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«DNIPROPETROVSK MEDICAL ACADEMY
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PHARMACOLOGY

WORKBOOK

FOR PRACTICAL CLASSES

FOR FOREIGN STUDENTS

(GENERAL MEDICINE)

Recommended by Ministry of education and science of Ukraine as a workbook for students of higher medical institutions of the 4th level of accreditation with English as the language of instruction



DNIPROPETROVSK – 2014

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The educational tutorial contains materials for practical classes and final module control on Pharmacology.

The tutorial was prepared to improve self-learning of Pharmacology and optimization of practical classes. It contains questions for self-study for practical classes and final module control, prescription tasks, pharmacological terms that students must know in a particular topic, medical forms of main drugs, multiple choice questions (tests) for self-control, basic and additional references. This tutorial is also a student workbook that provides the entire scope of student’s work during Pharmacology course according to the credit-modular system.

The tutorial was drawn up in accordance with the working program on Pharmacology approved by CMC of SE “Dnipropetrovsk medical academy of Health Ministry of Ukraine” on the basis of the standard program on Pharmacology for medical students in the specialties 7.12010001 – General medicine, 7.12010002 – Pediatrics, 7.12010003 – Preventive health care (Kyiv, 2006).

The tutorial was developed by composite authors of the Department of Pharmacology, Clinical Pharmacology and Pharmacoeconomics of State Establishment “Dnipropetrovsk medical academy of Health Ministry of Ukraine”.

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PHARMACOLOGY
WORKBOOK
FOR PRACTICAL CLASSES
FOR FOREIGN STUDENTS
(GENERAL MEDICINE)

Student _____

Course _____ Group _____ Decade _____

Faculty _____

Teacher _____

Academic year _____ / _____

№	<p style="text-align: center;">Module 1 General prescription. General pharmacology. Drugs affecting the synapses. Drugs affecting the peripheral and central nervous system</p>	Maximal grade
Unit №1 General prescription		
1.	Introduction into general prescription. Solid dosage forms.	6
2.	Soft dosage forms.	6
3.	Liquid dosage forms. Solutions for intrernal and external use, solutions for injections, aerosoles.	6
4.	Mixtures, infusions, decoctions and solutions that are dosed by drops and spoons. The final class «General prescription».	8
Unit №2 General pharmacology		
5.	Introduction into pharmacology. History of pharmacology and pharmacy. Pharmacokinetics and pharmacodynamics. The final class «General pharmacology».	8
Unit №3 Drugs affecting the afferent and efferent divisions of peripheral nervous system		
6.	Local anesthetics, astringents, covering drugs, adsorbents, irritants.	6
7.	Cholinergic agonists (cholinomimetics), acetylcholinesterase inhibitors. Cholinergic antagonists: M-cholinoblockers. N-cholinoblockers (ganglionic blockers, neuromuscular-blocking drugs).	6
8.	Drugs affecting adrenergic receptors. Adrenergic agonists: adrenomimetics, sympathomimetics. Adrenergic antagonists: adrenoblockers, sympatholytics.	6
9.	Dopaminergic and serotonergic drugs. The final class «Drugs affecting the afferent and efferent divisions of peripheral nervous system».	8
Unit №4 Drugs affecting the central nervous system		
10.	Psychotropic drugs. Sedative drugs, neuroleptics, tranquilizers (anxiolytic drugs), mood stabilizers.	6
11.	Hypnotic, antiepileptic and antiparkinsonian drugs.	6
12.	General anesthetics. Pharmacology and toxicology of ethyl alcohol.	6
13.	Narcotic (opioid) analgesics.	6
14.	Non-narcotic (non-opioid) analgesics. Nonsteroidal anti-inflammatory drugs.	6
15.	Psychomotor stimulants. Analeptics. Antidepressants. Nootropic drugs. Adaptogenes. Actoprotectors.	6
16.	The final class «Drugs affecting the central nervous system».	8
All units together		104
Student's individual self-study		16
The final module control		80
Total		200

№	Module 2 Drugs affecting the functions of peripheral executive systems and organs, metabolism, blood and immunity. Chemotherapeutic drugs	Maximal grade
Unit №5 Pharmacology of metabolism		
1.	Drugs affecting the endocrine system. Hormonal drugs, their synthetic analogs and antagonists.	6
2.	Vitamins. Enzymatic drugs and their inhibitors.	6
3.	Pharmacology of blood. Drugs affecting hematopoiesis, blood coagulation, platelet aggregation and fibrinolysis.	6
4.	Drugs affecting allergy and immunity. The final class «Pharmacology of metabolism».	8
Unit №6 Drugs affecting the functions of peripheral executive systems and organs		
5.	Pharmacology of the respiratory system.	6
6.	Pharmacology of the gastrointestinal (digestive) system.	6
7.	Pharmacology of blood circulation. Antihypertensive and hypertensive drugs. Antihyperlipidemic drugs. Angioprotectors.	6
8.	Pharmacology of the coronary and cerebral blood flow. Antianginal and cerebrovascular drugs.	6
9.	Cardiotonic and antiarrhythmic drugs.	6
10.	Diuretics. Drugs for treatment of gout.	6
11.	Uterine drugs and contraceptives. Test control «Drugs affecting the functions of peripheral executive systems and organs».	6
12.	The final class «Drugs affecting the functions of peripheral executive systems and organs».	8
Unit 7 Chemotherapeutic drugs		
13.	Antiseptics and disinfectants. Sulfonamides. Fluoroquinolones.	6
14.	Antibiotics I (β -lactams, aminoglycosides).	6
15.	Antibiotics II (macrolides, tetracyclines, chloramphenicol).	6
16.	Antifungal, antiviral, antimycobacterial, antiprotozoal, anthelmintic and anticancer drugs. The final class «Chemotherapeutic drugs».	8
17.	Pharmacology of acute poisonings and emergency conditions. Pharmacovigilance. The final test control for Module 2.	6
All units together		108
Student's individual self-study		12
The final module control		80
Total		200

Note: After getting the traditional marks the student receives the following points.

Practical classes:

«5» – 6

«4» – 4

«3» – 2

«2» – 0

Final classes:

«5» – 8

«4» – 6

«3» – 4

«2» – 0

Requirements for admittance to the final module control:

- routine academic performance with a minimal sum of grades **40 points** in every semester
- passing the final test control with a result **more than 75%**

PLAN OF LECTURES (Module 1)

№	TOPICS
1.	Introduction into pharmacology. History of pharmacology and pharmacy. Modern state of pharmacology. General pharmacology: pharmacokinetics and pharmacodynamics.
2.	Drugs affecting the efferent division of peripheral nervous system. Cholinergic agonists (cholinomimetics), acetylcholinesterase inhibitors. Cholinergic antagonists: M-cholinoblockers. N-cholinoblockers (ganglionic blockers, neuromuscular-blocking drugs).
3.	Drugs affecting adrenergic receptors. Adrenergic agonists: adrenomimetics, sympathomimetics. Adrenergic antagonists: adrenoblockers, sympatholytics.
4.	Psychotropic drugs. Sedative drugs, neuroleptics, tranquilizers (anxiolytic drugs), mood stabilizers. Hypnotic, antiepileptic and antiparkinsonian drugs.
5.	Pharmacology of pain. General anesthetics. Classification of analgesics. Narcotic (opioid) analgesics.
6.	Pharmacology of pain. Non-narcotic (non-opioid) analgesics. Nonsteroidal anti-inflammatory drugs.
7.	Drugs stimulating central nervous system. Psychomotor stimulants. Analeptics. Antidepressants. Nootropic drugs. Adaptogenes. Actoprotectors.
8.	Drugs affecting the endocrine system. Hormonal drugs, their synthetic analogs and antagonists.
9.	Pharmacology of blood. Drugs affecting hematopoiesis, blood coagulation, platelet aggregation and fibrinolysis.
10.	Drugs affecting the respiratory system.

**PLAN OF LECTURES
(Module 2)**

<i>No</i>	<i>TOPICS</i>
1	Drugs affecting the respiratory system: decongestants, expectorants, antitussives and bronchodilators.
2	Pharmacology of the gastrointestinal (digestive) system. Drugs affecting motor and secretory activity of stomach and intestine. Drugs affecting functions of liver and pancreas.
3	Pharmacology of systemic, coronary and cerebral circulation. Antihypertensive, antianginal and cerebrovascular drugs.
4	Pharmacology of heart failure. Cardiotonic drugs of glycoside and non-glycoside nature. Antiarrhythmic drugs.
5	Pharmacology of fluid and electrolytes balance. Diuretics. Drugs for treatment of gout.
6	Pharmacology of labor activity. Drugs affecting the contractile activity of the myometrium (uterus). Contraceptives.
7	Pharmacology of antimicrobial drugs. Antiseptics and disinfectants. Synthetic antimicrobial drugs: sulfonamides, derivatives of nitroimidazole, quinoxaline. Antimycobacterial and antifungal drugs.
8	General principles of rational antibiotic therapy. Pharmacology of β -lactam antibiotics.
9	Aminoglycosides. Macrolides. Tetracyclines. Chloramphenicol. Fluoroquinolones. Principles of combined antibiotic use.
10	Pharmacology of acute poisonings and emergency conditions. Pharmacovigilance. Monitoring of adverse drug reactions in Ukraine.

UNIT №1. GENERAL PRESCRIPTION

Learning objectives:

- Look through the content of the Law of Ukraine "About drugs" and the order of Health Ministry of Ukraine "About the drugs prescribing rules and dispensing of drugs procedure".
- Evaluate significance of correctly written out signature.
- Summarize and analyze the characteristics of solid and soft dosage forms, peculiarities of their manufacturing, routes of administration and prescribing.
- Summarize and analyze the characteristics of liquid dosage forms, peculiarities of their manufacturing, routes of administration and prescribing.
- Summarize and analyze the characteristics of new dosage forms (pastilles, caramels), peculiarities of their manufacturing, routes of administration and prescribing.

To know:

- Types of dosage forms, peculiarities of their use.
- The prescription structure and prescribing rules for different dosage forms.

To be able to:

- Write prescriptions (using full and short ways) for various dosage forms.

Prescription form (sample)

Juan Dela Cruz, MD

Tower A Bldg., Boni Ave, Mandaluyong City
Tel No.: 531-4534

Clinic Schedule:

Monday: 1:00PM – 5:00PM
Tue – Thur: 10:00AM – 3:00PM

Friday: 9:00AM – 12:00PM
Saturday: 12:00PM – 3:00PM

Name: Sarah Gonzales

Address: Boni Avenue, Mandaluyong City

Age: 8 Sex: F Date: 6/21/2012

R_x

Amoxicillin 250mg/5ml Susp.

2 lots

Reconstitute with water to make 60 mL suspension

Sig. Take 1 tablespoon TID for 777 days

Physician's Sig. J. Delacruz

Lic. No. 12345

PTR No. 1234567

S2 No. _____

DATE		Module 1
Unit №1. General prescription		
Introduction into general prescription. Solid dosage forms		

The list of basic terms in the topic

Term	Definition
Dosage form	Means by which drug molecules are delivered to sites of action within the body.
Prescription	Written doctor's request to a pharmacist about manufacturing and supplying a drug to a patient with instructions how to use this drug.
Pharmacopoeia	Collection of mandatory medical and pharmaceutical national standards and regulations concerning quality of drugs.
Main solid dosage forms	Powders, tablets, pills, capsules, pastilles, caramels.
Powder (Pulvis)	Solid, loose, dry particles of varying degrees of fineness.
Capsule (Capsula)	Solid dosage form in a gelatin container.
Tablet (Tabuletta)	Hard, compressed solid dosage form in round, oval or square shape.

Individual work

Theoretical questions:

1. The Law of Ukraine "About drugs", the order of Health Ministry of Ukraine "About the drugs prescribing rules and dispensing of drugs procedure". The concept of medical prescription, dosage forms, medicinal raw materials, substances, drugs.
2. Sources of drugs. Dosage forms and their classification.
3. Prescription: the structure and rules of prescribing drugs for adults and children. Types of prescription forms (1 and 3). Prescription as medical, legal, financial document. Prescribing rules for narcotic, poisonous and strong-acting drugs. Full and short ways of prescribing. Officinal and magistral prescriptions.
4. Dosing of drugs for adults and children. Pharmacy (chemist's).
5. Definition and types of Pharmacopoeia. State Pharmacopoeia, its content and purpose.
6. Solid dosage forms.
7. Simple and complex powders, dosed and non-dosed, for external and internal use. Excipients for powders. Prescribing rules.
8. Capsules: types, characteristics, purpose, prescribing rules.
9. Tablets and dragee: characteristics, purpose, prescribing rules.
10. The concept of other solid dosage forms.
11. Advantages and disadvantages of solid dosage forms. Features of application.

Prescribe the drugs:

- 1) 25 g of anesthesin in a simple Rp.:
powder (**Anaesthesinum**). For
applying on the wound.
- 2) 50 g of powder that contains 1% Rp.:
salicylic acid for treatment of
atopic dermatitis (**Acidum
salicylicum**).

- 3) 100 g of activated carbon (**Carbo activatus**) for internal use. Take 2 tablespoons mixed with a cup of water. Rp.:
- 4) 12 powders of pancreatin (**Pancreatinum**) 0,5 g. Use orally 1 powder three times a day before meal with alkaline water. Rp.:
- 5) 15 powders of nicotinic acid (**Acidum nicotinicum**) 0,03 g. Use orally 1 powder once a day. Rp.:
- 6) 12 complex powders of papaverine (**Papaverini hydrochloridum**) 0,02 g with anesthesin (**Anaesthesinum**) 0,3 g. Use orally 1 powder three times a day after meal. Rp.:
- 7) 30 capsules containing 0,3 g of iron lactate (**Ferri lactas**). Use orally 1 capsule 3 times a day after meal. Rp.:
- 8) 40 tablets of nitroglycerin (**Nitroglycerinum**) 0,0005 g. Take 1 tablet sublingually during angina attack. Rp.:
- 9) 20 diazolin dragees (**Diazolinum**) 0,05 g. Use 1 dragee 3 times a day for treatment of allergic rhinitis. Rp.:

References:

1. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
2. Stefanov O.V., Kucher V.G. Pharmacology with General Prescription: textbook for English-speaking students, 3rd edition. – Kyiv: Book-plus, 2011. – 336 p.

Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №1. General prescription		
Soft dosage forms		

The list of basic terms in the topic

Term	Definition
Main soft dosage forms	Ointments, creams, pastes, liniments, suppositories, plasters.
Ointment (Unguentum)	Non-dosed, homogeneous, viscous, soft (semi-solid) dosage form that is intended for external application to the skin or mucous membranes. It consists of active substance (drug) and an ointment base. Ointments can be officinal (written out in short way) and magistral (written out in short and full ways).
Paste (Pasta)	Dense ointment that contains at least 25% (up to 65%) solid components.
Liniment (Linimentum)	Liquid ointment or jelly mass made on vegetable oils that is spread at body temperature.
Suppository (Suppositoria)	Dosed, small, cone-shaped solid (at room temperature) dosage form that is inserted either into the rectum (<i>rectal suppository</i>), vagina (<i>vaginal suppository or pessaries</i>) where it dissolves or melts at body temperature.

Individual work

Theoretical questions:

1. Composition of ointment. Ointment bases (vaseline, lanolin, synthetic bases), their characteristics and significance for action of drugs. Eye ointments.
2. Paste and its differences from ointment.
3. Liniment and its variations.
4. Plasters and its use.
5. Other types of soft dosage forms: gel, cream.
6. Rectal and vaginal suppositories, their purpose.
7. Advantages and disadvantages of soft dosage forms. Prescribing rules for soft dosage forms.
8. Peculiarities of soft dosage forms use in pediatric practice.

Prescribe the drugs:

- 1) 30 g of 3% tetracycline ointment Rp.:
(Tetracyclinum). Apply on the affected area of skin.
- 2) 10 g of an eye ointment that Rp.:
contains 0,5% hydrocortisone
(Hydrocortisoni acetat). Put on the lower eyelids at night.
- 3) 30 g of a complex ointment Rp.:
containing 1% salicylic acid
(Acidum salicylicum) and 10% zinc oxide
(Zinci oxydum). Apply on the affected area of skin.

- 4) 20 g of officinal zinc ointment Rp.:
(Zincum). Apply on the wound.
- 5) 30 g of a paste containing 0,2% Rp.:
furacilin **(Furacilinum)**. Apply on
the affected area of skin.
- 6) 30 g of officinal liniment Rp.:
containing synthomycin
(Synthomycinum). Apply on the
wound.
- 7) 100 g of Vishnevsky liniment Rp.:
containing 3% birch tar oil **(Pix
liquida)**, 3% xeroform
(Xeroformium) and the base
castor oil **(Oleum Ricini)**. For
bandaging of purulent wounds.
- 8) 12 rectal suppositories that Rp.:
contain 0,1 g of levomycetin
(Laevomycetinum). Introduce
into the rectum two times a day.
- 9) 10 rectal suppositories containing Rp.:
0,2 g of metacin **(Methacinum)**
and 0,1 g of anesthesin
(Anaesthesinum). Introduce into
the rectum three times a day.
- 10) 20 vaginal suppositories Rp.:
containing 0,001 g of sinestrol
(Synoestrolum). Introduce into
the vagina in the morning and
evening.

References:

1. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
2. Stefanov O.V., Kucher V.G. Pharmacology with General Prescription: textbook for English-speaking students, 3rd edition. – Kyiv: Book-plus, 2011. – 336 p.

Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №1. General prescription		
Liquid dosage forms. Solutions for intrernal and external use, solutions for injections, aerosoles		

The list of basic terms in the topic

Term	Definition
<i>Solution (Solutio)</i>	Liquid dosage form that consists of a solvent (water, alcohol, glycerol, oil) and a soluble substance.
<i>Enteral solution (for internal use)</i>	Introduced per os, in stomach and duodenum by a gastrointestinal tube, per rectum.
<i>Topical solution (for external use)</i>	Applied on the skin (baths, lotions, rinses, etc.).
<i>Aerosol</i>	Container holding a substance under pressure that is able to be released as a fine spray, typically by means of a propellant gas.

Individual work

Theoretical questions:

1. The concept of solution. Solutions for external use (eye drops, nasal drops, ear drops, lotions), their use in medical practice. Solvents (water, alcohol, oil, glycerol), their characteristics. Ways of expressing the concentration of the solution. Prescribing of solutions for external use.
2. Solutions for internal use (mixtures, drops). Dosing of solutions for internal use (by tablespoons, dessertspoons, teaspoons, drops). Prescribing rules.
3. Dosage forms for injections. Requirements for them (sterility, purity, stability, apyrogenicity). Ways of their introduction. Prescribing rules for drugs in ampoules and vials.
4. Advantages and disadvantages of solutions (for internal and parenteral use) as compared to solid dosage forms.
5. Aerosols and sprays, their characteristics, application, prescribing rules.
6. Significance of solutions as pediatric dosage forms.

Prescribe the drugs:

- 1) 500 ml of 0,02% solution furacilin Rp.:
(Furacilinum). Use for washing the wounds.
- 2) 10 ml of 2% alcoholic solution of Rp.:
salicylic acid **(Acidum salicylicum)** for treatment of abscesses.
- 3) 12 doses (by tablespoons) of Rp.:
calcium chloride solution **(Calcii chloridum)**. Single dose (SD) – 1,0. Use 1 tablespoon per day.

- 4) 10 doses (by teaspoons) of Rp.:
dibazol solution (**Dibazolium**) for
a child. SD – 0,04. Use one
teaspoon 3 times a day.
- 5) 30 doses (by drops) of Rp.:
papaverine solution (**Papaverini
hydrochloridum**). SD – 0,005.
Use 10 drops 3 times a day.
- 6) Solution of papaverine Rp.:
(**Papaverini hydrochloridum**) in
1 ml ampoules for IM injections.
SD – 0,02. Use 1 ml twice a day.
- 7) 10 ampoules with 1 ml of 1% oil Rp.:
solution of progesterone
(**Progoesteronum**). Use 1 ml
subcutaneously once a day.
- 8) 500 ml of 5% glucose solution Rp.:
(**Glucosum**) in vial for IV use.
- 9) 20 vials of streptomycin sulfate Rp.:
(**Streptomycini sulfas**). SD –
0,5. Dissolve in 3 ml of saline and
use for IM injections twice a day.
- 10) 6 vials of corticotropin Rp.:
(**Corticotropinum**). SD – 10 IU.
Use for IM injections once a day.
- 11) Aerosol "Ingalipt" (**Ingaliptum**). Rp.:
Sprinkle the nasopharynx 6 times
a day.

References:

1. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
2. Stefanov O.V., Kucher V.G. Pharmacology with General Prescription: textbook for English-speaking students, 3rd edition. – Kyiv: Book-plus, 2011. – 336 p.

Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №1. General prescription		
Mixtures, infusions, decoctions and solutions that are dosed by drops and spoons.		
<u>The final class «General prescription»</u>		

The list of basic terms in the topic

Term	Definition
<i>Infusion (Infusum)</i>	Aqueous extraction from medicinal plants. Made from friable raw materials, as well as raw materials that contain volatile unstable substances (essential oils).
<i>Decoction (Decoctum)</i>	Aqueous extraction from medicinal plants. Made from dense raw materials.
<i>Tincture (Tinctura)</i>	Alcohol-containing extraction from medicinal plants.
<i>Extract (Extractum)</i>	Concentrated extraction from medicinal plants. Depending on the consistency extracts can be liquid, thick and dry.

Individual work

Theoretical questions:

1. Infusions and decoctions, their characteristics as multicomponent dosage forms. Methods of their preparation.
2. Herbal mixtures, their application.
3. Galenic preparations: tinctures, extracts. Their characteristics and application.
4. Suspensions and mucilages. Sources and application.
5. Syrups and aromatic waters, their application.
6. Mixtures on the basis of decoctions and infusions.
7. Advantages and disadvantages of these dosage forms. Methods of dosing and prescribing rules.
8. Peculiarities of these dosage forms use in pediatric practice.

Prescribe the drugs:

1. 12 doses (by tablespoons) of Rp.:
valerian infusion (**radix Valerianae**) with sodium bromide (**Natrii bromidum**). SD of valerian root – 0,5, SD of sodium bromide – 0,25. Use orally one tablespoon 3 times a day.
2. 10 doses (by teaspoons) of Rp.:
marshmallow root infusion (**radix Althaeae**) with sodium bicarbonate (**Natrii hydrocarbonas**) and syrup. SD of marshmallow root and sodium bicarbonate – 0,5 each. Use orally 1 teaspoon 5 times a day.

3. Tincture of hawthorn **(Crataegus)**. Use orally 20 drops 3 times a day. Rp.:
4. Complex tincture of motherwort **(Leonurum)** [SD – 20 drops] and strophanthus **(Strophanthum)** [SD – 5 drops]. Use orally 2 times a day. Rp.:
5. 20 doses (by teaspoons) of mixture from belladonna dry extract **(Belladonna)** [SD – 0,015] with sodium bicarbonate **(Natrii hydrocarbonas)** [SD – 0,3]. Use orally 1 teaspoon 2 times a day. Rp.:
6. 15 doses (by tablespoons) of oak bark decoction **(cortex Quercus)**. Use orally one tablespoon 3 times a day. Rp.:

References:

1. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
2. Stefanov O.V., Kucher V.G. Pharmacology with General Prescription: textbook for English-speaking students, 3rd edition. – Kyiv: Book-plus, 2011. – 336 p.

Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №2. General Pharmacology		
Introduction into pharmacology. History of pharmacology and pharmacy. Pharmacokinetics and pharmacodynamics. <u>The final class «General pharmacology»</u>		

Learning objectives:

- summarize and analyze main pharmacological terms;
- evaluate significance of pharmacology as a fundamental subject for the development of other subjects in medicine;
- analyze main stages of development of pharmacology as a science and the contribution of scientists in each stage;
- study the general principles of human-drugs interaction, main types of pharmacological reactions.

Individual work**Theoretical questions:**

1. Definition of pharmacology as a science. History of pharmacology and pharmacy.
2. Methods used in pharmacology. Drug development.
3. The main types of drug therapy.
4. General Pharmacology. Pharmacodynamics. Pharmacokinetics.
5. Routes of drug administration, their advantages and disadvantages. Comparative characteristics.
6. Types of drug action on the organism.
7. Therapeutic, toxic, main and adverse (side) effects of drugs.
8. Dependence of drug action on the chemical structure and other factors.
9. The action of drugs in their repeated introductions. Cumulation and its types. Tachyphylaxis. Tolerance.
10. Drug dependence. Prevention of drug addiction.
11. Types of synergism: summation and potentiation. Direct and indirect synergism. Its use in medicine.
12. Types of antagonism: direct and indirect. One-way and two-way antagonism. Its use in emergency treatment.
13. Pharmacokinetics and its stages.
14. The main mechanisms of drug transport through biological membranes.
15. Drug dose. Types of doses.
16. Metabolism of drugs. Reactions of drug biotransformation.
17. Elimination of drugs.
18. Toxicology. Drug disease.

ANSWER THE QUESTIONS:**1. DEFINITION OF PHARMACODYNAMICS AND PHARMACOKINETICS.**

2. MAIN STAGES OF PHARMACOKINETICS.

3. TYPES OF DRUG THERAPY.

4. DEFINITION OF SYNERGISM AND ANTAGONISM.

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
3. Stefanov O.V., Kucher V.G. Pharmacology with General Prescription: textbook for English-speaking students, 3rd edition. – Kyiv: Book-plus, 2011. – 336 p.
4. Lippincott's Illustrated Reviews: Pharmacology, 5th edition / Ed. Michelle A. Clark et al. – Philadelphia: Lippincott Williams & Wilkins, 2012. – 615 p.
5. Lectures on pharmacology.

Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №3. Drugs affecting the afferent and efferent divisions of peripheral nervous system		
Local anesthetics, astringents, covering drugs, adsorbents, irritants		

The list of basic terms in the topic

Term	Definition
Local anesthetics	Drugs that cause reversible local anesthesia (absence of sensation), generally for the aim of having a local analgesic effect, that is, inducing absence of pain sensation, although other local senses are often affected as well. Also, when it is used on specific nerve pathways (nerve block), paralysis (loss of muscle power) can be achieved as well. Local anesthetics reduce sensitivity of afferent nerve endings and suppress conduction of excitation along the nerve.
Astringents, adsorbents, covering drugs	Drugs that protect endings of sensory nerves from the action of irritating substances.
Irritants	Drugs that irritate sensitive nerve endings in the skin or mucous membranes and produce local vascular reactions, reflexive actions and distractive effects.

Individual work

Theoretical questions:

1. Classification of drugs affecting afferent innervation (drugs that reduce and increase the sensitivity of afferent nerves).
2. Drugs for local anesthesia. Classification of local anesthetics by chemical structure and their use for different types of anesthesia. Requirements for local anesthetics.
3. Pharmacology of esters (**Procaine [Novocaine], Trimecaine, Benzocaine [Anesthesine]**) and replaced amides (**Lidocaine, Articaine, Bupivacaine**).
4. Comparative characteristics of local anesthetics. Indications and clinical uses. The purpose of combination with adrenergic agonists.
5. Side effects of local anesthetics, prevention and treatment. Toxicology of cocaine.
6. Astringents. Organic and inorganic astringents. Mechanism of action, indications and clinical uses.
7. Pharmacological characteristics of **Tannin, Bismuth subnitrate, herb of St. John's wort (Hypericum), sage leaves, chamomile flowers**.
8. Covering drugs. General characteristics. Mechanism of action, indications and clinical uses (**starch mucus, flax seeds**).
9. Adsorbents. Classification. Mechanism of action. Indications and clinical uses (**Activated carbon, Enterosgel**).
10. Drugs irritating sensory nerves. Classification of irritants. Mechanism of action. Effects on the skin and mucous membranes. Indications and clinical uses.
11. Pharmacodynamics of **Ammonia solution, Menthol, mustard plaster, turpentine essence** and complex drugs on the basis of them.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. Tannin
2. Vikalin*
3. Herb of St. John's wort (Hypericum)
4. Sage leaves
5. Chamomile flowers

6. Novocaine [Procaine]*

7. Vicair

8. Articaine*

9. Bupivacaine

10. Lidocaine*

11. Activated carbon*

12. Ammonia solution*

Note: * – drugs for filling in the table**TASK FOR AN EXTRACURRICULAR WORK****Fill in the table:**

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

Vikalín

Novocaine

Rp:

Rp:

Activated carbon

Lidocaine

Rp:

Rp:

Ammonia solution

Articaine

Rp:

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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4. Lippincott's Illustrated Reviews: Pharmacology, 5th edition / Ed. Michelle A. Clark et al. – Philadelphia: Lippincott Williams & Wilkins, 2012. – 615 p.
5. Lectures on pharmacology.

Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №3. Drugs affecting the afferent and efferent divisions of peripheral nervous system		
Cholinergic agonists (cholinomimetics), acetylcholinesterase inhibitors. Cholinergic antagonists: M-cholinoblockers. N-cholinoblockers (ganglionic blockers, neuromuscular-blocking drugs)		

The list of basic terms in the topic

Term	Definition
Cholinergic agonists (cholinomimetics)	Drugs that mimic the effects of acetylcholine (ACh) by binding directly to cholinergic receptors.
M-cholinomimetics	Drugs that stimulate mainly muscarine-sensitive cholinergic receptors (M-cholinergic receptors).
N-cholinomimetics	Drugs that stimulate mainly nicotine-sensitive cholinergic receptors (N-cholinergic receptors).
Acetylcholinesterase inhibitors (anticholinesterases, indirect-acting cholinergic agonists)	Drugs that indirectly provide a cholinergic action by prolonging the lifetime of ACh produced endogenously at the cholinergic nerve endings. These drugs block the activity of acetylcholinesterase (enzyme that destroys acetylcholine in cholinergic synapses). There are reversible (effect lasts for a few hours) and irreversible drugs (effect lasts from a few days up to a month).
Reactivators of acetylcholinesterase	Drugs that restore the activity of acetylcholinesterase.
Cholinergic antagonists (cholinoblockers, anticholinergic drugs)	Drugs that bind to cholinergic receptors, but they do not trigger the usual receptor-mediated intracellular effects.
M-cholinoblockers	Drugs that block mainly muscarine-sensitive cholinergic receptors (M-cholinergic receptors).
N-cholinoblockers	Drugs that block mainly nicotine-sensitive cholinergic receptors (N-cholinergic receptors).
Ganglionic blockers	Drugs that specifically block the nicotinic receptors of both parasympathetic and sympathetic autonomic ganglia. This results in inhibition of transmission of nerve impulses from pre- to postganglionic fibers. Some drugs also block the ion channels of the autonomic ganglia.
Neuromuscular-blocking drugs	Drugs that block cholinergic transmission between motor nerve endings and the nicotinic receptors on the neuromuscular endplate of skeletal muscle. These neuromuscular blockers are structural analogs of ACh, and they act either as antagonists (nondepolarizing type) or agonists (depolarizing type) at the receptors on the endplate of the neuromuscular junction.

Individual work

Theoretical questions:

1. Anatomical and physiological characteristics of the autonomic nervous system. Cholinergic synapses, neurotransmitters and receptors.
2. Classification of drugs affecting the autonomic nervous system. Classification of drugs affecting the functions of cholinergic nerves.
3. Pharmacological effects of cholinergic receptors stimulation.
4. M-cholinomimetics. Pharmacological characteristics of **Pilocarpine**. Effects on eyes, smooth muscles, gland secretion, cardiovascular and urinary systems.

- Indications and clinical uses. Acute poisoning by muscarine, clinical symptoms and treatment. Antidote therapy.
5. N-cholinomimetics. Pharmacological effects of nicotine. Smoking as a medical and social issue. Drugs used to control nicotine smoking (**Cytisine [Tabex]**).
 6. Acetylcholinesterase inhibitors. Classification of anticholinesterases. Mechanism of action, pharmacological effects, indications and clinical uses, side effects. Comparative characteristics of anticholinesterases (**Neostigmine [Proserine], Galantamine, Pyridostigmine**).
 7. Peculiarities of organophosphorus compounds. Acute poisoning by organophosphorus compounds, clinical symptoms and treatment. Reactivators of acetylcholinesterase (**Dipiroxime, Pralidoxime**).
 8. Cholinergic antagonists. M- and N-cholinoblockers.
 9. Pharmacology of **Trihexyphenidyl [Cyclodol]**. Indications and clinical uses. Side effects.
 10. M-cholinoblockers. Pharmacological characteristics of **Atropine, Tropicamide**. Indications and clinical uses. Acute poisoning by atropine and atropine-containing plants, clinical symptoms and treatment.
 11. **Platyphylline, Hyoscine [Scopolamine], Belladonna extract, Ipratropium bromide [Atrovent], Pirenzepine [Gastrozepin]**. Comparative characteristics. Indications and clinical uses. Side effects.
 12. N-cholinoblockers. Classification of ganglionic blockers. Mechanism of action. Pharmacological effects, indications and clinical uses, side effects. Characteristics of drugs: **Hexamethonium [Benzohexonium], Trepirium iodide [Hygronium], Azamethonium bromide [Pentamine]**.
 13. Classification of neuromuscular-blocking drugs (skeletal muscle relaxants). Pharmacokinetics, pharmacodynamics of **Tubocurarine**. Indications and clinical uses, side effects.
 14. Pharmacological characteristics of skeletal muscle relaxants **Pipekuronium [Arduan]**. Overdose by nondepolarizing muscle relaxants, clinical symptoms and treatment. Decurarization.
 15. Pharmacological characteristics of depolarizing skeletal muscle relaxants **Suxamethonium chloride [Succinylcholine, Dithylin, Listenon]**. Indications and clinical uses. Overdose by depolarizing muscle relaxants, clinical symptoms and treatment.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. **Pilocarpine hydrochloride***
2. **Neostigmine [Proserine]***
3. **Galantamine hydrobromide***
4. **Atropine sulfate***
5. **Platyphylline hydrotartrate***
6. **Pipekuronium bromide [Arduan]***
7. **Ipratropium bromide [Atrovent]***
8. **Pirenzepine [Gastrozepin]***
9. Tubocurarine chloride
10. **Dithylin***
11. Hexamethonium [Benzohexonium]
12. Trepirium iodide [Hygronium]

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK**Fill in the table:**

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Proserine for prevention and treatment of intestinal atony. 2. Pilocarpine hydrochloride (eye drops).

Rp:

Rp:

3. Atropine sulfate (eye drops and ampoules).

Rp:

4. Platyphylline hydrotartrate for treatment of intestinal colic.

Rp:

Rp.:

5. Dithylin for displacement reduction.

Rp:

6. Ipratropium bromide for inhalation.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №3. Drugs affecting the afferent and efferent divisions of peripheral nervous system		
Drugs affecting adrenergic receptors. Adrenergic agonists: adrenomimetics, sympathomimetics. Adrenergic antagonists: adrenoblockers, sympatholytics		

The list of basic terms in the topic

Term	Definition
Adrenergic drugs	Drugs affecting receptors that are stimulated by norepinephrine (noradrenaline) or epinephrine (adrenaline).
Direct-acting adrenergic agonists (adrenomimetics)	Drugs that stimulate directly adrenergic receptors.
Alpha-adrenomimetics	Drugs that stimulate mainly alpha-adrenergic receptors.
Beta-adrenomimetics	Drugs that stimulate mainly beta-adrenergic receptors.
Sympathomimetics	Indirect-acting alpha- and beta-adrenomimetics that block the enzyme monoamine oxidase, and thus increase the release of neurotransmitter into the synaptic cleft.
Adrenergic antagonists (antiadrenergic drugs)	Drugs that reduce the transmission of impulses in the adrenergic synapses
Alpha-adrenoblockers	Drugs that block mainly alpha-adrenergic receptors.
Beta-adrenoblockers	Drugs that block mainly beta-adrenergic receptors.
Sympatholytics	Drugs that block sympathetic innervation by limitation of neurotransmitter release from adrenergic nerves endings.

Individual work

Theoretical questions:

- Adrenergic receptors, types, localization, functions.
- Classification of drugs affecting adrenergic innervation. Adrenergic agonists. Pharmacological characteristics.
- Pharmacological characteristics of alpha- and beta-adrenomimetics. Pharmacokinetics, pharmacodynamics of **Epinephrine [Adrenaline]**. Effects on cardiovascular system, smooth muscles and metabolism. Indications and clinical uses.
- Comparative characteristics of alpha-adrenomimetics: **Norepinephrine [Noradrenaline], Phenylephrine [Mesatone], Naphazoline, Xylometazoline**. Pharmacological effects, indications and clinical uses. Side effects.
- Comparative characteristics of beta-adrenomimetics: **Isoprenaline [Isoproterenol, Isadrine], Salbutamol [Albuterol], Fenoterol [Berotec]**. Pharmacodynamics, indications and clinical uses, contraindications, side effects.
- Indirect-acting adrenergic agonists (sympathomimetics). Mechanism of action, pharmacological effects, indications and clinical uses of **Ephedrine**. Side effects and contraindications.
- Adrenergic antagonists (antiadrenergic drugs). Adrenoblockers. Classification.
- Alpha-adrenoblockers: **Prazosin, Doxazosin [Cardura], Terazosin**. Pharmacodynamics, indications and clinical uses, Side effects and contraindications.
- Beta-adrenoblockers. Pharmacodynamics. Cardioselective and non-cardioselective beta-adrenoblockers. Comparative characteristics of **Propranolol [Anaprilin, Inderal], Talinolol, Atenolol, Metoprolol**. Intrinsic sympathomimetic activity.

10. Sympatholytics: **Guanethidine [Octadine], Reserpine.** Mechanism of action. Indications and clinical uses. Side effects and contraindications.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. **Epinephrine [Adrenaline hydrochloride]***
2. **Norepinephrine [Noradrenaline hydrotartrate]***
3. **Phenylephrine [Mesatone]***
4. Naphazoline
5. Xylometazoline
6. **Salbutamol [Albuterol]***
7. **Prazosin***
8. Doxazosin [Cardura]
9. Terazosin
10. **Propranolol [Anaprilin, Inderal]***
11. **Atenolol***
12. Metoprolol
13. Talinolol
14. Reserpine
15. Guanethidine [Octadine]

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Salbutamol for inhalation during asthma attacks.

Rp:

2. Adrenaline hydrochloride in case of anaphylactic shock.

Rp:

3. Phenylephrine [Mesatone] in ampoules.

Rp:

4. Metoprolol in tablets.

Rp:

5. Atenolol for treatment of arterial hypertension.

Rp:

6. Prazosin for treatment of benign prostatic hyperplasia.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
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Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №3. Drugs affecting the afferent and efferent divisions of peripheral nervous system		
Dopaminergic and serotonergic drugs.		
<u>The final class «Drugs affecting the afferent and efferent divisions of peripheral nervous system»</u>		

The list of basic terms in the topic

Term	Definition
<i>Dopamine</i>	Neurotransmitter of the catecholamine family that plays a number of important roles in the brain and peripheral tissues. In the blood vessels it inhibits norepinephrine release and acts as a vasodilator; in the kidneys it increases sodium excretion and urine output; in the pancreas it reduces insulin production; in the digestive system it reduces gastrointestinal motility and protects intestinal mucosa; and in the immune system it reduces the activity of lymphocytes. A variety of important drugs work by altering the way the body makes or uses dopamine. Dopamine itself is available for intravenous injection: although it cannot reach the brain from the bloodstream, its peripheral effects make it useful in the treatment of heart failure or shock. L-DOPA, the metabolic precursor of dopamine, does reach the brain and is the most widely used treatment for Parkinson's disease. Many antipsychotic drugs act by suppressing the effects of dopamine. Drugs that act against dopamine by a different mechanism are also some of the most effective anti-nausea agents.
<i>Serotonin (5-hydroxytryptamine)</i>	Monoamine neurotransmitter. Biochemically derived from tryptophan, serotonin is primarily found in the gastrointestinal (GI) tract, platelets, and in the central nervous system (CNS). Approximately 90% of total serotonin is located in the enterochromaffin cells in the GI tract, where it is used to regulate intestinal movements. The remainder is synthesized in serotonergic neurons of the CNS, where it has various functions. These include the regulation of mood, appetite, and sleep. Also serotonin serves as a vasoconstrictor and helps to regulate hemostasis and blood clotting. Serotonin agonists and antagonists are used in clinical practice as antiemetics, antidepressants and antimigrainous drugs.

Individual work

Theoretical questions:

1. Dopamine as a neurotransmitter. Dopamine receptors, types, localization.
2. Pharmacokinetics and pharmacodynamics of dopamine. Indications and contraindications for use of **Dopamine** and its agonists (**Levodopa, Bromocriptine**) and antagonists (**Aminazin, Metoclopramide**).
3. The role of serotonin (5-hydroxytryptamine) as a neurotransmitter in regulation of human body functions and in pathogenesis of different diseases. Serotonin receptors, types, localization.
4. Indications and clinical uses of serotonin agonists (**Sumatriptan**) and antagonists (**Ondansetron**).

SOLVE SITUATIONAL TASKS:

1. Determine the drug.

This drug contains glycoside sinigrin and enzyme myrosinase. Warm water (up to 40°C) causes enzymatic decomposition of sinigrin with formation of essential oil, that is due to its irritating properties causes therapeutic effect.

