MINISTRY OF HEALTH OF UKRAINE
POLTAVA STATE MEDICAL UNIVERSITY
Department of Pharmacology, Clinical pharmacology and Pharmacy

Methodical guidelines
for applicants for education the second (master's) level of higher education independent work in preparation for the practical lessons and the lesson

Academic subject	**Pharmacology**
Module 2	**Medical prescription. General pharmacology. Medicines that affect the nervous and cardiovascular systems**
Year of study	**III**
Faculty	**International Faculty Specialty of «Medicine»**

Topics of practical classes

N	Name topics	Number hours
Module 2		
Content module 5. ***Medicines affecting the respiratory system, gastrointestinal tract, kidney and reproductive processes, blood functions***		
1.	Medicinal agents, influencing on respiratory system	2
2.	Medicinal agents, influencing on digestive system	2
3.	Medicinal agents, influencing on digestive system (continuance)	2
4.	Medicinal agents, influencing on renal function and reproductive system	2
5.	Medicinal agents, influencing on hemostasis	2
6.	Medicinal agents, influencing on hemopoesis. Anticancer medicinal agents	2
Content module 6. ***Medicinal agents, influencing on metabolism***		
7.	Water soluble vitamins. Enzymes and anti-enzyme agents	2
8.	Fat-soluble vitamin preparations	2
9.	Hormonal preparations (peptide structure), their substitute medicinal agents and antagonists	2
10.	Hormonal preparations (steroide structure), their substitute medicinal agents and antagonists	2
11.	Anti-inflammatory, anti-allergic and immutropic medicinal agents.	2
Content module 7. ***Chemical therapeutic medicinal agents***		
12.	Antiseptic and disinfectant medicines.	**2**
13.	Antiseptic and disinfectant medicines (continuance)	**2**
14.	Synthetic antimicrobial medicinal agents. Anti-fungal agents	2
15.	Pharmacology of beta-lactam antibiotics	2
16.	Pharmacology of antibiotics of different groups	2
17.	Anti-tuberculosis medicinal agents. Anti-viral medicinal agents	2
18.	Anti-protozoal medicinal agents. Antihelmentic medicinal agents’	
Content module 8. ***Antidotes. Preparations of macro- and microelements. Plasma restitute agents and preparations for parenteral nutrition***		
19.	Preparations of macro- and microelements. Plasma restitute agents and preparations for parenteral nutrition	2
20.	Principles of therapy of acute poisonings by medicinal agents. Antidotes.	2

Content module № 5	**Medicines affecting the respiratory system, gastrointestinal tract, kidney and reproductive processes, blood functions**
Topic № 1	**Medicinal agents, influencing on respiratory system**

1. Relevance of the topic: Section "Medicines that affect the function of the respiratory system." Preparations of this group are used to treat numerous acute and chronic respiratory diseases and occupy one of the first places in the daily outpatient and clinical practice of a doctor, some of which are widely used in emergency care. Such drugs include: analeptics used to restore breathing when it is inhibited; defoamers and other drugs for the treatment of pulmonary edema; bronchodilators for the relief of asthma attacks - a fairly common disease, from which about 4% of the population of Ukraine suffers.

2. The specific goals:

1. Classify drugs that affect the respiratory system.
2. To assess the possibilities of their use for pharmacotherapy of various pathological conditions of the respiratory system.
3. Explain the mechanisms of action of drugs of each group.
4. Interpret indications for the use of drugs according to the knowledge of their pharmacodynamic and pharmacokinetic characteristics. Create an ambulance algorithm for patients using analeptics for respiratory depression due to poisoning (drugs, sleeping pills, carbon monoxide, etc.), bronchodilators for bronchial asthma attacks, antifoam agents and decongestants for pulmonary edema.
5. Explain the dependence of the action of drugs affecting the respiratory system on the pharmacokinetics of patients of different ages, concomitant diseases and routes of administration of drugs.
6. To make a judgment on the possibility of side effects of drugs in order to prevent them.
7. Prescribe and conduct a pharmacotherapeutic analysis of the prescribed drugs.

3. Basic knowledge, skills that are necessary to study the topic (interdisciplinary integration):

Names of previous disciplines	Acquired skills
1. Latin	Have Prescription Writing Skills
2. Physiology	Possess knowledge of lung exchange and respiratory homeostasis
3. Pathological physiology	Describe the mechanism of regulation of external respiration and the pathogenesis of diseases of the bronchi and lungs
4. Biological chemistry	Describe the biochemical processes that regulate the tone of the smooth muscles of the bronchi
5. Anatomy	To draw schematically the structure of the respiratory organs, epithelium and glands of the trachea and bronchi
6. Propaedeutics of internal diseases	Describe the etiology, pathogenesis and clinic of the development of diseases of the bronchi, asthma and pulmonary edema

4. Tasks for independent work in preparation for the lesson and in the lesson.

4.1. The list of drugs that a student should learn in preparation for the lesson:

Term	Definition

1. Analeptics	Drugs that stimulate the respiratory and vascular-motor centers in the medulla oblongata.
2. Antitussive drugs	Drugs that reflexively and centrally suppress the cough center in the hypothalamus.
3. Expectorants	Drugs that reflexively and resorptively stimulate sputum production.
4. Bronchodilators	Drugs that myotropically and through the autonomic nervous system expand the bronchi.
5. Antiallergic, desensitizing agents	Drugs that inhibit the release of anaphylaxis mediators.

PREPARATIONS

№	Drug name	Release form	Method of determining
ANALEPTICS			
1.	Etimizole Aethimizolum	Tab. 0,1 g Amp. 1%; 1,5% 3 и 5 ml	Orally 0.1 g In the muscle,vein 0.03-0.06 g
2.	Peyona Caffeini citrate	Amp. 2% 1 ml	Intravenously 10-20 mg / kg
3.	Sulfocamphocaine Sulphocamphocainum	Amp. 10% 2 ml	Under the skin (muscles, vein) 2 ml 2-3 times a day
ANTI-Cough Remedies			
1.	Codeine Phosphate Codeini phosphas	Powder 0.01 g Tab. 0.03 g	Orally 0.01-0.03 g
2.	Glaucine hydrochloride Glaucini hydrochloridum	Tab. 0.05 g Dragee 0.01 g	Orally 0.05 g 2-3 times a day after meals
3.	Oxeladine Oxeladinum	Tab. 0.01 and 0.02 g	Orally 0.01-0.04 g 3-4 times a day
4.	Libexin Libexinum	Tab. 0,1 g	Orally 0.1 g 3-4 times a day
5.	Butamirate Citrate Butamirate citrate	Dragee 0.02 g Syrup 0.08% 200 ml Flak. 0.5% 10 ml	Orally 0.02 g 2 times a day On 2 tablespoons of syrup 2-3 times a day 20 drops 4 times
EXPECTORANT AGENTS			
1.	Grass Thermopsis Herbae Thermopsidis	Herb 100.0 g	Orally 15 ml infusion 3-4 times a day (right at the age of 0.6: 200.0)
2.	Broth of Althea root Decoctum radicis Althaeae	Crushed root 100.0 g	Orally 15 ml 3-4 times a day (infusion or decoction 6.0: 180.0)
3.	Mukaltin Mucaltinum	Tablet 0.05 g	Orally 0.05-0.1 g 2-3 times a day
4.	Trypsin crystalline Trypsini crystallisatum	Flak. 0.01 and 0.005 g	In a muscle, 0.005 g in 1-2 ml of isotone. solution of sodium chloride

			Inhalation of 0.005-0.01 g in 2-3 ml of isotone. solution of sodium chloride
5.	Bromhexine Bromhexinum	Tablet 0.008 g	Orally 0.008 g 3-4 times a day
6.	Ambroxol Ambroxolum	Tablet 0.03 g Syrup 0.3% 100 ml Flak 0.75% 100 ml Amp. 0.75% 2 ml	0.03 g 3 times a day 2 teaspoon 2-3 times Inhalation 2 times a day To the muscle (vein) 0.03-0.045 g
7.	Acetylcysteine Acetylcysteinum	Tablet 0.2 g Amp. 20% 5 ml Amp. 10% 2, 3 ml	Orally 0.2 g Inhalation 3 times a day To the muscle 0.2 g(vein 0.5g)
BRONCHOLYTIC PRODUCTS			
1.	Salbutamol Salbutamolum	Aeroz. 10 ml (200 doses) Tab. 0.002	Inhalation (0.0001 g) 1-2 doses 3-4 times a day Inside 0.002 g 3-4 times a day
2	Salmeterol Salmeterol	Aeroz. 0.003 g (120 doses)	Inhalation (1 dose 0.000025 g) 1-4 doses 1-2 times a day
3.	Orciprenaline Sulfate Orciprenalini sulfas	Aeroz. 10 ml (400 doses) Amp. 0.05% 1 ml Tab. 0.02 g	Inhalation (0,00075 g) 1-2 doses 2-3 times a day In the muscle (under the skin, vein) 0.0005-0.001 g Inside 0.02 g 3-4 times a day
4.	Fenoterol Fenoterolum	Aeroz. 15 ml (300 doses)	Inhalation (0.0002 g) 1-2 doses 2-3 times a day
5.	Ipratropium bromide Ipratropium bromide	Aeroz. 15 ml (300 doses)	Inhalation (0.00002 g) 1-2 doses 3-4 times a day
6	Tiotropium bromide Tiotropium bromidum	Caps. 0.000018 g	Inhalation 0.000018 g once a day
7.	Theophylline Theophyllinum	Tab. 0.3 g Suppositories rect. 0.2 g	Orally 0.3 g 1 time per day after meals Rectally 0.2 g once daily
8.	Aminophylline (Euphylline) Euphyllinum	Tab. 0.15 g Amp. 2.4% 10 ml Amp. 24% 1 ml	Orally 0.15 g 1-3 times a day To the vein slowly 0.24-0.48g Into muscle 0.12-0.24 g
ANTI-ALLERGIC AND DESENBILIZING AGENTS			
1.	Cromolin Sodium Cromolin sodium	Caps. 0.02 g	Inhalation 0.02 g 4 times a day
2.	Ketotifen Ketotufen	Caps. (table) 0.001 g Syrup 0.02% 100 ml	Orally 0.001 g 10 g syrup 2 times a day
3.	Fluticasone propionate Fluticasone propionas	Aeroz. 60 or 120 doses (50 mcg / dose) Powder 50 mcg / dose, 100 mcg / dose and 250 mcg / dose	Intranasally 100 mcg once daily in the morning Inhalation 100-500 mcg 2 times a day

4.	Beclomethasone dipropionate Beclometazoni dipropionas	Aeroz. 15 ml (200 doses)	Inhalation (0.00005 g) 1 dose 3-4 times a day
5.	Flunisolid Flunisolide	Aeroz. 6 ml (120 doses)	Inhalation 2 doses 2 times a day
6.	Triamcinolone Triamcinolonum	Tab. 0.004 g	Orally 0.004 g 2-4 times a day
7.	Budesonide Budesonide	Aeroz. 0.04 (200 doses)	Inhalation (1 dose 0.0002 g) 1-8 doses 2 times a day
MEDICINES USED FOR PULMONARY EDEMA			
1.	Strofantin, digoxin, korglikon	See “Cardiac Glycosides”	
2.	Hygronium, pentamine, benzohexonium	See "Ganglion blocking agents"	
3.	Furosemide, manit	See “Diuretics”	
4.	Ephedrine hydrochloride, mesatone	See "Sympathomimetic agents"	
5.	Morphine hydrochloride, fentanyl	See “Narcotic Analgesics”	
6.	Prednisone	See "Glucocorticoids"	
7.	Ethanol	See "Ethanol"	

4.2. Theoretical questions for the lesson:

1. Respiratory stimulants. Classification of respiratory stimulants and pharmacological characteristics of camphor, sulfocamphocaine. Indications for use.
2. Antitussive drugs. Classification of antitussive drugs and general characteristics of codeine phosphate, glaucine hydrochloride (glauvent), butamirate citrate. Side effect.
3. Bronchodilator drugs. Classification. Pharmacology of adrenomimetic drugs: salbutamol, fenoterol, formoterol, salmeterol. Pharmacology of M-anticholinergics: ipratropium bromide (atrovent), tiotropium bromide (spiriva). Pharmacology of myotropic bronchodilators: theophylline (theopec), aminophylline. Pharmacokinetics, pharmacodynamics, side effects. Expectorant medicines and mucolytics. Classification of expectorants and mucolytics according to the mechanism of action and pharmacological characteristics of the agents (preparations of Althea, thermopsis, crystalline trypsin, mucaltin, acetylcysteine). Side effects.
4. Stimulants for the synthesis of surfactant (bromhexine, ambroxol). General characteristics of drugs.
5. General characteristics of topical anti-inflammatory drugs (beclomethasone, fluticasone) combined preparations (seretide) mast cell stabilizers (cromolyn glycate sodium, nedocromil, ketotifen), leukotriene receptor blockers (montelukast) drugs for systemic use in obstructive respiratory diseases (fenspiride) monoclonal antibodies (omalizumab), antihistamines and anti-leukotriene drugs.
6. Emergency care for acute respiratory dysfunction (apnea, bronchospasm, pulmonary edema).

4.3. Practical tasks that are performed in the lesson:

4.3.1. Write down the prescriptions and conduct their pharmacotherapeutic analysis (indicate group affiliation, indications for use, possible complications):

1. Ambroxol tablets and syrup.
2. Acetylcysteine in ampoules for inhalation and in tablets.
3. Salbutamol in aerosols.

4. Salmeterol aerosol.
5. Sulfocamphocaine in ampoules.
6. Aminophylline (aminophylline) in ampoules.
7. Glaucine hydrochloride tablets.
8. Thiotropium bromide in capsules.
9. Budesonide in an aerosol.
10. Beclomethasone dipropionate in aerosol.
11. Codeine phosphate tablets.
12. Caffeine citrate in ampoules.

