EUROPEAN MEDICAL UNIVERSITY

SYLLABUS OF THE EDUCATIONAL DISCIPLINE "PATHOMORPHOLOGY"

Cycle of Higher Education:	**second cycle of higher education (Master's degree)**
Field of Study:	**22 «Healthcare»**
Specialty:	**222 «Medicine»**
Educational qualification:	**Master of Medicine**
Professional qualification:	**doctor**

Dnipro - 2023

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1. Name, Code of the discipline and number of credits

SYLLABUS OF THE EDUCATIONAL DISCIPLINE "PHARMACOLOGY"

Cycle of Higher Education: second cycle of higher education (Master's degree)
Field of Study: 22 «Healthcare»
Specialty: 222 «Medicine» (3 course)
Educational qualification: Master of Medicine
Professional qualification: doctor
Semester: 5,6.
Number of credits ECTS (number of hours): 8 credits ECTS (240 hours).
Distribution by types of trainings and hours of study – Lectures 18 hours, Practical lessons – 111 hours, Independent work – 111 hours.

2. Time and place of educational discipline

Semester: 5, 6.
dp1funddis@dmitnm.edu.ua, 18 Titova Str.; Dnipro

3. Prerequisites and Postrequisites of educational discipline

Prerequisites: Pharmacology as a discipline which is based on the study of Latin, ethics, philosophy, ecology, medical biology, medical chemistry, biological and bioorganic chemistry, biophysics, human anatomy, pathological anatomy, physiology, pathological physiology, microbiology and integrates with these disciplines;

Postrequisites: it lays the foundations for the study of students of clinical pharmacology and pharmacotherapy and the formation of skills to apply knowledge of pharmacology in the further study of therapy, surgery, pediatrics and other clinical disciplines and in future professional activities.

4. Characteristic of the educational discipline

4.1. Purpose and definition of the educational discipline:

The purpose of the discipline "Pharmacology" involves the acquisition of theoretical knowledge and practical skills on the basic principles of substantiation of rational and safe for human health use of drugs for the treatment and prevention of diseases by each student. Achieving the goal will prepare students for practical activities, quality performance of functional responsibilities associated with the rational choice of drugs, self-preparation of pharmacotherapy regimens and further monitoring of the effectiveness and safety of pharmacotherapy, prevention of adverse reactions.

4.2. Tasks of educational "pediatrics" discipline

1) determining the group of drugs,
2) pharmacokinetics,
3) pharmacodynamics,
4) manifestations of possible side effects, symptoms of overdose, measures to prevent and promote the elimination of adverse reactions,

5) the main indications for administration,
6) interaction with other drugs,
7) acquisition of practical skills, in particular prescribing drugs in various dosage forms.

4.3. Appointment of the discipline

Competencies.

General competencies (GC):

GC 1	Ability to think abstractly, analyses and synthesize.
GC 2	Ability to learn and master modern knowledge.
CG 3	Ability to apply knowledge in practical situations.
GC 4	Knowledge and understanding of the subject area and understanding of professional activities.
GC 6	Ability to make justified decisions.
GC 10	Ability to use information and communication technologies.
GC 11	Ability to search, process and analyses information from various sources.
GC 12	Certainty and perseverance in relation to the tasks set and responsibilities assumed.

Special (professional, subject) competencies (SC):

SC 6	Ability to determine the principles and nature of treatment and prevention of diseases.
SC 23	Ability to develop and implement scientific and applied projects in the healthcare sector.
SC 24	Compliance with ethical principles when working with patients and laboratory animals.
SC 25	Compliance with professional and academic integrity, being responsible for reliability of the obtained scientific results.

