics. Normotymics. Poisoning by neuroleptics, tranquilizers, sedatives, hypnotics and lithium salts, help with this. Addiction. | 2 |
| 5 | <b>Antiarrhythmic and inotropic drugs. Antianginal drugs</b><br>The generalization and analysis the pharmacological characteristics of the main pharmacological agents, the explanation mechanisms of action of inotropic and antiarrhythmic drugs. The interpretation the indications for their use in accordance with the knowledge of pharmacodynamics. The analysis drugs with antianginal action (nitrates, agents of myotropic action, adrenoblockers, reflexly acting drugs, calcium channel blockers, energy sources, antihypoxants).<br>Classification, mechanism of action and pharmacology of antianginal drugs, their side effects. Emergency medical care for myocardial infarction. Principles of treatment of myocardial infarction.                                                                                                                   | 2 |
| 6 | <b>Neuroleptics. Tranquilizers. Sedatives. Antidepressants, adaptogens. Analeptics.</b><br>Psychotropic drugs. Classification of psychotropic drugs. General characteristics of neuroleptics, tranquilizers, sedatives, antidepressants, adaptogens, analeptic drugs. Classification by chemical structure. General characteristics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2 |
| 7 | <b>Drugs that affect the function of the digestive system</b><br>General pharmacological characteristics of drugs used to treat diseases of the esophagus, stomach and duodenum. General characteristics of anti-emetics. Characteristics of drugs that inhibit the excretory activity of the pancreas. Indications for use. Classification of cholagogues and their general characteristics. Laxatives, their mechanism of action. Indications for use.                                                                                                                                                                                                                                                                                                                                                                                                              | 2 |
| 8 | <b>Drugs that affect hemostasis</b><br>Classification, mechanisms of action and pharmacology of drugs that affect blood clotting and fibrinolysis. Antiplatelet agents. Help with complications in their use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2 |
| 9 | <b>Hormonal drugs. Antidiabetic drugs.</b><br>General characteristics of hormonal drugs. Classification of hormonal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2 |

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|       | drugs by origin. The mechanism of action of hormonal drugs. Indications for use. Hypoglycemic drugs. Classification of hypoglycemic agents. Features of use in hyperglycemic coma. Insulin overdose, help with hypoglycemic coma. Synthetic antidiabetic drugs, their comparative characteristics, side effects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |
| 10    | <b>Anti-inflammatory and anti-allergic drugs</b><br>Classification of anti-inflammatory drugs. The main focus of the action. Pharmacology of non-steroidal anti-inflammatory drugs and comparative characteristics of drugs. Side effects of drugs and measures to prevent them. Pharmacology of steroidal anti-inflammatory drugs and comparative characteristics of drugs. Indications, contraindications to use, dosage regimen. Side effects of glucocorticoids.<br>Anti-allergic drugs. The concept of histamine receptors. Classification and general characteristics of anti-allergic drugs.                                                                                                                                                                                                                                                                         | 2  |
| 11    | <b>Antiseptics and disinfectants. Synthetic antimicrobial drugs. Antifungals</b><br>Pharmacology of antiseptic and disinfectants of inorganic nature. Classification, mechanisms of action and pharmacology of antiseptics and disinfectants, complications in their use, assistance in their overdose. Pharmacology of antiseptic and disinfectants of organic nature. Classification, mechanisms of action and pharmacology of antiseptics and disinfectants, complications in their use, assistance in their overdose.                                                                                                                                                                                                                                                                                                                                                   | 2  |
| 12    | <b>Pharmacology of beta-lactam antibiotics</b><br>The concept of antibiosis, antibiotics, the spectrum of antibiotics. History of the discovery and introduction of antibiotics in medical practice. Principles of antibiotic therapy. Classification of antibiotics by chemical structure, spectrum and mechanism of action. Penicillin group. Classification. Mechanism, spectrum and duration of action. Routes of administration. Pharmacological characteristics of penicillin drugs. Pharmacological characteristics of carbapenems. Group of cephalosporins. Classification of drugs by route of administration and generations (generations). Mechanism and spectrum of action. Indications for use. Comparative characteristics of drugs of the cephalosporin group. Measures to help with anaphylactic shock during the administration of penicillin antibiotics. | 2  |
| 13    | <b>Pharmacology of antibiotics of different groups. Principles of rational antibiotic therapy</b><br>Principles of antibiotic therapy. Classification of antibiotics by chemical structure, spectrum and mechanism of action. Pharmacological characteristics of macrolides, tetracyclines, nitrobenzenes, aminoglycosides, and glycopeptides.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2  |
| 14    | <b>Principles of treatment of acute drug poisoning. Antidotes</b><br>Basic principles of pharmacotherapy of acute drug poisoning. Types of poisons, clinical signs of poisoning, pharmacological characteristics of antidotes, pharmacological drugs for symptomatic therapy.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2  |
| Total |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 28 |

**Thematic plan of seminar classes by modules and semantic modules specifying the basic issues which are considered at the seminar class**

| Seq. №                                                               | Title of the topic                                                                                                                                                                   | Number of hours |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>PHARMACOLOGY</b>                                                  |                                                                                                                                                                                      |                 |
| <b>Semantic module I. Medical prescription. General pharmacology</b> |                                                                                                                                                                                      |                 |
| 1                                                                    | <b><i>A medical prescription and the rules for prescribing it. Rules for prescribing dosage forms.</i></b><br>Law of Ukraine "About Medicines". The concept of medical prescription, | 2               |

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|   | <p>medicinal raw materials, substance, agent, form, preparation. The structure and rules for writing prescriptions for adults and children, types of prescription forms. Pharmacy. Definition of Pharmacopoeia, types of Pharmacopoeia. The concept of the magistral and officinal medicines. Methods for prescribing dosage forms. The choice of dosage forms for specific clinical situations. Solid dosage forms. Features of prescribing in recipes and applications. Soft dosage forms. Requirements for soft dosage forms, rules for prescribing and features of use. Liquid dosage forms for external use and for oral administration. Solutions for injection. Requirements for injection solutions, rules for prescribing, route of administration. Methods of sterilization of injection solutions. Features of the application.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |
| 2 | <p><b>Rules for prescribing non-dosed dosage forms.</b><br/>Solid, soft and liquid dosage forms. Features of prescribing in prescriptions and the use of dosage forms. Requirements for these forms.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2 |
| 3 | <p><b>Control of practical skills in medical prescription</b><br/>Filling out a prescription form. Prescribing drugs in various dosage forms. The choice of dosage forms for specific clinical situations.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2 |
| 4 | <p><b>General pharmacology. Pharmacokinetics of drugs. Control of practical skills in the ability to use modern reference books on medicines.</b><br/>Definition of Pharmacology. Pharmacology in the system of medical and biological sciences. The main sections of Pharmacology: theoretical, experimental, physico-chemical, biochemical, physiological, clinical. New directions in the development of Pharmacology: pediatric, geriatric, radiation, immunopharmacology, psychopharmacology, pharmacogenetics, chronopharmacology. The role of domestic and foreign scientists in the formation and development of Pharmacology as a science (Y. Petrovsky, M.P. Kravkov, A.I. Cherkes, N.P. Skakun, O.P. Viktorov, O.V. Stefanov). Modern development of Pharmacology in Ukraine. The main achievements of domestic pharmacologists.<br/>Pharmacokinetics of drugs. Routes of administration of drugs (enteral and parenteral, their varieties). Types of absorption and their main mechanisms (active transport, passive and facilitated diffusion, filtration, pinocytosis). The concept of bioavailability and bioequivalence. The binding of drugs to plasma proteins and other bioligands. Distribution of drugs in the body. Penetration through histo-hematological barriers: placental, blood-brain and others. Accumulation of medicines.<br/>The metabolism of drugs, its types. The role of cytochrome P-450. Ways of excretion of drugs from the body.<br/>The concept of the main pharmacokinetic parameters (absorption rate constant, half-life, stationary concentration, clearance). Age-specific pharmacokinetics (in children of the first years of life and in the elderly).</p> | 2 |
| 5 | <p><b>General pharmacology. Pharmacodynamics of drugs. Principles of classification of drugs.</b><br/>Dose definition, types of doses: single, daily, course, threshold, shock, fragmented, supportive, preventive, therapeutic, secondary and higher therapeutic, toxic and lethal. The breadth of therapeutic action. The concentration of the drug in the dosage form or biological fluid. The value of the dependence "concentration (dose) - effect" in Pharmacology. Pharmacological drugs. The concept of receptors, including action on specific receptors, agonists, antagonists. Synergism, potentiation, antagonism of drugs. Types of action of drugs. Types and modes of the drugs action. Metabolism (proteins, lipids, carbohydrates, electrolytes) as an object of the influence of drugs.<br/>Factors affecting in respect of pharmacodynamics and pharmacokinetics. The dependence of the pharmacological effect on the properties of drugs (chemical</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2 |

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|                                                                               | <p>structure, physico-chemical properties, their doses and frequency of using), as well as on factors associated with a biological object (age, genotype, phenotype, gender, body weight, ethnic factor, biorhythms), climatic and anthropogenic factors (seasonality, temperature, pollution with toxic substances), pathological condition (diseases of the kidneys, liver, infections, cardiovascular pathology, metabolic and other disorders), physiological characteristics (pregnancy, childbirth, etc).</p> <p>Features of the action of drugs in their repeated using. The concept of material and functional accumulation. Tolerance or addiction (including tachyphylaxis), dependence on the action of drugs (mental, physical). The concept of withdrawal and withdrawal syndrome. Medical and social aspects of the fight against drug dependence.</p> <p>Basic principles and types of drug interactions. Characterization of physico-chemical (pharmaceutical), pharmacokinetic and pharmacodynamic interactions of drugs. The combined effect of drugs is synergism (additive, summation, potentiation), antagonism (including antidotism). Incompatibility of drugs.</p> <p>The concept of drug safety. Side effects of drugs. Types of side effects. An overdose, absolute and relative (toxic effects). Intolerance. Allergic reactions. Mutagenicity, teratogenicity, embryotoxicity, fetotoxicity, carcinogenicity. Pharmacogenetics. Genetic polymorphisms that can affect the pharmacodynamics and pharmacokinetics of drugs. Pharmacological surveillance system in the world and Ukraine. The role of the doctor in the prevention of adverse reactions of drugs. Drug Adverse Action Emergency Card.</p> |   |
| <b>Semantic module 2. Medicines that affect the peripheral nervous system</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |
| 6                                                                             | <p><b><i>Drugs that act on the transmission of excitation in cholinergic synapses. Cholinomimetics. Anticholinesterase drugs.</i></b></p> <p>Classification of agents affecting the autonomic nervous system. Medicines that affect the function of cholinergic nerves. The concept of cholinergic receptors. Classification of agents affecting the function of cholinergic nerves. Pharmacological effects arising from the excitation and inhibition of cholinergic receptors. Cholinomimetic drugs M-, N-cholinomimetic drugs (choline alfoscerate). Anticholinesterase drugs and cholinesterase reactivators. Classification of anticholinesterase drugs. The mechanism of action, pharmacological effects, indications for using, side effects. Comparative characteristics of anticholinesterase drugs (neostigmine methylsulfate, galantamine hydrobromide, pyridostigmine bromide). Features of the action of organic phosphorus compounds (OPC). Acute poisoning with OPC and relief. Pharmacology of cholinesterase reactivators (aloxim, dipiroxim). M-cholinomimetics. Pharmacological characteristics of pilocarpine hydrochloride. Effect on the organ of vision, smooth muscles of internal organs, secretion of glands, cardiovascular and genitourinary systems. Indications for use. Acute muscarin poisoning. Relief measures, antidote therapy. N-cholinomimetics (cytisine, nicotine). Mechanism of action. Pharmacological effects, indications for use, side effects. Pharmacological effects of nicotine. Smoking as a medical and social problem. Medicines that facilitate the withdrawal of smoking cessation. Side effects.</p>                                                                        | 2 |
| 7                                                                             | <p><b><i>Drugs that act on the transmission of excitation in cholinergic synapses. M-cholinergic antagonists. H-cholinergic antagonists.</i></b></p> <p>Anticholinergic drugs. M-, N-anticholinergics (trihexyphenidyl). M-anticholinergic drugs. Pharmacological characteristics of atropine sulphate. Indications for using. Acute poisoning with atropine and plants containing alkaloids with M-anticholinergic properties. Help measures. Comparative characteristics of platyphylline hydrotartrate, tiotropium bromide, pirenzepine, hyoscine butyl bromide, homatropine hydrobromide, cyclopentolate,</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2 |

