The Ministry of Health of Ukraine
Bogomolets National Medical University

METHODICAL RECOMMENDATIONS
to lectures

Academic discipline	Pharmacology
Field of knowledge	22 “Health care”
Specialty	226 “Pharmacy. Industrial pharmacy”
Specialization	226.01 “Pharmacy”
Form of education	Full-time study
Department	Pharmacology

Approved at the Department of Pharmacology meeting
on August 26, 2024, protocol № 1

Head of the Department _____ prof. G.V. Zaychenko

Reviewed and approved by the CMC of specialty 226 “Pharmacy, Industrial Pharmacy” meeting on August 30, 2024, protocol № 1

2024-2025 a. y.

CONTENT

Lecture № 1. Stages of medicines elaboration and development. Drug life circle. Regulatory and legal aspects of medicines turnover in Ukraine and the world. General pharmacology. Pharmacokinetics of medicines. Pharmacodynamics of medicines. Main mechanisms of pharmacodynamics implementation.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**
  1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
  2. Ability to communicate in the state language both orally and in writing (GC03).
  3. Ability to communicate in a foreign language (GC04).
  4. Ability to work in a team (GC06).
  5. Ability to use information and communication technologies (GC09).
  6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).
- **special (professional, subject):**
  1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
  2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
  3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
  4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
  5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
  6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form a systematic understanding of the significance of medicines for the healthcare system, the stages of development and implementation of medicinal products; the lifecycle of medicinal products; regulatory and legal aspects of medicinal product circulation in Ukraine and globally;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. To understand the importance of medicines for the healthcare system and the preservation of people's lifespan and quality of life.
2. To understand the role and importance of the discipline "Pharmacology" in developing the competencies of a modern pharmacist.
3. To envision the process of developing and implementing new medicinal products, the quality assurance system, and the lifecycle of medicines.
4. To be familiar with the regulatory acts governing medicinal product circulation in Ukraine.
5. To know the general principles of drug naming and classification.
6. To know the general rules for dispensing medicines.
7. Understand the definition of "pharmacodynamics of drugs" and pharmacological effects.
8. Identify the main targets for medicines action mechanisms, and understand the concepts of selectivity and specificity of action. Know the primary types of medicines effects on the body.
9. Distinguish between different types of pharmacotherapy.
10. Understand the definition of "pharmacokinetics of drugs" and the main stages of pharmacokinetics (ADME model).
11. Justify the routes of medicines administration based on the objectives of pharmacotherapy and the medicines form.
12. Analyze phenomena that occur with repeated and combined use of medicines.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the significance of medicines for the healthcare system, and the importance of the discipline "Pharmacology" in developing the competencies of a modern pharmacist.	Reveal the relevance of the lecture topic; familiarize students with the lecture plan.	5 minutes

Main part	1. The main regulatory and legal acts governing the circulation of medicines in Ukraine. 2. Concept of the authorized organ that conducts expertise of materials and recommends medicines for registration. 3. Concepts of medicines and dosage forms. Requirements for medicines. Types of medicines. 4. Main stages of development and implementation of medicines. 5. Rules for dispensing medicines. 6. Definition of Pharmacodynamics 7. Types of medicines effects, basic and side effects of medicines. 8. Mechanisms of medicines action. 9. Combined effects of medicines. 10. Cumulative effects, tachyphylaxis, resistance 11. Pharmacokinetics. Basic stages 12. Types of pharmaco-therapy, routes of medicines introduction	Provide information on the Law of Ukraine "On Medicines"; state reimbursement program "Affordable Medicines," "State Formulary of Medicines," "State Pharmacopoeia of Ukraine" Understand the functions, rights, and responsibilities of the State Expert Center of the Ministry of Health of Ukraine Master the concepts of "medicines" and "dosage form"; appreciate the significance of measurement in chemistry and pharmacy. Learn the stages of the medicinal product lifecycle Acquire knowledge of prescription and over-the-counter dispensing of medicines Provide knowledge on the concepts of "pharmacodynamics" and "pharmacokinetics." Know the medicines basic effects. Understand the difference between basic and side effects of medicines. Know the types of medicines combinations.	75 minutes

		Learn the main stages of pharmacokinetics. Understand the types of pharmacotherapy and routes of medicines introduction.	
Summary	Emphasize the significance of pharmacology. Understand the difference between pharmacokinetics and pharmacodynamics.	Summarize the material covered; highlight the role and main objectives of pharmacology, emphasize the importance of pharmacokinetics and pharmacodynamics in the medicines lifecycle.	5 minutes
Questions and answers	Active dialogue / discussion / debate	Clarify unclear and most complex aspects of the lecture	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 1-68, 106-151, 750-755.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 9-27.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 1-88; 1146-1155.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): http://ek.librarynmu.com/cgibin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5
2. Repository: http://ir.librarynmu.com/handle/123456789/410
3. LIKAR_NMU Page**:** https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Medical and pharmaceutical terminology.
2. Latin terms defining pharmacodynamics and pharmacokinetics
3. Functioning of organs and systems involved in the metabolism and excretion of drugs
4. Biochemical processes underlying the molecular mechanism of drug action and the essence of pharmacokinetic processes
5. Mechanisms of sensitization and allergic reactions of various types, and their clinical manifestations

Questions for preparation for exams, covering the lecture material

1. The importance of medicines for the healthcare system and the preservation of human lifespan and quality of life.
2. The place and importance of the discipline "Pharmacology" in developing the competencies of a modern pharmacist.
3. The process of developing and implementing new medicines, the quality assurance system, and the lifecycle of medicines.
4. Regulatory and legal acts governing the circulation of medicines in Ukraine.
5. General principles of medicines naming and classification.
6. General rules for dispensing medicines.
7. Instructions for medical use of medicines: structure, importance for doctors, pharmacists, and patients.
8. Concept of pharmacokinetics and the LADME model.
9. Routes of drug administration and their impact on the speed, strength, and nature of drug action.
10. Mechanisms of drug transport across biological membranes.
11. Distribution of medicines in biological fluids, organs, and tissues.
12. Drug biotransformation.
13. Excretion of medicines (elimination).
14. Significance of pharmacokinetics for clinical practice.
15. Pharmacodynamics of medicines (mechanism of action, pharmacological effect.
16. Routes of medicines administration.
17. The concept of receptors. The main types of protein receptors of medicinal substances. Transmembrane ion channels: ligand-dependent, potential-dependent, regulated by secondary messengers. Transmembrane receptors connected to G-proteins (in particular, cannabinoid receptors), with enzymatic cytoplasmic domains - receptor tyrosine kinases, tyrosine phosphatases, serine/threonine kinases, guanylate cyclases, receptors associated with tyrosine kinases. Intracellular receptors, receptors - enzymes, receptors - membrane transporters.
18. Types of drug action (pre-absorptive or local, reflex, absorptive, selective, primary and secondary, direct and indirect, reversible and irreversible). Types of pharmacotherapy.
19. Concepts of doses (single, daily, course), average therapeutic, and average lethal doses; safety indicators: therapeutic range and therapeutic index.

20. Factors affecting the pharmacological effect of medicines in the body.
21. Phenomena occurring with repeated administration of drugs: cumulative effects, tachyphylaxis, habituation, tolerance. Types of drug dependence.
22. Combined effects of medicines: synergism and antagonism (types, causes, and practical significance).
23. Characteristics of pharmacokinetics and pharmacodynamics across different age groups**.**

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 2. Medicines affecting the transmission of excitation in adrenergic synapses. Adrenergic agonists. Adrenergic antagonists.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**

1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
2. Ability to communicate in the state language both orally and in writing (GC03).
3. Ability to communicate in a foreign language (GC04).
4. Ability to work in a team (GC06).
5. Ability to use information and communication technologies (GC09).
6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).

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

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematic knowledge regarding the role of drugs affecting neurotransmission in adrenergic synapses in the treatment of various pathological conditions and diseases, including the pharmacological characteristics of

adrenergic agonists and antagonists, and the specifics of their use based on pharmacokinetics and pharmacodynamics;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. Analyze the main classifications of medicines that affect neurotransmission in adrenergic synapses.
2. Explain the pharmacological characteristics of main medicines that affect neurotransmission in adrenergic synapses based on their mechanisms of action and pharmacokinetic properties.
3. Interpret the indications of adrenergic medicines in accordance with pharmacodynamic knowledge.
4. Evaluate the benefit-risk ratio of medicines affecting adrenergic transmission in patients of different ages, with concurrent diseases, and their treatments.
5. Understand the risk of side effects appearance when using adrenergic drugs and strategies for their prevention.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. Classification of medicines affecting neurotransmission in adrenergic synapses. 2. General characteristics of medicines affecting neurotransmission in adrenergic synapses. 3. Pharmacological characteristics of medicines affecting neurotransmission in adrenergic synapses: • Pharmacokinetics • Pharmacodynamics • Indications • Side effects	• Familiarize with the general characteristics of adrenergic medicines. • Provide a classification of medicines affecting neurotransmission in adrenergic synapses. • Explain the pharmacological effects resulting from the activation or blockade of adrenergic receptors. • Provide the pharmacological	75 minutes

	• Contraindications 4. Features of modern medicines affecting neurotransmission in adrenergic synapses. 5. Prescription of medicines affecting neuro-transmission in adrenergic synapses in different clinical situations.	characteristics of medicines affecting neurotransmission in adrenergic synapses.	
Summary	Summarize the importance of medicines affecting neurotransmission in adrenergic synapses in the treatment of various diseases.	Conclude the presented material; emphasize the significance of adrenergic drugs in treating different diseases.	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh : London ; New York : Elsevier, 2020. – P. 163-174, 197-216.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 66-76.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 137-172.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): http://ek.librarynmu.com/cgibin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5
2. Repository: http://ir.librarynmu.com/
3. LIKAR_NMU Page**:** https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms that characterize neurotransmission processes.
2. Anatomy and physiology of the peripheral nervous system, classifications of adrenergic receptors, changes in the functions of effector organs under the influence of norepinephrine.
3. Biochemical mechanisms underlying the modern understanding of the molecular mechanisms of action of mediator-type drugs.
4. Mechanisms of pathological processes related to the activation or inhibition of adrenergic receptor activity (heart rate, vascular tone, bronchial ventilation, intraocular pressure, intestinal peristalsis, metabolic processes, secretion of exocrine and endocrine glands, etc.).