Program learning outcomes (PLO):

PLO 1	Have a thorough knowledge of the structure of professional activity. Be able to carry out professional activities that require updating and integrating knowledge. Be responsible for professional development, the ability to further professional training with a high level of autonomy.
PLO 2	Understanding and knowledge of fundamental and clinical biomedical sciences at a level sufficient to solve professional problems in the field of healthcare.
PLO 3	Specialized conceptual knowledge that includes scientific achievements in the field of healthcare and is the basis for conducting research, critical understanding of problems in the field of Medicine and related interdisciplinary problems.
PLO 9	Determining the nature and principles of treatment of patients (conservative, operative) with diseases (according to list 2 takin into account the a e of the patient in the conditions of a health care institution, outside it and at the stages of medical evacuation, including in the field, on the basis of a preliminary clinical diagnosis, adhering to appropriate ethical and legal norms, by making a justified decision according to existing algorithms and standard schemes, if necessary, expand the

	standard scheme to be able to justify personalized recommendations under the supervision of a doctor-manager in a medical institution.
PLO 21	Searching for the necessary information in professional literature and databases of other sources, analyzing, evaluating and applying this information.

4.4 Content of the discipline

Lectures plan (L) – зменшити до 9 лекцій

№	Topic	Hours
1	History of pharmacology development. The state of modern pharmacology. The Law of Ukraine "On Medicines". General pharmacology.	2
2	Pharmacology of drugs affecting efferent innervation. Drugs that regulate the transmission of excitation in cholinergic and adrenergic synapses: cholinotropic and adrenotropic drugs.	2
3	Drugs for inhalation and non-inhalation anesthesia and analgesia. Local anesthetics. Pharmacology and toxicology of ethyl alcohol. Narcotic analgesics (opiates, opioids), non-steroidal anti-inflammatory drugs.	2
4	Psychotropic drugs with predominantly depressant and activating effects: sedatives, tranquilizers, neuroleptics (antipsychotics), antimanic drugs (normotimics); antiparkinsonian, antiepileptic drugs and analeptics and psychostimulants, antidepressants, nootropics and cerebroprotectors, adaptogens and actoprotectors.	2
5	Pharmacology of systemic and coronary circulation. Antihypertensive and antianginal and hypolipidemic drugs.	2
6	Cardiotonic drugs of glycoside and non-glycoside nature. Antiarrhythmic drugs.	2
7	Pharmacology of drugs for the treatment of infectious diseases. Classification of antibiotics.	2
8	Pharmacology of drugs for the treatment and prevention of parasitic diseases.	2
9	Pharmacology of drugs for emergency care in the practice of a general practitioner.	2
Total		**18**

Practical lessons plan (PL)

№	Topic	Hours
Semester: 5		

1.	The Law of Ukraine "On Medicinal Products". Introduction to the medicinal formulation. Solid dosage forms	3
2.	Introduction to pharmacology. Development of drug science and history of pharmacology. Pharmacokinetics and pharmacodynamics	3
3.	Soft and liquid dosage forms	3
4.	Propaedeutic drug formulation	3
5.	Drugs that act on the transmission of excitation in cholinergic synapses	3
6.	Drugs that affect the transmission of excitation in adrenergic synapses.	3
7.	Psychotropic drugs. Neuroleptics, tranquilizers, lithium salts, sedatives and hypnotics	3
8.	Antiepileptic and antiparkinsonian drugs. Central muscle relaxants	3
9.	Psychomotor stimulants. Nootropics and cerebrovascular agents. Antidepressants. Antimigraine drugs	3
10.	Pharmacology of pain and analgesia (narcotic analgesics).	3
11.	Pharmacology of pain and analgesia (non-narcotic analgesics).	3
12.	Drugs for inhalation and non-inhalation anesthesia.	3
13.	Local anesthetics. Pharmacology and toxicology of ethyl alcohol	3
14.	Hormonal drugs of the hypothalamus and pituitary gland. Thyroid hormones, their synthetic substitutes and antagonists. Drugs affecting phosphorus and calcium metabolism. Sex hormones	3
15	Adrenal cortical hormones, their analogs and antagonists. Pharmacology of inflammation (non-steroidal anti-inflammatory drugs. Disease-modifying antirheumatic drugs. Antigout medications)	3
16.	Drugs that affect hematopoiesis and hemocoagulation.	3
17.	Enzyme preparations and their inhibitors. Blood and plasma substitutes	3
18.	Pharmacology of allergy and immunity (leukopoiesis regulators). Pharmacology of vitamins.	3
Total of 5 semester		**54**
Semester: 6		
19.	Drug formulation. General pharmacology. Pharmacology of drugs that affect the nervous system and metabolism. Control work	3
20.	Pharmacology of the respiratory system	3
21.	Pharmacology of the digestive system	3
22.	Pharmacology of the circulatory system. Antihypertensive drugs	3
23.	Antianginal and hypolipidemic drugs. Angioprotectors	3
24.	Cardiotonic drugs of glycoside and non-glycoside nature. Antiarrhythmic drugs	3