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|                                                                                                                                            | <p>tropicamide, tolterodine. Indications for using. Side effects.</p> <p>N-anticholinergics (ganglionic blockers, muscle relaxants). Classification of ganglion blockers (hexamethonium bromide, hygronium). Mechanism of action. Pharmacological effects, indications for using, side effects. Classification of muscle relaxants. Pharmacokinetics, pharmacodynamics of muscle relaxants of antidepolarizing action. Indications for using, side effects. Comparative characteristics of drugs (atracurium, vecuronium bromide). Clinical symptoms of an overdose and help with an overdose of non-depolarizing (curare form) muscle relaxants. The concept of decurarization. Pharmacological properties of piminodine. Pharmacological characteristics of depolarizing (suxamethonium) muscle relaxants. Indications for use. Help in the case of its overdose. Drugs, which are used in spastic conditions of striated muscles. Central muscle relaxants (tolperisone, baclofen). Botulinum toxin type A. Mechanism of action. Pharmacological effects, indications for using, side effects.</p>                                                                                                                                                                                                                                                                                                                                                             |   |
| 8                                                                                                                                          | <p><b><i>Drugs that affect the transmission of excitation in adrenergic synapses. Adrenomimetics, sympathomimetics.</i></b></p> <p>Medicines that affect adrenergic innervation. Modern ideas about adrenergic receptors, their types and localization. Classification of agents affecting adrenergic innervation. Sympathomimetic drugs. Pharmacological characteristics of adrenomimetics. Pharmacokinetics, pharmacodynamics of epinephrine hydrochloride. Indications for use. Comparative characteristics of adrenergic agonists (norepinephrine hydrotartrate, ephedrine hydrochloride, phenylephrine, naphazoline, xylometazoline, oxymetazoline, clonidine, salbutamol, fenoterol, hexoprenaline, dobutamine). Antiadrenergic drugs. sumatriptan). General conception.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2 |
| 9                                                                                                                                          | <p><b><i>Drugs that affect the transmission of excitation in adrenergic synapses. Antiadrenergic drugs, sympathomimetics.</i></b></p> <p>Adrenergic blocking drugs. Features of the use of <math>\alpha</math>-blockers (prazosin, doxazosin, tamsulosin), mechanism of action and pharmacological effects of <math>\beta</math>-blocker agents. Comparative characteristics of propranolol, atenolol, metoprolol, bisoprolol, carvedilol. Sympatholytics (reserpine, methyldopa). The mechanism of action and indications for using, side effects. Dopamine-tropic, serotonin-tropic, histamine-tropic and GABA-ergic drugs (dopamine hydrochloride,</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |
| <p><b>Semantic module 3. Medicines that affect the function of the central nervous system.</b></p> <p><b><i>Psychotropic drugs</i></b></p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |
| 10                                                                                                                                         | <p><b><i>Medicines for local anesthesia.</i></b></p> <p>Medicines for local anesthesia. Classification by chemical structure and by use for various types of anesthesia. Requirements for drugs of a group of local anesthetics. Pharmacology of esters (procaine, benzocaine) and substituted amides (articaine, lidocaine, bupivacaine, mepivacaine). Comparative characteristics of local anesthetics and complex preparations based on them (ultracain DS). Indications for use. The purpose and possibilities of combination with adrenergic agonists. Side effects of local anesthetics, measures for their prevention and treatment. Organic and inorganic astringent medicines. The mechanism of action, indications for using. Pharmacological characteristics of tannin, bismuth subcitrate, phytopreparations containing astringent substances: St. John's wort herb, sage leaves, chamomile flowers. Complex preparations based on them. General characteristics of covering agents. The mechanism of action, indications for use (starch mucus, flax seeds). Adsorbent drugs. Classification of adsorbent agents. Mechanism of action. Indications for use. Coal preparations (activated carbon). Synthetic sorbents (enterosgel). The principles of hemo- and enterosorption. Medicines irritating endings of sensitive nerves (menthol, ammonia solution). Mechanism of action. Effects on the skin and mucous membranes. Indications for use.</p> |   |

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| 11 | <p><b>Drugs for general anesthesia</b></p> <p>General characteristics of general anesthesia. The history of the discovery of drugs for general anesthesia (D. Morton, F.I. Inozemtsev, N.I. Pirogov and others). Types of general anesthesia. Classification of drugs for general anesthesia. Requirements for drugs for general anesthesia. Theories of anesthesia. Comparative characteristics of drugs for inhalation general anesthesia (ether for narcosis, halotane, isoflurane, sevoflurane, dinitrogen oxide, xenon). Side effects. The combined use of drugs for general anesthesia with drugs of other pharmacological groups. Agents for non-inhalation general anesthesia. Classification by duration of action. Pharmacological and comparative characteristics of propofol, sodium thiopental, hexobarbital, ketamine, sodium oxybate. The concept of sedation, induction to general anesthesia, basic, and combined anesthesia.</p> <p>Pharmacology and toxicology of ethyl alcohol, use in clinical practice. Acute and chronic alcohol poisoning, relief measures. The principles of alcoholism treatment. The mechanism of action of disulfiram. The use of emetics for the treatment of alcoholism (apomorphine hydrochloride).</p>                                  |   |
| 12 | <p><b>Pharmacology of opiate (narcotic) analgesics.</b></p> <p>Analgesic medicines. General characteristics of opiate analgesics (morphine hydrochloride, codeine phosphate, trimeperidine, fentanyl, tramadol, butorphanol, buprenorphine, nalbuphine). Classification. Ways to pain relief. The concept of opiate receptors. Narcotic analgesics. Classification by chemical structure, origin and affinity for opiate receptors. Mechanism of action. Pharmacology of morphine hydrochloride. Features of the effect of the drug on the central nervous system. Comparative characteristics of drugs. Indications for the use of analgesic agents. Side effects. Acute poisoning with narcotic analgesic drugs. Clinical manifestations and measures of help. Characteristics of nalorphine hydrochloride, naloxone, naltrexone. Drug dependence on opiate analgesics, clinical manifestations, the concept of withdrawal symptoms, treatment methods. Addiction as a socio-biological problem.</p>                                                                                                                                                                                                                                                                                  | 2 |
| 13 | <p><b>Pharmacology of non-opiate (non-narcotic) analgesics and non-steroidal anti-inflammatory drugs.</b></p> <p>Non-opiate analgesics. Classification of non-opiate analgesics according to chemical structure. General characteristics of the group. Mechanisms of analgesic and antipyretic effect. Pharmacological and comparative characteristics of drugs (metamizole sodium, paracetamol, ketoprofen, dexketoprofen). Side effects of non-opiate analgesics, prevention.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |
| 14 | <p><b>Neuroleptics, tranquilizers, hypnotics and sedatives.</b></p> <p>Psychotropic drugs. Classification of psychotropic drugs.</p> <p>General characteristics of antipsychotics, classification by chemical structure. General characteristics. The mechanism of antipsychotic action of antipsychotics. Pharmacological effects of chlorpromazine, fluphenazine decanate, droperidol, haloperidol, sulpiride, clozapine, risperidone, olanzapine. Comparative characteristics, indications for using. Side effects of antipsychotics. Combined use with drugs of other pharmacological groups. The concept of neuroleptanalgesia.</p> <p>Tranquilizers. Classification of tranquilizers. The mechanism of tranquilizing effects, concepts of benzodiazepine receptors. Pharmacological and comparative characteristics of diazepam, clonazepam, phenazepam, and nitrazepam. Daytime tranquilizers (gidazepam). Indications and contraindications for the use of tranquilizers, their side effects. Drug addiction. Combined use with drugs of other pharmacological groups. The concept of ataralgesia. Anxiolytics of non-benzodiazepine structure (mebicar, afobazole). Acute poisoning with tranquilizers, relief measures. Benzodiazepine receptor antagonists (flumazenil).</p> | 2 |

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|                                                                                                                        | <p>Hypnotics. Modern ideas about the nature of sleep. The main types of insomnia. Classification of hypnotics by chemical structure and their general characteristics. Possible mechanisms of action. Comparative characteristics of hypnotics of various groups (phenobarbital, nitrazepam, doxylamine, zopiclone, zolpidem, zaleplon, suvorexant, melatonin). Indications for using, side effects (syndrome of withdrawing, aftereffect, drug dependence). Acute poisoning with barbiturates, relief measures.</p> <p>Sedatives. Classification and pharmacological characteristics of sedatives (sodium bromide, peony tincture, valerian tincture, motherwort tincture, combined preparations).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |
| 15                                                                                                                     | <p><b><i>Anticonvulsants and antiparkinsonian drugs. Medicines for the treatment of neurodegenerative diseases.</i></b></p> <p>Convulsions as symptoms of the manifestation of various pathological conditions. The using of drugs of various pharmacological groups to eliminate seizures (tranquilizers, muscle relaxants, hypnotics, narcotic drugs, myotropic antispasmodics). Antiepileptic drugs (phenobarbital, phenytoin, carbamazepine, clonazepam, topiramate, sodium valproate, lamotrigine, levetiracetam, gabapentin). Classification of antiepileptic drugs according to indications. Comparative characteristic, side effects of the antiepileptic drugs.</p> <p>Antiparkinsonian drugs (levodopa / carbidopa, selegeline, amantadine, ropinerol, pramipexole, pyribedil, trihexyphenidyl). Classification, basic mechanisms of action. Using in clinical practice. Medicines for the treatment of muscle spasticity (baclofen, midocalm, benzodiazepines, GABA-ergic drugs). General characteristics.</p> <p>Medicinal agents that can be used in Alzheimer's disease, multiple sclerosis and amyotrophic lateral sclerosis. Central cholinesterase blockers (donepezil, rivastigmine, galantamine), central m-, n-cholinomimetics (choline alfoscerate), NMDA receptor inhibitors (memantine hydrochloride) and metabolic drugs (glycine, L-lysine escinate, cerebrolysin).</p>                                            | 2 |
| 16                                                                                                                     | <p><b><i>Antidepressants. Nootropic drugs. Psychotropic stimulants and analeptic drugs.</i></b></p> <p>Classification of antidepressants according to their mechanism of action and chemical structure (amitriptyline, fluoxetine, venlafaxine, sertraline, salbutamine, mirtazapine). Pharmacological characteristics of antidepressants. Side effects of antidepressants. Nootropic drugs. Classification of nootropic drugs. Possible mechanisms of action, indications for use. Pharmacological characteristics and comparisons of piracetam, aminaloni, vinpocetine, nicergoline, pentoxifylline, aminophenylbutyric acid, Ginkgo Biloba preparations. Adaptogens. Classification and pharmacological characteristics of adaptogens of plant and animal origin (ginseng tincture, schizandra tincture, liquid eleutherococcus extract, liquid leuzea extract).</p> <p>Psychotropic stimulants. General characteristics of the group of psychostimulants. Pharmacokinetics and pharmacodynamics of sodium caffeine benzoate. Indications for using. The concept of psychodysleptics and amphetamines. Formation of dependence, social significance. Medicines which lead to addiction, drug and substance abuse.</p> <p>Analeptics. Classification of analeptics and pharmacological characteristics of niketamide, bemegride, etimizole, caffeine citrate, sulfocamphocaine, camphor, cytizine, and lobeline. Indications for use.</p> |   |
| <b>Semantic module 4. Pharmacology of drugs that affect the functions of the cardiovascular system, renal function</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |
| 17                                                                                                                     | <p><b><i>Antiarrhythmic drugs. Cardiotonic drugs. Cardiac glycosides.</i></b></p> <p>Antiarrhythmic drugs. Classification of antiarrhythmic drugs according to indications for using and mechanism of action. Pharmacokinetics and</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2 |