Questions for preparation for exams, covering the lecture material:

1. General characteristics of medicines affecting neurotransmission in adrenergic synapses.
2. Pharmacological classification of medicines affecting neurotransmission in adrenergic synapses.
3. Pharmacological characteristics of α,β-adrenergic agonists (mechanism of action, indications, side effects, contraindications).
4. Pharmacological characteristics of α-adrenergic agonists (mechanism of action, indications, side effects, contraindications, typical signs of overdose, and emergency measures for poisoning with these drugs).
5. Pharmacological characteristics of β-adrenergic agonists (mechanism of action, indications, side effects, contraindications, typical signs of overdose, and emergency measures for poisoning with these drugs).
6. Pharmacological characteristics of sympathomimetics (mechanism of action, indications, side effects, contraindications, typical signs of overdose, and emergency measures for poisoning with these drugs).
7. Pharmacological characteristics of α,β-adrenergic blockers (mechanism of action, indications, side effects, contraindications).
8. Pharmacological characteristics of α-adrenergic blockers (mechanism of action, indications, side effects, contraindications, typical signs of overdose, and emergency care for poisoning with these drugs).
9. Pharmacological characteristics of β-adrenergic blockers (mechanism of action, indications, side effects, contraindications, typical signs of overdose, and emergency care for poisoning with these drugs).
10. Pharmacological characteristics of sympatholytics (mechanism of action, indications, side effects, contraindications, typical signs of overdose, and emergency care for poisoning with these drugs).

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 3. Medicines affecting the transmission of excitation in cholinergic synapses. Cholinergic agonists. Cholinergic antagonists.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**

1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
2. Ability to communicate in the state language both orally and in writing (GC03).
3. Ability to communicate in a foreign language (GC04).
4. Ability to work in a team (GC06).
5. Ability to use information and communication technologies (GC09).
6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).

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

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematic knowledge regarding the role of drugs that affect neurotransmission in cholinergic synapses in the treatment of various pathological conditions and diseases, including the pharmacological characteristics of

cholinergic agonists and antagonists, and the specifics of their use based on pharmacokinetics and pharmacodynamics;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: Multimedia system, appropriate software.

Lecture tasks:

1. Analyze the main classifications of medicines that affect the peripheral nervous system.
2. Summarize and analyze the primary pharmacological mechanisms influencing neurotransmission processes in the autonomic nervous system.
3. Explain the pharmacological characteristics of major medicines affecting cholinergic transmission based on their mechanisms of action and pharmacokinetic properties.
4. Interpret the indications for the use of medicines in accordance with pharmacodynamic knowledge.
5. Evaluate the benefit-risk ratio of medicines affecting cholinergic transmission in patients of different ages, with concurrent diseases, and their treatments.
6. Develop an algorithm for managing patients with acute poisoning from organophosphates and anticholinesterase agents. Explain the use of antidotes in each specific case.
7. Understand the potential for side effects of medicines to prevent them effectively.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. General characteristics of neurotropic agents (N - agents acting on the nervous system). 2. Classification of medicines affecting the efferent nervous system. 3. General characteristics of medicines affecting the function of cholinergic nerves.	• Familiarize with the general characteristics of neurotropic medicines. • Provide a classification of medicines affecting the efferent nervous system. • Describe cholinergic medicines.	75 minutes

	4. Pharmacological effects arising from the stimulation and suppression of cholinergic innervation. 5. Cholinomimetic medicines. 6. Anticholinesterase medicines and cholinesterase reactivators. 7. Anticholinergic medicines. 8. Poisoning by cholinergic medicines and emergency care.	• Explain the pharmacological effects arising from the activation or blockage of cholinoreceptors. • Provide a pharmacological profile of cholinergic medicines with different mechanisms of action. • Explain the main signs of poisoning/overdose with muscarinic cholinomimetics (pilocarpine hydrochloride), muscarinic antagonists (atropine sulfate), and organophosphates (OPs). Emergency care.	
Summary	Summarize the significance of medicines affecting neurotransmission in cholinergic synapses in the comprehensive treatment of diseases of various origins.	Summarize the presented material; emphasize the importance of cholinotropic medicines in treating various diseases.	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh : London ; New York : Elsevier, 2020. – P. 163-174, 175-196.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 42-65.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 107-136.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. **Electronic Library Catalog (select guest login):** http://ek.librarynmu.com/cgibin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5
2. **Repository:** http://ir.librarynmu.com/
3. **LIKAR_NMU Page:** https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms that characterize neurotransmission processes.
2. Anatomy and physiology of the peripheral nervous system, classifications of cholinoreceptors, changes in the functions of effector organs under the influence of acetylcholine.
3. Biochemical mechanisms underlying the modern understanding of the molecular mechanisms of action of mediator-type drugs.
4. Mechanisms of pathological processes related to the activation or inhibition of cholinoreceptor activity (bronchial ventilation, heart rate, intraocular pressure, intestinal peristalsis, secretion of exocrine glands, etc.).

Questions for preparation for exams, covering the lecture material:

1. General characteristics of medicines that affect neurotransmission in cholinergic synapses.
2. Pharmacological classification of medicines that affect neurotransmission in cholinergic synapses.
3. Pharmacological characteristics of M, N-cholinomimetic medicines (mechanism of action, indications, side effects, contraindications).
4. Pharmacological characteristics of anticholinesterase medicines (mechanism of action, indications, side effects, contraindications, typical signs of overdose, and emergency measures for poisoning with these drugs).
5. Pharmacological characteristics of M-cholinomimetic medicines (mechanism of action, indications, side effects, contraindications, typical signs of overdose, and emergency measures for poisoning with these drugs).
6. Pharmacological characteristics of N-cholinomimetic medicines (mechanism of action, indications, side effects, contraindications, typical signs of overdose, and emergency measures for poisoning with these drugs).
7. Pharmacological characteristics of M, N-cholinoblockers with central action (mechanism of action, indications, side effects, contraindications).
8. Pharmacological characteristics of M-cholinoblockers (mechanism of action, indications, side effects, contraindications, typical signs of overdose, and emergency measures for poisoning with these drugs).
9. Pharmacological characteristics of medicines that inhibit the release of acetylcholine from presynaptic terminals (mechanism of action, indications, side

effects, contraindications, typical signs of overdose, and emergency care for poisoning with these drugs).

10. Pharmacological characteristics of muscle relaxants (mechanism of action, indications, side effects, contraindications, typical signs of overdose, and emergency care for poisoning with these drugs).
11. Pharmacological characteristics of ganglionic blockers (mechanism of action, indications, side effects, contraindications, typical signs of overdose, and emergency care for poisoning with these drugs).

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 4. Medicines affecting the afferent nervous system. Medicines for local anesthesia. Medicines for general anesthesia.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**

1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
2. Ability to communicate in the state language both orally and in writing (GC03).
3. Ability to communicate in a foreign language (GC04).
4. Ability to work in a team (GC06).
5. Ability to use information and communication technologies (GC09).
6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).

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

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematic knowledge regarding drugs for general and local anesthesia and drugs that affect afferent innervation, including their pharmacological characteristics, specifics of their prescription based on pharmacokinetics and pharmacodynamics, and dispensing rules;

2) educational objective – to contribute to the formation of a scientific worldview;
3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. Determine the group classification of medicines for general and local anesthesia according to current classifications.
2. Understand the pharmacodynamics of anesthetic medicines.
3. Explain the advantages and disadvantages of different methods of anesthetic management.
4. Identify potential side effects of anesthetic medicines, symptoms of overdose, and methods for their prevention and treatment.
5. Summarize and analyze the pharmacological properties of medicines affecting sensory nerve endings.
6. Justify the primary indications for prescribing anesthetic medicines and medicines affecting sensory nerve endings, and select the appropriate drug form for various clinical situations.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. What needs to be known about pain 2. General terms and definitions of analgesic medicines 3. Classification of anesthetic medicines 4. General characteristics of general anesthetic medicines 5. General characteristics of local anesthetic medicines. Indications. 6. Pharmacological characteristics of medicines affecting afferent/sensory nerve endings: adsorbents,	• Provide the concept of "pain" • Explain the classification of analgesic medicines • Clarify the pharmacological characteristics of general and local anesthetic medicines • Provide the pharmacological characteristics of medicines affecting afferent/sensory nerve endings: adsorbents, demulcents,	75 minutes

	demulcents, astringents, emollients, irritants	astringents, emollients, irritants	
Summary	Summarize the significance of general and local anesthetic medicines, as well as adsorbents, demulcents, astringents, emollients, and irritants in the pharmacotherapy of diseases.	Conclude the material presented; emphasize the importance of general and local anesthetics in pain therapy, and the role of adsorbents, demulcents, astringents, emollients, and irritants in the comprehensive treatment of gastrointestinal, respiratory, and other systems of the body.	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 531-541, 563-568.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 33-41; 90-99.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 440-473.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): http://ek.librarynmu.com/cgibin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5
2. Repository: http://ir.librarynmu.com/
3. LIKAR_NMU Page**:** https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms used in anesthesiology.
2. Structural and functional characteristics of afferent nerve endings and pain impulse conduction.

3. Functions of the antinociceptive system.
4. Properties of neurotransmitters involved in the transmission of impulses in afferent endings.
5. Biochemistry of neurotransmitters and hormones involved in pain formation.
6. Concepts of "pain" and "pain shock." Knowledge about the onset and progression of pathological processes accompanied by pain.

Questions for preparation for exams, covering the lecture material:

1. General characteristics of analgesic medicines. Definition of general and local anesthesia, anesthesia, and their types. Types of anesthesia.
2. Requirements for general anesthesia agents. Sequence of action of narcotic agents on different parts of the central nervous system.
3. ATC classification of drugs for general and local anesthesia. Classification of general anesthesia drugs based on: chemical structure, duration of action, and clinical application.
4. Pharmacological characteristics of general anesthesia medicines (mechanisms of action, classification, indications, side effects, contraindications).
5. Pharmacological characteristics of inhalational anesthetics (mechanisms of action, classification, indications, side effects, contraindications). Typical symptoms of overdose and emergency measures for poisoning.
6. Pharmacological characteristics of non-inhalational anesthetics (mechanisms of action, classification, indications, side effects, contraindications).
7. Combined use of anesthetics with medicines from other pharmacological groups (cholinoblockers, tranquilizers, muscle relaxants). Concepts of premedication, induction, basic, and combined anesthesia.
8. Pharmacological characteristics of local anesthetic medicines (mechanisms of action, classification, indications, side effects, contraindications). Requirements for anesthetic agents.
9. Use of medicines for various types of local anesthesia, typical symptoms of overdose and emergency measures for poisoning with these medicines, contraindications.
10. Classification of medicines that protect sensitive nerve endings from external irritants.
11. Pharmacological characteristics of each group of medicines that protect sensitive nerve endings from external irritants (astringents, adsorbents, coating agents). Indications.
12. Classification of medicines that irritate sensitive nerve endings.
13. Pharmacological characteristics of medicines that irritate sensitive nerve endings, mechanisms of action, indications for use. Features of application.

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 5. Analgesics. Opioid and Non-opioid analgesics.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**

1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
2. Ability to communicate in the state language both orally and in writing (GC03).
3. Ability to communicate in a foreign language (GC04).
4. Ability to work in a team (GC06).
5. Ability to use information and communication technologies (GC09).
6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).