25.	Pharmacology of drugs affecting reproductive function. Uterine drugs. Drugs used for erectile dysfunction. Prostatoprotectors	3
26.	Pharmacology of drugs affecting water and electrolyte balance, plasma substitutes and parenteral nutrition drugs. Anti-gout drugs	3
27.	Antiseptics and synthetic antimicrobial drugs	3
28.	β-Lactam and glycopeptide antibiotics.	3
29.	Pharmacology of antibiotics of the macrolides, aminoglycosides, tetracyclines, levomycetins group.	3
30.	Antituberculosis, antifungal and antitumor drugs.	3
31.	Antiviral, anthelminthic and antiprotozoal drugs	3
32.	Principles of therapy of acute drug poisoning. Antidotes. Pharmacology of emergency conditions	3
33.	Pharmacology of drugs affecting the function of organs and systems.	3
34.	Chemotherapy drugs.	3
35.	Adverse drug reactions. The main ways to prevent adverse drug reactions.	3
36.	Summar control.	3
Total of 6 semester		**57**
Total		**111**

Self-study topics

№	Topic	Hours
	Semester: 5	
1	Modern principles and methods of research of new medicines	5
2	Individual sensitivity to drugs. Idiosyncrasy. The concept of drug safety	6
3	Metabolism of drugs in the body. The role of the cytoplasmic reticulum of the liver in drug metabolism	6
4	Basic antidotes	5
5	Toxicological significance and ways to eliminate the symptoms of OPs poisoning	5
6	Drugs that affect n-cholinergic receptors. Toxicology of nicotine. Medications for the relief of smoking cessation	6
7	Drugs for inhalation anesthesia	5
8	Ethyl alcohol and drugs for the treatment of alcoholism	5
9	Antidepressants	5

Total of 5 semester		**48**
Semester: 6		
10	Adaptogens and actoprotectors	5
11	Pharmacology of normothymics and agents affecting metabolism GABA	6
12	Drugs affecting the metabolism of bone and cartilage tissue tissue metabolism.	6
13	Drugs affecting uric acid metabolism	6
14	Antacids	5
15	Hepatoprotectors	6
16	Probiotics, prebiotics and symbiotics	5
17	Pharmacology of drugs for the treatment of HIV infections	6
18	Pharmacology of chemotherapeutic drugs	6
19	Enzymes and their inhibitors.	6
20	Pharmacological control of side effects of medicines in Ukraine.	6
Total of 6 semester		**63**
Total		**111**

Practical classes provide theoretical justification of the main issues of the topic and acquiring **the following practical skills**:

Drugs that affect afferent innervation Lidocaine Ultracaine ***Cholinotropic drugs*** Atropine sulfate Neostigmine methyl sulfate (Proserine) Pilocarpine hydrochloride Suxamethonium (Dithiline) Tiotropium bromide ***Drugs that affect adrenergic synapses*** Epinephrine hydrochloride (Epinephrine hydrochloride) Phenylephrine (Mesaton) Propranolol (Anaprilin) Metoprolol	Acetylsalicylic acid Diclofenac sodium Acetaminophen (Paracetamol) Celecoxib Ibuprofen Meloxicam ***Drugs that affect the blood system*** Iron polymaltose Heparin Alteplase Warfarin Menadione (Vicasol) Calcium chloride Tranexamic acid Enoxaparin Dabigatran Protamine sulfate Clopidogrel