ANSWER _____

2. Determine the antidote for treatment of the patient.

A patient was delivered to emergency room in serious condition. Examination revealed narrowing of the pupils, increased salivation, sweating, difficult breathing, hypotension, bradycardia, spasms of abdominal smooth muscles, cramps. What antidote must be administered for this patient?

ANSWER _____

3. Determine the drug.

A 45 years old male suffers from bronchial asthma. A drug prescribed for him dilates bronchi and improves breathing. However tachycardia, hypertension, excessive CNS stimulation and sleep disturbances appeared in the patient. What drug could be prescribed for the patient?

ANSWER _____

4. Determine the drug.

Ultrastructural studies, combined with suitable histochemical techniques, show that the bulk of norepinephrine in the normal resting adrenergic neuron is stored in membrane-bound vesicles or granules. We administer a drug that, over time, depletes this supply of neurotransmitter and decreases the responses to sympathetic nerve activation. In vitro studies with chromaffin cells (dispersed cells from the suprarenal medulla) reveal that the drug acts by inhibiting uptake of the norepinephrine into the vesicles; it has no direct effect on catecholamine synthesis. What drug fits this description best?

ANSWER _____

5. Determine the pharmacodynamics of combined use of drugs.

It is common to include small amounts of epinephrine in solutions of local anesthetics that will be administered by infiltration (injection around sensory nerve endings), as when a skin laceration needs suturing. What is the most likely reason for, or outcome of, including the epinephrine?

ANSWER _____

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
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Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №4. Drugs affecting the central nervous system		
Psychotropic drugs. Sedative drugs, neuroleptics, tranquilizers (anxiolytic drugs), mood stabilizers		

The list of basic terms in the topic

Term	Definition
<i>Hallucination</i>	Perception of visual, auditory, tactile, olfactory, or gustatory experiences without an external stimulus and with a compelling sense of their reality, usually resulting from a mental disorder or as a response to a drug. Hallucinations involve sensing things while awake that appear to be real, but instead have been created by the mind.
<i>Delirium</i>	A temporary state of mental confusion and fluctuating consciousness resulting from high fever, intoxication, shock, or other causes. It is characterized by anxiety, disorientation, hallucinations, delusions, and incoherent speech. Delirium is an acute and relatively sudden (developing over hours to days) decline in attention-focus, perception, and cognition. In medical usage it is not synonymous with drowsiness, and may occur without it. Delirium is not the same as dementia (the two entities have different diagnostic criteria), though it commonly occurs in demented patients.
<i>Neurosis</i>	A relatively mild mental illness that is not caused by organic disease, involving symptoms of stress (depression, anxiety, obsessive behaviour, hypochondria) but not a radical loss of touch with reality. It is also known as psychoneurosis or neurotic disorder, and thus those suffering from it are said to be neurotic.
<i>Phobia</i>	A persistent, irrational, intense fear of a specific object, activity, or situation (the phobic stimulus), fear that is recognized as being excessive or unreasonable by the individual himself. When a phobia is a significant source of distress or interferes with social functioning, it is considered a mental disorder (sometimes called a phobic disorder).
<i>Neuroleptic drugs (antipsychotics, major tranquilizers)</i>	Pharmacological agents that tranquillize without impairing consciousness or causing paradoxical excitement, used in the treatment of psychoses like schizophrenia.
<i>Tranquilizers (anxiolytic, antianxiety drugs)</i>	A functional category of drugs useful in the treatment of anxiety and able to reduce anxiety at doses that do not cause excessive sedation. Most commonly used drugs falling into this category are benzodiazepines, which act at the γ -aminobutyric acid (GABA) receptor sites.
<i>Mood stabilizers</i>	A psychiatric drugs used to treat mood disorders characterized by intense and sustained mood shifts, typically bipolar disorder.

Individual work

Theoretical questions:

1. Classification of psychotropic drugs with inhibitory type of action.
2. Neuroleptics. Definition, classification, mechanism of action. Indications and clinical uses. Pharmacological effects of **Chlorpromazine [Aminazine]**, **Trifluoperazine [Triftazin]**, **Droperidol**, **Haloperidol**, **Clozapine**, **Chlorprothixene**, **Sulpiride**, **Fluphenazine [Phthorphenazine]**. Side effects of neuroleptics.
3. Combined use of neuroleptics with other drugs. The concept of neuroleptanalgesia.
4. Tranquilizers. Definition, classification. Benzodiazepine receptors. Pharmacodynamics of tranquilizers. Pharmacological effects of **Chlordiazepoxide [Chlozepide]**, **Diazepam [Sibazon, Valium]**, **Phenazepam**, daily tranquilizers (**Gidazepam, Medazepam**).
5. Indications and clinical uses for tranquilizers, main side effects.

6. Sedatives. Definition, classification, indications and clinical uses. Pharmacology of bromides. Bromism (bromide-poisoning). Clinical symptoms, prevention, treatment.
7. Herbal sedatives (**Tincture of valerian, Tincture of motherwort, Corvaldin**).

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. **Tincture of valerian***
2. Tincture of motherwort
3. Corvaldin
4. **Chlorpromazine [Aminazine]***
5. Trifluoperazine [Triftazin]
6. **Droperidol***
7. **Haloperidol***
8. Clozapine
9. **Chlorprothixene***
10. Sulpiride
11. **Chlordiazepoxide [Chlozepide]***
12. **Diazepam [Sibazon, Valium]***
13. **Phenazepam***
14. **Gidazepam***
15. Medazepam

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Diazepam in tablets.

Rp:

2. Droperidol for neuroleptanalgesia.

Rp:

3. Chlorpromazine [Aminazine] for treatment of psychosis.

Rp:

4. Tincture of valerian.

Rp:

5. Gidazepam (daily tranquilizer).

Rp:

6. Phenazepam.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №4. Drugs affecting the central nervous system		
Hypnotic, antiepileptic and antiparkinsonian drugs		

The list of basic terms in the topic

Term	Definition
<i>Insomnia</i>	Inability to obtain an adequate amount or quality of sleep. The difficulty can be in falling asleep, remaining asleep, or both. People with insomnia do not feel refreshed when they wake up.
<i>Hypnotic (soporific) drugs</i>	Class of drugs whose primary function is to induce sleep and to be used in the treatment of insomnia (sleeplessness).
<i>Convulsion (seizure)</i>	An intense, paroxysmal, involuntary muscular contraction or a series of such contractions.
<i>Antiepileptic drugs (anticonvulsants)</i>	Drugs that prevent or relieve convulsions (seizures) and other symptoms of epilepsy.
<i>Parkinson's disease (idiopathic or primary parkinsonism, hypokinetic rigid syndrome, paralysis agitans)</i>	A progressive disease of the nervous system marked by tremor, muscular rigidity, and slow, imprecise movement, chiefly affecting middle-aged and elderly people. It is associated with degeneration of the basal ganglia of the brain and a deficiency of the neurotransmitter dopamine.
<i>Antiparkinsonian drugs</i>	Drugs that are intended to treat and relieve the symptoms of Parkinson's disease (PD) or Parkinsonism. Most of these agents act by either increasing dopamine activity or reducing acetylcholine activity in the central nervous system.

Individual work

Theoretical questions:

1. Overview of normal sleep physiology. The main types of insomnia.
2. Classification of hypnotic drugs by chemical structure. General characteristics. Mechanism of action. **Phenobarbital, Nitrazepam, Bromisoval, Doxylamine [Donormyl], Chloral hydrate, Zopiclone [Imovane], Zolpidem**. Comparative characteristics of different groups of hypnotics.
3. Indications and clinical uses of hypnotic drugs, side effects. Acute poisoning by barbiturates, clinical symptoms and treatment.
4. Antiepileptic drugs. Classification. **Phenobarbital, Phenytoin [Diphenin], Carbamazepine, Clonazepam, Ethosuximide, Sodium valproate [Depakine], Lamotrigine**. Comparative characteristics. Side effects.
5. Antiparkinsonian drugs. Classification. Mechanism of action. **Levodopa [Sinemet, Madopar], Amantadine, Biperiden, Selegiline, Levodopa / Carbidopa [Nakom]**. Use in clinical practice.
6. Drugs for treatment of muscle spasticity. **Benzodiazepines, GABA-ergic drugs (Baclofen), Tolperisone [Mydocalm]**. General characteristics. Indications and clinical uses.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. **Phenobarbital***
2. **Nitrazepam***
3. Bromisoval
4. Doxylamine [Donormyl]
5. **Zopiclone [Imovane]***
6. Trihexyphenidyl [Cyclodol]
7. Phenytoin [Diphenin]

8. Carbamazepine*

9. Clonazepam

10. Lamotrigine*

11. Ethosuximide

12. Sodium valproate [Depakine]***13. Levodopa [Sinemet, Madopar]***

14. Amantadine

15. Biperiden

16. Selegiline***17. Levodopa / Carbidopa [Nakom]*****Note: * – drugs for filling in the table****TASK FOR AN EXTRACURRICULAR WORK****Fill in the table:**

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Zopiclone.

Rp:

2. Nitrazepam.

Rp:

3. Lamotrigine.

Rp:

4. Carbamazepine.

Rp:

5. Sodium valproate.

Rp:

6. Levodopa.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
3. Stefanov O.V., Kucher V.G. Pharmacology with General Prescription: textbook for English-speaking students, 3rd edition. – Kyiv: Book-plus, 2011. – 336 p.
4. Lippincott's Illustrated Reviews: Pharmacology, 5th edition / Ed. Michelle A. Clark et al. – Philadelphia: Lippincott Williams & Wilkins, 2012. – 615 p.
5. Lectures on pharmacology.

Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №4. Drugs affecting the central nervous system		
General anesthetics. Pharmacology and toxicology of ethyl alcohol (<u>Self-study</u>)		

The list of basic terms in the topic

Term	Definition
General anesthesia	Medically induced coma and loss of protective reflexes resulting from the administration of one or more general anaesthetic agents. A variety of medications may be administered, with the overall aim of ensuring sleep, amnesia, analgesia, relaxation of skeletal muscles, and loss of control of reflexes of the autonomic nervous system.
Amnesia	A partial or total loss of memory.
Analgesia	An inability to feel pain; a state in which painful stimuli are not perceived or interpreted as pain.
General anesthetics	Drugs that have the ability to bring about a reversible loss of consciousness.
Induction of anesthesia	Administration of a drug or combination of drugs at the beginning of an anesthetic that results in a state of general anesthesia.
Maintenance of anesthesia	Period during which the patient is surgically anesthetized.
Premedication	Administration of medication before anaesthesia. Premedication is used to prepare the patient for anaesthesia and to help provide optimal conditions for surgery.

Individual work

Theoretical questions:

1. Characteristics of general anesthesia. Theories of general anaesthetic action.
2. Stages and depth of anesthesia. Types of anesthesia.
3. Classification of general anesthetics. Requirements for general anesthetics.
4. Inhalation anesthetics. **Diethyl ether, Isoflurane, Nitrous oxide**. Comparative characteristics, side effects. Combined use of general anesthetics and other drugs.
5. Intravenous anesthetics. Classification by duration of action. Pharmacological characteristics of **Propofol, Ketamine, Thiopental sodium, Sodium oxybate [Hydroxybutyric acid]**. Comparative characteristics, side effects.
6. The concept of the premedication, induction and maintenance of anesthesia.
7. Pharmacology and toxicology of **Ethyl alcohol**, its use in clinical practice. Acute and chronic alcohol poisoning. Treatment for alcoholism. Mechanism of action of **Disulfiram [Antabuse, Teturam]**.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. Diethyl ether
2. Halothane [Phthorothane]
3. Isoflurane
4. Nitrous oxide
5. **Propanidid***
6. **Ketamine***
7. **Thiopental sodium***
8. **Sodium hydroxybutyrate***
9. Disulfiram [Antabuse, Teturam]

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK**Fill in the table:**

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Ketamine.

Rp:

2. Sodium oxybate.

Rp:

3. Thiopental sodium.

Rp:

4. Diazepam for premedication.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №4. Drugs affecting the central nervous system		
Narcotic (opioid) analgesics		

The list of basic terms in the topic

Term	Definition
<i>Pain</i>	An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.
<i>Analgesics (painkillers)</i>	Drugs acting to relieve pain. They are distinct from anesthetics, which reversibly eliminate sensation.
<i>Narcotic (opioid) analgesics</i>	Pain relievers that act on the central nervous system. Like all narcotics, they may become habit-forming if used over long periods. Repeated application have a particular impact on the human central nervous system, reflected in the development of the euphoria and the appearance of syndromes of mental and physical dependence (addiction) and withdrawal syndrome.
<i>Agonists of opioid receptors</i>	Drugs that by direct binding with opiate receptors produce an effect similar to natural antinociceptive substances – enkephalins, endorphins, and dynorphins.
<i>Antagonists of opioid receptors</i>	Drugs that by binding with opiate receptors block the effects of enkephalins, endorphins, dynorphins and exogenous opioids.
<i>Agonist-antagonists of opioid receptors (drugs with mixed type of action, synergistic antagonists)</i>	Drugs that are agonists of one and the antagonists of other subtype of opioid receptors.
<i>Euphoria</i>	A mental and emotional condition in which a person experiences intense feelings of well-being, elation, happiness, excitement, and joy. Euphoria is generally considered to be an exaggerated physical and psychological state, sometimes induced by the use of psychoactive drugs and not typically achieved during the normal course of human experience.
<i>Addiction</i>	A continued repetition of a behavior despite adverse consequences, or a neurological impairment leading to such behaviors.
<i>Drug tolerance (physiological tolerance)</i>	Commonly encountered in pharmacology, when a subject's reaction to a specific drug and concentration of the drug is progressively reduced, requiring an increase in concentration to achieve the desired effect. Drug tolerance can involve both psychological drug tolerance and physiological factors. The following are characteristics of drug tolerance: it is reversible, the rate depends on the particular drug, dosage and frequency of use, differential development occurs for different effects of the same drug.
<i>Physical dependence</i>	A state resulting from chronic use of a drug that has produced tolerance and where negative physical symptoms of withdrawal result from abrupt discontinuation or dosage reduction. Physical dependence can develop from low-dose therapeutic use of certain medications such as benzodiazepines, opioids, antiepileptics and antidepressants, as well as misuse of recreational drugs such as alcohol, opioids and benzodiazepines. The higher the dose used, the greater the duration of use, and the earlier age use began are predictive of worsened physical dependence and thus more severe withdrawal syndromes.
<i>Drug withdrawal (abstinence)</i>	Group of symptoms that occur upon the abrupt discontinuation or decrease in intake of medications or recreational drugs.

Individual work

Theoretical questions:

1. General characteristics of analgesic agents. The difference between narcotic (opioid) and non-narcotic (non-opioid) drugs.
2. Classification of opioids by origin, chemical structure and affinity to opioid receptors.

3. Narcotic analgesics and their comparative characteristics (**Morphine hydrochloride, Papaveretum [Omnopon], Codeine phosphate, Trimeperidine [Promedol], Fentanyl, Pentazocine, Tramadol, Buprenorphine**).
4. Mechanism of analgesic action of Morphine. Pharmacokinetics (biotransformation and elimination). Indications and clinical uses.
5. Effect of **Morphine** on breathing, cough and vomiting center, circulation and tone of smooth muscles of internal organs (pharmacodynamics).
6. Side effects of **Morphine** and the mechanisms of their development. Acute morphine intoxication, clinical symptoms and treatment.
7. The concept of drug withdrawal and physical dependence.
8. Antagonists of narcotic analgesics, mechanism of action (**Naloxone, Naltrexone**). Indications and clinical uses.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. **Morphine hydrochloride***
2. Papaveretum [Omnopon]
3. Codeine phosphate
4. **Trimeperidine [Promedol]***
5. Fentanyl
6. Pentazocine
7. **Tramadol***
8. **Buprenorphine***
9. Nalorphine
10. **Naloxone***
11. Naltrexone

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Morphine hydrochloride.

Rp:

2. Trimeperidine [Promedol].

Rp:

3. Tramadol.

Rp:

4. Naloxone.

Rp:

5. Buprenorphine.

Rp:

6. Fentanyl.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №4. Drugs affecting the central nervous system		
Non-narcotic (non-opioid) analgesics. Nonsteroidal anti-inflammatory drugs		

The list of basic terms in the topic

Term	Definition
<i>Nonsteroidal anti-inflammatory drugs (NSAIDs)</i>	A class of drugs that provides analgesic and antipyretic (fever-reducing) effects, and, in higher doses, anti-inflammatory effects. The term "nonsteroidal" distinguishes these drugs from steroids, which, among a broad range of other effects, have a similar eicosanoid-depressing, anti-inflammatory action. As analgesics, NSAIDs are unusual in that they are non-narcotic and thus are used as a non-addictive alternative to narcotics.
<i>Cyclooxygenase (COX) or prostaglandin-endoperoxide synthase (PTGS) or prostaglandin synthase (PHS) or prostaglandin endoperoxide synthetase (PES)</i>	An enzyme that is responsible for formation of important biological mediators called prostanoids, including prostaglandins, prostacyclin and thromboxane. Pharmacological inhibition of COX can provide relief from the symptoms of inflammation and pain. At present, three COX isoenzymes are known: COX-1, COX-2, and COX-3. COX-1 is considered a constitutive enzyme, being found in most mammalian cells. COX-2, on the other hand, is undetectable in most normal tissues. It is an inducible enzyme, becoming abundant in activated macrophages and other cells at sites of inflammation.
<i>COX-2 selective inhibitors</i>	Form of NSAIDs that directly targets COX-2, an enzyme responsible for inflammation and pain. Targeting selectivity for COX-2 reduces the risk of peptic ulceration, and is the main feature of celecoxib, rofecoxib and other members of this drug class.

Individual work

Theoretical questions:

1. Definition of non-narcotic analgesics, differences from narcotic analgesics.
2. Classification of non-steroidal anti-inflammatory drugs (NSAIDs). General characteristics of the group.
3. Mechanisms of analgesic, antipyretic and anti-inflammatory effects of NSAIDs.
4. Pharmacological characteristics of analgesic-antipyretics: **Metamizole sodium [Analgin, Dipyron], Paracetamol [Acetaminophen, Panadol, Efferalgan]**. Indications and clinical uses. Side effects.
5. Pharmacological characteristics of non-steroidal anti-inflammatory drugs. Non-selective COX-1 and COX-2 inhibitors: **Acetylsalicylic acid [Aspirin], Ibuprofen, Diclofenac sodium [Ortofen, Voltaren], Indometacin, Piroxicam**. COX-2 selective inhibitors: **Nimesulide, Meloxicam [Movalis] Celecoxib [Celebrex]**. Indications and clinical uses, side effects and their prevention.
6. Combination drugs: **Baralgin, Spazmalgon, Tempalgin**.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. **Acetylsalicylic acid [Aspirin]***
2. **Metamizole sodium [Analgin, Dipyron]***
3. **Paracetamol [Acetaminophen, Panadol, Efferalgan]***
4. Ibuprofen
5. Mefenamic acid
6. **Diclofenac sodium [Ortofen, Voltaren]***
7. **Indometacin***
8. **Piroxicam***
9. Nimesulide

10. Meloxicam [Movalis]*

11. Celecoxib [Celebrex]*

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Acetylsalicylic acid [Aspirin].