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

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematized knowledge on opioid and non-opioid analgesics, their pharmacokinetic and pharmacodynamic properties, and the rules for prescribing and dispensing;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. Differentiate between acute and chronic pain, and other types of pain to choose an appropriate method of analgesia.
2. Classify analgesics based on their chemical structure, mechanism and selectivity of action, duration of analgesic effect, pharmacokinetic properties, and indications for use.
3. Summarize and analyze the pharmacological characteristics of analgesics, and explain their mechanisms of action.
4. Interpret indications for prescribing analgesics based on knowledge of their pharmacodynamics.
5. Assess the benefit/risk ratio when prescribing analgesics from different pharmacological groups for pain syndromes.
6. Explain signs of overdose/intoxication and principles of emergency pharmacotherapy.
7. Understand the dangers of opioid substances, their destructive impact on the body, and the role of doctors/pharmacists in the prevention of drug addiction.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. Pain as an important indicator of health status. 2. Definition of analgesics as a specific group of medications for pain relief. 3. Components of the nociceptive and antinociceptive systems as targets for analgesic action. acute and chronic pain. 4. Pharmacological management of pain. multimodal analgesia. adjuvants for pain pharmacotherapy.	• Elucidate the principles of pharmacological management of pain syndromes of various etiologies. • Explain the significance of analgesics in pain treatment. • Describe the basics of pharmacological pain management. • Explain the concept of multimodal analgesia. • Emphasize the importance of	75 minutes

	5. Classification of opioid analgesics (NA) by chemical structure, origin, and affinity to opioid receptors and non-opioid analgesics (NNA), according to their ability to inhibit cyclooxygenase isoforms (COX). 6. Pharmacological characteristics of opioid and non-opioid analgesics. 7. Pharmaceutical approaches to enhancing the efficacy and safety of analgesics: molecular modification, dosage forms, fixed combinations. 8. Role of the pharmacist in preventing drug addiction and misuse of analgesics.	adjuvants in pain pharmacotherapy. • Focus on the classification of opioid and non-opioid analgesics. • Provide a pharmacological characterization of opioid and non-opioid analgesics. • Reveal the role of the pharmacist in preventing drug addiction and misuse of analgesics.	
Summary	Summarize the significance of opioid and non-opioid analgesics in pain pharmacotherapy.	Conclude the material presented; highlight the role of analgesics in pain management.	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 542-561.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 130-159.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 553-574, 642-666.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): **http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5**
2. Repository: **http://ir.librarynmu.com/**
3. LIKAR_NMU Page**:** https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms characterizing the mechanism of pain development.
2. Structural-functional characteristics of the pain analyzer, concepts of nociceptive and antinociceptive systems.
3. Mechanisms of pain formation, types of pain, and methods of its investigation.
4. Biochemical mechanisms underlying the activation of cyclooxygenase-1 (COX-1), cyclooxygenase-2 (COX-2), cyclooxygenase-3 (COX-3), lipoxygenase, phospholipase, arachidonic acid cascade, prostaglandins, leukotrienes, and other algogens.
5. Concepts of "pain," "pain shock." knowledge about the onset and course of pathological processes accompanied by pain.

Questions for preparation for exams, covering the lecture material:

1. Principles of pharmacological correction of pain syndrome of different origins.
2. General characteristics of opioid and non-opioid analgesics. Comparative characteristics of opioid and non-opioid analgesics.
3. ATC classification of analgesic agents.
4. Classification of opioid analgesics by origin, chemical structure, and effects on opioid receptors.
5. Pharmacological characteristics of opioid analgesics (mechanisms of action, indications, side effects, contraindications).
6. Pharmacological characteristics of specific opioid analgesics. Concept of neuroleptanalgesia.
7. Acute and chronic intoxication with opioid analgesics (morphinism), withdrawal state. Principles of emergency care for opioid analgesic intoxication. Drug addiction as a socio-biological problem.
8. Classification of non-opioid analgesics by chemical structure and mechanism of action.
9. Pharmacological characteristics of non-opioid analgesics (mechanisms of action, indications for use, side effects, contraindications).
10. Pharmacological characteristics of representatives of non-opioid analgesics.
11. Typical complications of pharmacotherapy with non-opioid analgesics and measures to prevent them.
12. Principles of emergency care for acetaminophen intoxication.

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 6 Antidiabetic medicines. Glucocorticoids.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**

1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
2. Ability to communicate in the state language both orally and in writing (GC03).
3. Ability to communicate in a foreign language (GC04).
4. Ability to work in a team (GC06).
5. Ability to use information and communication technologies (GC09).
6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).

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

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematized knowledge on antidiabetic medicines, including their pharmacokinetics and pharmacodynamics, and the rules for their prescription and dispensing;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. Identify the main types of carbohydrate metabolism disorders in diabetes mellitus (DM).
2. Establish the main causes of type 1 and type 2 DM, differences in pathogenesis and clinical course between different types of diabetes.
3. Summarize the main approaches to pharmacological correction of carbohydrate metabolism disorders in type 1 and type 2 DM.
4. Master the main classifications of antidiabetic medicines.
5. Review the main approaches and principles of insulin therapy in DM.
6. Understand the effects of oral hypoglycemic medicines based on their pharmacodynamic and pharmacokinetic characteristics in patients of different ages, clinical conditions, comorbidities, and therapies.
7. Judge the potential for adverse effects when using antidiabetic medicines to prevent them.
8. Assess the benefit/risk ratio when using insulin and synthetic oral hypoglycemic medicines.
9. Develop an algorithm for assisting patients in the case of hyperglycemic and hypoglycemic coma.
10. Analyze the main classifications of glucocorticoid medicines.
11. Summarize and analyze the main mechanisms of pharmacological action of glucocorticoid medicines in inflammatory, allergic, autoimmune diseases, and shock.
12. Explain the dependence of glucocorticoid medicines effects on their chemical structure, routes of administration, type of therapy in patients of different ages, and presence of concomitant diseases.
13. Assess the potential for side effects of glucocorticoid medicines and methods to prevent them.
14. Outline the algorithm for assisting patients experiencing withdrawal syndrome after glucocorticoid therapy.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. Discuss the role and significance of antidiabetic medicines in the	• Demonstrate the importance of antidiabetic medicines	30 minutes

	pharmacotherapy of diabetes mellitus (DM). 2. Highlight the prevalence, etiology, and pathogenesis of DM as an endocrine disorder. 3. Understand the etiological classification of glycemia disturbances and emergency conditions related to acute carbohydrate metabolism disorders. 4. Investigate the features of pharmacotherapy for type 1 DM. 5. Identify the pharmacological methods for compensating insulin deficiency in type 1 DM. 6. Review the most common insulin preparations: classification, pharmacological features, and the main principles of their use. 7. Explore the main approaches to pharmacotherapy for type 2 DM. 8. Establish the role and place of oral hypoglycemic medicines in the treatment of type 2 DM: main classifications, general characteristics of groups, and pharmacological features of their most important representatives. 9. Determine the causes of adverse effects when using antidiabetic	in the pharmacotherapy of DM. • Identify clinical aspects of DM as an endocrine disorder. • Explain the principles of pharmacotherapy for type 1 DM. • Demonstrate the most common insulin medicines and provide their pharmacological characteristics. • Clarify the principles of pharmacotherapy for type 2 DM. • Provide a pharmacological characterization of oral hypoglycemic medicines. • Demonstrate possible adverse effects of antidiabetic medicines. • Provide pharmacological features of medicines with glucocorticoid activity. • Explain the role of glucocorticoid drugs in treating inflammation, allergies, and other conditions. • Present the classification of adrenal cortex hormone drugs. • Describe the pharmacological characteristics of specific members of the glucocorticoid drug group.	

	medicines to prevent and manage them. 10. Adrenal cortex hormones: discovery history and biological properties. 11. General pharmacological characteristics of medicines with glucocorticoid hormone activity. 12. Current understanding of the anti-inflammatory, immunosuppressive, anti-allergic, and anti-shock activities of glucocorticoids. 13. Classification of adrenal cortex hormone drugs: natural hormone analogs and their synthetic derivatives. 14. Pharmacological features of specific members of the glucocorticoid drug group. 15. Use of glucocorticoid drugs in pulmonology, dermatology, arthrology, allergology, and other medical specialties. 16. Glucocorticoid therapy: types, indications /contraindications, complications, and prevention strategies.	• Demonstrate indications for prescribing glucocorticoid drugs in pulmonology, dermatology, allergology, and other medical specialties. • Provide indications and contraindications, possible side effects, and prevention strategies for glucocorticoid drugs	
Summary	Summarize the significance of insulin medicines and oral hypoglycemic medicines in the treatment of type 1 and type 2 DM;	Conclude the material by emphasizing the importance of antidiabetic medicines in the pharmacotherapy of DM; the significance of	5 minutes

	glucocorticoid therapy in treating various diseases	glucocorticoid drugs in the pharmacotherapy of diseases across different medical specialties	
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 408-421, 432-465, 470-478.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 334-357.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 667-792.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): http://ek.librarynmu.com/cgibin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5
2. Repository: http://ir.librarynmu.com/
3. LIKAR_NMU Page: https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms characterizing endocrine gland dysfunction and hormone-dependent diseases.
2. Classifications of peptide and polypeptide hormones (hypothalamic, pituitary, thyroid, parathyroid, and pancreatic hormones, calcitonin), their synthetic substitutes and antagonists, their effects on metabolism and target organ function.
3. Chemical structure, synthesis principles, and functions of insulin.
4. Etiology, pathogenesis, and clinical features of type 1 and type 2 diabetes mellitus, insulin resistance.
5. Anatomy and physiology of the adrenal and sex glands.
6. Adrenal hormones, their effects on metabolism and the function of target organs.
7. Chemical structure of steroid hormones and fatty acid derivatives, as well as corticosteroid antagonists.

8. Concepts of 'insufficiency' and 'hyperfunction' of the adrenal cortex: types (primary, secondary; acute, chronic), etiology, pathogenesis, clinical manifestations; Cushing's syndrome, Conn's syndrome, congenital adrenal hyperplasia (adrenogenital syndrome).
9. Effects of glucocorticoids on inflammation processes, allergic reactions, immune status, metabolism, and development of extreme conditions.

Questions for preparation for final control (FC) or exams, covering the lecture material:

1. Characteristics of the pharmacodynamics and pharmacokinetics of insulin and its synthetic and semisynthetic analogs.
2. Indications and contraindications for use, dosing, and side effects.
3. Main approaches to insulin therapy in type 1 diabetes mellitus.
4. Pharmacotherapy of type 2 diabetes mellitus: oral antidiabetic agents (classification, mechanism of action, complications of use).
5. Principles of emergency care for hyperglycemic and hypoglycemic coma.
6. Classification of steroidal hormonal medicines and fatty acid derivatives, sources of their production, principles of biological standardization, and characteristics of finished dosage forms.
7. Classification and general characteristics of adrenal cortex hormonal medicines and corticosteroid antagonists.
8. Classification and pharmacological properties of sex hormone medicines, their antagonists, and contraceptive medicines.
9. Anti-inflammatory, anti-allergic, and anti-shock properties of glucocorticoids. Features of their use and possible complications.
10. Withdrawal syndrome: causes, ways to reduce the risk of occurrence, and treatment if it develops.