Salbutamol Methyldopa Reserpine Doxazosin ***Drugs that affect the CNS*** Chlorpromazine (Aminazine) Droperidol Haloperidol Risperidone Diazepam Caffeine sodium benzoate Piracetam Amitriptyline Fluoxetine Sodium valproate Levodopa + Carbidopa Nitrazepam Ketamine Lamotrigine Doxylamine (Donormil) Phenobarbital Zopiclone Morphine hydrochloride Trimeperidine (Promedol) Fentanyl Naloxone	***Hormonal drugs and their Synthetic substitutes*** Levothyroxine Insulin Glibenclamide Metformin Prednisolone Fluticasone Mercazolyl ***Enzyme preparations and enzyme inhibitors*** Pancreatin Aprotinin (Contrycal) ***Vitamin preparations, macro- and microelements*** Cyanocobalamin Retinol acetate Pyridoxine Ascorbic acid Tocopherol acetate Ergocalciferol Folic acid ***Antiallergic and immunotropic drugs*** Diphenhydramine Loratadine Levocetirizine
Drugs that affect function respiratory system Ambroxol Acetylcysteine Glaucine ***Drugs that affect function cardiovascular system*** Digoxin Dobutamine Corglycon Glycerol trinitrate (Nitroglycerin) Verapamil Amiodarone Lisinopril Enalapril Magnesium sulfate Atorvastatin Fenofibrate	***Antiseptics, Desinfectants*** Iodine solution Chlorhexidine Hydrogen peroxide Potassium permanganate ***Antibiotics, antifungal, antiviral,antiprotozoal,*** Co-trimoxazole Nifuroxazide Benzylpenicillin sodium salt Amoxicillin + clavulanic acid Doxycycline Azithromycin Ciprofloxacin Lincomycin hydrochloride Meropenem Ceftriaxone Gentamicin

Amlodipine Nifedipine Losartan ***Drugs that affect function organs of the digestive system*** Famotidine Pirenzepine Omeprazole Lactulose Loperamide Drotaverine (No-spa) Sodium picosulfate Aluminum / magnesium hydroxide (Almagel) Bisacodyl Silymarin Metoclopramide ***Drugs that affect kidney function and myometrium*** Hydrochlorothiazide Furosemide Acetazolamide Spironolactone Potassium and magnesium asparagine (Asparkam, Panangin) Allopurinol Oxytocin Carbetocin Levonorgestrel	Clarithromycin Fluconazole Isoniazid Rifampicin Interferon α Acyclovir Oseltamivir Chingamine Metronidazole Mebendazole Albendazole Ivermectin ***Antitumor drugs*** Methotrexate Tamoxifen ***Drugs of antidote therapy*** Unithiol Flumazenil Deferoxamine Naloxone

Independent work of a student provides for preparation for practical classes and final control, studying topics for independent out-of-class work, preparing abstract reports, presentations, tables. Control of learning results of topics of independent out-of-class work is carried out during the class and during final control in the discipline.

Individual work includes the study of scientific literature, preparation of reviews on the submitted topics for presentation, implementation of scientific and practical research, participation in specialized competitions, scientific and practical conferences, competitions of student scientific papers.

Calendar plans of practical classes, thematic plan of independent extracurricular work, scope and directions of individual work are published on the website of the Department.

Route for receiving materials: Website of EMU/Student/ Department of fundamental disciplines / Educational and methodological support of the Department/ Pediatrics / or follow the link Department of fundamental disciplines, discipline "Pediatrics". Materials are accessed from the student's Office 365-based corporate account.

Forms and methods of monitoring learning success

Current control in practical classes	Methods: individual oral survey, structured written works, test tasks with the choice of correct answers.
Control of mastering the thematic section of the discipline in intermediate control classes	Methods: oral or written survey, electronic testing, *methods of self-control and self-assessment*.
Final semester control	According to the regulation on control measures in EMU (regulation of EMU)
Final control of the discipline - *exam*	Methods: by exam cards in the form of an oral exam, monitoring of acquiring of practical skills (According to the Regulation on control measures in EMU(Regulation of EMU).
Tools for diagnosing learning success	Theoretical questions, tests, clinically oriented situational tasks, practical tasks, demonstration of practical skills.