Rp:

2. Paracetamol [Panadol].

Rp:

3. Celecoxib [Celebrex].

Rp:

4. Diclofenac sodium [Voltaren].

Rp:

5. Metamizole sodium [Analgin].

Rp:

6. Meloxicam [Movalis].

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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Mark		Teacher's signature:
Number of points		

DATE		Module 1
Unit №4. Drugs affecting the central nervous system		
Psychomotor stimulants. Analeptics. Antidepressants. Nootropic drugs. Adaptogenes. Actoprotectors		

The list of basic terms in the topic

Term	Definition
<i>Psychomotor stimulants (psychostimulants)</i>	Psychoactive drugs that induce temporary improvements in either mental or physical functions or both. Examples of these kinds of effects may include enhanced alertness, wakefulness, and locomotion, among others.
<i>Analeptics</i>	Drugs that stimulate the cerebral cortex (Caffeine), the vital centers of the medulla – respiratory and vasomotor centers (Cordiamine, Aethimizol, Bemegrade, Sulfocamphocaine), as well as spinal cord (Strychnine). Their action occurs only in case of CNS depression.
<i>Psychodysleptics (hallucinogens)</i>	Drugs that affect the subjective qualities of perception, thought or emotion, resulting in altered interpretations of sensory input, alternate states of consciousness, or hallucinations. This general group of pharmacological agents can be divided into three broad categories: psychedelics, dissociatives and delirians.
<i>Depression</i>	A state of low mood and aversion to activity that can affect a person's thoughts, behavior, feelings and sense of well-being. Depressed people feel sad, anxious, empty, hopeless, worried, helpless, worthless, guilty, irritable, hurt, or restless. They may lose interest in activities that once were pleasurable, experience loss of appetite or overeating, have problems concentrating, remembering details, or making decisions, and may contemplate, attempt, or commit suicide. Insomnia, excessive sleeping, fatigue, loss of energy, or aches, pains, or digestive problems may also be present.
<i>Panic</i>	A sudden sensation of fear which is so strong as to dominate or prevent reason and logical thinking, replacing it with overwhelming feelings of anxiety and frantic agitation consistent with an animalistic fight-or-flight reaction.
<i>Antidepressants</i>	Drugs used for the treatment of major depressive disorder and other conditions, including dysthymia, anxiety disorders, obsessive compulsive disorder, eating disorders, chronic pain, neuropathic pain and, in some cases, dysmenorrhoea, snoring, migraines, attention-deficit hyperactivity disorder (ADHD), substance abuse and sleep disorders. They can be used alone or in combination with other medications. The most important classes of antidepressants are the selective serotonin reuptake inhibitors (SSRIs), serotonin-norepinephrine reuptake inhibitors (SNRIs), tricyclic antidepressants (TCAs) and monoamine oxidase inhibitors (MAOIs).
<i>Adaptogens (adaptogenic herbs)</i>	Natural substances considered to help the body adapt to stress and to exert a normalizing effect upon bodily processes.
<i>Nootropic drugs (nootropics, smart drugs, memory enhancers, neuro enhancers, cognitive enhancers, intelligence enhancers)</i>	Drugs that purportedly improve mental functions such as cognition, memory, intelligence, motivation, attention, and concentration. Nootropics are thought to work by altering the availability of the brain's supply of neurochemicals (neurotransmitters, enzymes, and hormones), by improving the brain's oxygen supply, or by stimulating nerve growth.

Individual work

Theoretical questions:

1. General characteristics of psychomotor stimulants. Chemical structure, classification.
2. The main pharmacological properties of purine derivatives: **Caffeine sodium benzoate**; phenylalkylamine derivatives **Amphetamine, Mesocarb [Sydnokarb]**;

- piperidine derivatives **Sibutramine [Meridia]**. Indications and clinical uses, contraindications, side effects.
3. Classification of analeptics by effect on different parts of central nervous system: a) cortex (**Caffeine sodium benzoate**); b) medulla (**Aethimizol, Cordiamine, Bemegrade, Sulfocamphocaine, Carbogen**); c) spinal cord (**Strychnine**). Classification of analeptics by type of action: a) direct action (**Bemegrade, Caffeine sodium benzoate, Aethimizol**), b) reflex action (**Lobeline, Ammonia solution**); c) mixed action (**Cordiamine, Sulfocamphocaine, Carbogen**).
 4. Main pharmacological effects of analeptics, indications and clinical uses, side effects.
 5. The concept of psychodysleptics (hallucinogens) and amphetamines (**Phenamine**). Formation of addiction and its social significance.
 6. Antidepressants. Classification according to the mechanism of action.
 7. Pharmacodynamics of antidepressants. Comparative characteristic of selective serotonin reuptake inhibitors (SSRIs) (**Fluoxetine [Prozac], Sertraline [Zoloft], Paroxetine [Paxil]**), serotonin-norepinephrine reuptake inhibitors (SNRIs) (**Venlafaxine**), norepinephrine reuptake inhibitors (NRIs) (**Maprotiline [Ludomil]**), tricyclic antidepressants (TCAs) (**Imipramine [Melipramine, Imizine], Amitriptyline**) and monoamine oxidase inhibitors (MAOIs) (**Nialamide, Moclobemide**).
 8. Indications and clinical uses of antidepressants. Side effects. Contraindications.
 9. The concept of adaptogens. Sources of adaptogens. Pharmacodynamics.
 10. Indications and clinical uses of adaptogens (**Tincture of magnolia-vine, Ginseng, Liquid extracts of Siberian Ginseng, Echinacea, Pantokrin**). Side effects. Contraindications. Chronopharmacology for ginseng-containing drugs.
 11. Actoprotectors. Definition. Pharmacodynamics, indications and clinical uses, side effects of **Ethylthiobenzimidazol [Bemityl]**.
 12. Nootropic drugs. Definition and classification.
 13. Mechanism of action for nootropic drugs, indications and clinical uses.
 14. Pharmacological characteristics of **Piracetam [Nootropil], Piracetam / Cinnarizine [Phezam], Gamma-aminobutyric acid [Aminalon], Glycine, Sodium oxybate [Hydroxybutyric acid]**.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. **Caffeine sodium benzoate***
2. **Tincture of Ginseng***
3. Tincture of magnolia-vine
4. **Liquid extract of Eleutherococcus***
5. Pantocrinum
6. **Piracetam [Nootropil]***
7. **Gamma-aminobutyric acid [Aminalon]***
8. Glycine
9. **Phenibut [Noofen]***
10. **Pantogam**
11. **Picamilone***
12. **Cinnarizine [Stugeron]***
13. Nimodipine [Nimotop]
14. Vinpocetine [Cavinton]
15. **Nicergoline [Sermion]***
16. Pentoxifylline [Trental]
17. Imipramine [Melipramine, Imizine]
18. **Amitriptyline***

19. Maprotiline [Ludiomil]

20. Fluoxetine [Prozac]*

21. Sertraline [Zoloft]*

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Caffeine sodium benzoate.

Rp:

2. Piracetam [Nootropil].

Rp:

3. Amitriptyline.

Rp:

4. Fluoxetine [Prozac].

Rp:

5. Tincture of Ginseng.

Rp:

6. Cinnarizine [Stugeron].

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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Mark		Teacher's signature:
Number of points		

DATE		Module 2
Unit №5. Pharmacology of metabolism		
Drugs affecting the endocrine system. Hormonal drugs, their synthetic analogs and antagonists		

The list of basic terms in the topic

Term	Definition
<i>Hormones</i>	Chemical substances that are produced in one part of the body (by an endocrine gland) and are carried in the blood to other distant organs or tissues where they act to modify their structure or function. Some cells release hormones that induce a response in the neighboring cells (paracrine function), or sometimes the hormones can act on the cells they are released from (autocrine function). For a cell to respond to a particular hormone it needs to have specific receptors for that hormone, and once the hormone binds to the receptor specific chemical pathways are activated that lead to a response.
<i>Thyroid hormones</i>	Triiodothyronine (T ₃) and thyroxine (T ₄), are tyrosine-based hormones produced by the thyroid gland that are primarily responsible for regulation of metabolism. Iodine is necessary for the production of T ₃ and T ₄ . A deficiency of iodine leads to decreased production of T ₃ and T ₄ , enlarges the thyroid tissue and will cause goitre.
<i>Hypoglycemic drugs</i>	Drugs used in treatment diabetes mellitus by lowering glucose levels in the blood.
<i>Glucocorticoids</i>	A class of steroid hormones that bind to the glucocorticoid receptor (GR). The name glucocorticoid (glucose + cortex + steroid) derives from its role in the regulation of the metabolism of glucose, its synthesis in the adrenal cortex, and its steroidal structure.
<i>Mineralocorticoids</i>	A class of steroid hormones characterized by their influence on salt and water balances. The name mineralocorticoid derives from early observations that these hormones were involved in the retention of sodium, a mineral. The primary endogenous mineralocorticoid is aldosterone. Aldosterone is produced in the cortex of the adrenal gland and its secretion is mediated principally by angiotensin II but also by adrenocorticotrophic hormone (ACTH) and local potassium levels.
<i>Estrogens</i>	A group of compounds named for their importance in both menstrual and estrous reproductive cycles. They are the primary female sex hormones. Natural estrogens are steroid hormones, while some synthetic ones are non-steroidal.
<i>Progestogens (gestagens)</i>	A group of hormones including progesterone. Progestogens are named for their function in maintaining pregnancy (pro-gestational), although they are also present at other phases of the estrous and menstrual cycles. The progestogen class of hormones includes all steroids with a pregnane skeleton, that is, both naturally occurring and synthetic ones. Exogenous or synthetic hormones are usually referred to as progestins.
<i>Hormonal contraceptives</i>	Drugs used to prevent pregnancy. There are two main types of hormonal contraceptive formulations: combined methods which contain both an estrogen and a progestin, and progestogen-only methods which contain only progesterone or one of its synthetic analogues (progestins). Combined methods work by suppressing ovulation and thickening cervical mucus; while progestogen-only methods reduce the frequency of ovulation, most of them rely more heavily on changes in cervical mucus.
<i>Anabolic steroid</i>	Drugs that are structurally related to the cyclic steroid ring system and have similar effects to testosterone in the body. They increase protein within cells, especially in skeletal muscles. Anabolic steroids also have androgenic and virilizing properties, including the development and maintenance of masculine characteristics such as the growth of the vocal cords, testicles and body hair.

Individual work

Theoretical questions:

1. General characteristics of hormonal drugs, their classification by origin, chemical structure, clinical use. Types and principles of hormone therapy.
2. Hormonal drugs of the hypothalamus and pituitary. Mechanism of action of **Corticotropin**, indications and clinical uses, side effects. Analogs of growth hormone (**Somatropin, Norditropin**) and somatostatin (**Octreotide**).
3. Pharmacological characteristics of gonadotropic hormones (**Human chorionic gonadotropin and Human menopausal gonadotropin (Menotropin)**).
4. Pharmacodynamics of hormones of the posterior pituitary (**Oxytocin, Vasopressin (Antidiuretic hormone)**), their synthetic analogues (**Demoxytocin, Desmopressin**). Indications and clinical uses.
5. Pharmacology of thyroid hormones (**L-thyroxine, Triiodothyronine**). Indications and clinical uses, side effects. Hormonal drug of parathyroid glands (**Parathormone**), its application.
6. Antithyroid drugs: classification by mechanism of action. Indications and clinical uses, contraindications, side effects of **Thiamazole [Mercazolil, Methimazole], Iodine agents**. Calcitonin drugs (**Calcitrin, Miacalcic**).
7. Hypoglycemic drugs. Classification by mechanism of action. Insulin. Classification by the sources and duration of action. Short-acting insulin (**Actrapid, Monodar, Humorap, Farmasulin N, Humulin R**), intermediate-acting (**Suspension Insulin Semilente, B-insulin monodar B, Farmasulin NPH**), long-acting (**Suspension Insulin ultralente, Suinsulin-long, Farmasulin HL**) and their characteristics.
8. Pharmacokinetics, pharmacodynamics, indications and clinical uses, side effects, contraindications of the insulin. Using in hyperglycemic coma. Overdose of insulin, treatment of hypoglycemic coma.
9. Synthetic (oral) antidiabetic drugs. Classification. Mechanisms of action, indications and clinical uses. Comparative characteristics of sulfonylurea derivatives (**Glibenclamide, Glipizide**), biguanide derivatives (**Metformin**), and other drugs (**Acarbose**).
10. Glucocorticoids. Classification, pharmacological effects, indications and clinical uses, contraindications, dosing regimen. Comparative characteristics of **Hydrocortisone acetate, Prednisolone, Dexamethasone, Triamcinolone, Flumetasone, Beclomethasone, Fluocinolone acetonide [Sinaflan]**. Side effects of glucocorticoids, their prevention.
11. Pharmacology of mineralocorticoids (**Deoxycorticosterone acetate**). Indications and clinical uses.
12. Sex hormones, classification. Male sex hormones (**Testosterone propionate, Methyltestosterone, Testenat**). Pharmacological characteristics. Indications and clinical uses, side effects. Androgen receptor antagonists (**Cyproterone, Flutamide**).
13. Pharmacology of anabolic steroids (**Nandrolone decanoate [Retabolil], Nandrolone phenylpropionate [Fenobolin], Methandrostenolone**). Mechanism of action, indications and clinical uses. Side effects of anabolic steroids. Non-steroidal anabolic drugs (**Inosine [Riboxin], Potassium orotate**). Indications and clinical uses.
14. General characteristics of female sex hormones, their classification. Estrogens (**Estrone, Estradiol dipropionate, Ethinylestradiol, Hexestrol [Synoestrol]**). Mechanism of action, indications and clinical uses, side effects. Estrogen receptor antagonists (**Tamoxifen**).

15. Mechanism of action, indications and clinical uses, side effects of gestagens (**Progesterone, Hydroxyprogesterone caproate**). Progesterone receptor antagonists (**Mifepristone**).
16. Hormonal contraceptives. Classification, principles of combination. Indications and clinical uses, contraindications, side effects. Comparative characteristics of **Desogestrel / Ethinylestradiol [Marvelon], Levonorgestrel [Postinor], Medroxyprogesterone acetate [Depo-provera], Gestodene / Ethinylestradiol [Logest]**.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. Hydrocortisone
2. Prednisolone*
3. Corticotropin [Adrenocorticotrophic hormone]
4. Dexamethasone*
5. L-thyroxine*
6. Thiamazole [Mercazolil, Methimazole]
7. Actrapid*
8. Glibenclamide*
9. Metmorfin*
10. Estradiol dipropionate
11. Oxytocin*
12. Hexestrol [Synoestrol]
13. Progesterone*
14. Testosterone
15. Nandrolone decanoate [Retabolil]*
16. Levonorgestrel [Postinor]

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Prednisolone.

Rp:

2. L-thyroxine.

Rp:

3. Oxytocin.

Rp:

4. Nandrolone decanoate [Retabolil].

Rp:

5. Fast and short-acting hormonal hypoglycemic agent.

Rp:

6. Synthetic hypoglycemic drug – sulfonylurea derivative.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
3. Stefanov O.V., Kucher V.G. Pharmacology with General Prescription: textbook for English-speaking students, 3rd edition. – Kyiv: Book-plus, 2011. – 336 p.
4. Lippincott's Illustrated Reviews: Pharmacology, 5th edition / Ed. Michelle A. Clark et al. – Philadelphia: Lippincott Williams & Wilkins, 2012. – 615 p.
5. Lectures on pharmacology.

Mark		Teacher's signature:
Number of points		

DATE		Module 2
Unit №5. Pharmacology of metabolism		
Vitamins. Enzymatic drugs and their inhibitors		

The list of basic terms in the topic

Term	Definition
<i>Vitamins</i>	Organic compounds required by an organism as a vital nutrients in limited amounts. An organic chemical compound (or related set of compounds) is called a vitamin when it cannot be synthesized in sufficient quantities by an organism, and must be obtained from the diet.
<i>Water-soluble vitamins</i>	Vitamins that dissolve easily in water and, in general, are readily excreted from the body, to the degree that urinary output is a strong predictor of vitamin consumption. Because they are not as readily stored, more consistent intake is important. Many types of water-soluble vitamins are synthesized by bacteria.
<i>Fat-soluble vitamins</i>	Vitamins that are absorbed through the intestinal tract with the help of lipids (fats). Because they are more likely to accumulate in the body, they are more likely to lead to hypervitaminosis than are water-soluble vitamins.

Individual work

Theoretical questions:

1. Definition of vitamins. Types of vitamin therapy.
2. Classification of vitamins.
3. General characteristics of water-soluble vitamins. Pharmacology of ***Thiamine chloride (bromide), Riboflavin, Pyridoxine, Nicotinic acid, Cyanocobalamin, Folic acid, Ascorbic acid, Calcium pangamate, Calcium pantothenate.***
4. Indications and clinical uses, side effects of water-soluble vitamins.
5. Bioflavonoids (***Rutin, Quercetin, Corvitin***), coenzymes.
6. General characteristics of the fat-soluble vitamins. Pharmacology of ***Retinol acetate, Ergocalciferol, Tocopheryl acetate, Menadione.***
7. Indications and clinical uses, contraindications of fat-soluble vitamins.
8. Side effects of fat-soluble vitamins. The concept of antivitamin.
9. Multivitamin preparations (***Askorutin, Revit, Dekamevit, Multitabs***).
10. Enzymatic drugs and enzyme inhibitors.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. **Ascorbic acid***
2. **Thiamine chloride***
3. Pyridoxine hydrochloride
4. **Nicotinic acid***
5. **Cyanocobalamin***
6. Folic acid
7. **Tocopheryl acetate***
8. **Retinol acetate***
9. **Ergocalciferol***
10. **Lydase***
11. **Panangin***
12. **Calcium gluconate***

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK**Fill in the table:**

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Ascorbic acid.

Rp:

2. Nicotinic acid.

Rp:

3. Tocopheryl acetate.

Rp:

4. Lydase.

Rp:

5. Vitamin for the treatment of burns,
inflammation of mucous membranes.

Rp:

6. Drug for the treatment of neuritis and
polyneuritis.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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Mark		Teacher's signature:
Number of points		

DATE		Module 2
Unit №5. Pharmacology of metabolism		
Pharmacology of blood. Drugs affecting hematopoiesis, blood coagulation, platelet aggregation and fibrinolysis		

The list of basic terms in the topic

<i>Term</i>	<i>Definition</i>
Coagulation (thrombogenesis)	The process by which blood forms clots. It is an important part of hemostasis, the cessation of blood loss from a damaged vessel, wherein a damaged blood vessel wall is covered by a platelet and fibrin-containing clot to stop bleeding and begin repair of the damaged vessel. Disorders of coagulation can lead to an increased risk of bleeding (hemorrhage) or obstructive clotting (thrombosis).
Platelet aggregation inhibitors (Antiplatelet drugs, antiaggregants)	Agents which decrease platelet aggregation and inhibit thrombus formation. Antiplatelet drugs are most effective for arterial clots that are composed largely of platelets.
Anticoagulants	Agents that prevent or reduce blood coagulation; prescribed to prolong clotting time or prevent intravascular clot formation, e.g. in patients with a history of stroke, atrial fibrillation or deep-vein thrombosis.
Thrombolytic (fibrinolytic) drugs, plasminogen activators	Agents that are used to dissolve (lyse) blood clots (thrombi). They act by activating plasminogen – body's own enzymes that break down fibrin, the protein that forms the basis of blood clots.
Coagulants	Agents which accelerate the process of blood clotting.
Antifibrinolytics (inhibitors of fibrinolysis)	Lysine-like drugs interfere with the formation of the fibrinolytic enzyme plasmin from its precursor plasminogen by plasminogen activators (primarily t-PA and u-PA) which takes place mainly in lysine rich areas on the surface of fibrin. These drugs block the binding sites of the enzymes or plasminogen respectively and thus stop plasmin formation.
Angioprotectors	Group of drugs that contribute to the stimulation of metabolic processes in the blood vessels leading to normalization of blood vessels permeability, decrease of tissue edema, microcirculation improvement and optimization of blood rheological properties. Angioprotectors are used to treat disorders of venous insufficiency, namely, chronic venous insufficiency, hemorrhoids.
Erythropoiesis	The process by which red blood cells (erythrocytes) are produced. It is stimulated by decreased O ₂ in circulation, which is detected by the kidneys, which then secrete the hormone erythropoietin. This hormone stimulates proliferation and differentiation of red cell precursors, which activates increased erythropoiesis in the hemopoietic tissues, ultimately producing red blood cells.
Leukopoiesis	The process of formation of leukocytes (white blood cells) from stem cells in haematopoietic organs. Leukocytes develop from either multipotential myeloid stem cells (CFU-GEMM) or multipotential lymphoid stem cells (CFU-L). Leukocytes developing from CFU-GEMM's are granulocytes (neutrophils, basophils and eosinophils) or monocytes. Leukocytes developing from CFU-Ls are lymphocytes (T & B cells, dendritic and NK cells).
Anemia	A decrease in the number of red blood cells (RBC's) or hemoglobin, resulting in a lower ability for the blood to carry oxygen to body tissues.
Erythropenia	Decreased numbers of erythrocytes in the blood, as occurs in some forms of anaemia.
Erythrocytosis (erythremia; polycythemia)	An increase in the number of circulating erythrocytes, usually occurring secondary to hypoxia.
Leukopenia	A reduction in the leukocyte count to values below the normal limit.
Agranulocytosis (agranulosis, granulopenia)	An acute condition involving a severe and dangerous leukopenia, most commonly of neutrophils causing a neutropenia in the circulating blood. It represents a severe lack of one major class of infection-fighting white blood cells. People with this condition are at very high risk of serious infections due to their suppressed immune system.
Leukocytosis	Elevation of the leukocyte count to values above the normal limit.