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 7. Anti-inflammatory medicines. Anti-allergic medicines.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**

1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
2. Ability to communicate in the state language both orally and in writing (GC03).
3. Ability to communicate in a foreign language (GC04).
4. Ability to work in a team (GC06).
5. Ability to use information and communication technologies (GC09).
6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).

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

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematized knowledge regarding medications for the treatment of inflammatory processes and allergic reactions, their pharmacokinetic and pharmacodynamic characteristics, prescription and dispensing rules;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. Classify anti-inflammatory and anti-allergic medicines according to the ATC classification, depending on the mechanism of action, chemical structure.
2. Summarize and analyze the pharmacological characteristics of anti-inflammatory and anti-allergic medicines for the pharmacological correction of inflammatory diseases and allergic reactions, according to their mechanism of action, pharmacodynamics, and pharmacokinetics.
3. Interpret indications for prescribing anti-inflammatory and anti-allergic medications for the pharmacological correction of inflammatory diseases and allergic reactions, based on knowledge of their pharmacological properties.
4. Explain the mechanisms of unwanted drug interactions of anti-inflammatory and anti-allergic medications with other drugs, food, and herbal remedies.
5. Make judgments about the possibility of adverse side effects of anti-inflammatory and anti-allergic medications with the aim of preventing them.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. The significance of non-steroidal anti-inflammatory drugs (NSAIDS) for clinical practice, consumption volumes, and the history of development 2. The pathogenesis of inflammation as the basis for the mechanism of action of NSAIDs 3. Classification of NSAIDs based on their effect on cyclooxygenases (COX) 4. Main pharmacological and side effects of NSAIDs	• Demonstrate the significance of NSAIDs in the treatment of various diseases • Reveal the relationship between the mechanism of action of NSAIDs and the pathogenesis of inflammation • Explain the classification of NSAIDs based on their effect on cyclooxygenases (COG)	75 minutes

	5. Indications for the use of NSAIDs (OTC and Rx) 6. The pathogenesis of allergy as the basis for the mechanism of action of anti-allergic drugs (AAD) 7. Classification and pharmacological characteristics of AADs 8. Comparative characteristics of first, second, and third generation antihistamines 9. Indications for prescribing AADs (OTC and Rx)	• Provide the main indications for use and side effects of NSAIDs • Highlight NSAIDs approved for over-the-counter (OTC) dispensing • Provide the classification and pharmacological characteristics of anti-allergic drugs (AAD) • Identify anti-allergic drugs available for OTC dispensing	
Summary	Summarize the significance of anti-inflammatory and anti-allergic medicines in the pharmacotherapy of inflammatory and allergic diseases	Conclude the material presented; emphasize the importance of anti-inflammatory and anti-allergic drugs	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh; London; New York: Elsevier, 2020. – P. 93-105, 233-243, 343-351, 358-359.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 143-159.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 277-299; 321-338.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. **Electronic Library Catalog (select guest login):** http://ek.librarynmu.com/cgibin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F

&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5

2. **Repository:** http://ir.librarynmu.com/
3. **LIKAR_NMU Page:** https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms characterizing inflammation and allergy.
2. Characteristics of the body's protective-adaptive response to damage.
3. Complex disorders occurring in the body under the influence of allergens, including changes in humoral and cellular immune response components.
4. The role of histamine, cytokines, and other mediators formed in the body during the inflammatory process and allergic reactions.
5. Concepts of "inflammation," "allergic reaction," "anaphylaxis," "sensitization." Apply knowledge of the onset and course of acute and chronic inflammation processes, immediate and delayed-type allergic reactions.

Questions for preparation for exams, covering the lecture material:

1. General characteristics of anti-inflammatory and anti-allergic medicines.
2. ATC and other classifications of anti-inflammatory and anti-allergic medicines.
3. Pharmacological characteristics of anti-inflammatory and anti-allergic medicines.
4. Comparative characteristics of non-selective and selective COX inhibitors.
5. Features of NSAID prescription in acute and chronic inflammation.
6. Gastrointestinal, thrombotic complications of NSAID therapy, causes and mechanisms of development, preventive methods.
7. Comparative characteristics of first, second, and third-generation antihistamines.
8. Emergency care of anaphylactic shock.

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 8. Biopharmaceutical medicines.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**

1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
2. Ability to communicate in the state language both orally and in writing (GC03).
3. Ability to communicate in a foreign language (GC04).
4. Ability to work in a team (GC06).
5. Ability to use information and communication technologies (GC09).
6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).

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

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematic knowledge about biopharmaceutical drugs, their pharmacokinetic and pharmacodynamic characteristics, and the rules for their prescription and dispensing;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. Form an understanding of biotechnological medicines.
2. Know the differences between synthetic immunobiological and biotechnological medicines.
3. Provide a differential characterization of original biotechnological medicines and biosimilars.
4. Know the general features of the development and production of biotechnological medicines.
5. Provide a pharmacological characterization of the main groups of biopharmaceutical medicines and conditions for their rational use.
6. Outline the clinical application areas of biotechnological drugs.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. Biotechnological medicines: history of discovery, features of production and structure, biosimilars. 2. Classification of biotechnological medicines. 3. Applications of biotechnological medicines in major pharmaco-therapeutic groups: indications/contraindications, complications, prevention and treatment of complications.	• Introduce the history of the discovery of biotechnological medicines. • Clarify the features of production and structure of biotechnological medicines. • Explain the difference between a biopharmaceutical medicines and a biosimilar. • Familiarize with the classification of biotechnological medicines. • Provide the applications of biotechnological medicines in major pharmaco-therapeutic groups: indications/contraindications, complications, prevention, and treatment of complications.	30 minutes

Summary	Summarize the significance of biotechnological medicines in the treatment of diseases of various organs and systems.	Highlight the importance of biotechnological medicines in treating diseases affecting different organs and systems.	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh : London ; New York : Elsevier, 2020. – P. 69-81, 249-251.
2. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 977-1002.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): http://ek.librarynmu.com/cgibin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5
2. Repository: http://ir.librarynmu.com/
3. LIKAR_NMU Page**:** https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms characterizing pathological processes for which biopharmaceutical medicines are used.
2. The immune system: structure and functions. Types of immune competent cells.
3. Types of immunoglobulins and their role in forming the immune response.
4. Concept of biopharmaceutical medicines.
5. Monoclonal antibodies, methods of obtaining them.
6. Formation of the immune response upon contact with pathogens. The role of immune competent cells in the development of immune system pathology.

Questions for preparation for final control (FC) or exams, covering the lecture material:

1. Definition and general characteristics of biotechnological medicines.
2. Sources of biotechnological medicines production.
3. Immunogenicity of biotechnological medicines, causes, and preventive methods.
4. Definition of "biosimilar," advantages, and disadvantages.
5. Hybridoma technology as a method for obtaining monoclonal antibodies.
6. Classification of monoclonal antibodies by origin, structure, and action.
7. Possibilities of using monoclonal antibodies for diagnostic purposes.

8. Pharmacological properties and characteristics of monoclonal antibodies used in oncology.
9. Pharmacological properties and characteristics of monoclonal antibodies used in bronchial asthma and allergology.
10. Pharmacological properties and characteristics of biotechnological medicines used in blood disorders.
11. Pharmacological properties and characteristics of biotechnological medicines used in rheumatoid arthritis and other autoimmune diseases.

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 9. Medicines affecting the respiratory system.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**
  1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
  2. Ability to communicate in the state language both orally and in writing (GC03).
  3. Ability to communicate in a foreign language (GC04).
  4. Ability to work in a team (GC06).
  5. Ability to use information and communication technologies (GC09).
  6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).
- **special (professional, subject):**

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematic knowledge about drugs for the treatment of respiratory system diseases, their pharmacokinetic and pharmacodynamic characteristics, and the rules for their prescription and dispensing;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. Classification of medicines affecting the function of the respiratory organs by main groups.
2. Mechanisms of action of the main groups of medicines affecting the respiratory system.
3. Pharmacological characteristics of the main groups of medicines affecting the respiratory system.
4. Indications for prescribing medicines affecting the function of the respiratory organs according to their pharmacodynamics.
5. International recommendations detailing medicines for the treatment of rhinosinusitis (EROS 2020), asthma (GINA 2022), and chronic obstructive pulmonary disease (GOLD 2022).
6. Modern medicines for innovative treatment of asthma, chronic obstructive pulmonary disease, and idiopathic pulmonary fibrosis.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. Prevalence and relevance of the problem of treating respiratory diseases. 2. Anatomical, physiological, and pathogenetic foundations of pharmacotherapy for respiratory diseases. 3. Classification of medicines affecting the respiratory system. 4. Pharmacological characteristics of decongestants and antitussive medicines.	• Familiarize with the prevalence and relevance of treating respiratory diseases. • Demonstrate the anatomical, physiological, and pathogenetic foundations of pharmacotherapy for respiratory diseases. • Provide the classification of medicines affecting the respiratory system. • Master the pharmacological characteristics of	30 minutes

	5. Pharmacological characteristics of expectorants and mucolytics. 6. Pharmacological characteristics of bronchodilators. 7. Pharmacological characteristics of exogenous surfactants and stimulators of their synthesis.	decongestants, antitussives; expectorants, mucolytics; surfactants, and stimulators of their synthesis.	
Summary	Summarize the significance of the main groups of medicines affecting the respiratory system in the treatment of respiratory diseases.	Summarize the material presented; highlight the importance of the main groups of medicines affecting the respiratory system in treating respiratory diseases.	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 228-232, 244, 371-381.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 281-294.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 346-366.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): http://ek.librarynmu.com/cgibin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5
2. Repository: http://ir.librarynmu.com/
3. LIKAR_NMU Page: https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms characterizing pathological changes occurring in respiratory system pathology.
2. Structure and age-related features of the respiratory organs. Physiology of the respiratory organs. Characteristics of respiratory system function in different age groups.
3. Main mechanisms of pathological processes in the respiratory system: rhinosinusitis, tracheobronchitis, bronchial asthma, pneumonia, idiopathic pulmonary fibrosis, and others.

Questions for preparation for exams, covering the lecture material:

1. General characteristics and classification of medicines affecting respiratory organ functions.
2. General characteristics of medicines used for treating rhinosinusitis.
3. Pharmacological characteristics of decongestants (mechanisms of action, classification, indications, side effects, contraindications).
4. General characteristics of medicines used for treating cough.
5. Pharmacological characteristics of antitussive medicines (mechanisms of action, classification, indications, side effects, contraindications).
6. Pharmacological characteristics of expectorants (mechanisms of action, classification, indications, side effects, contraindications).
7. General characteristics of medicines used for treating bronchial asthma.
8. Pharmacological characteristics of bronchodilator medicines (mechanisms of action, classification, indications, side effects, contraindications).
9. Algorithm for providing emergency medical assistance during an acute asthma attack.
10. Modern pharmaceutical medicines for the therapy of idiopathic pulmonary fibrosis.