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|    | <p>pharmacodynamics of antiarrhythmic drugs with a membrane-stabilizing effect (quinidine sulfate, procainamide, lidocaine hydrochloride, flecainide, phenytoin, ethacyzine, propafenone). Comparative characteristics of drugs. Indications for using. Beta-blocker agents (propranolol, atenolol, metoprolol, bisoprolol), potassium channel blockers (amiodarone, dronedarone), calcium channels blockers (verapamil) and if-channels blocker (ivabradine) blockers in the treatment of cardiac arrhythmias. Mechanism of antiarrhythmic actions of potassium preparations (potassium chloride, potassium and magnesium asparaginate). Medicines for the correction of bradycardia (M-anticholinergic drugs, sympathomimetic drugs).</p> <p>Inotropic drugs. Classification of inotropic agents. Pharmacokinetics and pharmacodynamics of cardiac glycosides. Comparative characteristics of strophanthin, corglycon, digoxin. Indications and contraindications for using. Side effects of cardiac glycosides. Acute and chronic cardiac glycoside poisoning. Aid measures and prevention. Pharmacological characteristics of non-glycoside inotropic drugs (dobutamine, dopamine, levosimendan). Indications for using.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |
| 18 | <p><b>Antianginal and hypolipidemic drugs.</b></p> <p>Classification and general pharmacological characteristics of antianginal drugs. Pharmacokinetics and pharmacodynamics of glyceryl trinitrate, side effects. Comparative pharmacological characteristics of drugs of the group of organic nitrates (isosorbide dinitrate, isosorbite mononitrate). The mechanism of action of calcium channel blockers (calcium antagonists). Pharmacological characteristics of verapamil, nifedipine, amlodipine, diltiazem. Features of the using of <math>\beta</math>-adrenergic blocker agents in the treatment of patients with coronary heart disease (propranolol, atenolol, metoprolol, bisoprolol, carvedilol, nebivolol), an If channels blocker (ivabradine), myotropic vasodilators (dipyridamole, papaverine hydrochloride, drotaverine), reflexive action agent (validol) and the agent, which has positive effect on myocardium metabolism (trimetazidine). Indications and contraindications for use, side effects. The concept of the "stealing" syndrome. Emergency medication for myocardial infarction.</p> <p>General characteristics of the pharmacological groups of anti-atherosclerotic drugs. Hypolipidemic drugs. General pharmacological characteristics of lipid-lowering drugs, the direction of action. Classification of lipid-lowering drugs according to the mechanism of action. Pharmacokinetics and pharmacodynamics of statins (lovastatin, simvastatin, atorvastatin, rosuvastatin). Comparative characteristics of drugs of other groups in the treatment of hyperlipidemia: fibrates (fenofibrate), niacin group (nicotinic acid), bile acid sequestrants (cholestyramine), cholesterol absorption inhibitors (ezetemib), lipid-modifying agents (human monoclonal antibody preparation - alirocumab), 3 ethyl ether omega-acids. Mechanisms of action. Indications for use and side effects.</p> | 2 |
| 19 | <p><b>Antihypertensive drugs. Angioprotectors.</b></p> <p>Classification and general characteristics of agents affecting the cardiovascular system. Ways of pharmacological correction of high blood pressure. Modern classification of antihypertensive drugs. Pharmacological characteristics of antihypertensive drugs of the main group. Pharmacology of <math>\beta</math>-adrenergic blocking agents (propranolol, atenolol, metoprolol, bisoprolol, carvedilol) ACE inhibitors (captopril, enalapril, lisinopril), angiotensin II receptor blockers (losartan, telmisartan, valsartan) calcium antagonists (nifedipine, amlodipine), hydrochlorothiazide, spironolactone). Medicines of an additional group. Pharmacological characteristics of central <math>\alpha_2</math>-adrenergic agonists (clonidine, methyl dopa), imidazoline receptor agonists (moxonidine), <math>\alpha_1</math>-adrenergic blockers (prazosin, doxazosin) sympatholytics (reserpine) and peripheral</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2 |

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|                                                                                                                                                    | vasodilators (sodium nitroprusside, magnesium sulfate). The principles of the combination of antihypertensive drugs. Comparative pharmacological characteristics of these groups, the rate of development of the hypotensive effect. Medicinal care for hypertensive crisis. Angioprotectors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |
| 20                                                                                                                                                 | <p><b>Drugs that affect renal function</b></p> <p>Diuretic drugs. Classification of diuretics according to chemical structure, localization, activity and mechanism of action. Pharmacokinetics and pharmacodynamics of furosemide, torasemide, acetazolamide, hydrochlorothiazide, indapamide. Indications for use, side effects. Comparative characteristics of potassium-sparing diuretics (spironolactone, eplerenone, triamteren). The concept of forced diuresis. Osmotic diuretics (mannitol). Indications for using. Side effects. Medicinal plants with a diuretic effect (herbal remedies, artichoke extract, horsetail grass, orthosiphon leaves). The principles of the combined use of diuretics.</p> <p>Anti-gout remedies. Remedies that affect the metabolism and excretion of uric acid (allopurinol).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2 |
| 21                                                                                                                                                 | <p><b>Test control of theoretical training from the KROK-1 database for content modules 1-4*.</b></p> <p>Test control of theoretical training.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2 |
| <b>Semantic module 5. Medicines affecting the respiratory system, gastrointestinal tract, kidneys, reproductive processes, and blood functions</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |
| 22                                                                                                                                                 | <p><b>Medicinal agents influencing respiratory system</b></p> <p>Bronchodilator drugs. Classification of bronchodilators. Pharmacology of adrenomimetic drugs (salbutamol, fenoterol, formoterol, salmeterol) M-anticholinergics (ipratropium bromide, tiotropium bromide) myotropic bronchodilators (theophylline, aminophylline) combined drugs. Pharmacokinetics, pharmacodynamics, side effects.</p> <p>The using of desensitizing and anti-allergic drugs. General characteristics of topical anti-inflammatory drugs (beclomethasone, budesonide, fluticasone) combined drugs (seretide), mast cell stabilizers (cromolyn glycate, nedocromil, ketotifen), leukotriene receptor blockers (montelukast), drugs for systemic using in obstructive respiratory disease, fenspirid, monoclonal antibodies (omalizumab), antihistamines and anti-leukotriene drugs.</p> <p>Respiratory stimulants. Classification of respiratory stimulants and pharmacological characteristics of niketamide, bemegride, etymizole, caffeine citrate, sulfocamphocaine, camphor, cytizine, lobeline. Indications for use.</p> <p>Antitussive drugs. Classification of antitussive drugs and general characteristics (codeine phosphate, glaucin, butamirate). Side effect.</p> <p>Expectorant medicines and mucolytics. Classification of expectorants and mucolytics according to the mechanism of action and pharmacological characteristics of the agents (preparations of marshmallow, thermopsis, crystalline trypsin, mucaltin, acetylcysteine, guaifenesin). Side effects. Surfactant synthesis stimulants (bromhexine, ambroxol). Pulmonary surfactants. General characteristics of drugs. Emergency care in the case of acute respiratory dysfunction (apnea, bronchospasm, pulmonary edema)</p> | 2 |
| 23                                                                                                                                                 | <p><b>Medicinal agent influencing digestive system</b></p> <p>Medicines that have action on appetite. General pharmacological characteristics, classification of drugs that affect appetite and are used to treat anorexia and bulimia. Medicines that stimulate appetite – bitterness. The concept of anorexigenic drugs. Pharmacology of orlistat. Medicines used for violations of the function of the stomach glands. The general pharmacological characteristics of agents that stimulate secretion of the gastric glands and are used for diagnosis (pentagastrin) and replacement therapy (pepsin, gastric natural juice, dilute hydrochloric acid). Medicines used for the treatment of diseases of the</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2 |

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|    | <p>esophagus, stomach and duodenum (almagel, maalox, sodium alginate), drugs used for NSAID gastropathy (misoprostol). Medicinal agents used for functional gastrointestinal disorders (mebeverin, prifinium bromide, hyoscine butylbromide, simethicone), stimulants of motor and evacuation function of the upper gastrointestinal tract (domperidone, metoclopramide).</p> <p>General characteristics of antiemetics: H1 receptor blockers (diphenhydramine) 5-HT<sub>3</sub> receptor blockers (ondasetron, tropisetron) and dopamine D<sub>2</sub> receptor blockers (metoclopramide). Pharmacological characteristics of metoclopramide.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |
| 24 | <p><b><i>Medicinal agents influencing digestive system (continuance)</i></b></p> <p>Medicines using in violation of the excretory function of the pancreas. Classification of agents that stimulate the excretory function of the pancreas and are used for replacement therapy (pancreatin). Indications for using. Characterization of drugs inhibiting the excretory activity of the pancreas (aprotinin, aminocaproic acid). Indications for using. Cholagogue drugs. Classification of choleretic drugs. General characteristics of agents that stimulate the formation of bile (choleretics). The mechanism of action of choleretic drugs containing bile and natural bile acids (ursodeoxycholic acid), of plant origin (corn stigmas, rose hips, holosas). Pharmacological characteristics of agents that enhance the outflow of bile – cholekinetics (magnesium sulfate, M-anticholinergics, antispasmodics of myotropic action). Indications for using. Hepatoprotectors and cholelitholytic drugs. The mechanism of action of agents that stimulate liver function (silymarin, essential phospholipids, ademethionine, arginine). Indications for use.</p> <p>Laxative agents (bisacodyl, sodium picosulfate, lactulose, polyethylene glycol, castor oil). Mechanism of action. Indications for use. Pharmacology of loperamide hydrochloride. Indications for use. Side effects. Probiotics.</p> | 2 |
| 25 | <p><b><i>Medicinal products affecting reproductive processes.</i></b></p> <p>Classification of agents affecting the myometrium. General characteristics of agents that stimulate the contractile activity of the myometrium. Prostaglandin preparations (dinoprost, dinoprostone), hormonal drugs (oxytocin, desaminoxytocin). Agents using for termination of the uterine bleeding. Pharmacological characteristics of ergot alkaloids (ergometrine maleate) and oxytocin receptor stimulants (carbetocin). Indications for use. Agents that reduce the tone and contractile activity of the myometrium or relax the cervix of uterus: tocopherol acetate, progesterone; m-anticholinergics (atropine sulfate) <math>\beta_2</math> -adrenergic agonists (phenoterol, hexoprenaline) antagonists of oxytocin receptors (atosiban), antispasmodics, magnesium sulfate. Prostatic protector agents: antiandrogens (cyproterone, bicalutamide, flutamide), 5<math>\alpha</math>-reductase inhibitors (finasteride, dutasteride), blockers of <math>\alpha_1</math>-adrenergic receptors (alfuzosin, tamsulosin), phytotherapeutic drugs (prostatophytum) and drugs used for erectile dysfunction.</p>                                                                                                                                                                                                          | 2 |
| 26 | <p><b><i>Medicinal agents influencing hemostasis</i></b></p> <p>Classification of drugs that effect on hemostasis. Medicines that affect blood coagulation, fibrinolysis and platelet aggregation. Classification of agents using for the prevention and treatment of bleeding. Classification of coagulants. Pharmacokinetics, pharmacodynamics of menadione. Indications for using. Pharmacology of hemostatic agents of other groups (aminocaproic acid tranexamic acid, aprotinin, eptacog-alpha, etamzilate, calcium chloride, thrombin, revul). Classification of agents using for the prevention and treatment of thrombosis. Classification of anticoagulants. Pharmacokinetics, pharmacodynamics of heparin. Indications and contraindications for use. Side effects. An overdose of heparin, relief measures (protamine sulfate). Low molecular weight heparin preparations (fraxiparin, enoxaparin). Antithrombotic agents: factor Xa inhibitors (rivaroxaban) and direct thrombin inhibitors</p>                                                                                                                                                                                                                                                                                                                                                                                                 |   |