4.3.2. Practical tasks performed at the lesson:

1. To familiarize with the preparations on the topic, to determine their affiliation with the pharmacological group and indications for use. Fill in the table:

Preparations	Mechanism of action	Indications for use	Side effects
1. Ambroxol			
2. Acetylcysteine			
3. Salbutamol			
4. Salmeterol			
5. Sulfocamphocaine			
6. Aminophilin (eufiln)			
7. Glaucine hydrochloride			
8. Thiotropium bromide			
9. Beclomethasone dipropionate			
10. Budesonide			
11. Codeine phosphate			
12. Caffeine citrate			

2. Justify the choice of the drug, its dosage form, dosage, concentration, route of administration:

1. The drug is a central action for the symptomatic treatment of cough.
2. A drug antitussive, anti-inflammatory and antispasmodic act.
3. A drug to stimulate breathing while suppressing it..
4. A drug for thinning sputum of a viscous purulent nature.
5. A drug that stimulates the synthesis of surfactant.
6. Selective agonist of β2-adrenergic receptors.
7. The drug for the relief of an attack of bronchial asthma.
8. A drug for the prophylactic treatment of asthma attacks.

Materials for self-control.

A.Tasks for self-control:

Using of text books and operative insyructions, syudent must fill in table:

Table N 1. "Features of the mechanism of action and indications for use"

№	Drug	Mechanism of action	Indications for use
1	Beclomethasone		
2	Fluticasone		

3	Seretide		
4	Cromoglycic acid		
5	Nedokromil		
6	Montelukast		
7	Fenspiride		
8	Omalizumab		
9	Theophylline		
10	Formoterol		
11	Zileuton		
12	Zafirlukast		

B. Tests for self-control:

1. What drug should be prescribed for chronic bronchitis with dense sputum of a purulent nature?

A. Bromhexine B. Codeine phosphate C Cititon D. Glaucin hydrochloride E. Salbutamol

2. Patients with bronchitis have been prescribed a remedy that restores the surfactant content in the lungs. What is this drug?

A. Ambroxol B. Grass Thermopsis C. Codeine Phosphate D. Glaucine hydrochloride E. Cititon

3. Patient A., sensing the precursors of an attack of bronchial asthma, took several tablets orally at short intervals without medical supervision. However, a short improvement was noticed only after drinking the first two tablets. The next dose of the drug did not alleviate his condition. What phenomenon causes a decrease in the effect of the drug?

A. Tachyphylaxis B. Cumulation C Addiction D. Dependence E. Idiosyncrasy

4. A patient suffering from chronic bronchitis takes a synthetic mucolytic drug, which helps to thin the sputum. Name this drug:

A. Acetylcysteine B. Eufillin C Isadrin D. Ephedrine E. Epinephrine hydrochloride

5. Assign the patient 32 years of bronchial asthma to prevent attacks of bronchodilator.

A. Salbutamol B. Norepinephrine hydrotartrate C. Metronidazole D. Proserin E. Anaprilin

6. In the pulmonology department of a 46-year-old patient, obstructive bronchitis with a spastic component shows the appointment of salbutamol. What are the features of the action of this drug in this pathology?

A. Preferably stimulate β2-adrenergic receptors

B. Equally activates β1- and β2-adrenergic receptors C. Blocks M-cholinergic receptors

D. Activates α- and β-adrenergic receptors

E. Blocks N-cholinergic receptors

7. In a patient with an attack of bronchial asthma, concomitant disease is angina pectoris. What bronchodilator drug should be prescribed in this case?

A. Salbutamol B. Adrenaline hydrochloride C. Isadrine D. Eufillin E. Atropine sulfate

8. A patient was prescribed a patient with bronchitis that breaks the disulfide bonds of acidic sputum glycosaminoglycans. What is this drug?

A. Infusion of thermopsis herb B. Atropine sulfate C Acetylcysteine D. Glaucine hydrochloride E. Falimint

9. A 40-year-old patient suffers from bronchial asthma and tachycardia for a long time. Specify a drug appropriate in this situation to eliminate bronchospasm:

A. Ephedrine hydrochloride B. Adrenaline hydrochloride C. Salbutamol D. Isadrin E. Atropine Sulfate

10. A man with asthma suffers from paroxysmal tachycardia at the same time, a beta1-adrenergic agonist is prescribed. Which of the following drugs did the doctor choose?

A. Isadrine B. Salbutamol C. Epinephrine hydrochloride D. Ephedrine E. Proserin

11. At the next attack of bronchial asthma, the patient inhaled the drug with an inhaler, is used as a bronchodilator in the form of inhalation, and in injections - in obstetric practice to prevent miscarriage. What drug was used?

A. Fenoterol B. Eufilin C. Izadrin D. Ephedrine hydrochloride E. Adrenaline hydrochloridec

12. A 70-year-old man with chronic bronchitis was prescribed the antitussive drug codeine phosphate. What mechanism of action provides the antitussive effect of this drug?

A. Central B. Competitive C. Peripheral D. Enzymatic E. Local

13. A patient with pulmonary edema against the background of acute heart failure was inhaled 30% ethyl alcohol. What was the purpose of this?

A. To reduce the surface tension of the foam bubbles and transfer it into a liquid

B. To anesthetize C. To stimulate energy metabolism D. As a sedative

E. As an anti-inflammatory

14. A 22-year-old ambulance crew was called for bronchial asthma. Which route of administration of salbutamol is most appropriate in this case?

A. Inhalation B. Intravenous C. Intramuscular D. Subcutaneous E. Sublingual

15. The drug A is used for bronchial asthma for inhalation in order to prevent attacks of bronchospasm. The therapeutic effect develops gradually. To stop the attack of bronchospasm, drug A is unsuitable. The active substance of the drug is:

A. Cromoline sodium B. Ipratropium bromide C. Ketotifen D. Salbutamol E. Eufillin

16. A patient with acute bronchitis was prescribed an expectorant - an infusion of thermopsis herb, after which vomiting occurred. Determine the mechanism of side effects of the drug?

A. Direct effect on the center of vomiting B. Depolymerization of sputum proteins

C. Direct myotropic action D. Reflex stimulation of the center of vomiting

E. Stimulation of the ciliated epithelium of the bronchi

17. A patient with bronchial asthma took pills inside, which caused insomnia, sweating, headache and increased blood pressure. What drug could cause such complications?

A. Ephedrine hydrochloride B. Adrenaline hydrochloride C. Libexin D. Eufillin E. Furosemide

18. What drug should be prescribed for chronic bronchitis with dense sputum of a purulent nature?

A. Bromhexine B. Codeine phosphate C. Cititon D. Glaucine hydrochloride E. Salbutamol

19. Patients with bronchitis have been prescribed a remedy that restores the surfactant content in the lungs. What is this drug?

A. Ambroxol B. Grass Thermopsis C Codeine Phosphate D. Glaucine hydrochloride E. Cititon

20. The mother approached the pediatrician with complaints of dry cough in a 11-month-old baby, which interferes with the baby's sleep. Which of these drugs can not be prescribed in this case?

A. Codeine phosphate B. Libexin C. Tusuprex D. Bromhexine E. Acetylcysteine

Content module № 5	**Medicines affecting the respiratory system, gastrointestinal tract, kidney and reproductive processes, blood functions**
Topic № 2	**Medicinal agents, influencing on digestive system**

1. Relevance of the topic: Digestive system diseases occupy a significant place in the structure of the incidence of the population. First of all, this applies to peptic ulcer of the stomach and duodenum, chronic hepatitis of various etiologies, the problem of effective pharmacotherapy of which has not yet been solved. In many cases, with the help of medications, it is necessary to inhibit the excessive function of a particular organ and system. For this purpose, use antacids, H2 histamine receptor blockers, proton pump inhibitors for peptic ulcers, myotropic antispasmodics, M-anticholinergic drugs for smooth muscle spasms, antienzyme drugs for acute pancreatitis, and others. A characteristic feature of the digestive organs pathology and the interdependence of disorders that arise from various parts of the digestive system: liver, stomach, intestines. This determines the need for complex treatment with the inclusion of drugs of various groups. In turn, this requires the attentive attitude of the doctor to the possible consequences of the interaction of therapeutic agents and the prevention of negative manifestations of such an interaction.

2. The specific goals:

1. To generalize and analyze the pharmacological characteristics of agents that affect the function of the digestive system, explain the mechanisms of action.
2. Assess the benefit / risk ratio when using drugs, affect the function of the digestive system.
3. Create an algorithm for the complex treatment of gastric ulcer and duodenal ulcer, hyperacid gastritis.
4. Explain the dependence of the action of drugs affecting the digestive organs on their pharmacokinetic parameters, the peculiarities of action in patients of different ages, in the presence of concomitant diseases and their pharmacotherapy.
5. To be able to predict the occurrence of side effects of drugs in order to prevent them.
6. Write and analyze recipes for drugs that affect the digestive system.

3. Basic knowledge, skills, skills needed to study the topic (interdisciplinary integration):

Names of previous disciplines	Acquired skills
1. Latin language	Section "Pharmacological Terminology and Formulation"
2. Normal physiology	Own prescription skills.
3. human anatomy	Section "Digestive system". Apply knowledge of the physiological characteristics of various organs of the digestive system
4. Department of Propaedeutic Therapy 5. Department of pathological physiology	Section "Digestive system". Use knowledge of the anatomical features of the digestive system

4. Tasks for independent work in preparation for the lesson and in the lesson.

4.1. The list of basic terms, parameters, characteristics that a student must learn in preparation for the lesson:

Term	Definition
1. Anorexigenic drugs	Drugs that reduce appetite and are used in the treatment of obesity.
2. Gastroprotectors	Drugs that protect the gastric mucosa from the action of pepsin and hydrochloric acid and various irritating substances.
3. Antacids	Drugs that reduce the concentration of hydrogen ions in the gastric contents due to neutralization or buffering, without interfering with the secretion mechanisms.

PREPARATIONS

№	Drug name	Release form	Method of determining
MEANS AFFECTING APPETIT			
1	Wormwood tincture Tinctura Absinthii	Flak. 25 ml	Inside, 20-25 drops in 15 minutes before meals
2	Orlistat Orlistat	Caps. 0.12 g	Inside, 0.12 g 3 times a day with meals
DIAGNOSTIC AND MEANS STIMULING THE STOMACH SECRET			
1	Pentagastrin Pentagastrinum	Amp. 0.025% 2 ml	Subcutaneously at a rate of 6 mcg per 1 kg of body weight
2	Acid hydrochloric diluted Acidum hydrochloricum dilutum	Flak. 30 and 100 ml	Inside 10-15 drops in 1/2 cup of water during meals
3	Pepsin Pepsinum	Powder 0.5 g	Inside 0.2-0.5 g or with meals
4	Gastric juice natural Succus gastricus naturalis	Flak. 100 ml	Inside 1-2 tbsp. spoon during or after meals
MEDICINES SUPPRESSING STOMACH SECRET			
1	Ranitidin Ranitidinum	Tab. 0.15 and 0.3 g	Inside 0.15 g 2-3 times a day
2	Famotidine Famotidinum	Tab. 0.02 and 0.04 g	Inside 0.02-0.04 g once a day
3	Pirenzepine Pirenzepine	Tab. 0.025 and 0.05 g Amp. 0.5% 2 ml	In the muscle (vein) 2 ml 2-3 times a day Inside 0.05 g 2 times a day
4	Omeprazole Omeprazolum	Tablet (caps) 0.02 g	Inside 0.02 g on an empty stomach once a day
5	Sodium bicarbonate Natrii hydrocarbonas	Powder	Inside 0.5-1 g per reception
6	Magnesium oxide Magnesii oxydum	Powder 30 g	Inside 0.25-1 g per reception; with acid poisoning and as a mild laxative - 3-5 g per dose
7	Almagel Almagel	Flak. 170 ml	Inside 1-2 tsp fasting 3 times a day
VOMITAL AND ANTI-ANTIVERS			
1	Apomorphine hydrochloride Apomorphini hydrochloridum	Amp. 1% 1 ml	Subcutaneous 0.2-0.5 ml
2	Scopolamine hydrobromide Scopolamini hydrobromidum	Amp. 0.05% 1 ml	Subcutaneous 0.5 -1ml
3	Pills "Aeron" Tabulettae «Aeronum»	Tab. (coated)	Inside 1-2 tablets. in 30 minutes before meals, then 1 more table. after 6 hours.
4	Diprazine Diprazinum	Tab. (coated) 0.025 g Amp. 2.5% 2 ml	Inside 0,025 g 2-3 times a day after meals In the muscle (vein) 2-10 ml per day
5	Diphenhydramine Dimedrolum	Tab. 0.03 g Amp. 1% 1 ml	Inside 0.03-0.05 g 1-3 times a day In muscles (veins) 1-5 ml per day
6	Metoclopramide Metoclopramidum	Tab. 0.01 g Amp. 0.5% 2 ml	Inside 0.01 g 2-3 times a day In muscles (veins) 2-6 ml per day

7	Ondasetron Ondasetronum	Tab. 0.004 g Amp. 2 and 4 ml	Inside 0.004 g per day Intravenously 0.008 g

4.2. Theoretical questions for the lesson:

1. Medicines that affect appetite. General pharmacological characteristics, classification of drugs that affect appetite and are used to treat anorexia and bulimia. Medicines that stimulate appetite - bitterness (wormwood). Concept of anorexigenic drugs. Pharmacology of orlistat.
2. Medicines used for violations of the function of the glands of the stomach. General pharmacological characteristics of agents that stimulate the secretion of gastric glands and are used for the purpose of diagnosis (pentagastrin) and replacement therapy (pepsin, gastric juice natural, dilute hydrochloric acid).
3. Medicines used to treat diseases of the esophagus, stomach and duodenum 12 gastroprotectors (bismuth tripotassium dicitrate) H2 receptor blockers (ranitidine, famotidine) proton pump blockers (omeprazole, lansoprazole, dexlansoprazole) selective M1 anticholinergics (pirenzepine) antacids (almagel, maalox, sodium alginate) drugs used for NSAID gastropathy (misoprostol). Drugs used for functional gastrointestinal disorders (mebeverin, prphinia bromide, hyoscine butyl bromide, simethicone), stimulators of motor evacuation function of the upper gastrointestinal tract (domperidone, metoclopramide).
4. General Description of Antiemetics: H1 Receptor Blockers (diphenhydramine) 5-HT3 receptor blockers (ondasetron, tropisetron) Dopamine D2 receptor blockers (metoclopramide). Pharmacological characteristics of metoclopramide.