Individual work

Theoretical questions:

- A. Natural antithrombotic factors. Diseases (thrombosis, thrombophlebitis, myocardial infarction, stroke) originating from deficiency of antithrombotic factors. Antithrombotic drugs used for prevention or treatment of them:
1. Antiplatelet drugs (platelet aggregation inhibitors): **Acetylsalicylic acid [Aspirin]**, **Ticlopidine [Tiklid]**, **Clopidogrel [Plavix]**, **Pentoxifylline [Trental]**. Mechanism of action, indications and clinical uses, contraindications, side effects.
 2. Anticoagulants: direct (**Heparin**, **Nadroparin calcium [Fraxiparine]**, **Hirudin**) and indirect (**Warfarin**, **Neodicumarine**, **Phenindione [Fenilin]**). Mechanism of action, indication and clinical uses, side effects. Overdose, clinical symptoms and treatment (**Protamine sulfate**, **Menadione sodium bisulfite [Vikasol]**).
 3. Thrombolytic (fibrinolytic) drugs: **Streptokinase**, **Urokinase**, **Alteplase [recombinant tissue plasminogen activator, rt-PA, Actilyse]**, **Tenecteplase [Metalyse]**. Mechanism of action, indications and clinical uses, contraindications, side effects.
- B. Natural factors that accelerate blood clotting and ensure hemostasis in vascular damage. Groups of drugs that accelerate blood clotting and arrest of bleeding (antihemorrhagic or hemostatic drugs):
1. Coagulants: direct (**Calcium chloride**, **Calcium gluconate**, **Hemostatic sponge**) and indirect (**Menadione sodium bisulfite [Vikasol]**). Mechanism of action, indications and clinical uses, contraindications.
 2. Inhibitors of fibrinolysis (**Aminocaproic Acid**). Mechanism of action, indications and clinical uses, contraindications.
 3. Angioprotectors or drugs that reduce the permeability of blood vessels (**Etamsylate [Dicynone]**, **Rutoside / Ascorbic acid [Askorutin]**, **Troxerutin [Troxevasin, Venoruton]**). Indications and clinical uses.
- C. Drugs affecting hematopoiesis:
1. Classification of agents affecting hematopoiesis: stimulating erythro- and leukopoiesis, suppressing erythro- and leukopoiesis.
 2. Erythropoiesis stimulants, their use for the treatment of anemia:
 - a) Etiology of iron deficiency anemia. Iron supplements: **Ferroplex**, **Tardiferon**, **Aktiferrin**, **Ferrum Lek**, **Ferkoven**. Pharmacokinetics and pharmacodynamics, side effects. Poisoning with iron, clinical symptoms and treatment (**Deferoxamine [Desferal]**).
 - b) Etiology of aplastic anemia. Treatment. Erythropoietin (**Epoetin alfa [Eprex]**) and colony stimulating factor (**Molgramostim [Leukomax]**). Mechanism of action, indications and clinical uses, contraindications.
 - c) Etiology of hemolytic anemia. Treatment (glucocorticoids).
 - d) Etiology of B12-folate deficiency (megaloblastic) anemia. Treatment (**Cyanocobalamin**, **Folic acid**). Mechanism of action, indications and clinical uses, contraindications.
 3. Drugs that suppress erythropoiesis (**Imiphos**, **Radioactive sodium phosphate**). Indications and clinical uses.
 4. Leukopoiesis stimulants: **Sodium nucleinate**, **Metiluracil**, **Pentoxyl**, **Leucogen**, **Molgramostim [Leukomax]**. Indications and clinical uses, contraindications, side effects.
 5. Drugs that suppress leukopoiesis: antineoplastic, pyrazolones, sulfonamides, antibiotics.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. **Acetylsalicylic acid [Aspirin]***
2. Ticlopidine
3. **Heparin***
4. Warfarin
5. **Protamine sulfate***
6. Ferric (III) hydroxyde polymaltose complex [Ferrum Lek]
7. Etamsylate [Dicynone]
8. **Aminocaproic acid***
9. **Alteplase [Tissue plasminogen activator, tPA]***
10. Methyluracil
11. **Nadroparin calcium [Fraxiparine]***
12. **Menadione sodium bisulfite [Vikasol]***
13. **Dipyridamole***

Note: * – *drugs for filling in the table*

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Heparin.

Rp:

2. Menadione sodium bisulfite [Vikasol].

Rp:

3. Aminocaproic acid.

Rp:

4. Alteplase.

Rp:

5. Antiplatelet drug for prevention of myocardial infarction and stroke.

Rp:

6. Indirect anticoagulant for treatment of thrombosis.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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5. Lectures on pharmacology.

Mark		Teacher's signature:
Number of points		

DATE		Module 2
Unit №5. Pharmacology of metabolism		
Drugs affecting allergy and immunity.		
<u>The final class «Pharmacology of metabolism»</u>		

The list of basic terms in the topic

Term	Definiton
Allergy	An abnormally high immunologic sensitivity to certain stimuli such as drugs, foods, environmental irritants, microorganisms, or physical conditions, such as temperature extremes. These stimuli act as antigens, provoking an immunological response involving the release of inflammatory substances, such as histamine, in the body. Allergies may be innate or acquired in genetically predisposed individuals. Common symptoms include sneezing, itching, and skin rashes, though in some individuals symptoms can be severe.
Sensitization	An immunologic state or condition that is evidenced by the acquired ability of a cell or individual to detect the presence of a foreign substance upon reexposure to the substance and to react immunologically.
Immediate (anaphylactic) hypersensitivity	An allergic reaction that may involve skin (urticaria and eczema), eyes (conjunctivitis), nasopharynx (rhinorrhea, rhinitis), bronchopulmonary tissues (asthma) and gastrointestinal tract (gastroenteritis).
Delayed type (cell mediated) hypersensitivity	An allergic reaction initiated by mononuclear leukocytes. These reactions are mediated by T cells and monocytes/macrophages rather than by antibodies. Examples of such reactions are contact dermatitis (poison ivy rash), tuberculin skin test reactions, granulomatous inflammation (sarcoidosis, Crohn disease), allograft rejection, graft versus host disease, and autoimmune hypersensitivity reactions.
Antihistamines (histamine antagonists)	Drugs that inhibit the action of histamine by either blocking its attachment to histamine receptors, or inhibiting the enzymatic activity of histidine decarboxylase; catalyzing the transformation of histidine into histamine.
Immunostimulants (immunostimulators)	Drugs that stimulate the immune system by inducing activation or increasing activity of any of its components.
Immunosuppressants (anti-rejection drugs)	Drugs that suppress or reduce the strength of the body's immune system. One of the primary uses of immunosuppressant drugs is to lower the body's ability to reject a transplanted organ, such as a liver, heart or kidney. These drugs also are used to treat autoimmune diseases such as lupus.

Individual work

Theoretical questions:

1. Classification of antiallergic agents.
 - I. Drugs that are used for immediate type (anaphylactic) allergic reactions:
 - 1.1. Drugs that inhibit the release of histamine and other biologically active substances (glucocorticoids): **Hydrocortisone, Prednisolone, Dexamethasone, Beclomethasone dipropionate;**
 - 1.2. Drugs that prevent the release of mediators of allergy by sensitized basophils: **Cromoglicic acid [Cromolyn], Ketotifen [Zaditen];**
 - 1.3. H₁-histamine blockers (antihistamines): **Diphenhydramine [Dimedrol], Promethazine [Pipolphen], Quifenadine [Phencarol], Loratadine [Claritin], Mebhydrolin [Diazolin];**
 - 1.4. Desensitizing drugs (antisensitizers): **Histamine / Gamma globulin [Histaglobulin];**
 - 1.5. Complement Inhibitors: **Heparin, Aminocaproic acid;**
 - 1.6. Symptomatic drugs:

- adrenomimetics: **Epinephrine [Adrenaline hydrochloride], Ephedrine, Phenylephrine [Mesatone];**
- myotropic bronchodilators: **Aminophylline [Euphylline].**

II. Drugs that are used for delayed type reactions: nonsteroidal anti-inflammatory drugs, immunosuppressants. Pharmacodynamics, indications and clinical uses, side effects.

2. The basic principles of first aid in anaphylactic shock.
3. Classification of immunostimulants. Pharmacodynamics, indications and clinical uses.
 - 3.1. Drugs that mainly stimulate nonspecific protective factors: purine and pyrimidine derivatives;
 - 3.2. Drugs of thymus: **Thymalin, Tactivin;**
 - 3.3. Drugs that mainly stimulate macrophages: **Prodigiosan, Pyrogenal.**
 - 3.4. Drugs that mainly stimulate T-cells: **Interferons, Lymphokines;**
 - 3.5. Synthetic drugs – **Levamisole [Decaris].**
4. Pharmacology of immunosuppressants: **Azathioprine, Ciclosporin.** Indications and clinical uses. Corticosteroids, cytostatics. Indications and clinical uses, side effects.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. **Diphenhydramine [Dimedrol]***
2. Chloropyramine [Suprastin]
3. **Mebhydrolin [Diazolin]***
4. Quifenadine [Phencarol]
5. **Loratadine [Claritin]***
6. Thymalin
7. Amizon
8. Azathioprine
9. Ciclosporin
10. **Prednisolone***

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Diphenhydramine [Dimedrol].

Rp:

2. Mebhydrolin [Diazolin].

Rp:

3. Loratadine [Claritin].

Rp:

4. Thymalin.

Rp:

5. Immunostimulatory agent in tablets.

Rp:

6. Drug for treatment of anaphylactic shock.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
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5. Lectures on pharmacology.

Mark		Teacher's signature:
Number of points		

DATE		Module 2
Unit №6. Drugs affecting the functions of peripheral executive systems and organs		
Pharmacology of the respiratory system		

The list of basic terms in the topic

Term	Definiton
Cough	A sudden and often repetitively occurring reflex which helps to clear the large breathing passages from secretions, irritants, foreign particles and microbes.
Expectorants	Drugs that help bring up mucus and other material from the lungs, bronchi, and trachea.
Antitussive drugs	Drugs that suppress coughing, possibly by reducing the activity of the cough center in the brain. Antitussive agents are used to relieve dry cough.

Individual work

Theoretical questions:

- Expectorants. Classification by mechanism of action. Pharmacological characteristics of ***Thermopsis infusion, Althaea root decoction, Althaea extract [Mukaltin], Trypsin, Bromhexine, Ambroxol [Lasolvan], Acetylcysteine***. Pharmacokinetics and pharmacodynamics. Side effects.
- Surfactant synthesis stimulants. Pharmacological characteristics, indications and clinical uses for ***Ambroxol [Lasolvan]***.
- Antitussive drugs. Classification. General characteristics of the centrally and peripherally acting drugs: ***Codeine phosphate, Glaucine [Glauvent], Oxeladin, Prenoxdiazine [Libexin], Butamirate***. Indications and clinical uses. Side effects.
- Bronchodilators. Classification. Pharmacology of adrenergic agonists: ***Salbutamol [Albuterol], Fenoterol [Berotec], Orciprenaline [Metaproterenol], Isoprenaline [Isoproterenol, Isadrine]***. Pharmacology of M-cholinergic antagonists: ***Ipratropium bromide [Atrovent], Platyphylline hydrotartrate***. Pharmacology of myotropic bronchodilators: ***Theophylline, Aminophylline [Euphylline], Papaverine***. Pharmacokinetics, pharmacodynamics, side effects.
- Use of antiallergic drugs for the treatment of bronchial asthma (***Cromoglicic acid [Cromolyn], Ketotifen [Zaditen]***).
- Use of hormonal anti-inflammatory drugs for the treatment of bronchial asthma (***Fluticasone propionate, Beclomethasone dipropionate, Triamcinolone***).
- Respiratory stimulants. Classification. Pharmacological characteristics of ***Aethimizol, Sulfocamphocaine, Cordiamine, Carbogen***. Indications and clinical uses, side effects.
- Drugs that are used in pulmonary edema (***cardiac glycosides, ganglionic blockers, diuretics, adrenergic agonists, narcotic analgesics, alcohol, glucocorticoids***).

THE LIST OF DRUGS FOR COMPULSORY STUDY:

- Sulfocamphocaine***
- Montelukast [Singulair]
- Codeine phosphate / Terpin hydrate [Codterpin]
- Glaucine [Glauvent]
- Prenoxdiazine [Libexin]***
- Acetylcysteine
- Cordiamine

8. **Ambroxol [Lasolvan]***
9. **Salbutamol [Albuterol]***
10. **Ipratropium bromide [Atrovent]***
11. **Aminophylline [Euphylline]***
12. Ketotifen [Zaditen]
13. **Beclomethasone dipropionate***
14. Fluticasone propionate

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Prenoxdiazine [Libexin].

Rp:

2. Ambroxol [Lasolvan].

Rp:

3. Aminophylline [Euphylline].

Rp:

4. Beclomethasone dipropionate.

Rp:

5. Centrally acting antitussive agent.

Rp:

6. Drug for arrest of bronchial asthma attacks.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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Mark		Teacher's signature:
Number of points		

DATE		Module 2
Unit №6. Drugs affecting the functions of peripheral executive systems and organs		
Pharmacology of the gastrointestinal (digestive) system		

The list of basic terms in the topic

Term	Definiton
Anorexia nervosa	An eating disorder characterized by immoderate food restriction and irrational fear of gaining weight, as well as a distorted body self-perception. It typically involves excessive weight loss and usually occurs more in females than in males.
Bulimia nervosa	An eating disorder characterized by binge eating and purging, or consuming a large amount of food in a short amount of time followed by an attempt to rid oneself of the food consumed (purging), typically by vomiting, taking a laxative, diuretic, or stimulant, and/or excessive exercise, because of an extensive concern for body weight.
Cachexia (wasting syndrome)	Loss of weight, muscle atrophy, fatigue, weakness, and significant loss of appetite in someone who is not actively trying to lose weight. The formal definition of cachexia is the loss of body mass that cannot be reversed nutritionally: Even if the affected patient eats more calories, lean body mass will be lost, indicating a primary pathology is in place.
Antacids	Drugs that neutralize stomach acidity.
Hepatoprotection	An ability to prevent damage to the liver.
Choleretics	Drugs that increase the volume of secretion of bile from the liver as well as the amount of solids secreted.
Cholagogues	Drugs that promote the flow of bile from the gall bladder into the duodenum.
Cholelitholytic agents	Drugs that are capable to dissolve bile (cholesterol) stones.
Prokinetic agents	Drugs that enhance gastrointestinal motility by increasing the frequency of contractions in the small intestine or making them stronger, but without disrupting their rhythm. They are used to relieve gastrointestinal symptoms such as abdominal discomfort, bloating, constipation, heart burn, nausea, and vomiting.

Individual work

Theoretical questions:

1. Drugs affecting appetite. Appetite stimulants: bitter, insulin, anabolic drugs. Their use for the treatment of anorexia, cachexia. Anorectic drugs for treatment of bulimia and obesity. Pharmacology of **Orlistat [Xenical]**.
2. Stimulants of gastric secretion (**Pentagastrin, Histamine**) and replacement drugs (**Natural gastric juice, Pepsin, Hydrochloric acid, Acidin-pepsin**). Indications and clinical uses.
3. Drugs that suppress gastric secretion (antisecretory agents). Pharmacological characteristics of M-cholinergic antagonists: **Pirenzepine [Gastrozepin]**, H₂-histamine blockers (**Ranitidine, Famotidine**), proton pump inhibitors (**Omeprazole**). Their use in treatment of peptic ulcer, gastritis, reflux esophagitis.
4. Pharmacological characteristics of antacids which reduce acidity of gastric juice (**Sodium bicarbonate, Magnesium oxide, Aluminum hydroxide**). Combined antacids (**Almagel, Maalox**).
5. Pharmacological characteristics of gastroprotectors that provide mechanical protection of gastric mucous membranes (**Sucralfate, Bismuth subcitrate [De-Nol]**) and enhance mucosal resistance to injury (**Misoprostol**). Indications and clinical uses.
6. Replacement therapy in excretory malfunction of pancreas (**Pancreatin, Panzinorm forte, Festal, Mezim forte, Creon**). Indications and clinical uses.

7. Antienzymatic drugs (antiproteases) that suppress excretory function of pancreas (**Aprotinin [Contrycal]**, **Aminocaproic acid**). Indications and clinical uses.
8. Bile drugs: 1) increasing secretion of bile – cholereitics (**Allochol**, **Cholenzym**); 2) enhancing the flow of bile – cholagogues (**Magnesium sulfate**); 3) cholelitholytics (**Atropine**, **Drotaverine [No-spa]**), 4) herbal drugs (**Immortelle flowers**, **Corn stigmas**, **Cholosas**). Indications and clinical uses.
9. Hepatoprotectors (**Legalon**, **Darcyl**, **Essentiale**, **Gepabene**, **Thiotriazolin**) and cholelitholytic agents (**Chenodeoxycholic acid [Chenofalk]**, **Ursodeoxycholic acid [Ursofalk]**). Indications and clinical uses.
10. Drugs stimulating motility of stomach and intestine: M-cholinomimetics and acetylcholinesterase inhibitors (**Neostigmine [Proserine]**), antagonists of dopamine and serotonin receptors (**Domperidone [Motilium]**, **Metoclopramide [Cerucal]**).
11. Centrally acting emetics (**Apomorphine**), mechanism of action, indications and clinical uses..
12. Laxatives, classification by localization and origin. Saline laxatives (**Magnesium sulfate**), laxatives containing antraglycosides (**Senadexin**), vegetable oils (**Castor Oil**), synthetic laxatives (**Sodium picosulfate [Guttalax]**, **Bisacodyl**, **Lactulose [Duphalac]**), combined (**Cafiol**, **Regulax**). Mechanism of action, indications and clinical uses.
13. Drugs that suppress motility and eliminate spasms of smooth muscles: M-cholinergic blockers (**Atropine**), spasmolytics (**Drotaverine [No-spa]**), combinations (**Baralgin**, **Spazgan**). Indications and clinical uses.
14. Antiemetics (centrally acting): neuroleptics (**Perphenazine [Etaperazin]**, **Tiethylperazin [Torekan]**), M-cholinergic blockers, histamine blockers, dopamine and serotonin receptors blockers (**Domperidone [Motilium]**, **Metoclopramide [Cerucal]**, **Ondansetron**). Their pharmacological characteristics, indications and clinical uses, contraindications.
15. Antiemetics (peripherally acting): local anesthetics (**Benzocaine [Anesthesine]**), **Menthol**. Indications and clinical uses.
16. Anti-diarrhoeal drugs (**Loperamide [Imodium]**), antimicrobials. Antiflatulent agents (**Peppermint**, **Chamomile**, **Simethicone [Espumisan]**). Their pharmacological characteristics, indications and clinical uses.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. **Thiotriazolin***
2. **Metoclopramide [Cerucal]***
3. **Omeprazole***
4. **Pirenzepine [Gastrozepin]***
5. **Ranitidine***
6. **Almagel***
7. Maalox
8. Pancreatin
9. **Aprotinin [Contrycal]***
10. **Ondansetron***
11. Apomorphine
12. Allochol
13. **Essentiale***
14. Magnesium sulfate
15. Buckthorn (Frangula) dry extract
16. **Bisacodyl***
17. Loperamide [Imodium]

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Metoclopramide [Cerucal].

Rp:

2. Omeprazole.

Rp:

3. Essentiale.

Rp:

4. Loperamide [Imodium].

Rp:

5. Drug for patients with severe pain, caused by hypersecretion and hyperacidity of gastric juice.

Rp:

6. Drug for treatment of chronic constipation, caused by colon atony.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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5. Lectures on pharmacology.

Mark		Teacher's signature:
Number of points		

DATE	Module 2
Unit №6. Drugs affecting the functions of peripheral executive systems and organs	
Pharmacology of blood circulation. Antihypertensive and hypertensive drugs. Antihyperlipidemic drugs. Angioprotectors	

The list of basic terms in the topic

Term	Definiton
Antihypertensive (hypotensive) agents	A class of drugs that are used to treat hypertension (high blood pressure). Antihypertensive therapy seeks to prevent the complications of high blood pressure, such as stroke and myocardial infarction.
Hypertensive crisis	A situation that can present as hypertensive urgency or as a hypertensive emergency. Hypertensive urgency is a situation where the blood pressure is severely elevated (180 or higher for systolic pressure or 110 or higher for diastolic pressure), but there is no associated organ damage. A hypertensive emergency exists when blood pressure reaches levels that are damaging organs.
Hypertensive agents	Drugs that increase of systemic blood pressure.
Atherosclerosis	A build up of a waxy plaque on the inside of blood vessels. It is characterized by plaque deposits that block the flow of blood. Atherosclerosis can cause a heart attack if it completely blocks the blood flow in the heart (coronary) arteries. It can cause a stroke if it completely blocks the brain (carotid) arteries. Atherosclerosis, a progressive process responsible for most heart disease, is a type of arteriosclerosis or hardening of the arteries. It can be caused by normal aging, by high blood pressure, and by diseases such as diabetes.
Hypolipidemic (antihyperlipidemic) agents, lipid-lowering drugs	Drugs that promote reduction of lipid levels in the blood. Some antihyperlipidemic agents aim to lower the levels of low-density lipoprotein (LDL) cholesterol, some reduce triglyceride levels, and some help raise the high-density lipoprotein (HDL) cholesterol. By reducing the LDL cholesterol, they can prevent both the primary and secondary symptoms of coronary heart disease.
Angioprotectors	Group of drugs that contribute to the stimulation of metabolic processes in the blood vessels leading to normalization of blood vessels permeability, decrease of tissue edema, microcirculation improvement and optimization of blood rheological properties. Angioprotectors are used to treat disorders of venous insufficiency, namely, chronic venous insufficiency, hemorrhoids.