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 10. Medicines affecting the digestion.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**

1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
2. Ability to communicate in the state language both orally and in writing (GC03).
3. Ability to communicate in a foreign language (GC04).
4. Ability to work in a team (GC06).
5. Ability to use information and communication technologies (GC09).
6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).

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

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematic knowledge regarding medications for the treatment of digestive system diseases, their pharmacokinetics and pharmacodynamics, and the rules for prescribing and dispensing;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. Summarize and analyze the main pharmacological correction (impact) pathways of medicines on the digestive organs.
2. Analyze the current classification of medicines affecting the digestive organs.
3. Explain the characteristics and mechanisms of action of medicines affecting the function of the digestive organs.
4. Explain the dependence of the effects of the aforementioned medicines on pharmacokinetic characteristics in patients of different ages, comorbidities, and their therapy.
5. Explain the choice of medicines according to the course of the disease.
6. Assess the possibility of adverse reactions of medicines affecting the gastrointestinal tract to prevent them.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. Classification and general characteristics of medicines affecting the digestive system. 2. Acid-dependent diseases of the upper gastrointestinal tract and pharmacological approaches to their correction. 3. Pharmacological characteristics of medicines used in acid-dependent diseases. 4. Pharmacological characteristics of emetic and antiemetic drugs. 5. Medicines used in disorders of pancreatic excretory function. 6. Pharmacological characteristics of choleretic agents.	• Provide the classification of medicines affecting the digestive system. • Explain pharmacological approaches to correcting acid-dependent diseases of the upper gastrointestinal tract. • Give pharmacological characteristics of medicines used in acid-dependent diseases. • Describe the pharmacological characteristics of emetic, antiemetic, choleretic agents, hepatoprotectors, and medicines for treating pancreatic dysfunction.	75 minutes

	7. Pharmacological characteristics of hepatoprotectors. 8. Pharmacological characteristics of laxatives. 9. Pharmacological characteristics of antidiarrheal medicines. 10. Pharmacological characteristics of agents restoring intestinal microflora.	• Explain the pharmacological characteristics of laxatives, antidiarrheals, and agents restoring intestinal microflora.	
Summary	Summarize the role of medicines affecting the digestive system in treating various diseases.	Summarize the material; emphasize the significance of medicines affecting the digestive system in the treatment of various diseases.	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 395-407.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 295-316.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 1087-1119.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): http://ek.librarynmu.com/cgibin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5
2. Repository: http://ir.librarynmu.com/
3. LIKAR_NMU Page: https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms characterizing organic and functional changes occurring in gastrointestinal tract pathology.
2. Anatomical and physiological features of the digestive system.
3. Digestive enzymes, their structure and function; composition of bile, its role in digestion and hepatoprotection.
4. Structure, chemical composition, and functions of plants used to produce drugs affecting digestive system function.
5. Etiology of peptic ulcer disease and other infectious gastrointestinal diseases.
6. Pathogenesis and symptoms of digestive organ diseases.

Questions for preparation for exams, covering the lecture material:

1. General characteristics of medicines affecting the gastrointestinal tract.
2. Pharmacological and ATC classification of medicines affecting the gastrointestinal tract.
3. General characteristics of medicines used for the treatment of acid-dependent diseases.
4. Pharmacological characteristics of antacids (mechanisms of action, classification, indications, side effects, contraindications).
5. Pharmacological characteristics of medicines that inhibit gastric gland secretion (mechanisms of action, classification, indications, side effects, contraindications).
6. Pharmacological characteristics of cytoprotective agents (mechanisms of action, classification, indications for use, side effects, contraindications).
7. Pharmacological principles of combined use of medicines for the treatment of acid-dependent diseases.
8. Pharmacological characteristics of emetic and antiemetic medicines (mechanisms of action, classification, indications for use, side effects, contraindications).
9. General characteristics of medicines used for the treatment of liver and biliary tract diseases.
10. Pharmacological characteristics of choleretic medicines (mechanisms of action, classification, indications for use, side effects, contraindications).
11. Pharmacological characteristics of hepatoprotective medicines (mechanisms of action, classification, indications for use, side effects, contraindications).
12. General characteristics of medicines used for the treatment of pancreatitis.
13. Pharmacological characteristics of medicines that stimulate or replace pancreatic exocrine function (mechanisms of action, classification, indications for use, side effects, contraindications).
14. Pharmacological characteristics of medicines used for constipation (mechanisms of action, classification, indications for use, side effects, contraindications).
15. General principles of pharmacological correction of diarrhea.
16. Pharmacological characteristics of antidiarrheal medicines (mechanisms of action, classification, indications for use, side effects, contraindications).
17. General characteristics of medicines used for the prevention and treatment of dysbiosis. Probiotics. Prebiotics. Eubiotics. Symbiotics.

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 11. Medicines affecting hematopoiesis and hemostasis

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**

1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
2. Ability to communicate in the state language both orally and in writing (GC03).
3. Ability to communicate in a foreign language (GC04).
4. Ability to work in a team (GC06).
5. Ability to use information and communication technologies (GC09).
6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).

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

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematic knowledge about medications for treating disorders related to hematopoiesis and hemostasis, including their pharmacokinetics and pharmacodynamics, as well as the rules for their prescription and dispensing;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. Summarize the main pathways through which medicines affect hematopoiesis and the hemostatic system.
2. Analyze current classifications of medicines that influence hematopoiesis and hemostasis.
3. Understand the mechanisms of action of key medicines affecting hematopoiesis and hemostasis.
4. Comprehend the pharmacological characteristics of major medicines affecting hematopoiesis and hemostasis and their indications.
5. Assess the potential for adverse reactions of medicines affecting hematopoiesis and hemostasis to prevent them.
6. Know the reversal agents/antidotes used in cases of overdose or to promptly counteract the effects of anticoagulants and hemostatics.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. Key aspects of hematopoiesis and major disorders related to hematopoiesis. 2. General classification of medicines affecting hematopoiesis. 3. Pharmacological characteristics of medicines affecting erythropoiesis. 4. Pharmacological characteristics of medicines affecting leukopoiesis. 5. Physiology and pharmacology of hemostasis.	• Provide classification of medicines affecting hematopoiesis. • Detail the pharmacological characteristics of medicines affecting erythropoiesis and leukopoiesis. • Review the basics of hemostasis physiology. • Provide classification of medicines affecting hemostasis. • Explain the main mechanisms of action of medicines that reduce blood clotting.	75 minutes

	6. Classification of medicines affecting hemostasis. 7. Main mechanisms of action of medicines that reduce blood clotting processes. 8. Pharmacological characteristics of anticoagulants (direct and indirect), antiplatelets, and thrombolytics. 9. Main mechanisms of action of medicines that enhance blood clotting processes. 10. Pharmacological characteristics of hemostatics and fibrinolysis inhibitors. 11. Reversal agents for overdose of medicines affecting blood clotting.	• Detail the pharmacological characteristics of anticoagulants, antiplatelets, and thrombolytics. • Explain the main mechanisms of action of medicines that enhance blood clotting. • Detail the pharmacological characteristics of hemostatics and fibrinolysis inhibitors. • Demonstrate reversal agents and explain their role in overdose situations for medicines affecting blood clotting.	
Summary	Summarize the significance of medicines affecting hematopoiesis and hemostasis.	Highlight the importance of medicines impacting hematopoiesis and hemostasis.	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh; London; New York: Elsevier, 2020. – P. 228-232, 319-333, 334-342.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 252-280.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 591-625.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): **http://ek.librarynmu.com/cgibin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5**

2. Repository: **http://ir.librarynmu.com/**

3. LIKAR_NMU Page**:** https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms characterizing pathological changes occurring in blood system diseases.
2. Diagram of hematopoiesis and coagulation cascade.
3. Role of iron and vitamin factors in the hematopoietic system.
4. Role of proteolytic enzymes in the coagulation cascade and fibrinolysis.
5. Structure, chemical composition, and functions of plants used to produce medications affecting hematopoiesis and hemostasis.
6. Pathogenesis and clinical course of anemia, bleeding, thrombosis, including pulmonary embolism, myocardial infarction, and stroke.

Questions for preparation for exams, covering the lecture material:

1. General characteristics of medicines s affecting hematopoiesis and hemostasis.
2. Pharmacological classification of medicines affecting hematopoiesis and hemostasis.
3. Pharmacological characteristics of medicines that stimulate erythropoiesis (mechanisms of action, classification, indications, side effects, contraindications).
4. Absorption, distribution, and pharmacological effects of Fe^{+2}, Fe^{+3}, and liposomal iron preparations.
5. Combined use of medicines for treating anemia and managing their side effects.
6. Pharmacological characteristics of medicines that stimulate leukopoiesis (mechanisms of action, classification, indications, side effects, contraindications).
7. General characteristics of medicines affecting hemostasis.
8. Pharmacological characteristics of drugs affecting platelet aggregation (mechanisms of action, classification, indications, side effects, contraindications).
9. Pharmacological characteristics of medicines affecting coagulation (mechanisms of action, classification, indications, side effects, contraindications).
10. Pharmacological characteristics of medicines affecting fibrinolysis (mechanisms of action, classification, indications, side effects, contraindications).

11. Pharmacological characteristics of coagulants (mechanisms of action, classification, indications, side effects, contraindications).
12. Use of medicines affecting hemostasis and hematopoiesis in the treatment of emergency conditions.
13. Antidotes and reversal agents for overdose or cessation of anticoagulants. Mechanisms of action, prescribing features, and discontinuation.

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 12. Medicines affecting kidney function. Antihypertensive medicines.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**

1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
2. Ability to communicate in the state language both orally and in writing (GC03).
3. Ability to communicate in a foreign language (GC04).
4. Ability to work in a team (GC06).
5. Ability to use information and communication technologies (GC09).
6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).