4.3. Practical tasks that are performed in the lesson:

4.3.1. Write down the prescriptions and conduct their pharmacotherapeutic analysis (indicate group affiliation, indications for use, possible complications):

1. Scopolamine hydrobromide in ampoules.
2. Metoclopramide tablets and ampoules.
3. Omeprazole tablets.
4. Famotidine tablets.
5. Ranitidine tablets
6. Pirenzepine tablets and ampoules
7. Almagel in bottles

4.3.2. Practical tasks performed at the lesson:

1. To familiarize with the preparations on the topic, to determine their affiliation with the pharmacological group and indications for use. Fill in the table:

Preparations	Mechanism of action	Indications for use	Side effects
1. Scopolamine hydrobromide			
2. Metoclopramide			
3. Омепразол			
4. Famotidine			
5. Ranitidine			
6. Pirenzepine			
7. Almagel			

2. To substantiate the choice of the drug, its pharmaceutical form, dosage, concentration, route of administration:

1. The drug is a proton pump inhibitor.

2. The drug is an inhibitor of H2 receptors.
3. Antacid drug.
4. A drug that is an antagonist of central dopamine receptors.
5. Selective blocker of M-cholinergic receptors.

Materials for self-control.

A. Tasks for self-control:

Using of text books and operative insyructions, syudent must fill in table:

Table N 1. "Pharmacokinetic characteristics of drugs"

Drug groups	Preparations	Dose, route of administration
1. Anorexigenic drugs 2. Vomiting 3. Antiemetic drugs 4. Antacids		

B. Tests for self-control:

1. Dentists use drugs of this group during operations to reduce the secretion of salivary glands, to prevent laryngospasm, nausea, and bradycardia. What is the group of drugs?

A. Anticholinesterase drugs B. Muscle relaxants
C. M-cholinomimetics D. M-anticholinergic E. Cholinesterase reactivators

2. A patient, 40 years old, exacerbated gastric ulcer with a significant increase in the acidity of gastric juice, pain and dyspeptic syndromes. What drug should be prescribed to the patient?

A. Allohol B. Famotidine C. Papaverine hydrochloride D. No-spa E. Platyphyllin hydrotartrate

3. The patient complains of pain in the stomach and heartburn. An examination revealed an increase in the acidity of the gastric juice. What should be prescribed to a patient to neutralize the acidity of gastric juice?

A. Benzohexonium B. Atropine sulfate C. Papaverine hydrochloride D. Proserin E. Almagel

4. A patient was admitted to the hospital with a diagnosis of gastric ulcer in the acute stage. Analysis of gastric juice showed increased secretory and acid-forming functions of the stomach. Prescribe a drug that will reduce the secretory function of the stomach due to blockade of H2 receptors.

A. Cholenzym B. Metacin C. Magnesium sulfate D. Ranitidite E. Atropine sulfate

5. A patient with a duodenal ulcer was prescribed a proton pump inhibitor. Which one?

A. Omeprazole B. Ranitidine C. Gastrofarm D. No-shpa E. Magnesium sulfate

6. The man at the enterprise received radiation, began to worry about vomiting, which arose unexpectedly. What drug should be prescribed to the patient?

A. Reserpine B. Metoclopramide C. Atropine sulfate D. Aeron E. Ethanol

7. The patient is 35 years old, complaints of sharp pain in the epigastrium on an empty stomach, heartburn. The doctor prescribed a drug from the group of H2-receptor blockers. What remedy is prescribed?

A. Diprazine B. Famotidine C. Omeprazole D. Aeron E. Diphenhydramine

8. Almagel was prescribed to a patient with gastric ulcer. Which of the listed pharmacological properties of almagel was used in the treatment of this pathology??

A. Neutralizes HCl B. Envelopment of the gastric mucosa
C. Blockade of the gastric gland H2 receptor D. Local anesthetic effect
E. Neutralizes HCl, enveloping the gastric mucosa

9. A patient was admitted to the hospital with a diagnosis of peptic ulcer of the duodenum in the acute stage. Analysis of gastric juice showed an increase in the secretory and acid-forming

functions of the stomach. Specify a drug that will reduce the secretory function of the stomach due to blockade of H2 receptors:

A. Famotidine B. Dry belladonna extract C. Almagel D. Metacin E. No-spa

10. A patient consulted a doctor with an exacerbation of gastric ulcer. Which membrane cytoreceptor blocker should be used in the complex therapy of the patient?

A. H2-histamine B. β-adrenergic receptors C. α-adrenergic receptors

D. β1-adrenergic receptors E. H1-histamine

11. In a patient after stomach resection surgery on the 2-3rd day, intestinal motility was not restored. What should be prescribed to a patient to stimulate gastric function:

A. Proserin B. Prazosin C. Cyclodol D. Atropine sulfate E. Norepinephrine

12. A patient suffering from stomatitis and gastric ulcer takes an antacid drug almagel. For the treatment of acute bronchitis, he was prescribed an antibiotic metacyclin. However, within 5 days the temperature did not decrease, the cough and the nature of sputum did not change. The doctor concluded that the drugs are incompatible with their interaction. What kind of drug incompatibility are we talking about?

A. Pharmacokinetic at the stage of absorption

B. Pharmacokinetic at the stage of biotransformation

C. Pharmaceutical D. Pharmacodynamic E. Direct antagonism

13. The doctor makes a plan for treating a patient with gastric ulcer. Which of the following pharmacological groups should be used?

A. H2 receptor blockers B. β-blockers C. Calcium channel blockers

D. NSAIDs E. Steroidal anti-inflammatory drugs

14. A 25-year-old man with gingivitis and peptic ulcer disease with localization of an active stomach ulcer was prescribed omeprazole. Ulcer healing was confirmed after 3 weeks with gastroscopy. What is the mechanism of action of this drug?

A. Blockade of M-cholinergic receptors B. Blockade of gastrin synthesis

C. Blockade of Na + -K + -ATPase D. Blockade of H2 receptors

E. Blockade of H + -K + -ATPase

15. A pregnant woman suffers from heartburn, which is caused by toxicosis. Which remedy is optimal in this case?

A. Sodium bicarbonate B. Bismuth subnitrate C. Ranitidine D. Omeprazole E. Almagel

16. Indicate the antacid that forms carbon dioxide when neutralizing hydrochloric acid, which leads to a secondary wave of its secretion..

A. Sodium bicarbonate B. Magnesium trisilicate C. Aluminum hydroxide

D. Magnesium oxide E. Almagel

17. Indicate an antiemetic that is a specific blocker of dopamine receptor trigger zones:

A. Metoclopramide B. Menthol C. Diphenhydramine

D. Apomorphine hydrochloride E. Almagel

18. Anorexigenic drugs include:

A. Phenamine, diphenhydramine, wormwood B. Menthol, insulin

C. Almagel, fepranon D. Apomorphine hydrochloride, phenamine

E. Phenamine, orlistat

19. Identify anorexigenic agent that suppresses gastrointestinal lipases:

A. Phenamine B. Menthol C. Fepranon D. Apomorphine hydrochloride E. Orlistat

Content module № 5	**Medicines affecting the respiratory system, gastrointestinal tract, kidney and reproductive processes, blood functions**
Topic №3 (continued)	**Medicinal agents, influencing on digestive system (continuance)**

1. Relevance of the topic: Digestive system diseases occupy a significant place in the structure of the incidence of the population. First of all, this applies to peptic ulcer of the stomach and duodenum and chronic hepatitis of various etiologies, the problem of effective pharmacotherapy, which has not yet been resolved. Significant attention in the treatment of diseases of the digestive system is given to remedies of the type of therapy: preparations of bile, pancreatic, gastric enzymes, etc. A characteristic feature of the pathology of the digestive system is the interconnection and interdependence of disorders that arise from various parts of the digestive system: liver, stomach, intestines. This determines the need for complex treatment with the inclusion of drugs of various groups. In turn, this requires the attentive attitude of the doctor to the possible consequences of the interaction of therapeutic agents and the prevention of negative manifestations of such an interaction.

2. The specific goals:

1. Summarize and analyze the pharmacological characteristics of agents that affect function of the digestive system, explain the mechanisms of action.
2. To determine the algorithm of care for acute and chronic pancreatitis, constipation and diarrhea.
3. Determine the indications for the use of enzyme, choleretic drugs.
4. Determine the indications for the use of hepatoprotectors, probiotics.
5. To be able to predict the occurrence of side effects of drugs in order to prevent them.
6. Write and analyze recipes for drugs that affect the digestive system.

3. Basic knowledge, skills, skills needed to study the topic (interdisciplinary integration):

Names of previous disciplines	Acquired skills
1. Latin	Own prescription skills.
2. Normal physiology	Section "Digestive system". Use knowledge of the anatomical features of the digestive system
3. Human anatomy	Section "Digestive system". Use knowledge of the physiological functions of the digestive system
4. Propaedeutic	Section "Digestive system". Use the knowledge of the clinic of the pathology of the digestive system and the mechanisms of its development

4. Tasks for independent work in preparation for the lesson and in the lesson.

4.1. The list of basic terms, parameters, characteristics that a student must learn in preparation for the lesson:

Term	Definition
1.Hepatoprotectors	Drugs that protect liver cells from the damaging effects of hepatocytes, normalize metabolic processes in hepatocytes.
2. Laxative medicines	Drugs that enhance bowel motor function and accelerate bowel movements.
3. Probiotics	Preparations that contain living cells of non-pathogenic microorganisms and are used to restore normal human microflora.

PREPARATIONS

№	Drug name	Release form	Method of determining
CHOLAGOGUE, HEPATOPROTECTORS			
1	Drotaverine hydrochloride (No-spa) Drotaverinum hydrochoridum	Tab. 0.04 g Amp. 0.5% 2 ml	Inside 1-2 tablets. 3 times a day In the muscle (vein), 2-4 ml 1-3 times a day
2	Pills "Holenzym" Tabulettae «Cholenzymum»	Tab. (coated)	Inside 1 tab. 1-3 times a day
3	Holosas Cholosasum	Flak. 250 ml	Inside 1 teaspoon 2-3 times a day
4	Holagol Cholagolum	Flak. 10 ml	Inside 5 specks. in 30 minutes before meals
5	Magnesium sulfate Magnesii sulfas	Powder 30.0	Dissolve in 100 ml of water, take orally 15-60 ml
6	Silibor Siliborum	Tab. 0.04 g	Inside 2-3 tablets 3 times a day before meals
7	Silymarin Silymarinum	Caps.	Inside, 1 capsule 1-2 times a day
8	Essentiale Essentiale	Amp. 5 ml Caps.	5 ml intravenously Inside 1 caps. 3 times a day
9	Legalon Legalonum	Caps.	Inside 2 caps. 3 times a day after meals
LIABILITY			
1	Magnesium sulfate Magnesii sulfas	Powder 30 g	Inside, 10-30 g on an empty stomach or in 30 minutes. before meals
2	Ricin oil Oleum Ricini	Caps. gelatin 1 g	Inside 15-20 g
3	Dry buckthorn extract Extractum Frangulae siccum	Tab. (coated) 0.2g	Inside 0.2 g at bedtime
4	Senna dry extract tablets Tabulettae extracti Sennae siccum	Tab. 0.3 g	Inside 0.3 g at bedtime
5	Phenolphthalein Phenolphthaleinum	Tab. 0.1 g	Inside 0.1 g on priyom
6	Isafenin Isapheninum	Tab. 0.01 g	Inside 0.001 g 1-2 times a day
7	Guttalax Guttalax	Flak. 15 ml	Inside 15 specks
8	Dufalac Duphalac	Flak. 200 ml	Inside 15-45 ml 3-4 times a day
9	Bisacodyl Bisacodilum	Dragee 0.005 g	Inside 1-3 tablets before bedtime
10	Regulax Regulax	Briquette 1.0	Briquette 1.0
11	Senadexin Senadexinum	Flak. 20 ml Inside 1.0	Flak. 20 ml Inside 1.0
ANTI-CARRYING (ANTI-DIARAH) MEANS			
1	Loperamide hydrochloride Loperamidi hydrochloridum (Imodium)	Caps. (Table) 0.002 g	Inside, 0.004 g, then 0.002 g after each bowel movement (in 0.016 g)
ENZYME AND ANTI-ENZYMIC MEDICINES			
1	Pancreatin Pancreatinum	Tab. 0.25 g	Inside 0.5 g 3 times a day

2	Panzinorm forte Panzynorm forte	Tab. (coated)	Inside 1 tab. 3 times a day with meals
3	Festal Festal	Dragees 60 and 100 pcs.	Inside 1-3 tablets during or after a meal
4	Aprotinin (Contrical) Contrykal	Flak. 10,000 U	Intravenous drip 10,000-50,000 units per day
PROBIOTICS			
1	Bifidumbacterin Bifidymbacterinum	Flak. 5 doses	Inside 5 doses 3 times a day for 2-4 weeks, dissolving in water per 1 dose of 5 ml of water
2	Linex Linex	Caps.	Inside 2 capsules 3 times daily after meals with a little water
3	Dry colibacterin Colibacterinum siccum	Flak. 5 doses	Inside 3-6 doses 2 times a day 30 minutes before meals, pre-dissolved in water per 1 dose of 5 ml of water

4.2. Theoretical questions for the lesson:

1. Medicines used in violation of the excretory function of the pancreas. Classification of agents that stimulate the excretory function of the pancreas and are used for replacement therapy (**pancreatin**). Indications for use.
2. Characterization of drugs inhibiting the excretory activity of the pancreas (**aprotinin, aminocaproic acid**). Indications for use.
3. Cholagogue drugs. Classification of choleretic drugs. General characteristics of agents stimulating the formation of bile (**choleretics**). The mechanism of action of choleretic drugs containing bile and natural bile acids (**ursodeoxycholic acid**), plant origin (**corn stigmas, rose hips, holosas**). Pharmacological characteristics of agents that enhance the outflow of bile - cholekinetics (**magnesium sulfate, M-anticholinergic drugs, myotropic antispasmodics**). Indications for use.
4. Hepatoprotectors and cholelitolytic drugs. The mechanism of action of funds that stimulate liver function (**silymarin, essential phospholipids, ademethionine, arginine**). Indications for use.
5. Laxatives (**bisacodyl, sodium picosulfate (regulax, guttalax), lactulose, castor oil**). Mechanism of action. Indications for use. pharmacology of loperamide hydrochloride. Indications for use. Side effect.
6. Probiotics: bifid-containing drugs (**bifidumbacterin, dry bifilis**), lactobacillus preparations (**linex, gastrofarm**), colic drugs (**colibacterin, bactisubtil**).