5. Evaluation criteria

Knowledge assessment is carried out according to regulation on control measures in EMU (regulation of EMU).

Current control	According to the four-point system of traditional grades: 5 "Excellent", 4 "Good", 3 "Satisfactory", 2 "Unsatisfactory"
Control of practical skills	According to the four-point system of traditional grades
Exam	Based on a 200-point scale (the sum of points for the current academic activity of the student, the result of passing the exam and for successful completion of an individual task, if any) Credited: 120 to 200 points Not credited: less than 120 points (see Rating scale)
Final control for the discipline	The final control of students' academic performance is carried out after completing the study of the discipline and is implemented in the form of an exam.

Discipline assessment:	The score on the discipline is determined based on the results of assessment of current activities and is expressed using a **fourpoint scale**: ("Excellent", "Good", "Satisfactory", "Unsatisfactory"), multi-point scale and ECTS. The assessment in the discipline consists of an assessment of the current academic performance and the result of passing the exam (in points), which is set when evaluating theoretical knowledge and practical skills in accordance with the list defined by the discipline program. The number of points that the applicant scored for current academic.
	performance in the discipline is defined as the arithmetic mean of the number of points that the applicant received during the study of the discipline (practical, seminar, laboratory classes, etc.). The resulting value of the average traditional rating is converted to points according to the scale of conversion of traditional ratings to rating points. The maximum number of points is 200.

Matching grades on a 200-point scale, a 4-point (traditional) scale, and ECTS scale

On a 200-point scale	**Rating on a 4-point scale**
180–200	Excellent
140–179	Good
120–139	Satisfactory
0–119	Unsatisfactory

On a 200-point scale	**ECTS evaluation**
192–200	A
172–191	B
148–171	C
128–147	D
120–127	E
0–119	F

Discipline/course policy

The student has the right to receive high-quality educational services, access to up-to-date scientific and educational information, qualified advice during the study of the discipline and mastering practical skills. The policy of the department in the provision of Educational Services is

student-centered, based on the regulatory documents of the Ministry of Education and the Ministry of Health of Ukraine, the Charter of the EMU and the procedure for providing educational services regulated by the regulation on the organization of the educational process in the EMU and the principles of academic integrity.

Compliance with the EMUschedule, safety precautions in the classroom.
Requirements for preparing for practical classes.
Students should arrive at classes on time, without being late. A student who is more than 10 minutes late for classes is not allowed in and must work it out in accordance with the established procedure. During practical classes, the student must wear a work uniform (medical gown, cap). Students who do not have a work uniform are not allowed to attend classes. The student must follow the safety rules during practical classes and while staying in the Department's premises. When discussing theoretical issues, students should demonstrate tolerance, politeness and respect for their colleagues and the teacher; when performing practical tasks, the workplace should be kept in order and cleaned after completing practical work.

Use of mobile phones and other electronic devices. The use of mobile phones and other electronic devices in the classroom is not allowed, only during Distance Learning, provided that it is technically necessary.

Academic integrity. When studying the discipline, the student should be guided by the following regulations: on academic integrity of EMU (regulation of EMU). In case of violation of the regulations of academic integrity during the current and final controls, the student receives a grade of "2" and must work it out to the teacher in accordance with the established procedure.
Regulation on control measures in EMU (Regulation of EMU).

Skipping classes. Missed classes should be worked out in accordance with the procedure established in the regulations on control measures in the EMU (regulation of EMU) during the time determined by the work schedule (Department of fundamental disciplines) to the teacher on duty. To work out a missed lesson the student must pass a test and answer in writing or verbally the question on the topic of the lesson.

Procedure for admission to the final control in the discipline is given in the regulations on control measures and regulations on the organization of the educational process in the EMU (regulation of EMU) and regulations on control measures in the TNM DMI (regulation of EMU).

Students who do not have missed not worked out practical classes and lectures and have received an average traditional grade of at least "3" are allowed to participate in the final control.