Individual work

Theoretical questions:

1. Regulation of blood pressure in humans.
2. Classification of antihypertensive drugs by mechanism of action:
 - I. Neurotropic agents:
 - a) Centrally acting:
 - sedatives – **bromides, Motherwort and Valerian, Magnesium sulfate;**
 - tranquilizers – **Diazepam [Sibazon];**
 - hypnotics – **Phenobarbital;**
 - stimulants of central α_2 -adrenoceptors – **Clonidine [Clophelin], Methyldopa;**
 - b) Peripherally acting:
 - ganglionic blockers – **Hexamethonium [Benzohexonium], Trepirium iodide [Hygronium], Azamethonium bromide [Pentamine];**
 - sympatholytic – **Guanethidine [Octadine], Reserpine, Raunatin;**
 - α_1 -blockers – **Prazosin, Doxazosin [Cardura], Terazosin;**
 - β -blockers – **Propranolol [Anaprilin, Inderal], Atenolol, Metoprolol, Talinolol;**

- α - β -blockers – **Labetalol, Carvedilol.**
 - II. Myotropic (peripheral) vasodilators: **Papaverine hydrochloride, Drotaverine [No-spa], Bendazol [Dibazol], Hydralazine [Apressin], Sodium nitroprusside, Pentoxifylline [Trental], Magnesium sulfate.**
 - III. Calcium channel blockers – **Verapamil [Isoptin], Nifedipine [Adalat, Phenyhydine, Corinfar], Amlodipine [Norvasc], Diltiazem.**
 - IV. Potassium channels openers – **Minoxidil, Nicorandil.**
 - V. Drugs affecting renin-angiotensin-aldosterone system:
 - Angiotensin-converting enzyme (ACE) inhibitors – **Captopril [Capoten], Enalapril, Lisinopril;**
 - angiotensin II receptor antagonists – **Losartan.**
 - VI. Drugs regulating water-salt metabolism (diuretics) – **Furosemide [Lasix], Hydrochlorothiazide, Clopamide, Spironolactone [Verospiron], Indapamide [Arifon].**
3. Classification of antihypertensive drugs by clinical use (WHO recommendations):
 - I. Main group (first-line drugs): diuretics, β -blockers, ACE inhibitors, calcium channel blockers, α_1 -blockers, angiotensin II receptor antagonists.
 - II. Additional group (second-line drugs): central α_2 -adrenergic agonists, sympatholytics, peripheral vasodilators.
 4. Comparative characteristics of antihypertensive drugs, possible side effects, their prevention and elimination.
 5. Treatment of hypertensive crisis (**Magnesium sulfate, Furosemide [Lasix], Clonidine [Clophelin], Azamethonium bromide [Pentamine], Chlorpromazine [Aminazine]**).
 6. Hypertensive agents. Classification by mechanism of action:
 - I. Drugs stimulating the vasomotor center (analeptics – **Caffeine, Cordiamin**).
 - II. Drugs stimulating CNS and cardiovascular system (adaptogens – **Tincture of Ginseng, Rhodiola, Schisandra, Pantocrin**).
 - III. Drugs with peripheral vasoconstrictive and cardiogenic effects:
 - stimulants of α - and β -adrenergic receptors, dopamine receptors in blood vessels and heart (**Epinephrine [Adrenaline hydrochloride], Ephedrine, Dopamine**);
 - α -adrenergic stimulants (**Norepinephrine [Noradrenaline], Phenylephrine [Mesatone]**);
 - hormones (**Vasopressin [Antidiuretic hormone], Prednisolone**);
 - cardiogenic drugs (**Strophanthin, Corglycon, Dobutamine**).
 7. Application of hypertensive drugs in patients with arterial hypotension, shock of different etiology, circulatory collapse, acute cardiac and vascular disease.
 8. Antiatherosclerotic (hypolipidemic) agents. Classification by mechanism of action.
 9. Pharmacodynamics, comparative characteristics of cholesterol absorption inhibitors (**Cholestyramine, Polysponin**). Pharmacokinetics. Indications and clinical uses. Contraindications. Side effects.
 10. Pharmacodynamics, comparative characteristics of statins – cholesterol synthesis inhibitors (**Lovastatin, Simvastatin, Fluvastatin, Probucol**). Pharmacokinetics. Indications and clinical uses. Side effects. Contraindications.
 11. Agents that selectively reduce triglycerides. Pharmacology of fibric acid derivatives – fibrates (**Fenofibrate**). **Nicotinic acid**. Mechanism of action. Indications and clinical uses. Side effects. Contraindications.
 12. Antioxidants: direct (**Tocopheryl acetate, Ascorbic acid**) and indirect (**Methionine, Glutamic acid**). Pharmacodynamics, comparative characteristics. Pharmacokinetics. Indications and clinical uses, side effects. Contraindications.

13. Angioprotectors (*Parmidin, Etamsylate [Dicynone], Quercetin*). Mechanism of action. Indications and clinical uses. Side effects. Contraindications.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. Phenylephrine [Mesatone]
2. Prazosin
3. Norepinephrine [Noradrenaline hydrotartrate]
4. Propranolol [Anaprilin, Inderal]
5. Atenolol
6. Clonidine [Clonidine]
7. **Drotaverine [No-spa]***
8. **Losartan [Cozaar]***
9. **Enalapril***
10. **Lisinopril***
11. **Lovastatin***
12. **Bendazol [Dibazol]***
13. **Amlodipine [Norvasc]***
14. **Magnesium sulfate***

Note: * – *drugs for filling in the table*

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Enalapril.

Rp:

2. Amlodipine [Norvasc].

Rp:

3. Losartan [Cozaar].

Rp:

4. Atenolol.

Rp:

5. Antihypertensive drug – calcium channel blocker.

Rp:

6. Antihypertensive drug – selective β_1 -blocker.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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5. Lectures on pharmacology.

Mark		Teacher's signature:
Number of points		

DATE		Module 2
Unit №6. Drugs affecting the functions of peripheral executive systems and organs		
Pharmacology of the coronary and cerebral blood flow.		
Antianginal and cerebrovascular drugs		

The list of basic terms in the topic

Term	Definition
<i>Coronary artery disease</i>	Narrowing of the blood vessels (coronary arteries) that supply oxygen and blood to the heart. Coronary heart disease is generally caused by atherosclerosis - when plaque (cholesterol substances) accumulates on the artery walls, causing them to narrow, resulting in less blood flow to the heart. Sometimes a clot may form which can obstruct the flow of blood to heart muscle. Coronary heart disease commonly causes angina pectoris (chest pain), shortness of breath, heart attack (myocardial infarction) and other symptoms.
<i>Angina pectoris</i>	Chest pain due to ischemia of the heart muscle, due in general to obstruction or spasm of the coronary arteries. The main cause of Angina pectoris is coronary artery disease, due to atherosclerosis of the arteries feeding the heart.
<i>Antianginal drugs</i>	Drugs that are used to manage angina pectoris by either improving perfusion of the myocardium, reducing the metabolic demand of the heart, or both.
<i>Cerebrovascular disease</i>	A group of brain dysfunctions related to disease of the blood vessels supplying the brain. Cerebrovascular disease primarily affects people who are elderly or have a history of diabetes, smoking, or ischemic heart disease. The results of cerebrovascular disease can include a stroke, or occasionally a hemorrhagic stroke. Ischemia or other blood vessel dysfunctions can affect the person during a cerebrovascular incident.
<i>Migraine</i>	A chronic neurological disorder characterized by recurrent moderate to severe headaches often in association with a number of autonomic nervous system symptoms. Typically the headache affects one half of the head, is pulsating in nature, and lasting from 2 to 72 hours. Associated symptoms may include nausea, vomiting, and sensitivity to light, sound, or smell. The pain is generally made worse by physical activity.

Individual work

Theoretical questions:

1. Principles of treatment of coronary artery disease.
2. Classification of antianginal drugs by mechanism of action.
 - I. Agents that reduce myocardial oxygen demand and increase oxygen delivery:
 - a) Organic nitrates:
 - ***Glyceryl trinitrate [Nitroglycerin]*** and prolonged nitrates (***Sustak, Nitrong***);
 - long-acting nitrates (***Isosorbide dinitrate [Nitrosorbide], Isosorbide mononitrate***);
 - b) Calcium channel blockers (***Verapamil [Isoptin], Nifedipine [Adalat, Phenyhydine, Corinfar], Amlodipine [Norvasc]***);
 - c) Potassium channel activators (***Nicorandil***);
 - d) Other drugs (***Amiodarone [Cordarone], Molsidomine***).
 - II. Agents that reduce myocardial oxygen demand: β -blockers (***Propranolol [Anaprilin, Inderal], Atenolol, Metoprolol***).
 - III. Agents that increase oxygen delivery to the myocardium:
 - a) Coronary dilators of myotropic action (***Dipyridamole, Papaverine, Drotaverine [No-spa]***);

- b) Drugs of reflex action that eliminate coronary spasm (**Validol**).
- IV. Agents that increase tolerance to myocardial hypoxia:
- Energy supplying drugs (**Trimetazidine [Preductal], ATP-long**);
 - Antihypoxic drugs (**Emoxipin**);
 - Anabolic drugs (**Inosine [Riboxin], Nandrolone decanoate [Retabolil]**).
- Mechanism of action, comparative characteristics, side effects, indications and clinical uses, contraindications of different antianginal drugs. The concept of cardiac steal syndrome (coronary steal).
 - Classification of antianginal drugs by clinical use:
 - Drugs for the relief of acute angina attacks (**Glyceryl trinitrate [Nitroglycerin], Validol**);
 - Drugs for prevention of angina attacks and treatment of coronary artery disease (nitrates, β -blockers, coronary dilators, etc).
 - Principles of myocardial infarction treatment (general anesthetics, narcotic and non-narcotic analgesics, antiarrhythmic drugs, cardiac glycosides, anticoagulants, fibrinolytics, etc).
 - Main drugs for prevention and treatment of migraine (adrenergic blockers, tranquilizers, vasodilators, nootropic, non-narcotic analgesics, antihistaminic agents).
 - The use of serotonin receptors agonists for treatment of migraine (**Sumatriptan**).

THE LIST OF DRUGS FOR COMPULSORY STUDY:

- Glyceryl trinitrate [Nitroglycerin]***
- Sustak***
- Isosorbide dinitrate [Nitrosorbide]
- Nifedipine [Adalat, Phenyhydine, Corinfar]
- Amlodipine [Norvasc]***
- Atenolol***
- Cinnarizine [Stugeron]
- Pentoxifylline [Trental]***
- Sumatriptan***
- Vinpocetine [Cavinton]***
- Nicergoline [Sermion]***
- Trimetazidine [Preductal]***

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Glyceryl trinitrate [Nitroglycerin].

Rp:

2. Pentoxifylline [Trental].

Rp:

3. Sumatriptan.

Rp:

4. Nicergoline [Sermion].

Rp:

5. Antianginal drug – calcium channel blocker.

Rp:

6. β -blocker for treatment of coronary artery disease.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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5. Lectures on pharmacology.

Mark		Teacher's signature:
Number of points		

DATE		Module 2
Unit №6. Drugs affecting the functions of peripheral executive systems and organs		
Cardiotonic and antiarrhythmic drugs		

The list of basic terms in the topic

Term	Definition
Heart failure, congestive heart failure	Disease that occurs when the heart is unable to provide sufficient pump action to maintain blood flow to meet the needs of the body. Heart failure can cause a number of symptoms including shortness of breath, leg swelling, and exercise intolerance.
Cardiotonic agents	Drugs that have a strengthening effect on the heart or that can increase cardiac output. They may be cardiac glycosides; sympathomimetics; or other drugs. They are used after myocardial infarct; cardiac surgical procedures; in shock; or in congestive heart failure.
Cardiac glycosides	Drugs that are used in the treatment of congestive heart failure and cardiac arrhythmia. These glycosides are found as secondary metabolites in several plants.
Antiarrhythmic drugs	Drugs that are used to suppress abnormal rhythms of the heart (cardiac arrhythmias), such as atrial fibrillation, atrial flutter, ventricular tachycardia, and ventricular fibrillation.

Individual work

Theoretical questions:

1. General characteristics and classification of cardiotonic drugs.
2. Sources of cardiac glycosides. Peculiarities of chemical structure of cardiac glycosides.
3. Mechanism of action of cardiac glycosides.
4. Pharmacological effects of cardiac glycosides.
5. Comparative characteristics of main cardiac glycosides (***Strophanthin, Corglycon, Digoxin, Digitoxin, Adonis infusion***).
6. Indications and clinical uses of cardiac glycosides.
7. Side effects of cardiac glycosides. Acute and chronic intoxication by cardiac glycosides. Principles of first aid in case of intoxication.
8. Pharmacological characteristics of non-glycoside cardiotonic drugs (***Epinephrine [Adrenaline], Dobutamine, Dopamine***).
9. Classification of antiarrhythmic drugs by mechanism of action and indications.
10. Pharmacokinetics and pharmacodynamics of Na⁺-channels blockers (class I). Comparative characteristics of IA-group (***Quinidine sulfate, Procainamide, Ajmalin***), IB-group (***Phenytoin [Diphenin], Lidocaine***), IC-group (***Ethacyzin, Propafenone***). Indications and clinical uses.
11. Pharmacological characteristics of β-blockers (class II). Indications and clinical uses. Comparative characteristics (***Propranolol [Anaprilin, Inderal], Metoprolol, Atenolol***).
12. Pharmacokinetics and pharmacodynamics of K⁺-channels blockers (class III). ***Amiodarone [Cordarone]***. Application in clinical practice.
13. Pharmacological characteristics of Ca²⁺-channels blockers (class IV). Comparative characteristics (***Verapamil [Isoptin], Diltiazem***). Indications and clinical uses.
14. Mechanism of antiarrhythmic action of potassium-containing drugs (***Potassium chloride, Panangin, Asparcam***). Use in clinical practice.
15. Role of M-cholinergic antagonists (***Atropine***) and adrenergic agonists in the treatment of cardiac arrhythmias.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. Strophanthin
2. **Corglycon***
3. **Digoxin***
4. **Procainamide***
5. **Lidocaine***
6. **Amiodarone [Cordarone]***
7. **Potassium chloride***
8. Levosimendan
9. **Dimercaprol [Unithiol]***

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Digoxin.

Rp:

2. Procainamide.

Rp:

3. Amiodarone [Cordarone].

Rp:

4. Dimercaprol [Unithiol].

Rp:

5. Cardiac glycoside in acute heart failure.

Rp:

6. Drug for urgent treatment of atrial paroxysmal tachycardia.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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Mark		Teacher's signature:
Number of points		

DATE		Module 2
Unit №6. Drugs affecting the functions of peripheral executive systems and organs		
Diuretics. Drugs for treatment of gout. Uterine drugs and contraceptives		

The list of basic terms in the topic

Term	Definiton
Diuretics	Drugs that elevate the rate of urination and thus provide a means of forced diuresis. There are several categories of diuretics. All diuretics increase the excretion of water from bodies, although each class does so in a distinct way.
Forced diuresis	Increased urine formation by diuretics and fluid. It may enhance the excretion of certain drugs in urine and is used to treat drug overdose or poisoning of these drugs and hemorrhagic cystitis.
Gout	Medical condition usually characterized by recurrent attacks of acute inflammatory arthritis – a red, tender, hot, swollen joint. The metatarsal-phalangeal joint at the base of the big toe is the most commonly affected (approximately 50% of cases). However, it may also present as tophi, kidney stones, or urate nephropathy. It is caused by elevated levels of uric acid in the blood. The uric acid crystallizes, and the crystals deposit in joints, tendons, and surrounding tissues.
Xanthine oxidase inhibitors	Drugs that inhibits the activity of xanthine oxidase, an enzyme involved in purine metabolism. In humans, inhibition of xanthine oxidase reduces the production of uric acid, and several medications that inhibit xanthine oxidase are indicated for treatment of hyperuricemia and related medical conditions including gout.
Uricosuric drugs	Drugs that increase the excretion of uric acid in the urine, thus reducing the concentration of uric acid in blood plasma. In general, this effect is achieved by action on the proximal tubule of the kidney.
Uterotonics	Agents used to induce contraction or greater tonicity of the uterus. Uterotonics are used both to induce labor, and to reduce postpartum hemorrhage.
Tocolytics (anti-contraction medications, labor repressants)	Drugs used to suppress premature labor. They are given when delivery would result in premature birth.

Individual work

Theoretical questions:

1. Basic physiological principles of regulation of water-salt metabolism. Diuretics. Classification according to the localization and mechanism of action.
2. Pharmacokinetics and pharmacodynamics of diuretics (**Furosemide [Lasix], Hydrochlorothiazide, Clopamide, Etacrynic acid, Mannitol, Urea**). Indications and clinical uses, side effects and their prevention. The concept of forced diuresis.
3. Comparative pharmacological characteristics of potassium-sparing drugs (**Spiroolactone [Verospiron], Triamterene**). Mechanisms of action, indications and clinical uses, side effects.
4. Peculiarities of agents that enhance renal blood flow (**Theophylline, Aminophylline [Euphylline], Xantinol nicotinate, Pentoxifylline**).
5. Herbal agents with diuretic activity (**Horsetail herb, Bearberry leaves, Orthosiphon leaves, Lespenephryl**). The principle of combined use of diuretics.
6. Pharmacological correction of purine metabolism disorders (gout). Classification of arthrifuge drugs by the mechanism of action.

7. Comparative pharmacological characteristics of arthrifuge drugs (**Allopurinol, Etamid, Urolesan, Urodan**).
8. Classification of drugs affecting the tone and contractile activity of myometrium.
9. Pharmacological characteristics of drugs that stimulate contractile activity of myometrium: prostaglandins (**Dinoprost, Dinoprostone**), hormones (**Oxytocin, Estrone, Estradiol dipropionate**), calcium salts (**Calcium chloride**), acetylcholinesterase inhibitors (**Neostigmine [Proserine]**).
10. Drugs used for arresting uterine bleeding: ergot alkaloids (**Ergometrine maleate**). Indications and clinical uses, contraindications. Side effects, acute and chronic poisoning, its treatment.
11. Drugs that reduce the tone and contractile activity of myometrium, relax cervix (**Atropine, Fenoterol, Drotaverine [No-spa], Magnesium sulfate, Tocopheryl acetate, Progesterone**). Indications and clinical uses, side effects.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. **Spironolactone [Verospiron]***
2. Indapamide [Arifon]
3. **Furosemide [Lasix]***
4. **Hydrochlorothiazide***
5. Mannitol
6. Allopurinol
7. Urolesan
8. **Dinoprostone***
9. **Oxytocin***
10. **Ergometrine maleate***
11. **Progesterone***

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Furosemide [Lasix].