4.3. Practical tasks that are performed in preparation for the lesson:

4.3.1. Write down prescriptions and conduct their pharmacotherapeutic analysis (indicate group affiliation, indications for use, possible complications):

1. Aprotinin (Contrikal) in vials.
2. Pancreatin tablets.
3. Holosas in bottles.
4. **Silymarin** in capsules.
5. Regulax in vials.
6. **Drotaverinum** in tablets.
7. **Bisacodyl** in a dragee.
8. **Loperamide hydrochloride** in capsules.

4.3.2. Practical tasks performed at the lesson:

1. To familiarize with the preparations on the topic, to determine their affiliation with the pharmacological group and indications for use. Fill in the table:

Preparations	Mechanism of action	Indications for use	Side effect
1. Contrikal			
2. Pancreatin			
3. Holosas			
4. Silymarin			
5. Regulax			
6. Guttalax			
7. Drotaverinum			
7. Bisacodyl			
8. Loperamide hydrochloride			

2. Justify the choice of the drug, its dosage form, dosage, concentration, route of administration:

1. A patient with acute pancreatitis.
2. A patient with chronic constipation due to colon hypotension.
3. A patient with alcoholic cirrhosis of the liver.
4. A drug that is a proteinase inhibitor.
5. The drug for the treatment of cholangitis.
6. A drug for the treatment of constipation against a background of dysbiosis.

Materials for self-control.

A. Tasks for self-control:

Using of text books and operative insyructions, syudent must fill in table:

Table N 1. "Pharmacokinetic characteristics of drugs»

Drug groups	Preparations	Dose, route of administration
1. Hepatoprotectors 2. Laxatives 3. Probiotics		

B. Tests for self-control:

1. A patient at the age of 69 suffers from chronic constipation, which is based on hypotension of the large intestine. Which of the following drugs should be prescribed?

A. Ricin oil B. Bisacodyl C. Sodium sulfate D. Proserin E. Magnesium sulfate

2. A 37-year-old man was hospitalized in the surgical department with acute pancreatitis (vomiting, diarrhea, weakness, dehydration, girdle pain). Which drug is most appropriate to use in the first place?

A. Ephedrine hydrochloride B. No-spa C. Platifilina hydrotartrate D. Etaperazin E. Contrical

3. A patient with diarrhea developed spastic pain in the small intestine. The drug must be used to help the patient?

A. Sodium sulfate B. Dehydrocholic acid C. Prozerin D. No-shpa E. Carboholin

4. A patient came to the doctor who had diarrhea when moving to a new place of residence. Which antidiarrheal drug you recommend?

A. Loperamide hydrochloride B. Pepsin C. Bisacodyl D. Flamin E. No-shpa

5. The patient has an exacerbation of cholelithiasis, which is accompanied by the occurrence of hepatic colic. What drug should be administered to the patient for its relief?

A. No-spa B. Silibor C. Proserin D. Activated carbon E. Allochol

7. The doctor prescribed a choleretic agent for a patient with biliary dyskinesia and constipation, which has a significant laxative effect. What drug was prescribed by the doctor?

A. Allohol B. Magnesium sulfate C. Holosas D. Cholenzym E. Nicodin

8. The patient has chronic hypotonic constipation. When using a laxative, a discoloration of the urine was noted. What laxative was the patient taking??

A. Bisacodyl B. Senadexin C. Tserukal D. Castor oil E. Thiotriazolin

9. The patient has gingivitis and cystic fibrosis. What enzyme preparation should be prescribed?

A. Festal B. Creon C. Pancreatin D. Mezim Forte E. Contrical

10. The patient has chronic atonic constipation. What choleretic agent can be prescribed?

A. Allohol B. Corn stigmas C. Legalon D. Darsil E. Kontrikal

11. The patient has atony of the gallbladder, complicated by cholelithiasis. What tool should be used to enhance the evacuation of bile into the intestine under these conditions?

A. Dehydrocholic acid B. Magnesium sulfate inside
C. Magnesium sulfate injection
D. Flamin E. No-shpu

12. Indicate an anti-enzyme agent that inhibits the activity of trypsin, calicrein and fibrinolysin..

A. Pancreatin B. Contrikal C. Holenzim D. Festal E. Panzinorm forte

13. What enzyme preparation should be prescribed for achilia:

A. Pancreatin B. Kontrikal C. Lineks D. Allohol E. Bisacodyl

14. Choose a probiotic that contains live milk bacteria:

A. Linex B. Bifibumbacterin C. Castor oil D. Allohol E. Kolibacterin

15. A 38-year-old patient received an acute attack of pain in the right hypochondrium at a dentist's appointment with chronic cholecystitis on the background of cholelithiasis. Which drug is the most rational to prescribe?

A. No-shpu B. Cholenzym C. Allohol D. Analgin E. Magnesium sulfate

16. The patient was admitted to the surgical department with a diagnosis of acute pancreatitis, conservative treatment was started. What drug is prescribed pathogenetically?

A. Contrical B. Trypsin C. Chymotrypsin D. Pancreatin E. Fibrinolysin

17. A 60-year-old patient is diagnosed with cirrhosis of the liver, the cause of which is toxic damage to alcohol. Which drug is best prescribed for the patient?

A. Ascorbic acid B. Essentiale C. Riboxin D. Cholenzym E. Allohol

18. Mark contraindications to the appointment of loperamide hydrochloride:

A. Colitis B. Cirrhosis of the liver C. Cholecystitis D. Gallstone disease
E. Diarrhea

19. Mark contraindications to the appointment of bisacodyl:

A. Intestinal obstruction B. Cirrhosis of the liver C. Cholecystitis
D. Gallstone disease E. Constipation

20. A pregnant woman was prescribed a drug to prevent premature birth, which is also known as anticonvulsant, hypotensive, choleretic and laxative. What is this drug?

A. Papaverine hydrochloride B. Oxitocin C. Benzoghexonium
D. Atropine sulfate E. Magnesium sulfate

21. A 37-year-old patient developed intestinal dysbiosis as a result of prolonged antibiotic therapy. What type of drugs should be used to normalize intestinal microflora?

A. Eubiotics B. Sulfanilamides C. Bacteriophages D. Autovaccine E. Vitamins

22. The patient was admitted to the surgical department with a diagnosis of acute pancreatitis. Conservative treatment started. What drug is prescribed pathogenetically?

A. Contrical B. Trypsin C. Chymotrypsin D. Pancreatin E. Fibrinolysin

Content module № 5	**Medicines affecting the respiratory system, gastrointestinal tract, kidney and reproductive processes, blood functions**
Topic № 4	**Medicinal agents, influencing on renal function and reproductive system**

1. Relevance of the topic: diuretics and drugs that affect reproductive processes are widely used in the clinic of internal diseases, surgery, urology, obstetrics and gynecology, so the doctor should be able to prescribe drugs of these groups taking into account their mechanisms of action and pharmacodynamics, be aware of possible complications and be able to prevent them.

2. The specific goals:

1. Classification of diuretics on the chemical structure, localization of action in different parts of the nephron, activity and mechanism of action.
2. Classify antigout medications.
3. Classify drugs that affect reproductive processes.
4. Explain the mechanisms of action of drugs of each group.
5. Treat indications for the use of drugs according to their pharmacodynamic and pharmacokinetic characteristics. Create an ambulance algorithm for patients using diuretics (for poisoning, for edema, hypertension).
6. To make a judgment on the possibility of side effects of drugs in order to prevent them.
7. Prescribe and conduct a pharmacotherapeutic analysis of the prescribed drugs

3. Basic knowledge, skills, skills needed to study the topic (interdisciplinary integration):

Names of previous disciplines	Acquired skills
1. Latin	Have Prescription Writing Skills
2. Normal physiology	Sections: excretory system and reproductive system
3. Human anatomy	Sections: excretory and reproductive system.
4. Propaedeutics of internal diseases	Know the etiology of kidney disease and the reproductive system

4. Tasks for independent work in preparation for the lesson and in the lesson.

4.1. The list of basic terms, parameters, characteristics that a student must learn in preparation for the lesson:

Term	Definition
1. Diuretics	Drugs that enhance the elimination of water from the body and eliminate edema of various origins.
2. Anti-gout remedies	Drugs that reduce uric acid and contribute to its excretion.
3. Prostatoprotectors	Drugs that normalize stromal-epithelial relationships in the prostate during its age-related morphogenesis.

PREPARATIONS

№	Drug name	Release form	Method of determining
DIURETICS			
1.	Furosemide Furosemidum	Tablet 0.04 g	Inside 0.04 g in the morning
2.	Hydrochlorothiazide Hydrochlorthiazidum	Amp. 2% 2 ml	In muscle (veins) 2 ml

3.	Indapamide Indapamidum	Tab. 0.025 and 0.1 g	Inside 0.025-0.05 g
4.	Ethacric acid Acidum etacrynicum	Tab. 0.0025 g (coated)	Inside 0.0025 g
5.	Spironolacton Spironolactonum	Tab. 0.05 g	Inside 0.05-0.2 g
6.	Triamteren Triamterenum	Tab. 0.025 g	Inside 0.075-0.3 g
7.	Mannitol Mannitum	Caps. 0.05 g	Inside 0.05-0.15 g
DRUGS POTASSIUM			
1.	Potassium and Magnesium Asparaginate (Asparkam) Asparcam	Table.	Inside 2 tablets 3 times daily
URICOZURIC MEDICINES			
1.	Alopurinol Allopurinolum	Tab. 0.1 g	Inside 0.1 g after meals
MEDICINAL PLANTS WITH DIREASTIC ACTION			
1.	Horsetail grass Herbae Equiseti	Grass 100 g	Inside 100 ml 2-3 times per day (infusion 1:20)
2.	Orthosiphon Leaves Folium Orthosiphoni	Leaves 50 g	Inside 100 ml 2-3 times per day (infusion 0.3: 20)
MEANS STIMULATING THE CONTRACTIVITY OF THE UTERUS			
1.	Dinoprost Dinoprostum	Amp. 0.001, 0.005 mg	Intravenous drip 0.000004 g
2.	Oxytocin Oxytocinum	Amp. 1ml (5 OD)	Intravenous drip in 5% glucose solution
3.	Calcium chloride Calcii chloridum	Amp. 10% 10 ml	In a vein slowly 10 ml
4.	Prozerin Proserinum	Powder	Inside, 0.015 g 3 times a day for 30 hv. before meals
MEANS FOR STOPING UTERINE BLEEDING			
1.	Ergometrina maleate Ergometrini maleas	Tablet 0.0002 g Amp. 0.02% 1 ml	Inside 0.0002 g Subcutaneously, in muscle 1ml
MEANS FOR REDUCING THE TONUS AND CONTRACTIVE ACTIVITY OF MYOMETRY, RELAXING THE UTERUS NECK			
1.	Tocopherol acetate Tocopheroli acetas	Caps. 20% 0.5 ml of oil solution Amp. 10% 1ml oil solution	Inside 1-2 capsules
2.	Fenoterol Fenoterolum	Tab. 0.005 g	oil on 1 ml
3.	Progesterone Progesteronum	Amp. 10 ml	Inside 0.005 g 8 times a day
4.	Atropine sulfate Atropini sulfas	Amp. 2.5% 1 ml oil rosin	In a vein drip

4.2 Theoretical questions for the lesson:

1. Diuretic drugs. Classification of diuretics by chemical structure,localization, activity and mechanism of action.
2. Pharmacokinetics and pharmacodynamics of saluretics (**furosemide, torasemide, acetazole-mid, hydrochlorothiazide, indapamide)**. Indications for use, side effects.
3. Comparative characteristics of potassium-sparing diuretics (**spironolactone, eplerenone, triamteren**). The concept of forced diuresis.
4. Osmotic diuretics **(mannitol**). Indications for use. Side effect.
5. Medicinal plants with a diuretic effect (**phytopreparations, artichoke extract, horsetail grass, orthosiphon leaves**). The principle of the combined use of diuretics.
6. Anti-gout remedies. Means that affect the metabolism and excretion of uric acid (**allopurinol**).
7. Classification of agents affecting the myometrium. General characteristics of funds stimulate the contractile activity of the myometrium. Prostaglandin preparations (**dinoprost, dinoprostone**), hormonal preparations (**oxytocin, desaminooxytocin**).
8. Means used to stop uterine bleeding. Pharmacological characterization of ergot alkaloids (**ergometrine maleate**) and stimulants oxytocin receptors (**carbetocin**). Indications for use.
9. Means that reduce the tone and contractile activity of the myometrium, relax the neck uterus tocopherol acetate, progesterone; m-anticholinergics (**atropine sulfate**) β2-adrenergic agonists (**fenoterol, hexoprenaline**) antagonists of oxytocin receptors (**atosiban**), antispasmodics, magnesium sulfate.
10. Prostatoprotectors: antiandrogens (**cyproterone, bicalutamide, flutamide**), 5α-reductase inhibitors (**finasteride, dutasteride**), blockers of α1-adrenergic receptors (**alfuzosin, tamsulosin**), phytotherapeutic drugs **(prostatophyte) and drugs used for erectile dysfunction**) .