Additional individual points. Points are awarded subject to the mandatory participation of the head, head teacher and teacher. These points are encouraging and are added once to the total score of the current academic performance and the result of passing the comprehensive exam. Their total number for one student should not exceed 10, and the final amount of points for an academic discipline should not exceed 200 points.

Individual tasks include:

1) writing essays and creating multimedia presentations with reports at meetings of the student scientific group of the department – 3 points;
2) participation in the creation of tables, graphological structure, posters on the topics of practical classes – 2 points;
3) participation in the student competition in the discipline at the First Stage – 1 point;
4) participation/prize-winner of the All-Ukrainian student competition in the discipline - 7/10 points;
5) author or co-author of abstracts/article – 2/5 points;
6) author or co-author of an oral/information stand report at a scientific conference – 6/3 points;
7) author of a student scientific paper accepted for participation or awarded by a diploma of I-III degree in the All – Ukrainian competition of student scientific papers at Stage II - 8 (participation) or 10 (diploma) points.

Resolving conflict issues. If there are misunderstandings and complaints against the teacher due to quality of educational services provided, knowledge assessment, and other conflict situations, the student must first report his/her claims to the teacher. If the conflict issue is not resolved, the student has the right to submit an appeal to the head of the department in accordance with the regulations on consideration of applications from applicants for higher education in EMU(regulation of EMU), Regulations on consideration of applications, complaints, and proposals of students in EMU (regulation of EMU), Regulations on meeting the requirements of the organization of the educational process (regulation of EMU), Regulation on the appeal of the results of the final control of knowledge of applicants for higher education in EMU(regulation of EMU), Regulations on safe educational environment in EMU (regulation of EMU).

Policy in the context of distance learning. The procedure for distance learning is regulated by regulation of EMU. The main training platforms for conducting training sessions are Microsoft Teams, Zoom. The procedure for conducting practical classes and lectures, working out and consultations during Distance Learning is published on the Department's Web page Department of fundamental disciplines. Feedback from the teacher is provided directly during the lesson and/or consultation, and is also possible via email (in case of force majeure) during working hours.

1. **Training resources**

   Educational and methodological support of the discipline is published on the website of the Department of fundamental disciplines. Consultations are held according to the consultation schedule.
2. **Schedule and distribution of groups by teacher** are published on the Department's Web page (Department of fundamental disciplines).
3. **Questions for intermediate and final control of the discipline** are published on the Department's Web page (Department of fundamental disciplines).

Questions for summary control

1. The importance of pharmacology as a fundamental discipline for the development of other disciplines and areas in medicine.
2. Stages of development of pharmacology as a science.
3. Pharmacokinetics of drugs. Ways of drug administration (enteral and parenteral, their varieties).
4. Types of absorption and their main mechanisms (active transport, passive and facilitated diffusion, filtration, pinocytosis). The concept of bioavailability and bioequivalence. Binding of drugs to blood plasma proteins and other bioligands.
5. Distribution of drugs in the body. Penetration through histohematological barriers: placental, hematoencephalic, etc. Drug deposit.
6. Biotransformation of drugs, its types. The role of cytochrome P-450.
7. Ways of excretion of drugs from the body.
8. The concept of basic pharmacokinetic parameters (bioavailability, bioequivalence, drug concentration, drug clearance, half-life, elimination constant).
9. Age features of pharmacokinetics (in children and the elderly).
10. Cholinomimetic drugs M, N-cholinomimetic drugs (*choline alfoscerate, carbacholin*). Anticholinesterase drugs. Classification. Mechanism of action, pharmacological effects, indications for use, side effects. Comparative characteristics of anticholinesterase drugs (*neostigmine methyl sulfate, galantamine hydrobromide, pyridostigmine bromide, physostigmine salicylate*).
11. Drugs that affect adrenergic innervation. Modern ideas about adrenergic receptors, their types and localization.
12. Classification of drugs that affect adrenergic innervation. Adrenomimetic drugs. Pharmacological characteristics of adrenomimetics. Pharmacokinetics, pharmacodynamics of *epinephrine hydrochloride*. Indications for use. Comparative characteristics of adrenomimetics

(*norepinephrine hydrotartrate, ephedrine hydrochloride, phenylephrine, naphazoline, xylometazoline, oxymetazoline, isoproteronol, salbutamol, fenoterol, hexoprenaline, dobutamine*). Beta-3-adrenomimetics. Pharmacology of *mirabegron*.