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|                                                                  | (dabigatran etekylate) Indirect anticoagulants (warfarin). Indications for use. Side effects of indirect anticoagulants. General characteristics of fibrinolytic agents. Pharmacology of fibrinolysin, alteplase. Indications for use. Side effect. General characteristics and mechanisms of action of agents that reduce platelet aggregation (acetylsalicylic acid, dipyridamole, clopidogrel, pentoxifylline).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |   |
| 27                                                               | <p><b><i>Medicinal agents influencing hematopoiesis. Anticancer medicinal agents</i></b></p> <p>Classification of agents that affect hematopoiesis. General characteristics of drugs that affect blood formation. Medicines that affect erythropoiesis. Stimulants of erythropoiesis. Classification and general characteristics of stimulants of erythropoiesis. Indications for use. Medicines used for hypochromic anemia. Pharmacokinetics, pharmacodynamics of iron preparations (iron (II) sulfate, iron (III) hydroxide polymaltose, iron (III) carboxymaltose). Combined drugs (ferroplect). Erythropoietins (epoetin alpha). Indications for using. Side effect. Acute iron poisoning and emergency care in this poisoning. Pharmacological characteristics of drugs using for the treatment of hyperchromic anemia. Pharmacokinetics, pharmacodynamics of cyanocobalamin and folic acid. Medicines that affect leukopoiesis. The mechanism of action of leukopoiesis stimulants (sodium nucleinate, methyluracil, filgrastim). Indications for using. General characteristics of leukopoiesis inhibitors.</p> <p>Classification, general characteristics, indications for the use of anticancer drugs. Pharmacology of alkyl compounds (sarcolysin, cyclophosphamide, doxorubicin, chlorobutin, myelosan), antimetabolites (methotrexate, mercaptopurine, fluorouracil, cytarabine), platinum preparations (cisplatin), enzymes (L-asparaginase), anthracycline cyclocyclic antioxidants, (paclitaxel), hormonal drugs, animal products, monoclonal antibodies.</p> |   |
| <b>Semantic module 6. Medicinal agent influencing metabolism</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |
| 28                                                               | <p><b><i>Water soluble vitamins. Enzymes and anti-enzyme agents</i></b></p> <p>The concept of vitamin preparations. Therapy with vitamin preparations and its types. Classification of vitamin preparations by biological role and chemical structure.</p> <p>General characteristics of water-soluble vitamin preparations. Pharmacology of thiamine bromide, riboflavin, pyridoxine, nicotinic acid, cyanocobalamin, folic acid, metapholin, ascorbic acid, calcium pangamate, calcium pantothenate. Indications for use, side effects. The concept of bioflavonoids (rutin, quercetin), coenzyme preparations.</p> <p>Classification of enzyme preparations. The mechanism of action and indications for use of peptidases (pepsin), proteases (crystalline trypsin, crystalline chymotrypsin), nucleases (ribonuclease, deoxyribonuclease), hyaluronidase preparations (lidase, ronidase). Fibrinolytic agents (streptoliasin, alteplase, urokinase, fibrinolysin). Indications for their using. General characteristics of enzyme inhibitors (aprotinin, aminocaproic acid). Classification. Indications and contraindications for using.</p>                                                                                                                                                                                                                                                                                                                                                                                                                            | 2 |
| 29                                                               | <p><b><i>Fat-soluble vitamin preparations</i></b></p> <p>Therapy with vitamin preparations and its types. Classification of vitamin preparations.</p> <p>General characteristics of fat-soluble vitamin preparations. Pharmacology of retinol acetate, indications for using. The concept of retinoids, their pharmacological properties and indications for use (tretinoin, isotretinoin, etretinate). Pharmacology of tocopherol acetate. Pharmacology of phyloquinone and menaquinone. Pharmacological properties of menadione (vitamin K3). Pharmacological properties and using of phytomenadione. Indications and contraindications for use. Pharmacology of vitamin D preparations: native vitamins (ergocalciferol, cholecalciferol), structural analogues of vitamin D2 (dihydrotachysterol), active metabolites of vitamin D (calcitriol, alfacalcidol).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2 |

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|    | Side effects of fat-soluble vitamin preparations. Multivitamin preparations. The concept of anti-vitamins.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |
| 30 | <p><b><i>Hormonal preparations (of peptide structure), their substitute medicinal agents and antagonists</i></b></p> <p>The general characteristics of hormonal preparations. Classification of hormonal drugs by origin. The mechanism of action of hormonal drugs. Indications for use.</p> <p>Hormonal preparations of the hypothalamus: analogues of gonadorelin (triptorelin), somatostatin: (octreotide), thyrotropin-releasing hormone (protirelin). Antigonadotropic drugs (danazol). Hormonal drugs of the pituitary gland (somatropin), gonadotropin hormones (folitropin alpha, folitropin beta, chorionic gonadotropin; menopausal gonadotropin). Analogs of vasopressin (desmopressin, terlipressin). Pharmacology of oxytocin and its synthetic substitutes (desaminooxytocin, carbetocin).</p> <p>Medicines used in diseases of the thyroid gland thyroid hormones (levothyroxine, thyrocomb), antithyroid drugs (thiamazole). Pharmacology of iodine-containing drugs (potassium iodide). Indications and contraindications for use, side effects. Calcitonin preparations, indications for using.</p> <p>Hypoglycemic drugs. Classification of hypoglycemic agents. Pharmacokinetics, pharmacodynamics, indications and contraindications for the use of insulin. Classification of natural insulin according to duration of action. Pharmacology of human genetically engineered insulin. Side effects. Features of using in hyperglycemic coma. An overdose of insulin, help with hypoglycemic coma. Synthetic antidiabetic drugs: sulfonylurea derivatives (glibenclamide, glimepiride, glyclazide), biguanide derivatives (metformin), prandial glycemic regulators (repaglinide), insulin sensitizers (pioglitazone, rosiglitazone), alpha glucosidase inhibitors (acarbose). Comparative characteristics, side effects. Medicines for the treatment of hypoglycemia: glucagon.</p> | 2 |
| 31 | <p><b><i>Hormonal preparations (of steroid structure), their substitute medicinal agents and antagonists</i></b></p> <p>General characteristics of hormonal drugs. Classification of hormonal drugs by origin. The mechanism of action of hormonal drugs. Indications for using.</p> <p>Hormonal drugs of the adrenal cortex. Pharmacological effects, indications, contraindications, dosage regimen for replacement therapy (hydrocortisone, prednisone, dexamethasone, methylprednisolone, triamcinolone, betamethasone, budesonide, mometasone furoate, beclomethasone dipropionate, fluticasone, fluocinolone acetonide). Comparative characteristics. The concept of glucocorticoid and mineral-corticoid activity. Side effects.</p> <p>Gonadal hormone preparations. Classification. General characteristics of female gonadal hormones. The mechanism of action and indications for the use of estrogenic (estradiol) and gestagenic (progesterone, dydrogesterone, levonorgestrel) drugs depending on age-related hormonal changes in women. Antagonists of estrogenic (clomiphene, tamoxifen) and gestagenic (mifepristone) hormones. Inhibitors of estrogen biosynthesis (anastrozole, letrozole). Combined drugs containing gestagens and estrogens. Principles, indications and contraindications for using, side effects. Hormonal birth control (contraceptive drugs).</p> <p>Male gonadal hormone preparations. Pharmacological characteristics of testosterone propionate, methyltestosterone. Indications for use, side effects. Antagonists of androgen hormones (cyproterone, bicalutamide, flutamide). Testosterone 5<math>\alpha</math>-reductase inhibitors (finasteride, dutasteride). Pharmacological characteristics of anabolic steroids. The mechanism of action, indications for use (nandrolone). Side effects of anabolic steroids.</p>                                   | 2 |
| 32 | <b><i>Anti-inflammatory, anti-allergic and immunotropic medicinal agents.</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2 |

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|                                                             | <p>Classification of anti-inflammatory drugs. The main focus of the action. Pharmacology of non-steroidal anti-inflammatory drugs and comparative characteristics of the drugs (acetylsalicylic acid, mefenamic acid, ketorolac, indomethacin, diclofenac sodium, ibuprofen, naproxen, dexamethasone, meloxicam, celecoxib, nimesulide) by the degree of inhibition of cyclooxygenase-2 (COX-2). Side effects of drugs and measures to prevent them. Pharmacology of steroidal anti-inflammatory drugs and comparative characteristics of drugs (hydrocortisone, prednisone, dexamethasone, methylprednisolone, triamcinolone, betamethasone, budesonide, mometasone furoate, beclomethasone dipropionate). Indications, contraindications for use, dosage regimen. Side effects of glucocorticoids.</p> <p>Anti-allergic drugs. Concept of histamine receptors. Classification and general characteristics of anti-allergic drugs. Medicines used for immediate type hypersensitivity (glucocorticoids, antihistamines, fibrinolysis inhibitors, adrenergic agonists, anticholinergics, antispasmodics, bronchodilators). Features of the application. Pharmacology of antihistamines - H1 receptor blockers (diphenhydramine, chloropyramine, climastin, mebhydroline, loratadine, desloratadine, cetirizine, levocetirizine, fenspiride, dimethindene maleate). Comparative characteristics of drugs of different generations, side effects. Pharmacological characteristics of leukotriene receptor blockers (montelukast). Pharmacokinetics, pharmacodynamics, indications for the use of cromoglicic acid, ketotifen. Principles of relief from anaphylactic shock. Medicines used for delayed hypersensitivity.</p> <p>Medicines that affect immune processes. General characteristics of agents that reduce tissue damage (steroidal and non-steroidal anti-inflammatory drugs). Medicines that affect immunity. Classification of immunomodulators. Pharmacology of thymus preparations (thymalin), leukopoiesis stimulants (sodium nucleinate, methyluracil), interferons and vaccines. Immunosuppressive drugs: antimetabolites (azathioprine, methotrexate), alkylating compounds (cyclophosphamide), 4-aminoquinoline derivatives (chloroquine), glucocorticoids, enzyme preparations, selective immunosuppressants (cyclosporin), monoclonal antibody preparations (adalimumab). Pharmacological characteristics, indications for use, side effects.</p> |   |
| <b>Semantic module 7. Chemotherapeutic medicinal agents</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |   |
| 33                                                          | <p><b>Antiseptic and disinfectant medicines</b></p> <p>Antiseptic and disinfectant medicines. The concept of antiseptics and disinfection. The history of the use of antiseptic agents. Requirements for modern antiseptic agents. Classification of antiseptic and disinfectants by chemical structure. Pharmacology of antiseptic and disinfectants of an inorganic nature. The mechanism of action of halogens and halogen-containing compounds (chlorhexidine bigluconate, Citeal, sodium hypochloride, iodine alcohol solution, Iodicerin, iodinol, povidone-iodine). Indications for use. Side effects. The mechanism of action, indications for the use of oxidizing agents (hydrogen peroxide, potassium permanganate). The dependence of the action on the concentration of the solution. The antiseptic and disinfecting effect of drugs of acids and alkalis group (boric acid, salicylic acid, citric acid, sodium bicarbonate, ammonia solution, sodium tetraborate). Local and resorptive action of acids and alkalis. Indications for use. Acute poisoning by acids and alkalis. Help measures. The mechanism and types of action of salts of heavy metals (pre-resorptive, resorptive). Factors that determine the antimicrobial activity of salts of heavy metals. Schmiedeberg line. Features of the use of mercury, lead, silver, bismuth, copper, and zinc.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2 |
| 34                                                          | <p><b>Antiseptic and disinfectant medicines (continuance)</b></p> <p>Antiseptic and disinfectant medicines. The concept of antiseptics and</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2 |