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

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematic knowledge of the pharmacological characteristics of antidiabetic agents, medications for the treatment of reproductive system disorders, their pharmacokinetics and pharmacodynamics, and the rules for their prescription and dispensing;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. Classify medications affecting the function of the urinary systems.
2. Summarize and analyze the pharmacological characteristics of drugs affecting kidney function, explaining their mechanisms of action.
3. Determine the indications of medicines affecting prostate function based on their pharmacodynamics.
4. Differentiate the indications and contraindications for prescribing medicines affecting uric acid crystal formation.
5. Differentiate the indications and contraindications for prescribing drugs used in the treatment of benign prostatic hyperplasia.
6. Differentiate the indications and contraindications for prescribing drugs for erectile dysfunction and potency disorders.
7. Explain the dependence of the action of medicines affecting kidney and prostate function on their pharmacokinetic parameters, including variations in patients of different ages, with concomitant diseases, and their pharmacotherapy.
8. Master the classification of antihypertensive drugs.
9. Understand the pharmacological characteristics of first-line antihypertensive drugs for treating arterial hypertension.
10. Familiarize yourself with second-line antihypertensive drugs for treating arterial hypertension.
11. Learn the main principles of combined therapy for arterial hypertension.
12. Master emergency care and medicines for managing hypertensive crises.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. Function of the kidneys and their role in blood pressure regulation. 2. Pharmacological approaches to influencing urine formation processes. 3. Pathogenetic basis for using diuretics in hypertension and other conditions.	• Summarize the function of the kidneys and their place in blood pressure regulation. • Explain the pharmacological approaches to influencing urine formation. • Describe the pathogenetic rationale	75 minutes

	4. Pharmacological characteristics of major groups of diuretics. 5. Classification and pharmacological characteristics of prostatic protectors. 6. Pathogenetic principles of pharmacotherapy for arterial hypertension (AH). 7. ATC classification of cardiovascular drugs. 8. Pharmacological characteristics: mechanism of action, pharmacodynamics, indications, and side effects of first- and second-line antihypertensive medications. 9. Pharmacological principles of combined therapy for AH. 10. Medicines for managing hypertensive crises.	for prescribing diuretics in hypertension and other conditions. • Provide a pharmacological overview of major groups of diuretics. • Introduce the classification and pharmacological characteristics of prostatic protectors. • Explain the pathogenetic principles of pharmacotherapy for AH. • Present the ATC classification of drugs affecting the cardiovascular system. • Provide pharmacological characteristics of first- and second-line antihypertensive drugs • Discuss the pharmacological principles of combined therapy for AH. • Present the algorithm for emergency care of hypertensive crises	
Summary	Summarize the importance of diuretics and antihypertensive drugs in the prevention and treatment of AH, cardiovascular diseases.	Summary of the material and the significance of diuretics and antihypertensive drugs in the prevention and treatment of arterial hypertension (AH), cardiovascular pathology	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 290-304, 382-394, 465-468.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 226-239, 317-333.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 173-193, 254-276.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): http://ek.librarynmu.com/cgiin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5
2. Repository: http://ir.librarynmu.com/
3. LIKAR_NMU Page**:** https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms characterizing pathological changes occurring in kidney diseases and arterial hypertension.
2. Anatomical and physiological features of the urinary systems.
3. Biochemical mechanisms underlying energy supply for urination processes, electrolyte metabolism; molecular mechanisms of action of sex hormones, mineralocorticoids, oxytocin, etc.
4. Principles of enzyme function of carbonic anhydrase (as one of the mechanisms of diuretics), 5-α-reductase, aromatase (for the conversion of sex hormones).
5. Structure, chemical composition, and functions of plants used to produce medications affecting the urogenital system.
6. Etiology, pathogenesis, and symptoms of diseases of the urogenital systems.
7. Central and peripheral mechanisms of blood pressure regulation.
8. Types of adrenergic receptors, and the impact of sympathetic nervous system mediators on the function of target organs.
9. Biochemical aspects of nerve impulse generation and conduction along adrenergic nerves, pathways of catecholamine formation and degradation, their role in nerve impulse transmission, and other components of mediator transmission.
10. The renin-angiotensin-aldosterone system and its role in regulating vascular tone, kidney function, and vascular remodeling processes.
11. Changes in components of various types of metabolism in arterial hypertension.

12. The role of certain enzymes (adenosine deaminase, phosphodiesterase, guanylate cyclase, etc.) in cardiovascular system function.
13. Structure, chemical composition, and functions of plants used to produce medications for treating different types of arterial hypertension.

Questions for preparation for exams, covering the lecture material:

1. General characteristics of medicines affecting kidney function.
2. Pharmacological characteristics of diuretics (mechanisms of action, classification, indications, side effects, contraindications).
3. Combined use of diuretic medicines and correction of their side effects.
4. General characteristics of medicines used for treating gout.
5. Pharmacological characteristics of medicines affecting uric acid metabolism (mechanisms of action, classification, indications, side effects, contraindications).
6. Combined use of medicines for treating acute gout attacks and preventing gout.
7. Pharmacological characteristics of prostate protectors, medications used for treating benign prostatic hyperplasia (BPH), erectile dysfunction (ED), and lower urinary tract symptoms (LUTS).
8. General characteristics of antihypertensive drugs.
9. Classification of antihypertensive drugs.
10. General characteristics of first-line antihypertensive drugs.
11. Pharmacological characteristics of angiotensin-converting enzyme inhibitors (mechanisms of action, classification, indications, side effects, contraindications).
12. Pharmacological characteristics of inhibitors of angiotensin II receptor blockers (mechanisms of action, classification, indications, side effects, contraindications).
13. Pharmacological characteristics of calcium channel antagonists (mechanisms of action, classification, indications, side effects, contraindications).
14. General characteristics of second-line antihypertensive drugs.
15. Combined use of antihypertensive drugs.
16. Pharmacological characteristics of antihypertensive drugs - fixed combinations: pharmacological rationale, patient benefits.
17. Medicines for managing hypertensive crises.

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 13. Antianginal and hypolipidemic medicines. Antiarrhythmic and cardiotonic medicines.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**

1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
2. Ability to communicate in the state language both orally and in writing (GC03).
3. Ability to communicate in a foreign language (GC04).
4. Ability to work in a team (GC06).
5. Ability to use information and communication technologies (GC09).
6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).

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

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematic knowledge about antianginal and hypolipidemic medications, including their pharmacokinetics and pharmacodynamics, as well as the rules for their prescription and dispensing;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. Classify antianginal and hypolipidemic medicines.
2. Summarize and analyze the pharmacological characteristics of medicines that reduce myocardial oxygen demand and improve blood supply, enhance myocardial tolerance to hypoxia and ischemia, and hypolipidemic medicines.
3. Understand the mechanisms of action of antianginal and hypolipidemic medicines.
4. Differentiate the indications and contraindications for medicines affecting coronary spasm, reducing preload and afterload on the myocardium, and treating lipid metabolism disorders.
5. Master the algorithm for providing emergency care during angina attacks and acute coronary syndrome.
6. Master the classification of cardiotonic and antiarrhythmic medicines.
7. Provide a comprehensive pharmacological description of steroidal and non-steroidal cardiotonic medicines.
8. Be able to provide a pharmacological description of antiarrhythmic medicines of classes I-IV.
9. Understand the pathophysiological approaches and clinical recommendations from the European and Ukrainian Cardiological Associations regarding the treatment of acute and chronic heart failure.
10. Be aware of the main adverse reactions associated with the use of cardiotonic and antiarrhythmic medicines.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. History of the discovery of antianginal medicines. 2. ATC classification of antianginal and hypolipidemic medicines. 3. Mechanisms of action of antianginal and hypolipidemic medicines.	• Present the history of the discovery of antianginal medicines. • Provide the ATC classification of antianginal and hypolipidemic medicines. • Explain the pharmacological	75 minutes

	4. Pharmacological characteristics of nitrovasodilators, calcium antagonists, ivabradine, and beta-blockers. 5. Pharmacological characteristics of hypolipidemic medicines. 6. Principles of emergency pharmacotherapy for acute coronary syndrome. 7. ATS classification of cardiotonic and antiarrhythmic medicines. 8. Pathogenetic principles of heart failure pharmacotherapy. 9. Cardiac glycosides: history of introduction into medical practice, classification. 10. Pharmacokinetics and pharmacodynamics of individual cardiac glycosides. 11. Principles of emergency treatment for cardiac glycoside poisoning. 12. Pharmacological characteristics of non-glycoside cardiotonic medicines. 13. Mechanisms of arrhythmias and their pharmacological correction. 14. Pharmacological characteristics of different classes of antiarrhythmic medicines.	characteristics of nitrovasodilators, calcium antagonists, ivabradine, and beta-blockers. • Provide the pharmacological characteristics of hypolipidemic medicines. • Present the algorithm for emergency pharmacotherapy of acute coronary syndrome. • Present the ATC classification of cardiotonic and antiarrhythmic medicines. • Master the pathogenetic principles of heart failure pharmaco-therapy. • Review the history of cardiac glycosides introduction into medical practice. • Provide a classification of cardiac glycosides. • Outline the pharmacological characteristics of individual cardiac glycosides. • Present the algorithm for emergency treatment of cardiac glycoside poisoning. • Provide the pharmacological characteristics of non-	

		glycoside cardiotonic medicines. • Explain the mechanisms of arrhythmias and their pharmacological correction. • Present the pharmacological characteristics of different classes of antiarrhythmic medicines.	
Summary	Summarize the significance of antianginal, hypolipidemic, cardiotonic, and antiarrhythmic medicines in the prevention and treatment of cardio-vascular diseases.	Summarize the material presented; emphasize the significance of antianginal and hypolipidemic medicines in the prevention and treatment of atherosclerosis and ischemic heart disease; cardiotonic and antiarrhythmic medicines in the treatment of heart failure and arrhythmias	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

4. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 271-279, 286-288, 304-306, 310-318.
5. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. – 4th ed., updater. – Vinnytsia : Nova Knyha, 2018. – P. 196-238, 254-268.
6. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 194-253, 626-641.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): http://ek.librarynmu.com/cgibin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5
2. Repository: http://ir.librarynmu.com/
3. LIKAR_NMU Page**:** https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms that characterize pathological changes occurring in cardiovascular diseases, heart failure and rhythm disturbances.
2. Anatomical and physiological features of the cardiovascular system and organs involved in the regulation of coronary circulation.
3. Preload and afterload on the myocardium.
4. Factors affecting energetic and metabolic processes in cardiomyocytes.
5. Mechanisms of cardiac contraction, conduction, excitability, and automaticity depending on the electrical activity of the myocardium.
6. Biochemical mechanisms underlying the energy supply for myocardial contractile activity, indicators of prooxidant-antioxidant homeostasis, and electrolyte balance.
7. Molecular mechanisms of lipid metabolism and its disruption in atherosclerosis.
8. Molecular aspects of endothelial dysfunction.
9. Functions of proteins that are targets of cardiotonic drugs.
10. Types of heart failure, pathogenesis, and symptoms of acute and chronic heart failure, and various cardiac rhythm disturbances.
11. Structure, chemical composition, and functions of plants used in the treatment of ischemic heart disease, atherosclerosis, chronic heart failure, and arrhythmias.
12. Pathogenesis and symptoms of cardiovascular diseases and atherogenesis.
13. Mechanisms of compensatory changes during myocardial ischemia and reperfusion; phenomena of myocardial preconditioning.
14. Concept of the cardiac continuum theory.

Questions for preparation for exams, covering the lecture material:

1. General characteristics of antianginal medicines.
2. Classification of antianginal medicines.
3. Pharmacological characteristics of nitrates and molsidomine (mechanisms of action, pharmacological effects, indications, main side effects, contraindications).
4. Pharmacological characteristics of β-blockers (mechanism of action, indications, side effects, contraindications).
5. Pharmacological characteristics of calcium channel blockers (mechanism of action, pharmacological effects, indications, side effects, contraindications).
6. Pharmacological characteristics of ivabradine (mechanism of action, pharmacological effects, indications, side effects, contraindications).
7. Main principles of pharmacological therapy for angina pectoris.
8. Fixed combinations of drugs for the treatment of coronary heart disease and atherosclerosis. Examples, pharmacological rationale, patient benefits.