4.3. Practical tasks that are performed in the lesson:

4.3.1. Write down prescriptions and conduct their pharmacotherapeutic analysis (indicate group affiliation, indications for use, possible complications):

1. Furosemide tablets and ampoules
2. Spironolactone tablets
3. Hydrochlorothiazide tablets
4. Indapamide tablets
5. Mannitol in bottles
6. Allopurinol tablets
7. Oxytocin ampoules
8. Fenoterol in ampoules
9. Ergometrine maleate tablets
10. Potassium and magnesium asparaginate (Asparkam) in tablets

4.3.2. Practical tasks performed at the lesson:

1. To familiarize with the preparations on the topic, to determine their affiliation with the pharmacological group and indications for use. Fill in the table:

Drug name	Mechanism of action	Indications for use	Side effect
1. Furosemide			
2. Spironolactone			
3. Hydrochlorothiazide			
4. Allopurinol			
5. Indapamide			
6. Mannitol			

7. Oxytocin			
8. Fenoterol			
9. Ergometrina maleate			
10.Asparcam			

2. Justify the choice of the drug, its dosage form, dosage, concentration, route of administration:

1. A drug for the treatment of gout.
2. The drug is an aldosterone antagonist.
3. A diuretic drug is a derivative of anthranilic acid.
4. The drug, which is an active means of arousal, stimulation of labor.
5. A drug to prevent premature birth. 6. The drug to stop uterine bleeding.
7. The drug is a long hypotensive and diuretic effect.
8. The drug is a potassium-sparing diuretic.

Materials for self-control.

A. Tasks for self-control:

Using of text books and operative insyructions, syudent must fill in table:

Table N 1. "Features of the pharmacodynamics of drugs»

№	A drug	Mechanism of action	Indications for use and side effects
1	Eplerenone		
2	Cyproterone		
3	Bicalutamide		
4	Finasteride		
5	Tamsulosin		
6	Sildenafil		
7	Flutamide		
8	Dutasteride		
9	Prostafit		
10	Atosiban		
11	Carbetocin		
12	Yohimbine		

B. Tests for self-control:

1. The patient was prescribed furosemide. What is the duration of this drug?

A. 4 hours B. 8 hours. From 7 o'clock. D. 4-8 hours E. 12 hours.

2. What group of diuretics is prescribed for the treatment of hypertension?

A. Thiazide diuretics B. Osmotic diuretics C. Aldosterone antagonists D. Herbal products E. Derivatives of pteridine (triamteren)

3. The patient in the blood test - hyperkalemia. Which diuretic drug is contraindicated?

A. Diacarb B. Furosemide S. Mannitol D. Spironolactone E. Clopamide

4. A woman at the 16th week of pregnancy has a threat of premature birth. What needs to be assigned?

A. Atropine sulfate B. Fenoterol C. No-shpu D. Ascorbic acid E. Urolesan

5. In case of poisoning with the uterine horns of ergot, which were contained in bakery products, which group of drugs should be prescribed?

A. M-anticholinergic drugs B. Vitamins C. Adrenopositive drugs D. Adrenergic drugs E. Antidepressants

6. With glaucoma, which diuretic is prescribed for the relief of its attack?

A. Manit B. Veroshpiron S. Oxytocin D. Furosemide E. Hydrochlorothiazide

7. What is the purpose of furosemide in pulmonary edema?

A. Anti-inflammatory action B. Antiseptic effect

C. Natriuretic action D. Antiviral effect E. Antibacterial effect

8. A patient with acute poisoning with an unknown drug was admitted to the intensive care unit. To quickly remove the poison from the body, forced diuresis was performed. Which of the following was used for this procedure?

A. Furosemide B. Spironolactone C. Omeprazole D. Hydrochlorothiazide E. Famotidine

9. The patient has chronic pyelonephritis. After uncontrolled intake of diuretics, extrasystoles and pains occurred in the area of the heart. An examination of the blood revealed hypokalemia. Which of the following drugs should be prescribed?

A. Asparkam B. Potassium permanganate C. Calcium chloride

D. Retinol acetate E. Hydrochlorothiazide

10. A 53-year-old man was diagnosed with urolithiasis with the formation of urates. This patient is prescribed allopurinol, which is a competitive inhibitor of the enzyme:

A. Xanthine oxidase B. Uridyl transferase C. Dihydrouracil dehydrogenesis

D. Urease E. Uratoxidase

11. In a patient, 46 years old, against the background of atrial fibrillation, pulmonary edema began. What kind of diuretic is needed to stop pulmonary edema??

A. Furosemide B. Veroshpiron C. Eufillin D. Amyloride E. Triamteren

12. A patient with a brain injury in the postoperative period developed a threat of cerebral edema. What drug will prevent cerebral edema?

A. Furosemide B. Hydrochlorothiazide C. Spironolactone D. Allopurinol E. Fenoterol

13. A pregnant woman with weak labor is hospitalized in the maternity ward. Does the tool provide physiologically rhythmic contractions of the myometrium?

A. Spironolactone B. Fenoterol C. Ergometrine D. Oxytocin E. Atropine sulfate

14. For a patient suffering from chronic heart failure and hypertension, the doctor recommended including a diuretic drug in the treatment regimen that does not remove potassium and is an aldosterone antagonist. What is the drug?

A. Allopurinol B. Furosemide C. Strofantin D. Digoxin E. Spironolactone

15. A patient with alcohol poisoning was admitted to the admission department. To assist the patient, forced diuresis was performed. Has the drug been used for this type of help?

A. Furosemide B. Diakarb C. Veroshpiron D. Urolesan E. No-shpa

16. In the patient, acute cardiopulmonary failure, accompanied by pulmonary edema. Which group of drugs should be prescribed?

A. Diuretics B. Bronchodilators C. Antiplatelet agents D. Expectorants

E. Respiratory Stimulants

17. A pregnant woman with a weak labor activity, who was injected with oxytocin, was hospitalized in the maternity ward. Which route of administration did the doctor choose?

A. Inside B. Intravenously C. Intramuscularly D. Subcutaneously E. Intraamnial

18. What drug can not be prescribed to stimulate labor?

A. Pituitrin B. Oxytocin S. Ergometrine maleate D. Calcium chloride E. No-shpa

19. What drug is prescribed for the treatment of gout?

A. Allopurinol B. Diakarb C. No-shpa D. Urolesan E. Furosemide

20. In the complex treatment of hypertension, a long-acting diuretic was prescribed. What diuretic is prescribed?

A. Veroshpiron B. Diakarb C. Furosemide D. Mannitol E. Ethacrine acid

Content module № 5	**Medicines affecting the respiratory system, gastrointestinal tract, kidney and reproductive processes, blood functions**
Topic № 5	**Medicinal agents, influencing on hemostasis**

1. Relevance of the topic: Hemostasis is one of the protective systems that provide homeostasis, the normal functioning of the body. Targeted pathogenetic therapy of dysfunctions of the hemostasis system can significantly increase the effectiveness of the treatment or prevent the death of the patient or woman in labor from shock and blood loss. To stop bleeding, hemostatic agents are used (coagulants of direct and indirect action, antifibrinolytics). Increased blood coagulation and platelet aggregation leads to thrombosis and thromboembolism, for the prevention and treatment of which anticoagulants, antiplatelet agents, fibrinolytics are used. This is of particular importance in emergency conditions, for example, with myocardial infarction.

2. The specific goals:

1. To summarize and analyze the pharmacological properties of drugs, which affect blood coagulation, fibrinolysis and platelet aggregation.
2. Interpret indications for the use of drugs, respectively pharmacodynamics.
3. To assess the ratio of benefit / risk when using drugs that affect blood coagulation, fibrinolysis and platelet aggregation.
4. Create an algorithm to help patients with an overdose of drugs that affect for blood coagulation.
5. Write down prescriptions for drugs that affect blood coagulation, fibrinolysis and platelet aggregation and pharmacotherapeutic analysis.

3. Basic knowledge, skills, skills needed to study the topic (interdisciplinary integration)

Names of previous disciplines	Acquired skills
1. Latin	In Own prescription skills.
2. Normal physiology	Identify specific specific coagulation factors. Describe the stages of blood clot formation. Classify physiological factors that cause thrombosis.
3. Biological chemistry	Schematically depict a cascade of sequential enzymatic reactions that produce a blood clot and fibrinolysis process.

4. Tasks for independent work in preparation for the lesson and in the lesson.

4.1. The list of main terms, parameters, characteristics, which should be taken by the student in preparation for the lesson:

Term	Definition
1.Procoagulants. Fibrinolysis Inhibitors	Blood clotting drugs.
2. Anticoagulants. Fibrinolytics. Antiplatelet agents.	Blood clotting drugs prevent thrombosis.

PREPARATIONS

№	Drug name	Release form	Method of determining
MEANS INFLUENCING THE PLATELET AGGREGATION			
1.	Acetylsalicylic acid Acidum acetylsalicylicum	Tab. 0.1; 0.25; 0.3; 0.5 g	Inside 0.075-0.325 g once daily
2.	Dipyridamole Dipiridamolum	Tab. (Dragee) 0,025; 0.075g	Inside 0.025-0.05 g 3 times a day

3.	Clopidogrel Clopidogrel	Tab.	Inside 1 tablet.
4.	Rivaroxaban (Xeralto) (Rivaroxabanum)	Tab. 0.1; 0.15; 0.2 g	(75 mg) once a day
MEDICINES INFLUENCING BLOOD COAGULATION			
1.	Heparin Heparinum	Flak. 5 ml (1 ml-5000 IU)	In the vein 5000-20 000 units every 4-6 hours
2.	Enoxaparin Enoxaparin	Syringe Tube 0.6 ml	Deep subcutaneous 0.6 ml 1 time per day
3.	Nadroparin (Fraxiparin) Fraxiparine	Syringe 0.3 ml	Subcutaneously 0.3 ml once daily
4.	Neodicumarin Neodicumarinum	Tab. 0.05; 0.1 g	Inside 0.05-0.1 g 3 times a day
5.	Warfarin Warfarin	Tab. 0.0025; 0.003;	Inside 0.0025-0.005 g depending on INR
6.	Sinkumar Syncumar	0.005 g	Inside 0.002 g
7.	Fenilin Phenylinum	Tab. 0.002 g	Inside 0.03-0.06 g, depending on the prothrombin index
8.	Protamine sulfate Protamini sulfas	Tab. (powder) 0.03 g	1 mg intravenously per 100 units of heparin
9.	Menadione (Vikasol) Vikasolum	Amp. 1% 2 ml	Inside 0.015-0.03 g Intramuscularly 1 ml
10.	Thrombin Thrombinum	(1 ml contains 10 mg)	Topically as a solution
11.	Fibrinogen Phibrinogenum	Tab. 0.015 g	2-4 g drop by drop, dissolved in water for injection
12.	Etamsylate Etamsylatum	Amp. 1% 1 ml	Inside 0.5-0.75 g
13.	Calcium chloride Calcii chloridum	Amp. (fl.) 125 EA	In a vein 2-5 ml
14.	Calcium gluconate Calcii gluconas	Flak. 1 and 2 g with a capacity of 250 and 500 ml	Slowly intravenously 5-15 ml
MEDICINES AFFECTING FIBRINOLYSIS			
1.	Fibrinolysin Fibrinolysinum	Flak. 10,000, 20,000 30 000 and 40 000 units with a bottle of isotone. solution of sodium chloride in 100, 200, 300 and 400 ml for dilution	Intravenous drip (to dissolve before administration at the rate of 100-600 IU in 1 ml) of 20 000-40 000 IU per day for 3-4 hours
2.	Streptokinase Streptokinase	Amp. 250,000 units, 500,000 units	In a vein drip 250 000-500 000 UNITS
3.	Alteplaza Alteplase	Flak. 0.05 g	In a vein drip 0.01-0.05 g
4.	Aminocaproic acid Acidum aminocapronicum	Powder	Inside 2.0-3.0 g

5.	Aprotinin (Contrical) Contrykalum	Flak. 5% 100 ml	5.0 g intravenously
6.	Tranexamic acid Acidum tranexamicum	Flak. 10,000 and 50,000 units with solvent	Intravenously drop 10 000-20 000 IU, having dissolved in 500 ml of isotonic sodium chloride solution

4.2. Theoretical questions for the lesson:

1. Classification of drugs that affect hemostasis. Medicines that affect blood coagulation, fibrinolysis on platelet aggregation. Classification of agents used for the prevention and treatment of bleeding.
2. Classification of coagulants. Pharmacokinetics, pharmacodynamics of menadione. Indications for use.
3. Pharmacology of hemostatic agents of other groups **(aminocaproic acid, tranexamic acid, aprotinin, eptacog-alpha, etamzilate, calcium chloride, thrombin).**
4. Classification of agents used for the prevention and treatment of thrombosis.
   Classification of anticoagulants. Pharmacokinetics, pharmacodynamics of heparin. indications and contraindications for use. Side effect. Heparin overdose, relief measures **(protamine sulfate).** Low molecular weight heparins **(fraxiparin, enoxaparin)**.
5. Antithrombotic agents: factor Xa inhibitors (rivaroxaban) and direct thrombin inhibitors **(dabigatran etexilate)**. Indirect anticoagulants **(warfarin)**. Indications for use. Side effect of indirect anticoagulants.
6. General characteristics of fibrinolytic agents. Pharmacology **fibrinolysin, alteplase.** Indications for use. Side effect.
7. The characterization and mechanisms of action of agents that reduce platelet aggregation **(acetylsalicylic acid, dipyridamole, clopidogrel, pentoxifylline).**

4.3. Practical tasks that are performed in the lesson:

4.3.1. Prescribe recipes and conduct their pharmacotherapeutic analysis (indicate group affiliation, indications for use, possible complications):

1. Acetylsalicylic acid in tablets.
2. Clopidogrel tablets.
3. Warfarin tablets.
4. Heparin in vials.
5. Enoxaparin in syringes.
6. Ethamsylate in tablets.
7. Alteplase in vials.
8. Protamine sulfate in ampoules.
9. Calcium chloride in ampoules.
10. Menadione (Vikasol) in tablets and ampoules.
11. Tranexamic acid in ampoules
12. Aminocaproic acid in vials.
13. Rivaroxaban in tablets.