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|    | <p>disinfection. Classification of antiseptic and disinfectants by chemical structure. Pharmacology of antiseptic and disinfectants of an organic nature. Derivatives of the aromatic series. The mechanism of action of phenol group drugs (phenol, resorcinol, thymol). Side effects. Acute poisoning with phenolic compounds, help. The mechanism of action of nitrofurans, indications and contraindications for use. Comparative characteristics of drugs (nitrofurazone, furazolidone). The mechanism of the antimicrobial action of dye preparations. Pharmacological characteristics of brilliant green, methylene blue, ethacridine lactate. Indications for use. Derivatives of the aliphatic series. Pharmacokinetics, pharmacodynamics of formaldehyde. Side effects. The mechanism of action of alcohols (ethyl alcohol, isopropyl alcohol). Pharmacology of surface-active substances. The mechanism of action, indications for the use of detergents (etonium, decamethoxin, chlorhexidine bigluconate, miramistin). The use of antibacterial agents of plant origin (sanguirhythm, chlorophyllipt, eucalymin). Combined drugs (Sterilium, cutasept).</p>                                                                                                                                                                                                                                                                                                                           |   |
| 35 | <p><b>Synthetic antimicrobial medicinal agents. Antifungal agents</b></p> <p>Synthetic antimicrobial agents. Sulfonamide preparations. Pharmacokinetics and pharmacodynamics of sulfonamides. The spectrum of antimicrobial action, the susceptibility of microorganisms to drugs of this group. Indications for use. Side effects and ways to prevent it. The combination of sulfonamides with trimethoprim (co-trimoxazole). Quinolone derivatives of the I-IV generation. Classification, mechanism of action, indications for use, side effects. Characteristics of drugs (nitroxoline). The peculiarity of the use of fluoroquinolone derivatives (ofloxacin, ciprofloxacin, levofloxacin, moxifloxacin) in medical practice. Derivatives of nitrofurans. The mechanism of action, indications for use, route of administration, side effects (nitrofurazone, furazolidone, furagin, nifuroxazide, nitrofurantoin). Synthetic antimicrobial drugs of various chemical structure (hydroxymethylquinolindioxide, dioxole, metronidazole, linezolid).</p> <p>Antifungal (antimycotic) drugs. Classification of antimycotic agents by origin and purpose. Pharmacokinetics, pharmacodynamics of polyenes (nystatin, amphotericin B, natamycin), imidazoles (ketoconazole, clotrimazole, miconazole), triazoles (fluconazole, itraconazole), allylamines (terbinafine). Antifungal agents of different groups (dequalinium chloride). Indications for using. Side effects.</p>                     | 2 |
| 36 | <p><b>Pharmacology of beta-lactam antibiotics</b></p> <p>The concept of antibiosis, the spectrum of action of antibiotics. The history of the discovery and introduction of antibiotics in medical practice. L. Pasteur, I.I. Mechnikov, O. Fleming, H.V. Flori. The principles of antibiotic therapy. Classification of antibiotics by chemical structure, spectrum and mechanism of action. Group of penicillins. Classification. The mechanism of the spectrum and duration of action. Routes of administration. Pharmacological characteristics of penicillin group preparations (benzylpenicillin sodium salt, benzathine benzylpenicillin, bicillin-5, oxacillin sodium salt, ampicillin, amoxicillin, phenoxymethylpenicillin). Pharmacological characteristics of carbapenems (meropenem) and monobactams (aztreonam). Comparative characteristics of drugs, indications for use, side effects. Relief measures for anaphylactic shock with the administration of penicillin antibiotics. The principles and purpose of the combination of penicillin preparations with <math>\beta</math>-lactamase inhibitors: clavulanic acid, sulbactam, tazobactam. A group of cephalosporins. Classification of drugs by route of administration and by generations. The mechanism and spectrum of action. Indications for use. Comparative characteristics of cephalosporin group preparations (cefazolin, cephalexin, cefuroxime, ceftriaxone, cefpirome). Side effects of cephalosporins. The</p> | 2 |

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|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|                                                                                                        | mechanism and spectrum of action, indications for use, side effects. General characteristics, mechanism and spectrum of action, indications for use, side effects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |
| 37                                                                                                     | <p><b>Pharmacology of antibiotics of different groups</b></p> <p>The principles of antibiotic therapy. Classification of antibiotics by chemical structure, spectrum and mechanism of action. Pharmacological characteristics of macrolides (erythromycin, spiramycin, josamycin, roxithromycin, clarithromycin, azithromycin). Pharmacological characteristics of lincosamides (lincomycin hydrochloride, clindamycin). The mechanism of action, comparative characteristics, indications and contraindications for use, side effects. Pharmacological characteristics of tetracyclines (tetracycline, doxycycline hydrochloride), antimicrobial activity, classification, side effects and contraindications. Pharmacological correction and prevention of complications with the use of tetracyclines.</p> <p>Preparations of the nitrobenzene group (chloramphenicol). The mechanism and spectrum of action, indications for use, side effects. Cyclic polypeptides (polymyxins) (sodium colistimethate). Spectrum of action, indications for use. Pharmacology of aminoglycoside preparations (streptomycin sulfate, gentamicin sulfate, amikacin sulfate, tobramycin). Pharmacology of glycopeptide preparations (vancomycin, teicoplanin). Comparative characteristics, mechanism of action, indications and contraindications for use, side effects. Pharmacology of fusidine sodium. Indications for use. Side effects. Pharmacology of antibiotics of various chemical groups (mupirocin).</p> | 2 |
| 38                                                                                                     | <p><b>Anti-tuberculosis medicinal agents. Anti-viral medicinal agents</b></p> <p>Anti-tuberculosis drugs. The basic principles of treatment and prevention of tuberculosis. Classification of drugs used to treat tuberculosis. Pharmacokinetics, pharmacodynamics of isonicotinic acid hydrazide derivatives (isoniazid). Side effects that occur with prolonged use of anti-TB drugs and ways to prevent them. Antibiotic drugs in the treatment of tuberculosis (rifampicin, streptomycin sulfate, kanamycin, cycloserine, amikacin). Side effects.</p> <p>Antiviral medicines. Classification of antiviral drugs according to the mechanism of action and indications for use. Pharmacological characteristics of drugs used for the prevention and treatment of influenza (rimantadine, oseltamivir, interferons). Features of the application. Medicines used for herpetic infections (acyclovir, valaciclovir, ganciclovir). Pharmacology of interferons (interferon alfa-2b). Interferon inducers (cycloferon, amizon, kagocel, proteflazid). Possibilities of using antiviral agents in the complex treatment of AIDS patients (zidovudine, abacavir).</p> <p>Antisymphilitic drugs. General characteristics of antisymphilitic drugs. Principles for treating syphilis. Classification of antisymphilitic drugs. Features of the use of antibiotics (penicillins, macrolides, cephalosporins), bismuth preparations (bioquinal) in the treatment of syphilis.</p>                              | 2 |
| 39                                                                                                     | <p><b>Antiprotozoal medicinal agents. Antihelmentic medicinal agents</b></p> <p>Basic principles for the prevention and treatment of malaria. Classification of antimalarial drugs. Mechanism of action. Pharmacological characteristics of chloroquine, primaquine, quinine, pyremethamine, fansidar. Indications and contraindications for use, side effects. Medication for malaria coma. Antiprotozoal agents (metronidazole, tinidazole).</p> <p>Anthelmintic drugs. Classification of anthelmintic drugs. Features of application for various types of helminthiases. Pharmacological characteristics of the drugs used to treat nematodoses (levamisole, pyrantel, piperazine adipinate, diethylcarbamazine), trematodoses (praziquantel) cestodoses (niclosamide). Anthelmintic agents of a wide spectrum of action (mebendazole, albendazole).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2 |
| <b>Semantic module 8. Antidotes. Preparations of macro- and microelements. Plasma restitute agents</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |

| <i>and preparations for parenteral nutrition</i> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 40                                               | <p><b>Preparations of macro- and microelements. Plasma substitute agents and preparations for parenteral nutrition</b></p> <p>Preparations of macro- and microelements. Potassium preparations (potassium chloride, potassium and magnesium asparaginate). Pharmacodynamics, indications for use. Magnesium preparations (magnesium sulfate). Pharmacokinetics, pharmacodynamics. The dependence of the effect on the route of administration. Indications for use. Calcium preparations (calcium chloride, calcium gluconate). Pharmacological effects, indications for use, route of administration. Sodium preparations (sodium chloride). Pharmacological effects of isotonic, hypertonic and hypotonic sodium chloride solutions. Indications for using.</p> <p>Preparations for the treatment and prevention of osteoporosis. Anabolic steroids (nandrolone), estrogens and estrogen-progestogen drugs, androgens; thyroid hormone (calcitonin) and its synthetic analogue; an analogue of parathyroid hormone (teriparatide), bisphosphonates (etidronic acid (xidiphon), alendronic acid), vitamin D preparations (ergocalciferol, cholecalciferol, dihydrotachisterol, calcitriol), calcium preparations (calcium carbonate, osteogenon), strontium preparations (strontium ranelate).</p> <p>Plasma replacing fluids. General characteristics of plasma substitutes. Pharmacological and indications for the use of saline solutions (isotonic sodium chloride solution, Ringer-Lock solution, trisol), alkaline solutions (sodium bicarbonate, trisamine), sugars (glucose), gelatin solution, preparations containing human blood components (human albumin), synthetic drugs (Rheopolyglucin, Neohaemodesum, refortan). Energy, antitoxic, osmotic effect of glucose (glucose), indications for the use of isotonic and hypertonic glucose solutions. Preparations for parenteral nutrition (lipofundin).</p> | 2  |
| 41                                               | <p><b>Principles of therapy of acute poisonings by medicinal agents. Antidotes.</b></p> <p>The basic principles of pharmacotherapy of acute drug poisoning. Causes of acute poisonings. Symptoms of acute poisonings with drugs of various pharmacological groups. Methods of active detoxification, the use of emetics, laxatives, covering, astringents, and adsorbents. The use of active diuretics in order to remove toxic substances from the blood (forced diuresis), the use of hemodialysis, peritoneal dialysis, hyperbaric oxygenation, hemo- and lymphosorption. The concept of antidotes. Types of antidote therapy. Pharmacology of dimercaprol, acetylcysteine, tetacin-calcium, penicillamine, deferoxamine, cholinesterase reactivators. Principles of symptomatic therapy of acute poisonings. Side effects of heavy metal salt preparations. Acute poisoning. Help with acute heavy metal salt poisoning, principles of antidote therapy.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2  |
| 42                                               | <p><b>Test control of theoretical training from the KROK-1 database on content modules 5-8*.</b></p> <p>Test control of theoretical training.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |
| Total                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 84 |

### Independent work

| Seq. №              | Title of the topic                                                                               | Number of hours |
|---------------------|--------------------------------------------------------------------------------------------------|-----------------|
| <b>PHARMACOLOGY</b> |                                                                                                  |                 |
| I                   | Preparation for practical classes - theoretical preparation and development of practical skills. | 50              |
| II                  | Processing of topics that are not included in the classroom lesson plan (list):                  |                 |

|       |                                                                                                                                                                                                                                                                                                                                                                                                                 |           |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|       | <b>Classifications and mechanisms of adverse drug reactions. The main ways to prevent adverse reactions to medicines</b><br>Adverse reactions to medicines that occur with repeated use. Tolerance or addiction (as a type of tachyphylaxis), dependence on the action of drugs (mental, physical). The concept of withdrawal and withdrawal symptoms. Medical and social aspects of drug dependence treatment. | 5         |
|       | <b>Pharmacology of neuroleptics. Side effects</b><br>Main manifestations and mechanisms of adverse reactions of neuroleptics.                                                                                                                                                                                                                                                                                   | 4         |
|       | <b>Pharmacology of normotimetics</b><br>Normotimetics (lithium preparations – lithium hydroglutamate). Pharmacokinetics and pharmacodynamics, indications for using. Side effects. Acute poisoning with lithium preparations. Help in the case of poisoning.                                                                                                                                                    | 1         |
|       | <b>Pharmacology of adaptogens</b><br>Adaptogens. Classification and pharmacological characteristics of adaptogens of plant and animal origin                                                                                                                                                                                                                                                                    | 4         |
|       | <b>Antiarrhythmic drugs</b><br>Classification of antiarrhythmic drugs by indications for use and mechanism of action. Pharmacokinetics and pharmacodynamics of antiarrhythmic drugs.                                                                                                                                                                                                                            | 4         |
|       | <b>Vitamin preparations. Antivitamins (continued)</b><br>The concept of retinoids, their pharmacological properties and indications for use.                                                                                                                                                                                                                                                                    | 4         |
|       | <b>Pharmacology of oral contraceptives</b><br>Hormonal contraceptive drugs.                                                                                                                                                                                                                                                                                                                                     | 4         |
|       | <b>Adverse reactions to hormonal drugs.</b><br>Main manifestations and mechanisms of adverse reactions to hormonal drugs                                                                                                                                                                                                                                                                                        | 4         |
|       | <b>Side effects of chemotherapeutic drugs</b><br>The main manifestations and mechanisms of typical adverse reactions to chemotherapeutic drugs.                                                                                                                                                                                                                                                                 | 6         |
| III   | Preparation for the exam.                                                                                                                                                                                                                                                                                                                                                                                       | 12        |
| Total |                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>98</b> |

### Individual tasks

1. Report on the practical lesson.
2. Participation in the 1st round of the All-Ukrainian Olympiad in Pharmacology. Report - presentation in Power Point format at a practical lesson.
3. Creating visual patterns of action of drugs in the form of tables, figures and posters for practical exercises and lectures in electronic form.
4. Victory in the I round of the All-Ukrainian Olympiad in Pharmacology (I-III places).
5. Report at a meeting of the students scientific group of the department.
6. Scientific publication (an abstract) on Pharmacology in the materials of scientific and practical conferences.
7. Work in the SSC and a report at scientific and practical conferences from the Department of Pharmacology.
8. Scientific publication (an article) based on materials of the own research in Pharmacology.