9. Emergency care for angina attacks and acute coronary syndrome (myocardial infarction).
10. General characteristics of hypolipidemic medicines.
11. Pharmacological characteristics of hypolipidemic medicines. (mechanisms of action, indications, side effects, contraindications).
12. Specifics of using hypolipidemic drugs (pharmacovigilance).
13. General characteristics of cardiotonic medicines.
14. Classification of cardiotonic medicines.
15. Sources of origin, chemical structure features of cardiac glycosides (role of glycone and aglycone).
16. Pharmacological characteristics of glycosidic cardiotonic drugs (mechanism of action, classification, indications, side effects, contraindications).
17. Pharmacological characteristics of non-glycosidic cardiotonic drugs (mechanisms of action, classification, indications, side effects, contraindications).
18. Medicines used for acute and chronic heart failure.
19. Acute and chronic intoxication with cardiac glycosides. Principles of emergency treatment for intoxication (list of medicines and explanation of their effects on different aspects of intoxication).
20. General characteristics of antiarrhythmic medicines.
21. Classification of antiarrhythmic medicines.
22. Pharmacological characteristics of antiarrhythmic medicines, sodium channel blockers (Class I) (mechanisms of action, classification, indications, side effects, contraindications). Comparative characteristics of Class IA, IB, and IC drugs.
23. Pharmacological characteristics of antiarrhythmic medicines, beta-blockers (Class II) (mechanisms of action, classification, indications, side effects, contraindications).
24. Pharmacological characteristics of antiarrhythmic medicines, potassium channel blockers (Class III) (mechanisms of action, classification, indications, side effects, contraindications).
25. Pharmacological characteristics of antiarrhythmic medicines, calcium channel blockers (Class IV) (mechanisms of action, classification, indications, side effects, contraindications).
26. Pharmacological characteristics of antiarrhythmic medicines, potassium preparations (mechanisms of action, classification, indications, side effects, contraindications).

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 14. Antibiotics

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**

1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
2. Ability to communicate in the state language both orally and in writing (GC03).
3. Ability to communicate in a foreign language (GC04).
4. Ability to work in a team (GC06).
5. Ability to use information and communication technologies (GC09).
6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).

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

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematized knowledge on antibacterial medicines, their pharmacokinetic and pharmacodynamic properties, and the rules for prescribing and dispensing;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. Analyze the current classifications of antimicrobial medicines.
2. Understand the pharmacological characteristics of time-dependent and concentration-dependent antibiotics, and the conditions for their rational use.
3. Be able to differentiate between various groups of antibacterial medicines (disinfectants, antiseptics, antibiotics, synthetic antibacterial drugs).
4. Understand the different approaches to antibiotic classification (by structure, type of action, spectrum of action, pharmacodynamics/pharmacokinetics, predominant area of use, priority for prescription).
5. Summarize the main mechanisms of action of antibiotics on microbial cells.
6. Understand the pharmacological characteristics and side effects of the main groups of antibiotics.
7. Assess the potential for antibiotic resistance and understand the main strategies for its prevention.
8. Memorize the primary indications for antibiotic use, including in dentistry, as well as the side effects and contraindications.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. History of the discovery of major antimicrobial medicines and the development of resistance to them. 2. Classification of antimicrobial medicines. 3. Main mechanisms of action of antibiotics. 4. Pharmacological characteristics, indications, side effects, and contraindications of major groups of antibiotics. 5. Antibiotic resistance (AR), mechanisms of development, prevention, and strategies for overcoming it.	• Present the history of the discovery of major antimicrobial medicines and the development of resistance to them. • Provide the classification of antimicrobial medicines. • Master the main mechanisms of action of antibiotics. • Review the pharmacological characteristics, indications, side effects, and contraindications of	75 minutes

	6. Prospects for the development and clinical implementation of new antibiotics. 7. Conditions for the rational use of antibiotics. 8. Brief information on prebiotics, probiotics, symbiotics, and lantibiotics.	major groups of antibiotics. • Explain the concept of antibiotic resistance (AR), mechanisms of development, prevention, and strategies for overcoming it. • Present the prospects for the development and clinical implementation of new antibiotics. • Explain the conditions for the rational use of antibiotics. • Provide information on prebiotics, probiotics, symbiotics, and lantibiotics.	
Summary	Summarize the significance of antibacterial medicines in the treatment of infectious diseases and the maintenance of epidemiological health.	Summarize the material; highlight the importance of antibacterial medicines in the treatment of infectious diseases and the maintenance of epidemiological well-being.	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 649-659, 663-671.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 462-492.

3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 793-833.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): http://ek.librarynmu.com/cgibin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5
2. Repository: http://ir.librarynmu.com/
3. LIKAR_NMU Page**:** https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms characterizing the infectious process.
2. Classification of bacteria, viruses, fungi, protozoa, their structure and microbiological characteristics.
3. The role of microorganisms in the development of the infectious process.
4. Basic principles of the infectious process, its pathogenesis, and clinical manifestations.

Questions for preparation for exams, covering the lecture material:

1. Concepts of antibiosis, antibiotics, and the spectrum of antibiotic activity. History of the discovery and introduction of antibiotics into medical practice. L. Pasteur, I.I. Mechnikov, A. Fleming, H.W. Florey, E.B. Chain, Z.V. Ermolyeva, S. Waksman, B.C. Derkach. Principles of antibiotic therapy.
2. General characteristics of antibiotics.
3. Classification of antibiotics by chemical structure, spectrum, and mechanism of action.
4. Pharmacological characteristics of penicillin group medicines (mechanisms of action, classification, indications, side effects, contraindications).
5. Pharmacological characteristics of cephalosporin group medicines (mechanisms of action, classification, indications, side effects, contraindications).
6. Pharmacological characteristics of carbapenem group medicines (mechanisms of action, classification, indications, side effects, contraindications).
7. Pharmacological characteristics of monobactam group medicines (mechanisms of action, classification, indications, side effects, contraindications).
8. Pharmacological characteristics of glycopeptide group medicines (mechanisms of action, classification, indications, side effects, contraindications).
9. Pharmacological characteristics of aminoglycoside group medicines (mechanisms of action, classification, indications, side effects, contraindications).
10. Pharmacological characteristics of tetracycline group medicines (mechanisms of action, classification, indications, side effects, contraindications).

11. Pharmacological characteristics of macrolide and azalide group medicines (mechanisms of action, classification, indications, side effects, contraindications).
12. Pharmacological characteristics of phenicol group medicines (mechanisms of action, classification, indications, side effects, contraindications).
13. Pharmacological characteristics of lincosamide group medicines (mechanisms of action, classification, indications, side effects, contraindications).
14. Pharmacological characteristics of polypeptide group medicines (mechanisms of action, classification, indications, side effects, contraindications).
15. Pharmacology of antibiotics from different chemical groups.
16. Basic principles of antibiotic therapy.
17. Principles and goals of combining penicillin group medicines with β-lactamase inhibitors.
18. Antibiotic resistance: ways to prevent, reduce, and overcome bacterial resistance to antibiotics.

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 15. Antiparasitic and antiprotozoal medicines. Antitumor medicines.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**
  1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
  2. Ability to communicate in the state language both orally and in writing (GC03).
  3. Ability to communicate in a foreign language (GC04).
  4. Ability to work in a team (GC06).
  5. Ability to use information and communication technologies (GC09).
  6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).
- **special (professional, subject):**

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematize knowledge regarding medications for the treatment of tuberculosis, malaria, syphilis, helminthiasis, fungal infections, including their pharmacokinetics and pharmacodynamics, and the rules for prescribing and dispensing them.;

2) educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. Understand the classification of antitubercular, antifungal, antisyphilitic, and antitumor medicines.
2. Summarize and analyze the pharmacological characteristics of antitubercular, antisyphilitic, and antifungal medicines, explaining their mechanisms of action.
3. Interpret the indications for the use of key antitubercular, antisyphilitic, and antifungal medicines based on pharmacodynamics knowledge.
4. Interpret evidence-based medicine data regarding the clinical use of current antitubercular, antisyphilitic, and antifungal medicines.
5. Explain the dependence of the action of antitubercular, antisyphilitic, and antifungal medicines on pharmacokinetic factors in patients of different ages, with concurrent diseases, and their therapy.
6. Assess the possibility of adverse effects of antitubercular, antisyphilitic, antiviral, and antifungal medicines to prevent them.
7. Summarize and analyze the pharmacological characteristics of anthelmintic and antimalarial medicines, explaining their mechanisms of action.
8. Summarize and analyze the pharmacological characteristics of chemotherapeutic, immunobiological, and biotechnological antitumor medicines, explaining their mechanisms of action.
9. Differentiate the indications and contraindications for prescribing chemotherapeutic, immunobiological, and biotechnological antitumor medicines.
10. Interpret evidence-based medicine data regarding the clinical use of modern antitumor medicines.
11. Assess the potential for adverse effects of major groups of antitumor medicines to prevent and pharmacologically correct them.
12. Explain the prospects and advantages of immunobiological treatment as a modern and safer method for treating oncological pathology.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. Classification, mechanisms of action, pharmacological characteristics of	• Explain the classification and pharmacological characteristics of	75 minutes

	antitubercular medicines. First-line (primary) and second-line (reserve) medicines. 2. Classification, mechanisms of action, pharmacological characteristics of antifungal medicines. Characteristics of treating fungal infections. 3. Classification, mechanisms of action, pharmacological characteristics of antisyphilitic medicines. 4. Classification, mechanisms of action, pharmacological characteristics of anthelmintic medicines. Preparation and discontinuation of anthelmintic therapy. 5. Classification, mechanisms of action, pharmacological characteristics of antimalarial and other antiprotozoal medicines. 6. Pharmacovigilance when using antitubercular, antisyphilitic, antifungal, and antiprotozoal medicines. 7. Principles of chemotherapy for malignant tumors. 8. Classification and mechanisms of action of chemotherapeutic, immunobiological, and	antitubercular medicines. • Demonstrate the difference between first-line and second-line medicines. • Describe the mechanism of action and provide the pharmacological characteristics of antifungal medicines. • Explain the classification, mechanisms of action, and pharmacological characteristics of antisyphilitic medicines. • Provide the classification, mechanisms of action, and pharmacological characteristics of anthelmintic medicines. • Explain the preparation and discontinuation procedures for anthelmintic therapy. • Provide the classification, mechanisms of action, and pharmacological characteristics of antimalarial medicines. • Explain the features of pharmacovigilance for the use of antitubercular, antisyphilitic, antifungal, and antiprotozoal medicines. • Explain the principles of chemotherapy for malignant tumors.	