4.3.2. Practical tasks performed at the lesson:

1. To familiarize with the preparations on the topic, to determine their affiliation with the pharmacological group and indications for use. Fill in the table:

Preparations	Mechanism of	Indications for use	Side effects

	action		
Acetylsalicylic acid			
Clopidogrel			
Warfarin			
Heparin			
Enoxaparin			
Etamsylate			
Alteplaza			
Protamine sulfate			
Calcium chloride			
Menadione (Vikasol)			
Tranexamic acid			
Aminocapronic acid			
Rivaroxaban			

2. Justify the choice of the drug, its dosage form, dosage, concentration, route of administration:

1. An antiplatelet agent that inhibits the synthesis of thromboxane.
2. Anticoagulant direct action.
3. Coagulant direct action.
4. The drug to stop bleeding associated with increased fibrinolysis.
5. Hemostatic local action.
6. A remedy for bleeding due to an overdose of heparin.
7. A remedy for bleeding due to an overdose of anticoagulants indirect action.
8. Competitive reversible direct thrombin inhibitor for prevention thromboembolism.
9. The irreversible blocker of adenosine diphosphate (ADP) effects on the membrane platelets for the prevention of atherothrombosis.
10. An inhibitor of ADP-dependent platelet aggregation.
11. An agent that interferes with platelet adhesion to prevent capillary bleeding.
12. Coagulation factor activator VIIa for the prevention of bleeding in patients hemophilia.
13. A synthetic amino acid to prepare a hemophilia patient for surgery.
14. Hemostatic agent of plant origin in the form of a bandage.
15. Prothrombinase complex blocker.

3. Instructions for conducting experimental work.

EXPERIENCE 1. The effect of heparin and warfarin on blood coagulation in vitro.

Pour 0.1 ml of heparin solution (20 PIECES / ml) into one test tube, 0.1% warfarin solution into the second and isotonic sodium chloride solution into the third test tube. Add 0.5 ml of blood to each tube. Compare the process of blood coagulation in various test tubes. Draw conclusions.

EXPERIENCE 2. The effect of vicasol on blood coagulation.

Get a blood sample from the extreme vein of the ear of a rabbit and determine the clotting time of blood. Enter 1 ml of a 1% solution of vikasol. After 1-1.5 hours after administration of the drug, a blood test is repeated and the results are compared.

Materials for self-control.

A. Tasks for self-control:

Using of text books and operative insyructions, syudent must fill in table:

Table N 1 "Features of the mechanism of action and indications for the use of antithrombotic agents"

Preparations	Mechanism of action	Indications for use
Dabigatran etexilate		
Argatroban		
Tirofiban		
Howl		
Eptacog alpha		

Table N2 "The mechanism of action of antiplatelet agents"

Preparations	Mechanism of action
Acetylsalicylic acid	
Dipyridamole	
Clopidogrel	
Ticlopidine	

Table N3 "Comparative characteristics of anticoagulants"

Index	Direct-acting anticoagulants	Indirect anticoagulants
Preparations		
Mechanism of action		
Fat solubility		
Route of administration		
Efficiency (in vivo,		
in vitro)		
Effect development speed		
Action duration		
Indications for use		
Side effect		

B. Self-control tasks:

Task 1. A patient with acute myocardial infarction as part of complex pharmacotherapy was prescribed an antiplatelet drug at a dose of 100 mg daily for a long time. After 2 weeks, she began to complain of pain in the epigastrium.

A) What remedy was prescribed by the doctor?
B) Explain the effect of the drug, which will provide its therapeutic effect and the ability to cause gastropathy.
B) Justify the choice of dose.
D) What drug can replace this tool?

Task 2. A patient with acute bleeding from the vesiculosis of the esophagus, which arose as a result of portal hypertension against cirrhosis of the liver, was admitted to the surgical department of the hospital.

A) What hemostatic agents should be prescribed?
B) What is the principle of drug selection?
C) Explain the mechanisms of their action.

C. Tests for self-control:

1. In a 45-year-old patient who has been taking neodicumarin for thrombophlebitis for two weeks, a regular examination revealed a decrease in prothrombin in the blood, and microhematuria was observed in the urine. What drug should be used as an antagonist of neodicumarin?

A. Vikasol B. Protamine sulfate C. Amben D. Sodium citrate E. Thrombin

2. A patient with myocardial infarction was given an intravenous anticoagulant every 6 hours. A few days later he had bleeding from the gums, nose, and red blood cells appeared in the urine. What drug was administered to the patient?

A. Heparin B. Thrombin C. Vikasol D. Calcium gluconate E. Neodicumarin

3. A patient who takes neodicumarin in connection with thrombophlebitis has bleeding. What drug should be taken to eliminate bleeding?

A. Vikasol B. Protamine Sulfate

C. Acetylsalicylic acid D. Dipyridamole E. Pentoxifylline

4. In acute thrombosis, anticoagulant therapy is intended. Identify a direct-acting anticoagulant used for thrombosis.

A. Dipyridamole B. Phenylin C. Sodium citrate D. Heparin

E. Pentoxifylline

5. A patient in the gynecological department experienced symptoms of internal bleeding. What should be prescribed to suppress fibrinolysis and stop bleeding?

A. Vikasol B. Fibrinogen C. Aminocaproic acid

D. Dicinon E. Calcium chloride.

6. During the examination before the operation, the patient revealed a deficiency of prothrombin in the blood. What substance must be prescribed in advance to reduce blood loss during surgery?

A. Vikasol B. Thrombin C. Aminocaproic acid

D. Phenilin E. Contrical

7. The patient is 37 years old, suffers from obliterating endarteritis of the vessels of the lower extremities, receives phenylin in a daily dose of 60 mg / kg. In connection with the manifestations of the convulsive syndrome, phenobarbital was prescribed, after the cancellation of which the patient experienced nosebleeds. This complication is associated with:

A. Induction of phenobarbital by enzymes of microsomal oxidation in the liver

B. Aliphatic hydroxylation of phenobarbital

C. Conjugation of phenyline with glucuronic acid

D. Oxidative deamination of phenyline

E. Phenobarbital inhibition of microsomal oxidation in the liver

8. With heparin therapy, bleeding occurred. Which of the following medicines should be administered to stop heparin?

A. Calcium chloride B. Thrombin

C. Protamine sulfate D. Adrenaline hydrochloride E. Atropine sulfate

9. A child of 8 years was prepared for tonsillectomy. A blood test showed that clotting time was increased (up to 7 minutes). What drug should be included in the complex of medicines of the preparatory period in the first 5 days before surgery?

A. Dicinon B. Calcium chloride C. Aminocaproic acid D. Fibrinogen E. Vikasol

10. A 43-year-old woman operated on for uterine fibroids started to bleed. To stop the bleeding, the doctor intravenously prescribed a 5% solution of aminocaproic acid (100 ml). What is the mechanism of action of this drug?

A. Blockade of the synthesis of fibrinolysin

B. Strengthening the synthesis of thromboplastin

C. Activation of thrombin synthesis D. Acceleration of thrombin formation

E. Blockade of antithrombin formation

11. A patient who suffered a myocardial infarction was prescribed 75 mg daily of acetylsalicylic acid. What is the purpose of the drug?

A. Lower temperature B. Reducing inflammation C. Pain Relief
D. Decreased platelet aggregation
E. Dilation of coronary vessels

12. In case of an overdose of indirect anticoagulants, it is necessary to use:

A. Protamine sulfate B. Thrombin C. Heparin D. Vikasol E. Etamzilat

2. To determine the means for oral administration in thrombosis:

A. Kontrikal B. Fraksiparin C. Girudin D. Heparin E. Fenilin

13. Select the correct positions regarding fraxiparin:

A. Increases the inhibitory effect of antithrombin III on conversion prothrombin to thrombin
B. DOES NOT inhibit thrombin
C. Inhibits thrombin more actively than standard heparin
D. Has a pronounced anti-aggregation activity E. Toxic than heparin

14. Indicate the medicines that belong to the new type of fibrinolytics - tissue activator of profibrinolysin:

A. Vikasol B. Amben C. Heparin D. Alteplaza E. Etamzilat

15. Indicate indications for the use of antifibrinolytic agents:

A. Tendency to thrombosis B. Fibrinolytic bleeding
C. Acute pancreatitis D. Overdose of heparin
E. Overdose of anticoagulants of indirect action

16. A patient who has had a myocardial infarction is prescribed 75 mg daily acetylsalicylic acid. What is the purpose of the drug?

A. Decrease in temperature B. Decrease in inflammation
C. Decrease in pain D. Decreased platelet aggregation
E. Coronary vasodilation

17. In medical practice, anticoagulants are used that enhance the effect of the coagulation factor inhibitor antithrombin III. What is the inherent effect:

A. Heparin B. Collagen C. Hyaluronic acid D. Keratan sulfate
E. Dermatan sulfate

18. A patient suffering from angina pectoris and taking isosorbide mononitrate was additionally prescribed a drug with a disaggregant effect. Define this drug:

A. Acetylsalicylic acid B. Nitroglycerin C. Anaprilin D. Nifedipine
E. Validol

19. The doctor proposed a patient with hypertension a remedy that stops thrombosis and is administered parenterally. Choose this tool:

A. Heparin B. Amben C. Protamine sulfate D. Neodicumarin E. Sincumar

20. A patient with acute myocardial infarction was prescribed heparin in complex therapy. Some time after the administration of this drug, hematuria appeared. Which heparin antagonist should be administered to a patient to eliminate this complication?

A. Fibrinogen B. Protamine sulfate C. Aminocaproic acid D. Vikasol
E. Neodicumarin

21. Determine the fibrinolysis activator with selective action on plasminogen in the thrombus area:

A. Fibrinolysin B. Streptokinase C. Alteplase D. Aminocaproic acid
E. Acetylsalicylic acid

Content module № 5	**Medicines affecting the respiratory system, gastrointestinal tract, kidney and reproductive processes, blood functions**
Topic № 6	**Medicinal agents, influencing on hemopoesis. Anticancer medicinal agents**

1. Relevance of the topic: Medicines that regulate blood formation stimulate or inhibit the formation of blood cells (red blood cells and white blood cells) and / or stimulate the formation of hemoglobin. There are two main groups of agents that regulate hematopoiesis: affecting erythropoiesis and leukopoiesis. The violation of erythropoiesis in the clinic is manifested by a decrease in the level of red blood cells and / or hemoglobin (anemia) and an increase in the level of red blood cells (erythremia). For the treatment of anemia, which can develop due to massive blood loss (posthemorrhagic anemia), with increased destruction of red blood cells in the peripheral blood (hemolytic anemia), due to impaired blood formation, erythropoiesis stimulating agents are used. A common pathological condition is leukopenia and agranulocytosis, which can occur when the body is exposed to ionizing radiation, including during x-ray and radiotherapy, exposure to toxic substances and certain medications. Therefore, it is relevant to know the means that stimulate leukopoiesis. One of the priority issues of pharmacology is the treatment of cancer. According to the WHO, every year in the world 10 million people are diagnosed with cancer, in Ukraine - 160 thousand. To treat malignant tumors in clinical practice, they use antitumor drugs aimed at damaging the genome and cell division apparatus (“classical chemotherapeutic drugs”).

2. The specific goals:

1. To analyze and generalize the modern directions of pharmacological correction of violations of the formation of blood cells and the process of blood coagulation.
2. Familiarize yourself with current classifications of drugs that affect the blood system.
3. To carry out the pharmacological characterization of agents that affect the blood system.
4. Explain the features of the action and use of drugs that affect the blood system, depending on their pharmacokinetics, age of patients, the presence of concomitant diseases, concomitant pharmacotherapy.
5. To draw a conclusion about the possibility of side effects of drugs that affect the blood system.
6. Know the classification and general characteristics of antitumor agents.
7. To be able to prevent complications of chemotherapy.
8. Write down recipes and make pharmacotherapeutic analysis of prescribed drugs acting on the blood system and antitumor effects.