### The list of theoretical questions for students' preparation for the exam (semester final attestation)

1. Medical Prescription, its aim and tasks.
2. The concept of medical prescription. Definitions: drug, drug, dosage form, drug.
3. Prescription. General rules for writing prescriptions, kinds of prescription forms. Rules for prescribing for medicines containing drastic, toxic and narcotic substances.
4. Dosage forms. Types of dosage forms, peculiarities of the manufacture and prescribing. Requirements for dosage forms for injections.

- 5.The definition of Pharmacology, its place among other medical and biological sciences.
- 6.The origin and formation of experimental pharmacology, the development of pharmacology in Ukraine and other countries.
- 7.Basic principles and test methods for new drugs. Preclinical and clinical studies (phases I-IV). The concept of placebo. Functions of the State Pharmacological Center of the Ministry of Health of Ukraine. Law of Ukraine "About Medicines".
- 8.The concept of pharmacokinetics of drugs.
- 9.Routes of administration and ways of excretion of drugs from the body, peculiarities of absorption and distribution in the body, the main types of biotransformation.
- 10.The concept of the main pharmacokinetic parameters (constant absorption rate, elimination half-life, stationary concentration, clearance).
- 11.Age features of pharmacokinetics.
- 12.Definition of the concept of a dose, types of doses.
- 13.Pharmacological drugs.
- 14.The concept of receptors (agonists, antagonists).
- 15.Types and modes of the action of drugs.
- 16.The dependence of the pharmacological effect on the properties of drugs (chemical structure, physico-chemical properties, their doses and frequency of use).
- 17.The dependence of the pharmacological effect on the age and gender of the patient. Features of the reaction of the child's body to the drug. Principles of dosage of medicines for children and the elderly.
- 18.The importance of climatic and anthropogenic factors for the pharmacological action of the drug.
- 19.The dependence of the action of drugs on the physiological characteristics of the body and pathological conditions.
- 20.The concept of pharmacogenetics and chronopharmacology.
- 21.Features of the action of drugs during their repeated use. The concept of material and functional cumulation, tolerance or addiction, mental and physical dependence. The concept of withdrawal and withdrawal syndrome.
- 22.The combined effect of drugs (synergism and antagonism).  
The concept of the drug safety.
- 23.Side effects of drugs. Types of side effects. Intolerance. Idiosyncrasy. Allergic reactions. Mutagenicity, teratogenicity, embryotoxicity, fetotoxicity, and carcinogenicity.
- 24.The principles of classification of drugs that affect the autonomic nervous system.  
The principles of classification of drugs that affect the cholinergic nervous system. M- and N-cholinomimetic drugs.
- 25.The principles of classification of anticholinesterase drugs. The mechanism of action, pharmacological effects, indications for use, side effects.
- 26.Features of the action of organophosphate compounds. Acute poisoning with organophosphate compounds and its relief. Pharmacology of acetylcholine esterase reactivators.
- 27.The principles of classification and pharmacological characteristics of M-cholinomimetics. Impact on organs and systems. Indications for use.
- 28.Acute muscarine poisoning. Relief measures, antidote therapy.
- 29.Medicines affecting N-cholinergic receptors.
- 30.Pharmacological effects of nicotine. Smoking as a medical and social problem. Medicines used to combat tobacco smoking.
- 31.The principles of classification of M-anticholinergic drugs. Pharmacological characteristics of atropine sulfate. Indications for use.
- 32.Acute poisoning with atropine and plants containing atropine. Help measures.  
General characteristics of N-cholinergic antagonists. Classification of ganglion blockers. Mechanism of action. Pharmacological effects, indications for use, side effects.
- 33.The principles of classification of muscle relaxants. Pharmacokinetics, pharmacodynamics of tubacurarin chloride. Indications for use, side effects.
34. The principles of classification of drugs affecting adrenergic innervation.  
Pharmacological characteristics of adrenergic agonists. Pharmacokinetics, pharmacodynamics of adrenaline hydrochloride. Indications for use.

35. Comparative characteristics of adrenergic agonists. Side effects.  
The principles of classification of antiadrenergic drugs. Features of the use of  $\alpha$ -blockers, mechanism of action and indications for use.
36. Pharmacological effects of  $\beta$ -blockers. Comparative characteristics of drugs. The concept of the intrinsic sympathomimetic activity.
37. Pharmacology of sympatholytics. The mechanism of action and indications for use, side effects.  
The principles of classification of local anesthetics, mechanism of action, comparative characteristics of drugs. Indications for use, side effects.
38. Pharmacology of astringent drugs. The mechanism of action, indications for use. Pharmacological characteristics of drugs.
39. General characteristics of covering medicines. The mechanism of action, indications for the use of drugs.
40. The principles of classification of adsorbing agents. Mechanism of action. Indications for use. Coal preparations and synthetic sorbents.
41. Principles for the classification of irritants. Mechanism of action. Effects on the skin and mucous membranes. Indications for use.
42. The principles of classification of drugs for general anesthesia.  
History of the discovery of drugs for general anesthesia.
43. Types of general anesthesia. Requirements for drugs for general anesthesia. Theories of anesthesia.  
The principles of classification of drugs for inhalation general anesthesia. Comparative characteristics of drugs, side effects. The combined use of drugs for general anesthesia with drugs of other pharmacological groups.
44. The principles of classification of drugs for non-inhalation general anesthesia. Comparative characteristics of drugs.
45. The concept of sedation, induction, basic, and combined general anesthesia.  
Pharmacology and toxicology of ethyl alcohol, use in clinical practice.
46. Acute and chronic alcohol poisonings, relief measures. The principle of the alcoholism treatment.
47. Opiate analgesics. Classification by chemical structure, origin and affinity for opiate receptors.  
mechanism of action
48. Pharmacology of morphine hydrochloride. Features of the effect of the drug on the central nervous system. Comparative characteristics of opiate analgesics. Indications for use. Side effects.
49. Acute poisoning with opiate analgesics. Clinical manifestations and measures of assistance.  
Drug dependence arising in opiate analgesics, clinical manifestations. The concept of withdrawal symptoms, treatment methods.
50. Non-opiate analgesics. Classification principles, general characteristics of the group. Mechanisms of action. Pharmacological characteristics of drugs.
51. Comparative characteristics of non-opiate analgesic drugs, side effects.
52. Principles for the classification of psychotropic drugs.
53. Antipsychotics. The principles of classification. The mechanism of their antipsychotic action.  
Pharmacological effects of chlorpromazine.
54. Comparative characteristics of antipsychotic drugs, indications for use, side effects of antipsychotics. Combined use with the drugs of other pharmacological groups.  
The concept of neuroleptanalgesia.
55. Pharmacology of tranquilizers. Classification. The mechanism of tranquilizing effects, concepts of benzodiazepine receptors.
56. Comparative characteristics of tranquilizer preparations.
57. Indications and contraindications for the use of tranquilizers, side effects. Drug addiction.
58. The combined use of tranquilizers with drugs of other pharmacological groups. The concept of ataralgesia.
59. The principles of classification of hypnotics. General characteristics of hypnotics, possible mechanisms of action.
60. Comparative characteristics of hypnotics of various groups. Indications for use, side effects. Acute poisoning with barbiturates, relief measures.

61. The principles of classification of sedatives.
62. Pharmacology of bromides. Indications for use. Side effects.
63. Bromism, its clinical signs, treatment and prevention.
64. Herbal sedative medicines.
65. Pharmacology of normotimics. Pharmacokinetics and pharmacodynamics, indications for use. Side effects. Acute poisoning with lithium preparations.
66. Antiepileptic drugs. Classification principles, comparative characteristics, side effects of antiepileptic drugs.
67. Antiparkinsonian drugs. Classification. The main mechanisms of action. Use in clinical practice. Psychomotor stimulants. General characteristics of the group of psychostimulants. Sodium caffeine benzoate. Pharmacokinetics and pharmacodynamics, indications for use, side effects.
68. The concept of psychodysleptics and amphetamines. Formation of dependence, social significance. Pharmacology of antidepressants. Classification of antidepressants by the mechanism of action and chemical structure. Comparative characteristics. Side effects of antidepressants.
69. Classification of nootropic drugs. Possible mechanisms of action. Indications for use. Pharmacological characteristics of the drugs.
70. Adaptogens and actoprotectors. Indications for use. The main properties of the preparations, comparative characteristics.
71. Pharmacology of analeptics. Classification, characteristics of drugs, indications for use. Current clinical classification of antihypertensive agents.
72. Pharmacological characteristics of antihypertensive drugs of the main and additional groups. The principles of the combination of antihypertensive drugs. Comparative pharmacological characteristics of these groups, the rate of development of the hypotensive effect.
73. Medicinal care for hypertensive crisis.
74. Hypolipidemic drugs. General pharmacological characteristics of lipid-lowering drugs, the direction of action.
75. The concept of angioprotectors. Pharmacokinetics and pharmacodynamics of drugs.
76. Classification of antiarrhythmic drugs. Pharmacological characteristics. Comparative characteristics, indications for the use of antiarrhythmic drugs.
77. Classification of inotropic drugs. Pharmacokinetics and pharmacodynamics, indications and contraindications for the use of cardiac glycosides. Side effects of cardiac glycosides. Acute and chronic cardiac glycoside poisoning, relief measures and prevention.
78. Pharmacological characteristics of non-glycoside inotropic agents. Indications for use. Classification and general pharmacological characteristics of antianginal drugs.
79. Pharmacokinetics and pharmacodynamics of nitroglycerin, side effects. The mechanism of action and characteristics of calcium channel blockers (calcium antagonists). Pharmacological characteristics of the drugs.
80. Features of the use of  $\beta$ -blockers in the treatment of patients with coronary heart disease. Vasodilating agents of myotropic action, reflex type of action and energy-supplying agents. Indications and contraindications for use, side effects.
81. The principles of complex therapy of myocardial infarction. General characteristics of pharmacological groups. Indications and contraindications for use. Antitussive drugs. Classification, characteristics of drugs. Side effects.
82. Expectorant medicines. Classification. Pharmacokinetics and pharmacodynamics, side effects of expectorants.
83. Stimulants of the surfactant synthesis. General characteristics of surfactant synthesis stimulants. Classification of bronchodilator drugs. General characteristics of drugs. Medicines used in pulmonary edema. The tactics of assisting with pulmonary edema, the choice of drugs.
84. Classification of drugs that affect appetite. General pharmacological characteristics of the drugs. Emetic drugs. The mechanism of action and application features.
85. Pharmacological characteristics of antiemetics. Indications for use, side effects.