Rp:

2. Hydrochlorothiazide.

Rp:

3. Oxytocin.

Rp:

4. Ergometrine maleate.

Rp:

5. Drug for treatment of gout.

Rp:

6. Drug for treatment of hyperaldosteronism.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
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Mark		Teacher's signature:
Number of points		

DATE		Module 2
Unit №7. Chemotherapeutic drugs		
Antiseptics and disinfectants. Sulfonamides. Fluoroquinolones		

The list of basic terms in the topic

Term	Definiton
Antimicrobials	Drugs that kills microorganisms or inhibits their growth. Antimicrobial medicines can be grouped according to the microorganisms they act primarily against. For example, antibacterials (commonly known as antibiotics) are used against bacteria and antifungals are used against fungi. They can also be classed according to their function. Antimicrobials that kill microbes are called microbicidal; those that merely inhibit their growth are called microbiostatic.
Antiseptics	Antimicrobial substances that are applied to living tissue/skin to reduce the possibility of infection, sepsis, or putrefaction. Antiseptics are generally distinguished from antibiotics by the latter's ability to be transported through the lymphatic system to destroy bacteria within the body.
Disinfectants	Antimicrobial substances that are applied to non-living objects to destroy microorganisms that are living on the objects. Disinfectants work by destroying the cell wall of microbes or interfering with the metabolism.
Sulfonamides (sulfa drugs)	Synthetic antimicrobial agents that contain the sulfonamide group. In bacteria, antibacterial sulfonamides act as competitive inhibitors of the enzyme dihydropteroate synthetase, an enzyme involved in folate synthesis. Sulfonamides are therefore bacteriostatic and inhibit growth and multiplication of bacteria, but do not kill them. Humans, in contrast to bacteria, acquire folate (vitamin B ₉) through the diet.
Derivatives of 8-hydroxyquinoline	Synthetic antimicrobial agents that contain oxyquinolinic ring and possess antibacterial, antiparasitic and antifungal activity.
Nitrofurans	Class of drugs typically used as antiseptics, antibiotics, antiprotozoal or antifungal agents. The defining structural component is a furan ring with a nitro group.
Fluoroquinolones	Family of synthetic broad-spectrum antibacterial drugs which have a fluorine atom attached to the central ring system, typically at the 6-position or C-7 position. Fluoroquinolones exert their antibacterial effect by preventing bacterial DNA from unwinding and duplicating

Individual work

Theoretical questions:

1. General characteristics of antimicrobial agents. Disinfectants, antiseptics and chemotherapeutic drugs. Requirements for modern antiseptics.
2. Classification of antiseptics and disinfectants depending on chemical structure. Factors affecting antimicrobial activity of the drugs.
3. Pharmacology of inorganic antiseptics and disinfectants. Mechanism of action of halogenated compounds: **Chloramine, Chlorhexidine, Iodine alcoholic solution, Lugol's iodine, Iodicerine, Iodinole**. Indications and clinical uses, side effects.
4. Mechanism of action, indications and clinical uses of oxidants: **Hydrogen peroxide, Potassium permanganate**. Dependence of pharmacological effect on concentration of the drug.
5. Antiseptics and disinfectants – acids and alkalis: **Salicylic acid, Boric acid, Ammonia solution**.
6. Mechanism of action of metallic salts (pre-resorptive, resorptive). Factors that determine the antimicrobial activity of the drugs. Schmiedeberg sequence. Indications and clinical uses of **silver, lead, bismuth, copper, and zinc**-containing drugs. Side effects of metallic salts.

7. Pharmacology of organic antiseptics and disinfectants. Aromatic compounds. Mechanism of action of phenolic antiseptics: **Phenol, Resorcinol, Birch tar, Balsamic liniment Vishnievsky, Ichthyol**. Side effects. Acute poisoning by phenol, treatment.
8. Mechanism of antimicrobial action of dyes. Pharmacological characteristics of **Brilliant green, Methylene blue, Ethacridine lactate [Rivanol]**. Indications and clinical uses.
9. Aliphatic compounds. Pharmacokinetics and pharmacodynamics of **Formaldehyde**. Side effects. Mechanism of antimicrobial action of **Ethyl alcohol**.
10. Pharmacology of surfactants (quaternary ammonium compounds). Mechanism of action, indications and clinical uses of detergents: **Aethonium, Decamethoxin, Miramistin**.
11. Herbal antiseptics: **Calendula tincture, Chlorophyllipt**.
12. Definition and classification of chemotherapeutic drugs. General principles of chemotherapy.
13. Sulfonamides (sulfa drugs). definition, mechanism and spectrum of antimicrobial action.
14. Indications and contraindications for use of sulfonamides. Side effects and their prevention.
15. Classification of sulfonamides depending on the duration of action:
 - short-acting – **Streptocide [Sulfanilamide], Sulfadimidine [Sulfadimezine], Phthalylsulfathiazole [Phthalazole], Sulfacetamide [Sulfacyl sodium], Sulfaethidole [Etazole]**;
 - intermediate-acting – **Sulfamethoxazole**;
 - long-acting – **Sulfadimethoxine, Sulfamethoxyipyridazine [Sulfapyridazine]**;
 - ultralong-acting – **Sulfalene**.
16. Combinations with sulfonamides: **Trimethoprim / sulfamethoxazole [Co-trimoxazole, Biseptol, Bactrim], Sulfasalazine [Salazopyridazine]**.
17. Mechanism of action and antimicrobial spectrum of nitrofurans. Indications, contraindications and side effects of **Nitrofurantoin [Furacilin], Furazolidone, Furazidin [Furagin]**.
18. Mechanism and spectrum of antimicrobial action, indications, contraindications, side effects of derivatives of 8-hydroxyquinoline **Nitroxoline, Chlorquinaldol**.
19. Mechanism and spectrum of antimicrobial action, indications, contraindications and side effects of fluoroquinolones **Ofloxacin [Zanocin], Ciprofloxacin [Ciprinol]**.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. Zinc phosphate
2. Potassium permanganate
3. Ethacridine lactate
4. **Chlorhexidine bigluconate***
5. **Miramistin***
6. **Hydrogen peroxide***
7. Nitrofurantoin [Furacilin]
8. **Iodine solution***
9. Salicylic acid
10. Ofloxacin
11. **Ciprofloxacin***
12. Furazolidone
13. **Co-trimoxazole***
14. **Sulfadimethoxine***

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK**Fill in the table:**

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Brilliant green.

Rp:

2. Hydrogen peroxide.

Rp:

3. Co-trimoxazole.

Rp:

4. Chlorhexidine bigluconate.

Rp:

5. Sulfonamide.

Rp:

6. Fluoroquinolone for treatment of urinary tract infection.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
3. Stefanov O.V., Kucher V.G. Pharmacology with General Prescription: textbook for English-speaking students, 3rd edition. – Kyiv: Book-plus, 2011. – 336 p.
4. Lippincott's Illustrated Reviews: Pharmacology, 5th edition / Ed. Michelle A. Clark et al. – Philadelphia: Lippincott Williams & Wilkins, 2012. – 615 p.
5. Lectures on pharmacology.

Mark		Teacher's signature:
Number of points		

DATE		Module 2
Unit №7. Chemotherapeutic drugs		
Antibiotics I and II (β-lactams, aminoglycosides, macrolides, tetracyclines, chloramphenicol)		

The list of basic terms in the topic

Term	Definiton
Antibiotics (antibacterial drugs)	Drugs that inhibit bacterial growth or kill bacteria. Antibacterials are divided into two broad groups according to their biological effect on microorganisms: bactericidal agents kill bacteria, and bacteriostatic agents slow down or stall bacterial growth.
Classes of antibiotics	Antibacterial drugs are commonly classified based on their mechanism of action, chemical structure, or spectrum of activity. Most target bacterial functions or growth processes. Those that target the bacterial cell wall (penicillins and cephalosporins) or the cell membrane (polymyxins), or interfere with essential bacterial enzymes (rifamycins, quinolones, and sulfonamides) have bactericidal activities. Those that target protein synthesis (macrolides, lincosamides and tetracyclines) are usually bacteriostatic (with the exception of bactericidal aminoglycosides). Further categorization is based on their target specificity. "Narrow-spectrum" antibacterial antibiotics target specific types of bacteria, such as Gram-negative or Gram-positive bacteria, whereas broad-spectrum antibiotics affect a wide range of bacteria.
Antibiotic resistance	Form of drug resistance whereby some (or, less commonly, all) sub-populations of a microorganism, usually a bacterial species, are able to survive after exposure to one or more antibiotics; pathogens resistant to multiple antibiotics are considered multidrug resistant (MDR) or, more colloquially, superbugs. Microbes, rather than people, develop resistance to antibiotics.
β-lactam antibiotics (beta-lactam antibiotics)	Broad class of antibiotics, consisting of als that contains a β -lactam ring in their molecular structures. This includes penicillin derivatives (penams), cephalosporins (cephems), monobactams, and carbapenems. Most β -lactam antibiotics work by inhibiting cell wall biosynthesis in the bacterial organism and are the most widely used group of antibiotics.
Aminoglycosides	Antibiotics that are composed of amino-modified sugars.
Macrolides	Group of antibiotics whose activity stems from the presence of a macrolide ring, a large macrocyclic lactone ring. These rings are usually 14-, 15-, or 16-membered.
Tetracyclines	Group of closely related compounds that, as the name implies, consist of four fused rings with a system of conjugated double bonds.

Individual work

Theoretical questions:

1. General characteristics of antibiotics. Spectrum of antibacterial activity. History of discovery and introduction of antibiotics into medical practice. Principles of antibiotic therapy.
2. Classification of antibiotics by mechanism action and antibacterial spectrum.
3. Penicillins. Classification. Antibacterial spectrum, mechanism and duration of action. Routes of administration. Pharmacological characteristics of natural drugs: **Benzylpenicillin sodium, Benzylpenicillin potassium, Benzathine benzylpenicillin [Bicillin-1], Bicillin-3, Bicillin-5**. Semisynthetic penicillins: **Oxacillin, Ampicillin, Amoxicillin, Ampicillin / Oxacillin [Ampiox]**. Comparative characteristics of drugs, indications and contraindications, side effects and toxicity. Anaphylactic shock to penicillins, prevention and treatment.
4. Principles and objectives of penicillin combination with β -lactamase inhibitors: clavulanic acid (**Co-Amoxiclav, Augmentin**) and sulbactam (**Unasyn**).

5. Cephalosporins. Classification of drugs according to generations and routes of administration. Indications and clinical uses. Comparative characteristics of cephalosporins (**Cefazolin, Cefalexin, Cefuroxime, Cefotaxime, Ceftriaxone, Cefepime, Cefpirome**). Side effects.
6. Pharmacological characteristics of carbapenems (**Meropenem**) and monobactams (**Aztreonam**). Mechanism of action, antibacterial spectrum, indications and clinical uses, side effects.
7. Pharmacological characteristics of macrolides (**Erythromycin, Clarithromycin, Azithromycin**). Mechanism of action, antibacterial spectrum, indications and clinical uses, side effects.
8. Pharmacology of aminoglycosides (**Streptomycin, Gentamicin, Amikacin**). Comparative characteristics, mechanism of action, antibacterial spectrum, indications and contraindications, side effects and their prevention.
9. Tetracyclines: natural (**Tetracycline**), semisynthetic (**Doxycycline [Vibramycin], Methacycline [Randomycin]**). Mechanism and spectrum of antimicrobial action. Indications and contraindications, side effects and their prevention.
10. Pharmacological characteristics of **Chloramphenicol [Laevomycetin]**. Mechanism of action, antibacterial spectrum, indications and clinical uses, side effects.
11. Cyclic polypeptides (polymyxins): **Gramicidin S, Polymyxin M, Polymyxin B**. Mechanism of action, antibacterial spectrum, indications and clinical uses, side effects.
12. **Rifampicin [Rifampin]**. Mechanism of action, antibacterial spectrum, indications and clinical uses, side effects.
13. Lincosamides. Pharmacokinetics and pharmacodynamics of **Lincomycin, Clindamycin**. Indications and clinical uses, side effects.

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. Benzylpenicillin sodium*
2. Bicillin-5*
3. Amoxicillin
4. Co-Amoxicillin (Amoxiclav)*
5. Cefazolin
6. Ceftriaxone*
7. Azithromycin
8. Doxycycline hydrochloride*
9. Gentamicin sulfate*
10. Amikacin sulfate*
11. Chloramphenicol
12. Lincomycin sulfate

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK

Fill in the table:

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Benzylpenicillin sodium.

Rp:

2. Bicillin-5.

Rp:

3. Ceftriaxone.

Rp:

4. Azithromycin.

Rp:

5. Amikacin sulfate.

Rp:

6. Drug for treatment of pneumonia in case of allergy to penicillins.

Rp:

References:

1. Chekman I.S., Gorchakova N.O., Panasenکو N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
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4. Lippincott's Illustrated Reviews: Pharmacology, 5th edition / Ed. Michelle A. Clark et al. – Philadelphia: Lippincott Williams & Wilkins, 2012. – 615 p.
5. Lectures on pharmacology.

Mark		Teacher's signature:
Number of points		

DATE		Module 2
Unit №7. Chemotherapeutic drugs		
Antifungal, antiviral, antimycobacterial, antiprotozoal, anthelmintic and anticancer drugs. The final class «Chemotherapeutic drugs»		

The list of basic terms in the topic

Term	Definiton
Antifungal drugs	Drugs that are used to treat infections caused by fungi (mycoses) and to prevent the development of fungal infections in patients with weakened immune systems. There are several classes of drugs typically used to treat fungal infections: polyenes, azoles, allylamines, and echinocandins.
Antiviral drugs	Drugs that are used specifically for treating viral infections. Most of the antiviral drugs now available are designed to help deal with HIV, herpes viruses, the hepatitis B and C viruses, and influenza A and B viruses.
Antimycobacterial drugs	Drugs that are used in the treatment of diseases caused by members of the Mycobacterium genus, including tuberculosis (TB) and leprosy.
Antiprotozoal drugs	Drugs that are used to treat a variety of diseases caused by protozoa (amebiasis, malaria, trypanosomiasis, leishmaniasis, toxoplasmosis, giardiasis).
Anthelmintic drugs	Drugs that expel parasitic worms or helminths (nematodes, trematodes, and cestodes) from the body, by either stunning or killing them. They may also be called vermifuges (stunning) or vermicides (killing).
Chemotherapy	Treatment of cancer with one or more cytotoxic anti-neoplastic drugs (chemotherapeutic agents) as part of a standardized regimen. Traditional chemotherapeutic agents act by killing cells that divide rapidly, one of the main properties of most cancer cells. This means that chemotherapy also harms cells that divide rapidly under normal circumstances: cells in the bone marrow, digestive tract, and hair follicles.

Individual work

Theoretical questions:

1. Antifungal (antimycotic) drugs: antibiotics (**Griseofulvin, Nystatin, Amphotericin B**), synthetic drugs – azoles (**Clotrimazole, Ketoconazole [Nizoral], Itraconazole, Fluconazole**), other drugs (**Terbinafine, Dequalinium chloride [Decaminum]**). Pharmacological characteristics, mechanism of action, indications and clinical uses, side effects.
2. Antiviral drugs. Classification by clinical uses. Pharmacological characteristics of drugs used for treatment and prevention of influenza (**Rimantadine, Oxolin**), herpes (**Acyclovir [Zovirax]**), HIV infection **Zidovudine [Azidothymidine]**. Pharmacology of interferons (**Human leukocyte interferon, Laferon, Reaferon**) and interferon inducers (**Amixin**).
3. Classification of antiprotozoal drugs.
4. Antimalarial drugs. Basic principles of prevention and treatment of malaria. Classification of antimalarial drugs. Mechanism of action. Pharmacological characteristics **Chingamine, Chloridine, Primaquine, Quinine**. Indications and contraindications, side effects. Combined antimalarial drugs: **Pyrimethamine / Sulfadoxine [Fansidar]**.
5. Drugs used to treat trichomoniasis. Pharmacokinetics and pharmacodynamics of **Metronidazole**. Indications and clinical uses, side effects. **Tinidazole, Ornidazole, Furazolidone** in treatment of trichomoniasis.
6. Drugs for treatment of chlamydia infection. Pharmacological characteristics of **Macrolides, Doxycycline, Metronidazole**.
7. Drugs for treatment of giardiasis.

8. Classification of antiamebic drugs. Pharmacological characteristics of **Metronidazole, Doxycycline, Chingamine, Emetine**.
9. Drugs for treatment of toxoplasmosis . Pharmacological characteristics of **Chloridine, Chingamine, Sulfonamides**.
10. Antihelminthic drugs. Classification. Peculiarities of administration in different types of helminthiasis.
11. Pharmacological characteristics of drugs used for treatment of intestinal helminthiasis (**Mebendazole, Albendazole, Levamisole, Pyrantel, Piperazine adipate**). Indications and clinical uses, side effects.
12. Drugs used for extraintestinal helminthiasis (**Praziquantel, Chloxyl, Ditrazine citrate**). Indications and clinical uses, side effects.
13. Basic principles of antitubercular drugs administration.
14. Classification of antitubercular drugs: high-efficacy drugs (group 1): **Rifampicin, Isoniazid**; moderate-efficacy drugs (group 2): **Ethambutol, Ethionamide, Streptomycin, Kanamycin, Amikacin, Cycloserine, Pyrazinamide**; low-efficacy drugs (group 3): **Sodium paraaminosalicylate**.
15. Clinical classification of antitubercular drugs: first-line drugs (**Isoniazid, Rifampicin, Ethambutol, Pyrazinamide**) and second-line drugs (**Ethionamide, Cycloserine, Sodium paraaminosalicylate, Ofloxacin, Kanamycin, Streptomycin, Amikacin**).
16. Pharmacokinetics and pharmacodynamics of isonicotinic acid derivatives (**Isoniazid, Ftivazid**). Side effects of long-term administration, their prevention.
17. Antibiotics for treatment of tuberculosis (**Rifampicin, Streptomycin, Kanamycin, Amikacin, Cycloserine**). Indications and contraindications, side effects and their prevention.
18. Pharmacological characteristics of other drugs: **Ethionamide, Ethambutol, Ofloxacin, Sodium paraaminosalicylate**. Side effects, their prevention.
19. Basic principles of chemotherapy (treatment of cancer).
20. Classification, general characteristics, indications and clinical uses of anticancer drugs.
21. Pharmacology of alkylating agents (**Sarcolysin, Busulfan [Myelosan]**), antimetabolites (**Methotrexate, 6-Mercaptopurine, 5-Fluorouracil**), anthracycline antibiotics (**Doxorubicin**), alkaloids (**Vincristine, Vinblastine**), antiestrogens (**Tamoxifen**), antiandrogens (**Flutamide**), glucocorticoids (**Prednisone, Dexamethasone**).

THE LIST OF DRUGS FOR COMPULSORY STUDY:

1. Nystatin*
2. Terbinafine*
3. Itraconazole*
4. Acyclovir*
5. Isoniazid*
6. Rifampicin*
7. Pyrazinamide
8. Ethambutol
9. Metronidazole*
10. Mebendazole
11. Pyrantel
12. Methotrexate
13. Mercaptopurine
14. Doxorubicin*

Note: * – drugs for filling in the table

TASK FOR AN EXTRACURRICULAR WORK**Fill in the table:**

<i>Drug and dosage form</i>	<i>Mechanism of action</i>	<i>Indications and clinical uses</i>	<i>Adverse effects and contraindications</i>

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Prescribe the drugs:

1. Itraconazole.

Rp:

2. Nystatine.

Rp:

3. Acyclovir.

Rp:

4. Doxorubicin.

Rp:

5. Isoniazid.

Rp:

6. Metronidazole.

References:

1. Chekman I.S., Gorchakova N.O., Panasenko N.I., Bekh P.O. Pharmacology. – Vinnytsya: Nova Knyha Publishers, 2006. – 384 p.
2. Bobyrov V.M., Devyatkina T.O., Vazhnicha O.M., Khristyuk V.M. Pharmacology: textbook. – Vinnytsya: Nova Knyha Publishers, 2010. – 520 p.
3. Stefanov O.V., Kucher V.G. Pharmacology with General Prescription: textbook for English-speaking students, 3rd edition. – Kyiv: Book-plus, 2011. – 336 p.
4. Lippincott's Illustrated Reviews: Pharmacology, 5th edition / Ed. Michelle A. Clark et al. – Philadelphia: Lippincott Williams & Wilkins, 2012. – 615 p.
5. Lectures on pharmacology.