	biotechnological antitumor medicines. 9. Pharmacological characteristics of chemotherapeutic, immunobiological, and biotechnological antitumor medicines. 10. Pharmacovigilance in the use of chemotherapeutic, immunobiological, and biotechnological antitumor medicines.	• Demonstrate the classification and mechanisms of action of chemotherapeutic, immunobiological, and biotechnological antitumor medicines. • Provide the pharmacological characteristics of chemotherapeutic, immunobiological, and biotechnological antitumor medicines. • Reveal the features of pharmacovigilance in the use of chemotherapeutic, immunobiological, and biotechnological antitumor medicines.	
Summary	Summarize the significance of medicines used for the treatment of parasitic and protozoal diseases; hemotherapeutic, immunobiological, and biotechnological antitumor medicines in the treatment of malignant tumors.	Summarize the presented material; emphasize the significance of medicines used for the treatment of parasitic and protozoal diseases in maintaining epidemiological well-being; chemotherapeutic, immunobiological, and biotechnological antineoplastic medicines in the treatment of malignant tumors.	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 673-675, 675-688, 690-694, 696-708, 710-731.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina;

Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 455-461, 493-536.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 842-894, 917-976.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): http://ek.librarynmu.com/cgibin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5
2. Repository: http://ir.librarynmu.com/
3. LIKAR_NMU Page**:** https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms characterizing pathological changes occurring in parasitic, protozoal, oncological diseases.
2. Life cycles of the causative agents of tuberculosis, syphilis, fungal infections, helminths, malaria plasmodium, various forms of interaction between them and the human body, the origin and evolution of parasitism, routes of infection, diagnostic methods, prevention of helminthiases, malaria, and other diseases caused by parasites and protozoa.
3. Knowledge of taxonomy, morphology, biochemical properties, pathogenic factors, and routes of human infection by parasites from the protozoan kingdom.
4. Structure, chemical composition, and functions of plants used to produce antiparasitic medicines.
5. The role of microorganisms, protozoa, helminths, and ectoparasites in the development of the infectious process.
6. Knowledge of the cell, genetic information, and expression of specific genes leading to morphological and functional diversity in cellular differentiation.
7. Phases of cell division and possible methods to influence the cell division process.
8. Biochemical mechanisms underlying the formation of RNA, DNA, the activity of metalloproteinases, telomerases, and other enzymes involved in carcinogenesis.
9. Structure, chemical composition, and therapeutic properties of plant-derived bioactive substances used in the creation of antineoplastic medicines.
10. Tumor process, mechanisms of malignancy, and metastasis.
11. The role of immune system cells in the onset and development of tumors, and the progression of changes at the cellular, genetic, and transcriptional levels.

Questions for preparation for exams, covering the lecture material:

1. General characteristics of antituberculosis medicines.
2. Basic principles of treatment and prevention of tuberculosis.
3. Classification of antituberculosis medicines.

4. Pharmacological characteristics of synthetic antituberculosis medicines (mechanisms of action, classification, indications, side effects, contraindications).
5. Pharmacological characteristics of antibiotics used in tuberculosis treatment (mechanisms of action, classification, indications, side effects, contraindications).
6. Principles and goals of combining antituberculosis medicines.
7. Basic principles of tuberculosis pharmacotherapy.
8. Resistance to antituberculosis medicines: prevention, reduction, and overcoming of drug resistance in Mycobacterium.
9. General characteristics and classification of antisyphilitic medicines.
10. Pharmacological characteristics of antisyphilitic medicines (mechanisms of action, classification, indications, side effects, contraindications).
11. Principles of syphilis treatment.
12. General characteristics and classification of antifungal medicines.
13. Pharmacological characteristics of antifungal medicines (mechanisms of action, classification, indications, side effects, contraindications).
14. Basic principles of treatment and prevention of fungal diseases.
15. General characteristics of anthelmintic medicines.
16. Classification of anthelmintic medicines.
17. Pharmacological characteristics of medicines for treating nematode infections (mechanisms of action, side effects, contraindications).
18. Pharmacological characteristics of medicines for treating trematode infections (mechanisms of action, side effects, contraindications).
19. Pharmacological characteristics of medicines for treating cestode infections (mechanisms of action, side effects, contraindications).
20. Pharmacological characteristics of broad-spectrum and extra-broad-spectrum medicines (mechanisms of action, side effects, contraindications).
21. Basic principles of helminthiasis treatment. Specifics of drug use for different types of helminthiasis.
22. General characteristics and classification of antimalarial medicines.
23. Pharmacological characteristics of antimalarial medicines (mechanisms of action, side effects, contraindications).
24. Basic principles of treatment and prevention of malaria. Specifics of treatment for different types of malaria. Medication therapy for malaria coma.
25. Pharmacological characteristics of medicines for treating amoebiasis (mechanisms of action, classification, indications, side effects, contraindications).
26. Pharmacological characteristics of medicines for treating trichomoniasis (mechanisms of action, classification, indications, side effects, contraindications).
27. Pharmacological characteristics of medicines for treating giardiasis (mechanisms of action, classification, indications, side effects, contraindications).

28. Pharmacological characteristics of medicines for treating toxoplasmosis (mechanisms of action, classification, indications, side effects, contraindications).
29. Pharmacological characteristics of medicines for treating leishmaniasis (mechanisms of action, classification, indications, side effects, contraindications).
30. General characteristics of medicines for treating scabies and pediculosis.
31. General characteristics of anticancer medicines.
32. General principles of tumor chemotherapy. Modern understandings of the mechanisms of action of anticancer agents. Cytostatic and cytotoxic effects of antiblastic medicines. Correction of immune system protection. Resistance to cytostatics.
33. Classification of anticancer chemotherapeutic agents.
34. Pharmacological characteristics of alkylating anticancer medicines (mechanisms of action, classification, indications for use, side effects, contraindications).
35. Pharmacological characteristics of antimetabolite anticancer medicines (mechanisms of action, indications, side effects, contraindications).
36. Pharmacological characteristics of antineoplastic antibiotics (mechanisms of action, indications, side effects, contraindications).
37. Pharmacological characteristics of plant-derived anticancer cytostatics (mechanisms of action, indications, side effects, contraindications).
38. Pharmacological characteristics of enzyme-based anticancer agents (mechanisms of action, indications, side effects, contraindications).
39. Pharmacological characteristics of medicines used for hormone-dependent cancer treatment (mechanisms of action, indications, side effects, contraindications).
40. Pharmacological management of side effects of major groups of anticancer medicines.
41. Innovative approaches to treating malignant tumors. Immunobiological treatment as a modern and safest method for treating oncological conditions. Targeted therapy. Perspectives and advantages of immunobiological treatment.

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.

Lecture № 16. Principles of acute medicine poisoning therapy. Antidotes.

Type of lecture: traditional (informational).

Competences:

- **integral competence:** ability to solve problems of a research and/or innovative nature in the field of pharmacy.
- **general:**

1. Knowledge and understanding of the subject area; understanding of professional activity (GC02).
2. Ability to communicate in the state language both orally and in writing (GC03).
3. Ability to communicate in a foreign language (GC04).
4. Ability to work in a team (GC06).
5. Ability to use information and communication technologies (GC09).
6. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty (GC10).

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

1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts (PC01).
2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy (PC02).
3. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility (PC03).
4. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying (PC04).
5. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient. (PC06).
6. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics (PC08).

Purpose:

1) didactic objective – to form systematic understanding of the principles of treating acute poisonings, the medications used as antidotes, their pharmacokinetics and pharmacodynamics, and the rules for their prescription and dispensing;

educational objective – to contribute to the formation of a scientific worldview;

3) developmental objective – to enhance intellectual abilities, thinking skills, and independence.

Lecture equipment: multimedia system, appropriate software.

Lecture tasks:

1. To understand the factors leading to poisoning by medicines and the manifestation of their toxicodynamics.
2. To evaluate the basic clinical symptoms that occur in cases of drugs poisoning.
3. To summarize and analyze contemporary classifications and pharmacological characteristics of antidotes.
4. To assess the benefit-risk ratio when using antidotes.
5. To predict and prevent the adverse effects of antidotes.
6. To understand the algorithm for assisting patients with acute poisoning by medicines and toxic substances.

Lecture plan:

Stage Name	Content of the Stages	Educational Objective of the Stage	Time
Introduction	Present information on the learning objectives and lecture plan.	Reveal the relevance of the lecture topic and familiarize students with the lecture plan.	5 minutes
Main part	1. Relevance of acute poisoning problems, especially with medicines. 2. Definition of the terms "poison" and "antidotes." 3. Routes of poison entry into the body. 4. Main mechanisms of detoxification in acute poisoning. 5. Classification and mechanisms of action of antidotes. 6. Pharmacological characteristics of antidotes. 7. Examples of pharmacological correction of specific types of poisoning.	• Introduce the issue of acute poisoning, particularly with medicines. • Provide definitions of the terms "poison" and "antidotes." • Explain the routes by which poisons enter the body. • Demonstrate the main mechanisms of detoxification in acute poisoning. • Present the classification and mechanisms of action of antidotes. • Provide the pharmacological characteristics of antidotes. • Demonstrate examples of pharmacological	75 minutes

		correction for specific types of poisoning.	
Підсумки	Summarize the significance of antidotes in the treatment of acute poisoning.	Summarize the presented material; emphasize the significance of antidotes in the treatment of acute poisoning.	5 minutes
Questions and answers	Active dialogue/discussion/debate.	Clarify unclear and most complex aspects of the lecture.	5 minutes

Recommended Literature

Basic:

1. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 537-551.
2. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 1003-1046.

Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

Information Resources:

1. Electronic Library Catalog (select guest login): http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5
2. Repository: http://ir.librarynmu.com/
3. LIKAR_NMU Page**:** https://likar.nmu.kiev.ua/md/course/view.php?id=1189

Questions for student self-preparation before the lecture:

1. Latin terms describing pathological changes occurring in the body during acute poisoning.
2. Biochemical reactions in the human body involved in the detoxification and excretion of xenobiotics.
3. Structure, chemical composition, and therapeutic properties of plant-based medicinal substances used in antidote therapy.
4. Mechanisms of pathological changes development during intoxication with different agents.

Questions for preparation for exams, covering the lecture material:

1. Basic principles of pharmacotherapy for acute poisoning with medicines.

2. Symptoms of acute poisoning with medicines from various pharmacological groups.
3. Methods of active detoxification, including the use of emetics, laxatives, demulcents, astringents, and adsorbents.
4. Use of active diuretics to remove toxic substances from the blood (forced diuresis), and application of hemodialysis, peritoneal dialysis, hyperbaric oxygenation, hemoperfusion, and lymph perfusion.
5. Concept of antidotes. Types of antidote therapy.
6. Pharmacological characteristics of dimercaprol, acetylcysteine, calcium disodium edetate, penicillamine, deferoxamine, cholinesterase reactivators, fomepizole, succimer, sodium thiosulfate, protamine sulfate, and idarucizumab.
7. Treatment of overdose with narcotic analgesics and benzodiazepine-derived tranquilizers.

Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.