86. Classification of drugs used for violations of the function of the gastric glands.
87. General pharmacological characteristics of agents that stimulate the secretion of the glands of the stomach and are used for the diagnosis and replacement therapy.
88. Classification and general pharmacological characteristics of agents that inhibit the secretion of gastric glands.
89. Pharmacological treatments for gastric ulcer, duodenal ulcer and hyperacidic gastritis. Pharmacological characteristics of H<sub>2</sub>-receptor blockers, M-anticholinergics and proton pump blockers.
90. General pharmacological characteristics of drugs that reduce the increased acidity of gastric juice. The concept of gastroprotectives. General pharmacological characteristics of the drugs.
91. Medicines influencing the excretory function of the pancreas. Indications for use. Chologogue drugs. Classification. General characteristics. Indications for use. Hepatoprotectors and cholelitholytic drugs. Indications for use.
92. Classification of laxatives. Pharmacokinetics, pharmacodynamics of drugs, indications for use. General characteristics of drugs with antidiarrheal effect.
93. Classification of diuretic drugs. Pharmacokinetics and pharmacodynamics, indications for use, side effects.
94. The concept of forced diuresis.
95. Classification of anti-gout medications. General characteristics of drugs, side effects.
96. Classification and pharmacological characteristics of drugs that affect the activity of the myometrium (uterotonics, tocolytics).
97. Pharmacological characteristics of drugs that affect reproductive processes.
98. Classification of drugs that affect hematopoiesis and hemostasis.
99. Classification of drugs used for the prevention and treatment of thrombosis. General characteristics.
100. Classification of anticoagulants. Pharmacokinetics, pharmacodynamics of drugs, indications and contraindications for use. Side effects.
101. General characteristics of fibrinolytic agents. Indications for use. Side effects.
102. Classification of coagulants. Pharmacokinetics, pharmacodynamics, indications for the use of coagulant preparations.
103. Medicines that stimulate erythropoiesis. Pharmacokinetics, pharmacodynamics, indications for use, side effects.
104. Medicines that affect leukopoiesis. The mechanism of action of leukopoiesis stimulants. Indications for use.
105. General characteristics of drugs that inhibit leukopoiesis. Indications for use, side effects. Antitumor (anticancer) drugs. Classification and general characteristics of antitumor agents.
106. The concept of radioisotope drugs, indications for use, side effects. Pharmacotherapy with vitamin preparations and its types.
107. Classification of vitamin preparations by solubility and biological role. Characterization of water-soluble vitamin preparations. Indications for use, side effects.
108. The concept of bioflavonoids, coenzyme preparations. General characteristics of fat-soluble vitamin preparations. Indications and contraindications for use. Side effects of fat-soluble vitamin preparations.
109. Multivitamin preparations.
110. The concept of anti-vitamins.
111. Classification of enzyme preparations. The mechanism of action and indications for use.
112. Combined enzyme preparations. Indications for their use.
113. Pharmacological characteristics of enzyme and anti-enzyme drugs.
114. The mechanism of action and indications for the use of peptidases, proteases, nucleases, hyaluronidase preparations and enzyme inhibitors.
115. General characteristics of enzyme inhibitors. Classification. Indications and contraindications for use.
116. Hormonal drugs of the hypothalamus and pituitary gland.
117. The mechanism of action of corticotropin, indications for use, side effects. Synthetic analogues of

corticotropin.

118. Pharmacological characteristics of gonadotropin hormonal drugs.

119. Pharmacological preparations of the posterior pituitary gland. Indications for use.

Pharmacology of hormonal thyroid preparations. Antithyroid drugs. Indications and contraindications for use, side effects.

120. Calcitonin preparations. Indications for use.

121. Hypoglycemic drugs. Classification of hypoglycemic agents.

Pharmacokinetics, pharmacodynamics, indications and contraindications for the use of insulin. Side effect. Features of the use in hyperglycemic coma.

122. An overdose of insulin, help with hypoglycemic coma.

Long-acting insulin preparations.

123. Synthetic antidiabetic drugs. Classification, mechanism of action, indications for use.

124. Comparative characteristics, side effects.

Hormonal preparations of glucocorticoids. Pharmacological effects, indications, contraindications, dosage regimen. Comparative characteristics.

125. Side effects of glucocorticoids.

Gonadal hormones. Classification of gonadal hormones. General characteristics of female gonadal hormones.

126. The mechanism of action and indications for the use of estrogens, anti-estrogen drugs, gestagen drugs, anti-gestagen drugs.

Side effects of drugs of female gonadal hormones and their antagonists.

127. Contraceptive drugs. Classification, principles of combination, indications and contraindications for use, side effects. Comparative characteristics of contraceptive drugs.

Preparations of male gonadal hormones. Pharmacological characteristics. Indications for use, side effects.

128. Antagonists of androgen hormones.

Anti-allergic drugs.

129. Classification and general characteristics of anti-allergic drugs.

Medicines used for immediate hypersensitivity.

130. Pharmacology of antihistamines - H1 receptor blockers (diphenhydramine, suprastin, phencarol, diazolin, loratadine, diprazine, desloratidine).

131. Indications for use of cromolyn sodium, ketotifen.

132. Principles of relief from anaphylactic shock. Medicines used for delayed hypersensitivity.

Pharmacology of immunosuppressants (cytostatic drugs, glucocorticoids).

133. Medicines that affect the immune processes.

134. Medicines that affect the immune system.

135. Classification of immunity stimulants.

136. Pharmacology of thymus preparations (thymalin), leukopoiesis stimulants (sodium nucleinate, methyluracil), interferons and vaccines.

137. Immunosuppressive drugs (antimetabolites, alkylating compounds, glucocorticoids, enzyme preparations). Indications for use, side effects.

138. Requirements for modern antiseptic agents.

139. Classification and pharmacological characteristics of antiseptic drugs.

140. The mechanism of action of halogens and halogen-containing compounds. Indications for use, side effects. Acute poisoning and relief measures.

141. The mechanism of action, indications for the use of oxidizing agents. Comparative characteristics of drugs.

142. Preparations of acids and alkalis. Local and resorptive action of acids and alkalis. Antiseptic effect of acids and alkalis. Indications for use. Acute poisoning by acids and alkalis. Help measures.

143. Pharmacology of preparations of heavy metal salts. Mechanism of action. Side effects of drugs of salts of heavy metals. Acute poisoning. Help with acute poisoning with salts of heavy metals, the principles of antidote therapy.

144. Pharmacology of aromatic antiseptics. The mechanism of action of phenol group drugs. Side effects. Acute phenol poisoning, help.

145. The mechanism of action of nitrofurantoin derivatives, indications and contraindications for use. Comparative characteristics of drugs.
146. The mechanism of the antimicrobial action of dye preparations. Pharmacological characteristics of drugs. Indications for use.
147. Antiseptics - derivatives of the aliphatic series. Pharmacokinetics, pharmacodynamics of formaldehyde. Side effect.  
The mechanism of the antimicrobial action of ethyl alcohol.
148. Pharmacology of surface-active substances. The mechanism of action, indications for the use of detergents.
149. Sulfonamide preparations. Classification. Pharmacokinetics and pharmacodynamics of sulfonamides. Indications for use. Side effects and ways to prevent them. Comparative characteristics of drugs. Combined preparations of sulfonamides.
150. Synthetic antimicrobial drugs. Quinoline derivatives. Classification, mechanism of action, indications for use, side effects. Characterization of drugs.  
Feature of the use in medical practice of fluoroquinolone derivatives.
151. Antifungal (antimycotic) drugs. Classification.  
Pharmacological characteristics of antibiotics of polyene structure and antifungal drugs of other groups. Indications for use, side effects.
152. The concept of antibiosis, the spectrum of action of antibiotics. The principles of antibiotic therapy.
153. Classifications of antibiotics by chemical structure, spectrum and mechanism of action.
154. Classification and pharmacological characteristics of penicillin antibiotics. The mechanism of the spectrum and duration of action.
155. Classification and pharmacological characteristics of the antibiotics of the cephalosporin group. The mechanism and spectrum of action of drugs. Indications for use. Side effect.
156. Antibiotics of the macrolide and azalide group. General characteristics, mechanism and spectrum of action, indications for use, side effects.
157. Antibiotics of the tetracycline group. Pharmacokinetics, mechanism and spectrum of action, indications and contraindications for use, side effects and their prevention.
158. Antibiotics of the chloramphenicol group. The mechanism of action and spectrum of action, indications for use, side effects.
159. Pharmacology of aminoglycoside preparations, classification. Comparative characteristics, mechanism of action, indications and contraindications for use, side effects.
160. Antibiotics of the cyclic polypeptide group (polymyxins). The mechanism and spectrum of action, indications for use, route of administration, side effects.
161. Classification of drugs used to treat tuberculosis.
162. Pharmacokinetics, pharmacodynamics of derivatives of isonicotinic acid hydrazide. Side effects that occur with prolonged use and ways to prevent them.
163. Pharmacological characteristics of rifampicin. Features of long-term use.
164. Pharmacological characteristics of anti-TB drugs of various chemical groups. Side effects.  
Antiviral drugs. Classification.
165. The pharmacological characteristics of the drugs which are prescribed for patients with influenza. Features of the application.
166. Medicines used for herpetic infection.  
The possibilities of using antiviral agents in the complex treatment of AIDS patients.
167. Classification of antisyphilitic drugs. General characteristics of antisyphilitic drugs.  
Features of the use of antibiotics, bismuth preparations in the treatment of syphilis.
168. Classification of antiprotozoal drugs.
169. Antimalarial medicines. Basic principles for the prevention and treatment of malaria.
170. Classification of antimalarial drugs. Mechanism of action.
171. Medication for malaria coma.
172. Medicines used to treat trichomoniasis. Pharmacokinetics, pharmacodynamics of metronidazole. Indications for use and side effects.
173. Medicines for the treatment of Chlamydia infection.

174. Classification of anti-amoebic drugs. Pharmacological characteristics of drugs.
175. Medicines for the treatment of patients with giardiasis.
176. Medicines used to treat patients with toxoplasmosis.
177. Anthelmintic drugs. Classification of anthelmintic drugs. Features of use for various types of helminthiasis.
178. Pharmacological characteristics of the drugs used to treat intestinal helminthiasis.
179. Medicines used for extraintestinal helminthiasis.
180. Pharmacological characteristics of macro- and micronutrient preparations.
181. Sodium preparations. Pharmacological characteristics and indications for use.
182. Potassium preparations. Pharmacodynamics, indications for use.
183. Magnesium preparations. Pharmacokinetics, pharmacodynamics. The dependence of the effect on the route of administration. Indications for use.
184. Calcium preparations. Pharmacological effects, indications for use, route of administration.
185. Plasma replacing fluids. Classification. General characteristics of plasma substitutes. Indications for use.
186. Preparations for parenteral nutrition.
187. Causes and symptoms of acute poisoning with drugs of various pharmacological groups. Methods of active detoxification.
188. The concept of antidotes. Types of antidote therapy. Pharmacological characteristics of the main antidotes.
189. Principles of symptomatic therapy of acute poisoning.
190. The basic principles of pharmacotherapy of acute emergency conditions. Preparations for the treatment of emergency conditions, principles of their action and route of administration.

#### **The list of practical skills required for the semester final assessment**

1. To be able to draw up a recipe and make prescription.
2. To be able to make calculations of concentrations of drugs based on a single dose for adults and children of different ages.
3. To be able to prescribe different dosage forms in prescriptions.
4. To be able to prescribe drugs in prescriptions for the corresponding pathological conditions in adults and children based on the characteristics of the pharmacodynamics and pharmacokinetics of drugs.
5. To be able to write prescriptions for medicines that are widely used in therapy and pediatrics and emergency care.
6. To be able to predict the dependence of the action of drugs on the individual characteristics of the body of adults and children.
7. To be able to conduct a pharmacological experiment.

#### **The form of final control of academic performance - Exam (Semester final certification)**

##### **The system of continuous and final control**

When assessing the mastery of each module topic, student is graded by a 4-point (traditional) scale using developed standardized generalized criteria for assessing students' knowledge for the discipline. This takes into account all types of work provided by the guidelines for the study of topics.