3. Basic knowledge, skills, skills needed to study the topic (interdisciplinary integration):

Name of previous disciplines	Acquired skills
1. Latin	Have skills in writing prescriptions.
2. Normal physiology	Section "Physiology of the blood system"
3. Biological chemistry	Apply knowledge from biochemistry and physiology of the blood system.

4. Tasks for independent work in preparation for the lesson and in the lesson.

4.1. List of main terms, parameters, characteristics, which should be taken by the student in preparation for the lesson:

Term	Definition
1. Anemia	A disease in which the number of red blood cells and / or hemoglobin decreases or increases.
2. Antianemic drugs	Drugs that increase or decrease the number of red blood cells and (or) hemoglobin.
3. Drugs that inhibit leukopoiesis	Antineoplastic agents that inhibit the growth and development of undifferentiated cells that divide uncontrollably

PREPARATIONS

№	Drug name	Release form	Method of determining
ERYTHROPOESIS STIMULANTS			
1	Iron sulfate Ferri sulfas	Caps. (Powder) 1.0 g	Inside 1 g 3-5 times a day
2	Ferkoven Fercovenum	Amp. 5 ml	Intravenously slowly 5 ml over 10-15 days
3	Iron hydroxide polymaltose Maltofer Maltofer Ferrum Lek Ferrum Lek	Chewable tablets 0.1 g	Chew 0.1 g once a day
4	Iron carboxymaltose (Ferinzhekt) Ferinjectum	Amp. 2 ml	Intramuscularly 2 ml
5	Ferroplekt Feroplect	Flak. 2 that 10 ml	Intravenously 2 ml in 50 ml isotonic sodium chloride solution
6	Cyanocobalamin Cyanocobalaminum	Amp. 0.005%; 0.01%; 0.02%; 0.05% 1 ml	Intravenously, intramuscularly, subcutaneously 1 ml
7	Folic Acid Acidum folicum	Tablet (powder) 0.005 g	Inside 0.005 g per day
8	Erythropoietin (Epoetin Alpha) Erythropoietinum (Epoetinum alfa)	Amp. 1 ml (2000 U / 1ml)	Intravenously 50-150mg / kg 3 times a week
LEUKOPOIESIS STIMULANTS			
1	Sodium Nucleate Natrii nucleinas	Powder 0.25; 0.5 g	Inside 0.25-0.5 g after eating
2	Methyluracil Methyluracilum	Tab. 0.5 g	Inside 0.5 g 4 times a day
3	Pentoxyl Pentoxylum	Suppositories 0.5 g	Enter the rectum
4	Timalin Thymalinum	Ointment 10% 25 g	Lubricate the skin and mucous membranes
5	T-activin T-activinum	Tab. 0.2 g	Inside 0.2 g 3 times a day
6	Filgrastim Filgrastimum	Flak. 0.01 g	Into the muscles deeply 0.005-0.03 mg daily

7	Leucogen Leucogenum	Flak. 0.01% 1 ml	Under the skin 1ml at bedtime for 5-14 days
EXPRESSING LEUKOPEOSIS			
1	Methotrexate Methotrexatum	Tab. 0.0025 g	Inside 0, 0025-0.0075 g
2	Mercaptopurine Mercaptopurinum	Amp. 0.005 g	Intravenously, in muscle 10-20 mg
3	Thiophosphamide Thiophosphamidum	Tab. 0.05 g	Inside 0.05 g 3 times a day
4	Myelosan Myelosanum	Flak. 0.01 g	Intravenously, in muscles, arteries, cavities, tumors with 0.5% solution
5	Doxorubicin Doxorubicinum	Tab. 0.002 g	Inside 0.002 g. 1-3 times a day.
6	Vincristine Vincristinum	Flak. 0.01	10 mg intravenously
7	Cyclophosphamide Cyclophosphamidum (Endoxan)	Flak. 0.001	Intravenously 2 mg per 1
8	Paclitaxel Paclitaxelum	Flak. 0.1; 0.2 g	m2 body surface

4.2. Theoretical questions for the lesson:

1. Classification of agents that affect hematopoiesis. general characteristics medicines that affect blood formation.
2. Medicines that affect erythropoiesis. Stimulants of erythropoiesis. Classification and general characteristics of erythropoiesis stimulants. Indications for use.
3. Medicines that are used for hypochromic anemia. Pharmacokinetics of iron preparations (**iron (II) sulfate, iron (III) hydroxide, polymaltose (ferrum lek), carboxymaltose (fermentect).** Combination drugs (**ferroplekt**). Drugs - Erythropoietins (**epoitin - alpha**). Indications for use. Side effect. Acute iron poisoning and relief measures.
4. Pharmacological characteristics of drugs that are used to treat hyperchromic anemia. Pharmacokinetics, pharmacodynamics **cyanocobalamin and folic acid**.
5. Medicines that affect leukopoiesis. The mechanism of action of leukopoiesis stimulants **(натрия нуклеинат, метилурацил, филграстим Medicines that affect leukopoiesis. The mechanism of action of leukopoiesis stimulants)**. Indications for use. General characteristics of drugs that inhibit leukopoiesis **(mercaptopurine, methotrexate).** Indications for use, side effect.
6. Classification, indications for the use of anticancer drugs.
7. Pharmacology of alkylating compounds **(sarcolysin, cyclophosphamide, dopan, chlorobutin, myelosan), antimetabolites (methotrexate, mercaptopurine, fluorouracil, cytarabine),** platinum preparations **(cisplatin)**, enzymes **(L-asparaginase),** anthracycline antibiotics **(doxorubicin)**, alkaloids **(vincristine, vinblastine, paclitaxel)**, hormonal drugs, animal products, monoclonal antibodies.

4.3. Practical tasks that are performed in the lesson:

4.3.1. Prescribe recipes and conduct their pharmacotherapeutic analysis (indicate group affiliation, indications for use, possible complications):

1. Iron sulfate in capsules.
2. Ferringect in bottles.
3. Cyanocobalamin in ampoules.

4. Folic acid in tablets.
5. Dioxomethyltetrahydropyrimidine (methyluracil) in tablets.
6. Methotrexate tablets
7. Cyclofasfamide tablets.
8. Mercapturin tablets.
9. Doxorubicin in vials.
10.Paclitaxel in vials.
11. Tamoxifenum in tablets.
12. Cisplatin in vials.

4.3.2. Practical tasks performed at the lesson:

1. To familiarize with the preparations on the topic, to determine their affiliation with the pharmacological group and indications for use. Fill in the table:

Preparations	Mechanism of action	Indications for use	Side effects
Iron sulfate			
Ferinject			
Cyanocobalamin			
Folic acid			
Methyluracil			
Methotrexate			
Cyclophosphamide			
Mercaptopurine			
Doxorubicin			
Paclitaxel			
Tamoxifen			
Cisplatin			

2. Justify the choice of the drug, its dosage form, dosage, concentration, route of administration:

1. Means for the treatment of megaloblastic anemia.
2. A means for treating a patient with leukopenia, which arose as a result uncontrolled use of biseptol.
3. Means for treating a patient with macrocytic anemia.
4. Antitumor drug from the group of antibiotics.
5. Antitumor drug from the group of antimetabolites.
6. Antitumor drug with antimitotic effect.

Materials for self-control.

A. Tasks for self-control:

Using of text books and operative insyructions, syudent must fill in table:

Table N 1. "Pharmacological characteristics of drugs"

A drug	Mechanism of action	Indications for use	Application for use	Side effects
Maltofer				
Epoetin Alpha				
Filgrastim				

Timalin				
L-asparaginase				
Bleomitsyn				
Vincristine				
Cytarabine				

Table N 2. “Pharmacological groups, preparations, their kinetics”

Disease	Pharmacological groups	Preparations	Dose, route of administration
Iron-deficiency anemia			
Folic Deficiency Anemia			
B12 deficiency anemia			
Aplastic anemia			
Granulocytopenia			
Leukemia			

B. Self-control tasks:

Task 1. A patient with anacid gastritis developed general weakness, dizziness, pallor of the skin, headache, glossitis and funicular myelosis. In the peripheral blood, the content of red blood cells is reduced, there are megaloblasts.

A) Indicate which medicines should be prescribed to the patient.

B) Determine the mechanism of their action.

C) Determine the dose and route of administration of these drugs.

Task 2. After an organ transplant, a patient with an immunosuppressive effect was prescribed to prevent his rejection.

A) Determine which drug was administered to the patient if he is a derivative of purine?

B) Explain the mechanism of its action. C) What side effects of the drug may occur?

C. Tests for self-control:

1. During the annual medical examination, a radiologist noted leukopenia. Is it necessary to prescribe a remedy for the correction of hematopoiesis?

A. Methyluracil B. Iron-Lek C. Hemostimulin D. Folic acid E. Cyanocobalamin

2. A patient with megaloblastic anemia that arose after a gastrectomy received a long course of treatment with vitamin B12. The drug was administered intramuscularly. What is the advantage of the parenteral route of administration of vitamin B12?

A. Effective in case of gastromucoprotein deficiency

B. Drug is rapidly absorbed C. It circulates in the blood for a long time.

D. Not destroyed in the liver E. Quickly excreted

3. The patient was diagnosed with iron deficiency anemia after examination. What drug should she prescribe?

A. Ferkoven B. Heparin C. Verapamil D. Propranolol E. Dichlothiazide

4. The patient has iron deficiency anemia. Together with iron preparations, vitamin C was prescribed. What role does ascorbic acid play in this case?

A. Promotes absorption of iron by reducing ferric iron in divalent

B. Promotes absorption of iron due to its ionization

C. Improves epithelization of the gastrointestinal tract

D. Promotes the digestion of food E. Improves the transport of iron in the blood

5. Due to the large blood loss in the woman after thyroidectomy, hypochromic anemia occurred. What drug should be prescribed to the patient?

A. Ferrum-lek B. Pentoxyl C. Methotrexate D. Pantothenic acid E. Sinkumar

6. The cancer patient was prescribed methotrexate, to which, over time, the target cells of the tumor lost sensitivity. What gene expression does this change?

A. Dehydrofolate reductase B. Timinase C. Deaminase D. Folatoxidase
E. Folate decarboxylase

7. Derivatives of pterin (aminopterin and methotrexate) - are competitive inhibitors of dihydrofolate reductase, as a result of which they inhibit the regeneration of tetrahydrofolate into dihydrofolate. These drugs lead to inhibition of intermolecular transport of monocarbon groups. What polymer biosynthesis is inhibited?

A. DNA B. Protein C. Homopolysaccharides D. Gangliosides
E. Glycosaminoglycans

8. Intermolecular transport reactions of monocarbon radicals are necessary for the synthesis of proteins and nucleic acids. Which of the following vitamins produces the coenzyme necessary for the above reactions?

A. Folic acid B. Pantothenic acid C. Thiamine D. Riboflavin E. Ascorbic acid

9. A 60-year-old man who had severe iron deficiency anemia due to impaired absorption in the gastrointestinal tract turned to the doctor. Which drug is better to recommend to the patient?

A. Ferrum-Lek B. Iron reduced C. Iron lactate D. Folic acid E. Cyanocobalamin

10. In a 25-year-old pregnant woman megaloblasts were found in a blood test, the level of color index increased. What treatment should be prescribed?

A. Pentoxyl B. Iron preparations C. Cobalt preparations D. Methyluracil
E. Cyanocobalamin

11. A patient with radiation sickness with skin lesions was prescribed complex therapy. What leukopoiesis stimulant should be prescribed topically?

A. Methyluracil B. Folic acid C. Levamisole D. Sodium nucleinate E. Timalin

12. A patient suffering from chronic pneumonia was prescribed a microbial preparation as part of complex therapy, which stimulates the immune system and enhances regeneration. Define this remedy.

A. Levamisole B. Timalin C. Methyluracil D. Sodium nucleinate E. Vilozen

13. A 43-year-old woman, a radiologist, was found to have leukopenia. Prescribe a remedy for the correction of leukopoiesis.

A. Ferrum-Lek B. Hemostimulin C. Ascorbic acid D. Folic acid E. Methyluracil

14. A number of drugs were used to stimulate leukopoiesis, including those from the group of colony-stimulating factors. Identify the agent that belongs to the group.

A. Filgrastim B. Leucogen C. Pentoxyl D. Ferkoven E. Hemostimulin

15. A 35-year-old man is treated in the hematology department with a diagnosis of acute leukemia. Which treatment is best prescribed?

A. Cephaloridin B. Cyanocobalamin C. Methyluracil D. Mercaptopurin E. Pentoxyl

16. The patient was prescribed an antagonist of natural metabolites. Indicate this drug if it disrupts the synthesis of nucleic acids in tumor cells by blocking dihydrofolate reductase.

A. Fluorouracil B. Cytarabine C. Cisplastin D. Mercapturin E. Methotrexate

17. When examining a man of 40 years old, the diagnosis was established: hypochromic anemia. What drug should be prescribed for treatment?

A. Ferkoven B. Cyanocobalamin C. Pentoxyl D. Heparin E. Vikasol

18. Patient with iron deficiency anemia was prescribed iron sulfate. What side effect is typical for iron preparations?

A. Constipation B. Extrapyramidal disorders C. Increased blood pressure
D. Osteoporosis E. Bradycardia

Content module № 6	**Medicinal agents, influencing on metabolism**
Topic № 7	**Water soluble vitamins. Enzymes and anti-enzyme agents**

1. **Relevance of the topic:** Vitamins are indispensable nutritional factors and are necessary for the normal growth and development of the human body. Vitamins play a huge role in metabolic processes, in particular cellular respiration, ensuring the functions of the nervous and endocrine systems, and regulating immunobiological and detoxification processes. Membranotropic vitamins perform a plastic function, regulate the permeability of membranes, protect them from damaging effects. Coenzyme vitamins are transformed in the body into coenzymes, which, when combined with proteins, form biocatalyst enzymes of various biochemical reactions. Vitamin preparations are used as substitutes for hypovitaminosis, as well as in the complex treatment of many diseases.