Mark		Teacher's signature:
Number of points		

THE LIST OF DRUGS FOR PRESCRIBING (Module 1)

Novocainum – amp. 0,25%, 0,5%, 1%,
2% - 1, 2, 5, 10, 20 ml

Lidocaini hydrochloridum – amp. 1%,
2%, 10% - 2, 10, 20 ml

Articainum – amp. 1%, 2% - 5, 20 ml

Anaesthesinum – ointment 5%, 10%;
supp. 0,1

Carbo activatus – tab. 0,25, 0,5

Atropini sulfas – amp. 0,1% - 1 ml; eye
drops 1% - 10 ml

Platyphyllini hydrotartras – amp. 0,2% -
1 ml

Ipratropii bromidum – aerosol 15 ml

Pirenzepinum – tab. 0,025; 0,05

Proserinum – amp. 0,05% - 1 ml; tab.
0,015

Galanthamini hydrobromidum – amp.
0,1%; 0,25%; 0,5%; 1% - 1 ml

Dipiroximum – amp. 15% - 1 ml

Pilocarpini hydrochloridum – eye drops
1%, 2% - 5, 10 ml

Tubocurarini chloridum – amp. 1% -
1,5 ml

Dithylinum – amp. 2% - 5, 10 ml

Pipecuronii bromidum – vial 0,004

Adrenalini hydrochloridum – amp. 0,1%
- 1 ml

Noradrenalini hydrotartras – amp. 0,2% -
1 ml

Mesatonum – amp. 1% - 1 ml

Anaprilinum – tab. 0,01, 0,04

Atenololum – tab. 0,025, 0,05, 0,1

Metoprololum – tab. 0,05, 0,1

Salbutamolum – aerosol 10 ml

Prazosinum – tab. 0,001, 0,002, 0,005

Isadrinum – tab. 0,005

Aminazinum – amp. 2,5% - 1, 2, 5 ml;
tab. 0,025, 0,05, 0,1

Haloperidolum – tab. 0,0015, 0,005;
amp. 0,5% - 1 ml

Droperidolum – amp. 0,25% - 5 ml

Clozapinum – tab. 0,025, 0,1; amp.
2,5% - 2 ml

Chlorprothixenum – tab. 0,015, 0,05

Diazepamum – tab. 0,005, 0,01, amp.
0,5% - 2 ml

Phenazepamum – tab. 0,0005, 0,001

Gidazepamum – tab. 0,02, 0,05

Mezapamum – tab. 0,01

Tinctura Valerianae – vial 30 ml

Ketamini hydrochloridum – amp. 5% -
2, 10 ml, 1% - 20 ml

Natrii oxybutyras – amp. 20% - 10 ml

Thiopentalum-natrium – vial 0,5, 1,0

Phenobarbitalum – tab. 0,005, 0,05,
0,1

Zolpidemum – tab. 0,01

Zaleplonum – caps. 0,005

Zopiclonum – tab. 0,0075

Nitrazepamum – tab. 0,005

Natrii valproas – tab. 0,1, 0,2, 0,5

Lamotriginum – tab. 0,025, 0,05, 0,1,
0,2

Carbamazepinum – tab. 0,1, 0,2, 0,4

Levodopa – caps. 0,25, 0,5

Cyclodolum – tab. 0,001, 0,002, 0,005

Selegilini hydrochloridum – tab. 0,005

Morphini hydrochloridum – amp. 1% -
1 ml; tab. 0,01

Tramadolum – caps. 0,05; amp. 5%, 10%
- 1 ml; supp. 0,1

Promedolum – amp. 1%, 2% - 1 ml; tab.
0,025

Buprenorphini hydrochloridum – amp.
0,03% - 1 ml

Naloxonum – amp. 0,04% - 1 ml

Diclophenac-natrium – tab. 0,025; amp.
2,5% - 3 ml

Paracetamololum – tab. 0,125, 0,2, 0,25,
0,325, 0,5; supp. 0,08, 0,15, 0,3; syrup
2,4% - 50, 100 ml

Acidum acetylsalicylicum – tab. 0,05,
0,075, 0,1, 0,25, 0,3, 0,5

Analginum – tab. 0,5; amp. 50% - 2 ml

Indometacinum – tab. 0,025; supp. 0,05;
ointment 5%, 10%

Piroxicamum – tab. 0,01; caps. 0,01,
0,02; supp. 0,02

Meloxicamum – tab. 0,0075, 0,015;
supp. 0,015

Celecoxibum – caps. 0,1, 0,2

Coffeini-natrii benzoas – amp. 10%,
20% - 1, 2 ml; tab. 0,01, 0,02

Amitriptylinum – tab. 0,025; amp. 1% -
2 ml

Fluoxetinum – caps. 0,02

Sertralinum – tab. 0,05, 0,1

Cordiaminum – amp. 1, 2 ml

Piracetamum – tab. 0,2; caps. 0,4, 0,8,
1,2; amp. 20% - 5 ml

Aminalonum – tab. 0,25; caps.. 0,25

Cavintonum – tab. 0,005; amp. 0,5% -
2, 5, 10 ml

Phenibutum – tab. 0,25

Picamilonum – tab. 0,02, 0,05

Cinnarizinum – tab. 0,025

Nicergolinum – tab. 0,005, 0,01, 0,03;
vial 0,004

Tinctura Ginsengi – vial 50 ml

Extractum Eleutherococci – vial 50 ml

THE LIST OF DRUGS FOR PRESCRIBING (Module 2)

Prednisolonum – amp. 3% - 1, 2 ml; tab.

0,001, 0,005; ointment 0,5% - 10,0, 15,0

Dexamethasonum – amp. 0,4% - 1 ml;

tab. 0,0005; ointment 0,5% - 10,0, 15,0

L-thyroxinum – tab. 0,000025; 0,00005;

0,000075; 0,0001; 0,000125, 0,00025

Mercazolilum – tab. 0,005

Actrapidum – vial 40 IU/ml, 100 IU/ml - 10

ml

Glibenclamidum – tab. 0,0035, 0,005

Metforminum – tab. 0,85, 0,5

Oxytocinum – amp. 1, 2 ml

Progesteronum – amp. 1%, 2,5% - 1 ml

(oil)

Glucosum – amp. 40% - 10, 20 ml

Retabolilum – amp. 5% - 1 ml (oil)

Acidum ascorbinicum – amp. 5%, 10% -

1, 2 ml; tab. 0,05, 0,5

Tocopheroli acetat – amp. 5%, 10%,

50% - 1 ml; caps. 0,1, 0,2, 0,4

Cyanocobalaminum – amp. 0,02%,

0,05% - 1 ml

Acidum nicotinicum – amp. 1% - 1 ml;

tab. 0,05

Retinoli acetat – vial 3,44% - 10 ml; caps.

0,15, 0,3

Ergocalciferolum – vial 0,125% - 10 ml

(oil)

Lydasum – amp. 64 IU

Calcii gluconat – amp. 10% - 5, 10 ml;

tab. 0,5

Thiamini chloridum – amp. 2,5%, 5% -

1 ml; tab. 0,002

Pananginum – amp. 10 ml; tab. 0,3

Ferrum Lek – amp. 5% - 2 ml; syrup 1% - 100 ml; tab. 0,1

Heparinum – vial 5 ml (1 ml – 5000 IU)

Protamini sulfat – amp. 1% - 2, 5 ml

Acidum aminocaproicum – vial 5% - 100 ml

Vikasolum – amp. 1% - 1 ml; tab. 0,01

Fraxiparinum – amp. 2850 IU (0,3 ml);

3800 IU (0,4 ml); 5700 IU (0,6 ml); 7600

IU (0,8 ml)

Alteplase – vial 0,05

Dipyridamolum – amp. 0,5% - 2 ml;

tab. 0,075

Dimedrolum – amp. 1% - 1 ml, tab.

0,05, 0,1

Diazolinum – tab. 0,1; dragee 0,05, 0,1

Loratadinum – tab. 0,01

Aethimizolum – tab. 0,1; amp. 1%,

1,5% - 3 ml

Libexinum – tab. 0,1

Acetylcysteinum – tab. 0,1, 0,2, 0,6

Ambroxolum – tab. 0,03, 0,075; syrup

0,3%, 0,6% - 100 ml

Salbutamolum – aerosol 10 ml

(100 mcg/dose)

Euphylinum – tab. 0,15; amp. 2,4% -

10 ml; 24% - 1 ml

Beclometasoni dipropionat – aerosol

(50, 100, 250 mcg/dose)

Metoclopramidum – amp. 0,5% - 2 ml;

tab. 0,01

Omeprazolium – caps. 0,01, 0,02, 0,04;
tab. 0,02; vial 0,04

Carsilium – dragee 0,035

Pirenzepinum – amp. 0,5% - 2 ml; tab.
0,025

Ranitidinum – tab. 0,15, 0,3

Almagelum – vial 170, 200 ml

Contrycalum – vial 10000 IU

Ondansetronum – amp. 0,2% - 2 ml; tab.
0,004, 0,008

Essentiale – caps. 0,3; amp. 5 ml

Bisacodylum – dragee 0,005; supp. 0,01

Loperamidum – tab. 0,002; caps. 0,002

Drotaverini hydrochloridum – amp. 2% -
2 ml; tab. 0,04, 0,06

Losartanum – tab. 0,0125, 0,025, 0,05

Enalaprilum – tab. 0,0025, 0,005, 0,01,
0,02

Magnesii sulfas – amp. 20%, 25% - 5,
10 ml

Lisinoprilum – tab. 0,005, 0,01, 0,02

Amlodipinum – tab. 0,0025, 0,005, 0,01

Lovastatinum – tab. 0,01, 0,02, 0,04

Pentoxophillinum – amp. 2% - 5 ml; tab.
0,1, 0,2

Nitroglycerinum – amp. 1% - 2 ml
(alcoholic); tab. 0,0005

Sustac forte – tab. 0,0026, 0,0064

Atenololum – tab. 0,025, 0,05, 0,1

Amiodaronum – amp. 5% - 3 ml; tab. 0,2

Sumatriptanum – tab. 0,05, 0,1

Vinpocetinum – amp. 0,5% - 2 ml; tab.
0,005, 0,01

Nicergolinum – tab. 0,01

Trimetazidinum – tab. 0,02, 0,035

Corglyconum – amp. 0,06% - 1 ml; tab.
0,0005

Novocainamidum – tab. 0,25, 0,5;
amp. 10% - 5 ml

Digoxinum – amp. 0,025% - 1 ml, tab.
0,0005, 0,00025

Lidocaini hydrochloridum – amp. 1%,
2%, 10% - 2, 10, 20 ml

Amiodaronum – amp. 5% - 3 ml; tab.
0,2

Kalii chloridum – vial 4%, 7,5% - 10,
20 ml

Dobutaminum – amp. 5% - 5 ml, vial
20 ml

Unithiolum – amp. 5% - 5 ml

Spiroolactonum – tab. 0,025, 0,05,
0,1

Furosemidum – amp. 1% - 2 ml; tab.
0,04

Hydrochlorothiazidum – tab. 0,025,
0,1

Asparkamum – tab. 0,35; amp. 8,5% -
5 ml

Dinoprostum – amp. 0,5% - 1, 1,5, 4, 5,
8 ml

Oxytocinum – amp. 1, 2 ml

Ergometrini maleas – tab. 0,0002;
amp. 0,02% - 1 ml

Progesteronum – amp. 1%, 2,5% - 1
ml (oil)

Chlorhexidini bigluconatum – vial
0,05% - 100 ml

Myramistinum – vial 0,01% - 50, 200 ml;

ointment 0,5% - 15,0, 30,0, 100,0, 1000,0

Solutio Viride nitens – vial 1% - 10, 15,

20, 25 ml

Solutio Iodi spirituosa – vial 5% - 10, 15,

20, 25 ml

Hydrogenii peroxydi diluta – vial 3% -

25, 40, 50, 100 ml

Solutio Furacilini – vial 0,02% - 200,

400 ml

Ciprofloxacinum – tab. 0,25, 0,5, 0,75;

vial 0,2% - 50, 100 ml; amp. 1% - 10 ml

Co-trimoxazolum – tab. 0,12, 0,48, 0,96

Sulfadimethoxinum – tab. 0,5

Furadoninum – tab. 0,05, 0,1

Benzylpenicillinum natrium – vial

500000, 1000000 IU

Bicillinum-5 – vial 1500000 IU

Amoxiclavum – tab. 0,625, 1,0; vial 0,6,

1,2

Ceftriaxonum – vial 0,25, 0,5, 1,0, 2,0

Doxycyclini hydrochloridum – caps. 0,1

Azithromycinum – caps. 0,125, 0,25, 0,5

Gentamycini sulfas – amp. 4% - 1, 2

ml; ointment 0,1% - 10,0, 15,0; eye

drops 0,3%

Amikacini sulfas – vial 0,1, 0,25, 0,5

Nystatinum – tab. 250000 IU, 500000

IU; supp. 250000 IU, 500000 IU;

ointment 100000 IU/1,0

Itraconazolum – caps. 0,1

Aciclovirum – tab. 0,2, 0,4, 0,8;

ointment 5% - 2,0, 5,0; eye ointment 3%

- 4,5

Azidothymidinum – tab. 0,3

Isoniazidum – amp. 10% - 5 ml; tab.

0,1, 0,2, 0,3

Rifampicinum – caps. 0,05, 0,15; amp.

0,15

Mebendazolum – tab. 0,1

Metronidazolum – tab. 0,2, 0,25, 0,4;

supp. 0,15, 0,3

Doxorubicinum – amp. 0,2% - 5 ml;

vial 0,01, 0,05

THE LIST OF QUESTIONS FOR THE FINAL MODULE CONTROL

Module 1. General prescription. General pharmacology. Drugs affecting the synapses. Drugs affecting the peripheral and central nervous system.

1. Routes of drug administration. Dependence of speed, strength and character of the pharmacologic effect on the ways of drug administration.
2. Absorption of drugs at the site of introduction. The main mechanisms of absorption. Factors which influence absorption. Bioavailability of drugs.
3. Metabolism (biotransformation) of drugs in the organism. Main stages (reactions). Biological role.
4. Elimination of drugs from the organism. Main routes. Factors affecting elimination.
5. The localization and main mechanisms of drug action (targets for drugs in the organism). The conception of terms "receptor", "agonist", "antagonist".
6. The main types of drug therapy (aetiotropic, pathogenic, symptomatic).
7. The action of drugs in their repeated introductions (cumulation, drug tolerance, tachyphylaxis).
8. Forms of negative influence of drugs on the organism: allergic reactions, idiosyncrasy, addiction, embriotoxic, teratogenic, fetotoxic, mutagenic, cancerogenic effects).
9. Combined action of drugs (synergism, antagonism).
10. M-cholinomimetics: the mechanism of action, main effects, applications for use, side effects.
11. M-cholinoblockers. Main representatives, pharmacological effects, applications for use, side effects.
12. Anticholinesterase drugs. Classification. Mechanism of action, indication and contraindication for use. Side effects.
13. Ganglionic blockers. Localization and mechanism of action. Main effects. Applications for use. Side effects.
14. Neuromuscular-blocking drugs. The mechanism of action and pharmacologic effects. Clinical uses and possible complications. Antagonists.
15. Localization of adrenoreceptors. Classification of adrenergic drugs.
16. Drugs which stimulate α -adrenoreceptors. Classification. Representatives. Applications for use, side effects.
17. Drugs which block α -adrenoreceptors. Representatives. The main and side effects, applications for use.
18. Drugs which stimulate β -adrenoreceptors mainly. Representatives. The mechanism of action, main and side effects, applications for use.
19. Drugs which block β -adrenoreceptors. Classification. The main and side effects, applications for use.
20. Drugs which stimulate α - and β -adrenoreceptors (direct and indirect action): the mechanism of action, main effects, clinical use. Adverse reactions.

21. Chemical classification of local anesthetics. Mechanism of action, pharmacological properties.
22. Irritating drugs, astringent agents, adsorbents, covering drugs. Pharmacological properties, indications and contraindications and clinical uses. Side effects.
23. Sedative drugs. Definition. Representatives. Pharmacological effects, indications and clinical uses, toxic effects.
24. General characteristics of tranquilizers. Main representatives, pharmacological effects, indications and clinical uses, side effects.
25. General characteristics of neuroleptics, representatives, mechanism of action, pharmacological effects, applications for use, side effects, contraindications and clinical uses.
26. Hypnotic drugs. Classification. Pharmacodynamics and pharmacokinetics of hypnotic drugs. Therapeutic uses and adverse effects of hypnotic drugs.
27. Antiepileptic drugs. Classification. Representatives. Mechanisms of action of different drugs. Indications and clinical uses.
28. Drugs used in treatment of Parkinson disease. Classification of antiparkinsonian drugs, mechanism of action, characteristic of the drugs, their adverse effects.
29. Inhaled and non-inhaled drugs for general anesthesia. Representatives. Comparative characteristic. Pharmacological effects, indications and contraindications and clinical uses.
30. Narcotic analgesics. Classification. Representatives. Central and peripheral pharmacological effects.
31. Narcotic analgesics. Indications and contraindications and clinical uses of opioid analgesics. Side effects.
32. Non-narcotic analgesics. Classification (agents), mechanism of action, main pharmacological effects.
33. Non-narcotic analgesics. Indications for usage. Side effects of non-narcotic analgesics, their correction, contraindications and clinical uses.
34. General characteristics of psychostimulants. Agents, mechanism of action, pharmacological effects.
35. Antidepressants. Classification upon mechanism of action and chemical structure. Representatives. Indication for use.
36. Drugs improving cerebral blood circulation. Classification. Pharmacological effects, indications and contraindications and clinical uses.
37. Analeptic drugs. Definition. Representatives. Pharmacological effects, indications and contraindications and clinical uses.
38. Nootropic drugs. Definition. Representatives. Pharmacological effects, indications and contraindications and clinical uses.

THE LIST OF QUESTIONS FOR THE FINAL MODULE CONTROL

Module 2. Drugs affecting the functions of peripheral executive systems and organs, metabolism, blood and immunity. Chemotherapeutic drugs.

1. Insulin. Mechanism of action. Pharmacodynamics. Clinical usage. Side effects.
2. Synthetic hypoglycemic agents. Classification, mechanism of their action, indications for usage, side effects.
3. Drug for treatment of hyper- and hypothyreosis. Agents. Mechanism of their action. Pharmacodynamics, indications for usage.
4. Glucocorticoid drugs. Pharmacodynamics, mechanism of action. Clinical usage. Side effects.
5. Estrogen drugs, their biological role. Indications for usage.
6. Gestagens. Main representatives, biological role, indications for usage.
7. Antihistaminic drugs (H₁-blockers): classifications. Agents. Indications and contraindications for usage. Side effects.
8. Immunotropic drugs (stimulants, inhibitors). Main representatives. Indications for usage of these drugs.
9. Hemostatics. Mechanism of action of different drugs. Pharmacodynamics, indications for usage.
10. Antithrombotic drugs. Agents, mechanisms of action.
11. Drugs influents upon fibrinolysis and aggregation of platelets. Indications and contraindications for usage.
12. Anticoagulants. Classifications. Pharmacodynamic. Agents. Indications and contraindications for usage. Side effects and their prophylaxis.
13. Expectorant drugs. Classification, mechanism of action. Indications and contraindications for usage.
14. Antitussive drugs. Mechanism of action of different drugs. Clinical usage. Side effects.
15. Agents for arresting of bronchospasm. Main groups. Drugs. Mechanism of action.
16. Bile-expelling drugs. Classification, mechanisms of acting. Indications for usage.
17. Drugs for treatment of ulcer of the stomach and duodenum. Classification. Mechanisms of action.
18. Classification of laxative drugs upon mechanism of their action. Indications for usage.
19. Drugs affecting upon the gastric secretion. Pharmacodynamics. Indications for usage.
20. Antacids: mechanisms of action, agents, indications for their usage.
21. Classification of hypotensive drugs upon their mechanism of action.
22. Antianginal agents. Classification. Mechanism of action of different drugs. Clinical usage. Side effects.
23. Antagonists of Ca²⁺ ions. Drugs. Mechanisms of action, pharmacological properties, indications for usage, side effects.

24. Drugs used for prophylaxis and treatment of atherosclerosis. Classification upon the mechanism of their action.
25. Cardiac glycosides. Pharmacokinetic properties. Pharmacodynamics. Mechanisms of action. Indications for usage.
26. Classification of antiarrhythmic drugs upon their mechanism of action. Agents.
27. Diuretics: classification, agents. Indications and contraindications for usage. Side effects.
28. Drugs affecting upon the myometrium. Classification, indications for usage and contraindications.
29. Tocolytics. Drugs. Side effects. Clinical usage.
30. Main principles of antimicrobial chemotherapy. Classification of the antimicrobial drugs.
31. 8-oxiquinoline and fluoroquinolone derivatives: main drugs, mechanism, spectrum of action, classification. Side effects.
32. Sulfonamides: mechanism, spectrum, type of action, classification upon the duration of action. Side effects of sulfonamides and their prophylaxis.
33. Conception of antiseptics and disinfectants, their principal difference from chemotherapeutical antimicrobial drugs, classification. Indication for usage.
34. Classification of antibiotics by the mechanism and type of anti-microbial action.
35. Penicillins. Classification, mechanism, spectrum, type of action, characteristics of drugs. Side effects and their prophylaxis.
36. General characteristics of cephalosporines: mechanism, spectrum, type of action, classification. Side effects.
37. Aminoglycosides: preparations, mechanism, spectrum of action. Side effects, their prophylaxis, clinical use.
38. Macrolides and tetracyclines: mechanism, spectrum, type of action, characteristics of drugs. Side effects, clinical use.
39. Classification, mechanism and spectrum of action of antifungal agents.
40. Classification, mechanism of action and clinical use of antiviral drugs.
41. Classification, mechanism of action and clinical use of antimycobacterial drugs.
42. Antimalarial agents, mechanism of action, principles of treatment, public and individual prophylaxis, side effects.
43. Agents for treatment of protozoal infections, characteristics of the drugs.
44. Principles of treatment of acute drug poisoning.
45. Specific antidotes and mechanism of their action.

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