13. Psychotropic drugs. Classification of neuroleptics by chemical structure. The concept of «typical» and «atypical» neuroleptics. Mechanism of antipsychotic action. Pharmacodynamics and comparative characteristics of *chlorpromazine (aminazine), fluphenazine, chlorprothixene, haloperidol, droperidol, sulpiride, clozapine, risperidone, sertindole*. Comparative characteristics, indications for use. Side effects of neuroleptics. Combined use with drugs of other pharmacological groups. The concept of neuroleptanalgesia.

14. Normotimics (*lithium preparations - lithium hydroglutamate*). Pharmacokinetics and pharmacodynamics, indications for use. Side effects. Acute poisoning by lithium drugs. Help in case of poisoning.

15. Tranquilizers. Classification of tranquilizers. The mechanism of tranquilizing action, the concept of benzodiazepine receptors. Pharmacology of *chlordiazepoxide, diazepam (sibazone), phenazepam*. Comparative characteristic. Daytime tranquilizers (*gidazepam*). The concept of atypical tranquilizers (*buspirone, hydroxyzine*). Indications and contraindications to the use of tranquilizers, their side effects. Drug addiction. Combined use with drugs of other pharmacological groups. The concept of ataralgesia. Acute tranquilizer poisoning, relief measures. Benzodiazepine receptor antagonists (*flumazenil*).

16. Analgesic drugs. General characteristics of analgesics. Ways to eliminate pain.

17. 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 pharmacokinetics and drug effect on the CNS. *Omnopon, codeine phosphate, trimeperidine (promedol), fentanyl, tramadol.* Comparative characteristic. The concept of synergistic antagonists (*buprenorphine, nalbuphine, nalorphine hydrochloride, pentazocine*). Indications for the use of analgesics. Side effects.

18. Ways of pharmacological correction of high blood pressure. Modern clinical and pharmacological classification of antihypertensive drugs.

19. Pharmacological characteristics of antihypertensive drugs of the main group. Pharmacology of β-blockers - *propranolol (anaprilin), atenolol, metoprolol, nebivolol*; ACE inhibitors: *captopril, enalapril, lisinopril*; angiotensin II receptor blockers (*losartan, valsartan*); calcium antagonists (*nifedipine, amlodipine, verapamil*); diuretics (*dihydrochlorothiazide, indapamide, spironaloctone*).

20. Classification and general pharmacological characteristics of antianginal drugs.

21. Pharmacokinetics and pharmacodynamics of glyceryl trinitrate (*nitroglycerin*), side effects. Pharmacological characteristics of drugs - nitrovasodilators (*isosorbide mononitrate, isosorbide dinitrate*).

22. The mechanism of action of calcium channel blockers (*calcium antagonists*). Pharmacological characteristics of *verapamil, amlodipine*. Features of use in the treatment of patients with coronary heart disease β-blockers (*propanolol, atenolol, metoprolol*), *amiodarone*, vasodilators of myotropic action (*dipyridamole*), antiplatelet agents (*acetylsalicylic acid*), energy-supplying drugs. Indications and contraindications to use, side effects. Drugs of other pharmacological groups: *ivabradine* and *ranolazine*.

23. Diuretics. Classification of diuretics by chemical structure, localization of effect, activity and mechanism of action. Pharmacokinetics and pharmacodynamics of *acetazolamide, furosemide, torasemide, hydrochlorothiazide*. Indications for use, side effects.

24. Pharmacological characteristics of drugs that provide potassium retention in the body - *spironolactone, triamterene*.