**Table 1. Standardized generalized criteria for grading the knowledge of higher education students in PSMU**

| A 4-point scale | Grades in ECTS | Grades criteria |
|-----------------|----------------|-----------------|
|-----------------|----------------|-----------------|

|                  |    |                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5 (outstanding)  | A  | Student shows special creative abilities, is able to acquire knowledge independently, finds and processes necessary information, is able to use the acquired knowledge and skills for making decisions in unusual situations, makes convincing answers, independently reveals own talents and inclinations, possesses not less than 90% of knowledge on the topic both during the survey and all types of control. |
| 4 (good)         | B  | Student is fluent in the studied amount of material, applies it in practice, freely solves exercises and problems in standardized situations, independently corrects errors, the number of which is insignificant, has at least 85% knowledge of the topic both during survey and all types of control.                                                                                                            |
|                  | C  | Student is able to compare, summarize and systematize information under the guidance of a teacher, independently applies it in practice, to control his/her own activities; corrects mistakes, chooses arguments to confirm opinions, has at least 75% knowledge of the topic both during survey and all types of control.                                                                                         |
| 3 (pass)         | D  | Student reproduces a significant part of theoretical material, shows knowledge and understanding of basic provisions with the help of a teacher, can analyze educational material, correct mistakes, has at least 65% knowledge of the topic both during survey and all types of control.                                                                                                                          |
|                  | E  | Student has the educational material at a level higher than initial, a significant part of it reproduces at the reproductive level, has at least 60% knowledge of the topic both during survey and all types of control.                                                                                                                                                                                           |
| 2 (insufficient) | FX | Student knows material at the level of individual fragments that make up a small part of the material, has less than 60% knowledge of the topic both during survey and all types of control.                                                                                                                                                                                                                       |
|                  | F  | Student knows material at the level of elementary recognition and reproduction of individual facts, elements, has less than 60% knowledge of the topic both during survey and all types of control.                                                                                                                                                                                                                |

Grades conversion by traditional 4-point scale into multi-point (maximum score - 120 points) - conversion of total grade for the module – is carried out only after the final lesson, which precedes a final certification. Conversion is performed according to the following algorithm (table 2):

- calculate the average student's grade by traditional 4-point scale, obtained during the final classes which belongs to this module (up to 0,01);
- obtain a converted multi-point total grade for the module; the average grade obtained by traditional 4-point scale must be multiplied by a factor of 24. Exceptions are cases where the average score by traditional 4-point scale is 2. In this case, the student receives 0 points on a multi-point scale;
- an average grade is calculated on the total number of classes in the module, and not on the actual number of students attended.

The minimum convertible sum of grades for the module is 72 points.

Retake of unsatisfactory grade takes place at the department; the number of attempts is not limited. Retake of unsatisfactory grades begins two weeks before the end of semester and is carried out

if the student's average score from the module is less than 3.0.

**Table 2. Unified table of grades, FMC grades, examination, and the traditional 4-point grades accordance**

| Average grade (A) | Average grade on module (A*24) | FMC grade (A*16) | Grades for module/exam (A*24 + A*16) | ECTS category | 4-point scale     |   |           |
|-------------------|--------------------------------|------------------|--------------------------------------|---------------|-------------------|---|-----------|
| 2                 | 48                             | 32               | 80                                   | F FX          | 2<br>insufficient |   |           |
| 2,1               | 50                             | 34               | 84                                   |               |                   |   |           |
| 2,15              | 52                             | 34               | 86                                   |               |                   |   |           |
| 2,2               | 53                             | 35               | 88                                   |               |                   |   |           |
| 2,25              | 54                             | 36               | 90                                   |               |                   |   |           |
| 2,3               | 55                             | 37               | 92                                   |               |                   |   |           |
| 2,35              | 56                             | 38               | 94                                   |               |                   |   |           |
| 2,4               | 58                             | 38               | 96                                   |               |                   |   |           |
| 2,45              | 59                             | 39               | 98                                   |               |                   |   |           |
| 2,5               | 60                             | 40               | 100                                  |               |                   |   |           |
| 2,55              | 61                             | 41               | 102                                  |               |                   |   |           |
| 2,6               | 62                             | 42               | 104                                  |               |                   |   |           |
| 2,65              | 64                             | 42               | 106                                  |               |                   |   |           |
| 2,7               | 65                             | 43               | 108                                  |               |                   |   |           |
| 2,75              | 66                             | 44               | 110                                  |               |                   |   |           |
| 2,8               | 67                             | 45               | 112                                  |               |                   |   |           |
| 2,85              | 68                             | 46               | 114                                  |               |                   |   |           |
| 2,9               | 70                             | 46               | 116                                  |               |                   |   |           |
| 2,95              | 71                             | 47               | 118                                  |               |                   |   |           |
| 3                 | 72                             | 50               | 122                                  |               |                   | E | 3<br>pass |
| 3,05              | 73                             | 50               | 123                                  |               |                   |   |           |
| 3,1               | 74                             | 50               | 124                                  |               |                   |   |           |
| 3,15              | 76                             | 50               | 126                                  |               |                   |   |           |
| 3,2               | 77                             | 51               | 128                                  |               |                   |   |           |
| 3,25              | 78                             | 52               | 130                                  | D             | 4<br>good         |   |           |
| 3,3               | 79                             | 53               | 132                                  |               |                   |   |           |
| 3,35              | 80                             | 54               | 134                                  |               |                   |   |           |
| 3,4               | 82                             | 54               | 136                                  |               |                   |   |           |
| 3,45              | 83                             | 55               | 138                                  |               |                   |   |           |
| 3,5               | 84                             | 56               | 140                                  | C             |                   |   |           |
| 3,55              | 85                             | 57               | 142                                  |               |                   |   |           |
| 3,6               | 86                             | 58               | 144                                  |               |                   |   |           |
| 3,65              | 88                             | 58               | 146                                  |               |                   |   |           |
| 3,7               | 89                             | 59               | 148                                  |               |                   |   |           |
| 3,75              | 90                             | 60               | 150                                  |               |                   |   |           |
| 3,8               | 91                             | 61               | 152                                  |               |                   |   |           |
| 3,85              | 92                             | 62               | 154                                  |               |                   |   |           |
| 3,9               | 94                             | 62               | 156                                  |               |                   |   |           |

|      |     |    |     |          |                          |
|------|-----|----|-----|----------|--------------------------|
| 3,95 | 95  | 63 | 158 | <b>B</b> |                          |
| 4    | 96  | 64 | 160 |          |                          |
| 4,05 | 97  | 65 | 162 |          |                          |
| 4,1  | 98  | 66 | 164 |          |                          |
| 4,15 | 100 | 66 | 166 |          |                          |
| 4,2  | 101 | 67 | 168 |          |                          |
| 4,25 | 102 | 68 | 170 |          |                          |
| 4,3  | 103 | 69 | 172 |          |                          |
| 4,35 | 104 | 70 | 174 |          |                          |
| 4,4  | 106 | 70 | 176 |          |                          |
| 4,45 | 107 | 71 | 178 |          |                          |
| 4,5  | 108 | 72 | 180 | <b>A</b> | <b>5<br/>outstanding</b> |
| 4,55 | 109 | 73 | 182 |          |                          |
| 4,6  | 110 | 74 | 184 |          |                          |
| 4,65 | 112 | 74 | 186 |          |                          |
| 4,7  | 113 | 75 | 188 |          |                          |
| 4,75 | 114 | 76 | 190 |          |                          |
| 4,8  | 115 | 77 | 192 |          |                          |
| 4,85 | 116 | 78 | 194 |          |                          |
| 4,9  | 118 | 78 | 196 |          |                          |
| 4,95 | 119 | 79 | 198 |          |                          |
| 5    | 120 | 80 | 200 |          |                          |

**Examination (Semester final certification)** is carried out in one day in two stages: computer testing and theoretical component. At first stage, on the day of exam in the departments computer class, students are tested on 20 questions (in 20 minutes) from the academic base of KTE-1. Each correct answer for the test task is counted as 1 point (maximum - 20 points). The result of the computer control is not a reason for not admitting him to the theoretical part of the exam. The control of theoretical and practical training is carried out by verbal answer to the examination ticket. Each question of the examination ticket is assessed within 0-20 points.

Based on the computer control and the theoretical part of the exam, the student is given a total score from 0 to 80 points, the conversion of points into the traditional score is not carried out.

**Control of theoretical and practical training of the student during the semester final certification is carried out according to the following regulations:**

1. Computer test control (20 tests - 20 points).
2. The answer to three theoretical questions with pharmacotherapeutic tasks - 20 points each.

Student has the right to retake the exam only 2 times and only during the examination session. The result of the student's exam is recorded in the «Statement of student achievement in the discipline» and sealed with the signatures of the examiner and the head of the department.

Students who during the study of module acquired an average grade from 4.50 to 5.0 are exempt from FMC and exam and automatically (by agreement) receive a final grade according to the table 2 considering mandatory presence of the student at FMC and exam. In case of disagreement with the assessment, the specified category of students are passing FMC and exam according to the general rules.

A student who has successfully passed all the final module tests during the study of the discipline has the right to increase the grade on the traditional 4-point scale and ECTS grade only with the permission of the rector or first vice-rector only in the final year.

**Teaching methods:**

- verbal (lecture, explanation, storytelling, conversation, instruction);
- visual (observation, illustration, demonstration);
- practical (thematic discussions, brainstorming, «round table», analysis of specific situations (case method), presentations).

**Forms and methods of control:**

- oral control;
- written control;
- test control;
- programmable control;
- practical verification;
- self-control;
- self-esteem.

**Assessment forms:**

- preliminary;
- current;
- exam (final modular control).

**Methodological support:**

1. Working program of the discipline.
2. Thematic plans of lectures, practical classes.
3. Syllabus.
4. Methodical development of lectures.
5. Methodical instructions for independent work of students during preparation for a practical lesson and in class.
6. Multimedia presentations, slides.
7. Packages of tests, pharmacotherapeutic tasks and situational tasks.
8. The educational literature used in the study of the discipline.
9. Computer programs filled with test tasks from licensed tests Step-1.
10. Tables, drug collections, stands, display cabinets; materials and equipment for pharmacological experiments.

**Recommended reading**

**Basic (available at the library of PSMU):**

1. Pharmacology: textbook for English-speaking students of higher medical educational institutions [of the 4th level of accreditation with English as the language of instruction] / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina. – 4th ed., updat. – Vinnytsia: Nova Knyha, 2018. – 551 p.
2. Pharmacology: textbook / V. Bobyrov, O. Vazhnicha, T. Devyatkina, N. Devyatkina. - 5-е вид. оновл. та перероб. – Вінниця: Нова Книга, 2020. – 560 с: il.

**Supplementary**

1. Germanyuk, T. A. Modern classifications of the essential drugs : tutorial / T. A. Germanyuk, V. P. Bobruk, S. I. Tykholaz; National Pirogov Memorial Medical University (Vinnytsya). – Vinnytsia : TVORY, 2021. – 112 p.
2. Golan, D. Principles of Pharmacology : the Pathophysiologic Basis of Drug Therapy / D. E. Golan, E. J. Armstrong, A. W. Armstrong. – 4th ed. – Philadelphia [etc.] : Wolters Kluwer, 2017. – XIX, 1020 p.
3. Goodman and Gilman's the Pharmacological Basis of Therapeutics / eds.: L. L. Brunton, R. Hilal-Dandan, B. C. Knollmann. – 13th ed. – New York [etc.] : McGraw-Hill Education, 2018. – XIII, 1419 p.

4. Mosby's Dental Drug Reference / ed. A. H. Jeske. – 12th ed. – Philadelphia : Elsevier, 2018. – XVI, 1494 p.

5. USMLE. Step 1. 2018. Pharmacology: lecture notes / ed.: C. Davis, S. R. Harris; contributor: L. Kerecsen, B. R. Krishna. – New York: Kaplan Medical, 2018. – 321 p.

#### **Information resources**

1. Basic Pharmacokinetics and Pharmacodynamics: An Integrated Textbook and Computer Simulations: <http://surl.li/cobkm>

2. Lippincott Illustrated Reviews: Pharmacology Karen Whalen: <http://surl.li/cvjls>

3. Pharmacokinetics and Adverse Effects of Drugs: <http://surl.li/cobjp>

4. Antihypertensive drug: [https://en.wikipedia.org/wiki/Antihypertensive\\_drug](https://en.wikipedia.org/wiki/Antihypertensive_drug)

5. Pharmacology Anticoagulants & Antiplatelet blood thinners explained clearly by Mike Linares from: <http://homedesigningersing.com/>

6. Antimicrobial drugs: <http://surl.li/cvjly>

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