25. Osmotic diuretics (*mannitol*). Indications for use. Side effect.

26. General characteristics of hormonal drugs. Classification of hormonal drugs by origin. Mechanisms of action of hormonal drugs. The main areas of application.
27. Hormonal drugs of the pituitary gland and hypothalamus (*desmopressin, oreotide, somatotropin*).
28. Drugs used in diseases of the thyroid gland: thyroid hormones (*levothyroxine*); antithyroid drugs (*thiamazole*). Pharmacology of iodine-containing drugs (*potassium iodide*). Indications and contraindications to use, side effects.
29. Anti-inflammatory drugs. Classification. The main focus of the action.
30. Pharmacology of nonsteroidal anti-inflammatory drugs and comparative characteristics of drugs (*acetylsalicylic acid, mefenamic acid, ketorolac, indomethacin, diclofenac sodium, ibuprofen, naproxen, dexketoprofen, meloxicam, celecoxib, nimesulide*) and anti-inflammatory action. Side effects of drugs and measures to prevent them.
31. Classification of drugs that affect hematopoiesis. General characteristics of drugs that affect hematopoiesis. Stimulators of erythropoiesis. Classification and general characteristics. Indications for use. Drugs used in hypochromic anemia. Pharmacokinetics, pharmacodynamics of iron preparations (*iron (II) sulfate, iron (III) hydroxide polymaltose*). Acute iron poisoning and relief measures (*deferoxamine*).
32. General characteristics and mechanisms of action of agents that reduce platelet aggregation (*acetylsalicylic acid, dipyridamole, clopidogrel, eptifibatide, ticagrelor*).
33. Pharmacology of desensitizing and antiallergic drugs. General characteristics of topical anti-inflammatory drugs (*beclomethasone, budesonide, fluticasone*); combined drugs (*seretide*); mast cell stabilizers (*cromoglycic acid, nedocromil, ketotifen*), leukotriene receptor blockers (*montelukast*); monoclonal antibody drugs (*omalizumab*) and antihistamines - blockers of histamine H_1-receptors (*diphenhydramine, loratadine, desloratadine*).
34. Vitamin therapy and its types. Classification of vitamin preparations.
35. Antiseptic and disinfectant drugs. The concept of antiseptics and disinfection. History of antiseptic use. Requirements for modern antiseptics. Classification of antiseptics and disinfectants by chemical structure.
36. The concept of antibiosis, 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.
37. Anti-tuberculosis drugs. Basic principles of treatment and prevention of tuberculosis. Pharmacology of first-line drugs used to treat tuberculosis. Pharmacokinetics, pharmacodynamics of isonicotinic acid hydrazide derivatives (*isoniazid*), side effects that occur with prolonged use and ways to prevent them. Pharmacological characteristics of other first-line drugs: *rifampicin, ethambutol, pyrazinamide*. Features of long application. Pharmacological characteristics of injectable anti-TB drugs (second group): *kanamycin, streptomycin, amikacin, capreomycin* and fluoroquinolones (third group): *ciprofloxacin, ofloxacin, moxifloxacin, gatifloxacin*. Bacteriostatic anti-tuberculosis drugs of the II series: *cycloserine, prothionamide, sodium para-aminosalicylate*. Reserve accidents of the third row. (fifth group) - *bedaquiline, delamanide*. Side effects.
38. Antiviral drugs. Classification of antiviral drugs by mechanism of action and indications for use. Pharmacological characteristics of drugs prescribed to patients with influenza (*rimantadine, oseltamevir*). Drugs for the treatment of HIV infection - reverse transcriptase inhibitors: *zidovudine, tenofovir, nevirapine*; protease inhibitors: *indinavir*. Features of application. Medicines used for herpes infections (*acyclovir*). Pharmacology of drugs used to treat HCV (*peginterferon, ribavirin*).

39. Antifungal (antifungal) drugs. Classification of antifungal drugs by origin and purpose. Pharmacological characteristics of *nystatin, amphotericin B, ketoconazole, clotrimazole, itraconazole, fluconazole*. Indications for use, side effects.

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Basic

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Additional

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Electronic resources:

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3. www.drugs.com
4. www.pubmed.com