2. The specific goals:

1. Explain the difference between vitamins and vitamin preparations, give a definition.
2. Classify vitamin preparations by biological role, chemical structure and solubility.
3. Pharmacology of vitamin preparations, their mechanisms of action, indications, side effects.
4. Create an algorithm to help patients with possible poisoning with individual vitamin preparations. Understand the effects of antidote therapy for these poisonings. Anti-vitamins.
5. Prescribe and conduct a pharmacotherapeutic analysis of the prescribed drugs.

3. Basic knowledge, skills, skills needed to study the topic (interdisciplinary integration)

Previous disciplines	Acquired skills
1. Latin	Know the Latin terminology and structure of the recipe.
2. General hygiene	Determine the origin and physiological role of vitamins, their daily requirement. Know the causes of the development of hypo- and vitamin deficiencies, their types
3. Bioorganic	Use knowledge on the classification of vitamins by chemical structure and solubility. Draw the chemical structure of vitamins. Describe the participation of vitamins in biochemical processes. Know the role of enzymes and antienzymes

4. Tasks for independent work in preparation for the lesson and in the lesson.

4.1. The list of basic terms, parameters, characteristics that a student must master during preparation for the lesson:

Term	Definition
1. Vitamin preparations water-soluble	Preparations that are similar to water soluble vitamins.
2. Vitamin preparations, fat-soluble	Drugs That Are Similar to Fat-Soluble Vitamins
3. Anti Vitamins	Substances that reduce the absorption of vitamins
4. Enzymes	Enzyme preparations
5. Antiferments	Drugs that inhibit enzyme activity

PREPARATIONS

№	Drug name	Release form	Method of determining
VITAMIN PREPARATIONS WATER-SOLUBLE			
1.	Ascorbic acid Acidum ascorbinicum	Tab. 0.05; 0.1 g	Inside 0.05 g 3 times a day
2.	Thiamine chloride Thiamini chloridum	Amp. 5%, 10% 1 ml	Intramuscularly, in a vein 0.05-0.15 g

3.	Cocarboxylase Cocarboxylazum	Tab. 0.005, 0.01 g	Inside 0.01 g 3 times a day
4.	Pyridoxine hydrochloride Pyridoxini hydrochloridum	Amp. 2.5%, 5% 1 ml	Intramuscularly 0.025-0.05 g
5.	Riboflavin Riboflavinum	Amp. 0.05 g	Intramuscularly, in a vein 0.05-0.1 g per day
6.	Nicotinic Acid Acidum nicotinicum	Tab. 0.005, 0.01 g	Inside 0.005 g per day
7.	Calcium pantothenate Calcii pantotenas	Amp. 1%, 5% 1 ml	Intramuscularly, into a vein 0.01 g
8.	Cyanocobalamin Cyanocobaminum	Tab. 0.005, 0.01 g	Inside 0.005-0.01 g
9.	Folic Acid Acidum folicum	Flak. 0.1% 10 ml (eye drops)	In the cavity of the conjunctiva, 1-2 drops 2 times a day
ENZYMES AND ANTI-ENZYMES			
1.	Trypsin crystalline Trypsinum crystallisatum	Flak., Amp. by 0, 005 and 0.01 g	Intramuscularly at 0.005-0.01 g, dissolving in 2 ml of 0.5% solution of novocaine,
2.	Lidase Lydasum	Flak. 64 UE	1-2 times a day
3.	Alteplaza Alteplase	Flak. 0.05 g	Locally 1-5% solution of 0.5% novocaine solution
4.	Contrical (Aprotinin) Contrykalum	Flak. 10000, 30,000, 50,000 units	Dissolve the contents of the vial in a 0.5% solution of novocaine, inject subcutaneously or into a scar
5.	Aminocaproic acid Acidum aminocapronicum	Flak. 5% 100 ml	Intravenously in a stream or drip

4.2. **Theoretical questions for the lesson:**

1. The concept of a vitamin drug.
2. Therapy with vitamin preparations and its types.
3. Classification of vitamin preparations by biological role and chemical structure.
4. General characteristics of water-soluble vitamin preparations.
5. Pharmacology **of thiamine bromide, riboflavin, pyridoxine, nicotinic acid, cyanocobalamin, folic acid, metapholine, ascorbic acid, calcium pangamate, calcium pantothenate**.
5. Indications for use, side effects.
6. The concept of bioflavonoids (**rutin, quercetin**), coenzyme preparations.
7. Classification of enzyme preparations.
8. The mechanism of action and indications for the use of peptidases (**pepsin),** protease (**crystalline trypsin, crystalline chymotrypsin**), nuclease (**ribonuclease, deoxyribonuclease),** hyaluronidase preparations **(lidase, ronidase**).
9. Classification and general characteristics of enzyme inhibitors (aprotinin, aminocaproic acid).
10. Indications and contraindications for the use of enzyme preparations.

4.3. Practical tasks that are performed in the lesson:

4.3.1. Prescribe recipes and conduct their pharmacotherapeutic analysis (indicate group affiliation, indications for use, possible complications):

1. Thiamine bromide tablets and ampoules
2. Riboflavin in the eye drops.

3. Pyridoxine in ampoules.
4. Nicotinic acid in ampoules.
5. Cyanocobalamin in ampoules.
6. Folic acid in powders.
7. Cocarboxylase in ampoules.
8. Ascorbic acid in tablets and ampoules.
9. Calcium pantothenate in ampoules.
10. Trypsin crystalline in ampoules.
11. Lidase in vials.
12. Alteplaza in bottles.
13. Aprotinin in vials.

4.3.2. Practical tasks performed at the lesson:

1. To familiarize with the preparations on the topic, to determine their affiliation with the pharmacological group and indications for use. Fill in the table:

Preparations	Mechanism of action	Indications for use	Side effects
1. Thiamine bromide			
2. Riboflavin			
3. Pyridoxine hydrochloride			
4. Nicotinic Acid			
5. Cyanocobalamin			
6. Folic Acid			
7. Ascorbic acid			
8. Calcium pantothenate			
9. Trypsin			

2. To substantiate the choice of the drug, its pharmaceutical form, dosage, concentration, route of administration.

1. A drug for the treatment of polyneuritis.
2. Preparations for the treatment of cardiovascular disease, diabetes.
3. A drug for the treatment of megaloblastic anemia.
4. The drug for the treatment of capillarotoxicosis.
5. The drug is a water-soluble antioxidant.
6. An antioxidant drug for the treatment of atherosclerosis.
7. A preparation for restoration of connective tissue, elastin, epithelium.
8. A drug for the normalization of redox processes in the myocardium.
9. The drug is to stimulate the synthesis of immunoglobulins.
10. A drug for the treatment of acute pancreatitis.

3. Instructions for conducting an experiment:

EXPERIENCE 1. The study of the antioxidant supply of the body and the effect of ascorbic acid on it.

Students apply 1 drop (0.04) ml of a 0.01% solution of 2,6-dichlorophenolindophenol (Tilmans Paint) to the upper dry surface of the tongue and hold the tongue outwardly in a horizontal position. Next, determine the time of the disappearance of staining. Conclusion.

Materials for self-control.

A. Tasks for self-control:

Using of text books and operative insyructions, syudent must fill in table:

Table N 1. "Pharmacological characteristics of vitamin and enzymatic agents"

Preparations	Mechanism of action	Indications for use	Side effects
Metafolin			
Calcium Pangamat			
Routine			
Chymotrypsin crystalline			
Ribonuclease			
Ronidase			
Streptoliasis			
Urokinase			

Table N 2. “Selection of vitamin preparations by type of hypovitaminosis”

Hypovitaminosis	Vitamin preparations
1) Take it	1) cyanocobalamin
2) Microcytic anemia	2) Nicotinic acid
3) Pernicious anemia	3) Folic acid
4) Pellagra	4) Thiamine bromide

B. Self-control tasks:

Task 1. A patient with diabetes mellitus, which was complicated by vascular retinopathy and visual impairment, was prescribed a vitamin remedy in complex treatment, which has a hypoglycemic effect and dilates blood vessels.

A) What drug was used?

B) Justify its therapeutic effect.

C) Determine its side effect.

Task 2. A patient with chronic hepatitis was prescribed a vitamin preparation inside. After the first dose, the patient's face and neck were covered with red spots, he felt dizzy. These symptoms disappeared without medical intervention.

A) Justify the choice of a vitamin preparation for liver disease.

B) What are the causes of a short-term reaction?

Task 3. In a 5-year-old girl, after a thermal burn, scars form on her face.

A) What enzyme preparation should be prescribed?

B) Explain the mechanism of its action and route of administration.

Task 4. An enzyme preparation was prescribed for a patient with osteomyelitis of the lower jaw. After the injection, the patient developed dizziness, hives, suffocation, tachycardia, and body temperature increased.

A) What drug was prescribed and for what purpose?

B) What complication developed?

C) What is the treatment for complications?

C. Tests for self-control:

1. *A patient with diabetes was prescribed an injection of vitamin B1 to correct metabolic acidosis. What biochemical mechanism of action of the drug is associated with its positive effect?*

A. Increased synthesis of acetylcholine
B. Activation of adenylate cyclase
C. Phosphodiesterase blocking
D. Increased adrenaline synthesis
E. Activation of Krebs cycle dehydrogenases

2. For the synthesis of the main components of connective tissue - mucopolysaccharides and collagen, the necessary condition is the presence of:

A. Nicotinic acid B. Ascorbic acid C. Folic acid
D. Salicylic acid E. Acetylsalicylic acid

3. For the prevention of bleeding gums, the doctor recommended drinking a decoction from the fruit:

A. Raspberries B. Pears C. Apple Trees D. Rosehip E. Hawthorn

4. The patient has dermatitis, dementia and diarrhea. Prescribe a treatment.

A. Pantothenic acid B. Riboflavin C. Pantothenic acid D. Nicotinamide
E. Thiamine

5. In a woman of 25 years who lost weight for 1.5 months, her body weight decreased by 5 kg, but there were constant nosebleeds, bleeding gums, headaches, seborrhea, and hair loss. What drug is appropriate?

A. Cyanocobalamin B. Folic acid C. Retinol acetate D. Ascorbic acid
E. Vikasola

6. Due to a violation of carbohydrate metabolism and the accumulation of ketoacids in the body, the patient developed metabolic acidosis. Which terminates this condition?

A. Pyridoxine B. Riboflavin C. Thiamine D. Rutin E. Calgam

7. A patient with chronic alcoholism has developed polyneuritis and heart failure, muscle pain, swelling. What vitamin preparation will help?

A. Retinol acetate B. Filoquinon C.Thiamine chloride D.Tocopherol acetate
E.Calcium Pangamat

8. A 55-year-old patient was admitted to the hematology department with acute anemia. The number of red blood cells - 1.5 × 12 October in 1 liter, HB - 80 g%, color indicator - 1.3. What remedy should be prescribed?

A. Ferroplekt B. Ferrum-lek S. Cyanocobalamin D. Hemostimulin E. Folic acid

9. A patient with acute pancreatitis was prescribed an agent that is an inhibitor of proteolysis, fibrinolysis and kininogenesis. Define a remedy.

A. Diclofenac sodium B. Aspirin C. Aprotinin D. Prednisolone E. Ticlopidine

10. What agent in the dressing for a purulent wound can be used to remove non-viable tissue?

A. Trypsin B. Alteplase C. Trental D. Pentoxifylline E. Pyridoxine

11. A newborn born prematurely was found to have dysbiosis and anemia. What vitamin preparation should be prescribed?

A. Thiamine chloride B. Pyridoxine C. Folic acid D. Ascorbic acid
E. Nicotinic acid

12. To improve the body's resistance, a drug containing two antioxidants was prescribed. Identify this drug.

A. Cyanocobalamin B. Asparkam C. Ascorutin D. Aevit E. Vikasol

13. The pregnant woman developed toxicosis. Determine a vitamin preparation to reduce the phenomenon of intoxication?

A. Ergocalciferol B. Cyanocobalamin C. Pyridoxine D. Riboflavin
E. Rutin

14. In the complex treatment of diabetes, a vitamin preparation was used, which caused facial redness, dizziness, hypotension. What side effects of the drug are listed?

A. Nicotinamide B. Riboflavin C. Nicotinic acid D. Rutin
E. Calcium Pangamat

15. To reduce the dose of cardiac glycoside, it is necessary to prescribe a vitamin preparation, which also has a cardiotonic effect. Identify this drug.

A. Pyridoxine B. Nicotinic acid C. Thiamine chloride
D. Calcium pantothenate E. Calcium pangamate

16. Antibiotic treatment contributed to the occurrence of angular stomatitis and conjunctivitis. What vitamin preparation corrects complications of therapy?

A. Retinol acetate B. Riboflavin C. Rutin D. Thiamine chloride
E. Nicotinamide

17. The rapid intravenous administration of a vitamin preparation in acute heart failure caused respiratory arrest. What drug was administered?

A. Nicotinic acid B. Thiamine chloride C. Riboflavin
D. Calcium pantothenate E. Ascorbic acid

18. A patient with tuberculosis was treated with isoniazid, which caused neuritis, convulsions, anemia, and dermatitis. What signs of hypovitaminosis occurred in the patient?

A. Vitamin B2 B. Vitamin B6 C. Vitamin B9 D. Vitamin B12
E. Vitamin B5

19. To stop the diabetic coma, they introduced a drug - an active form of thiamine. Identify this drug.

A. Ascorutin B. Ergocalciferol C. Cocarboxylase D. Riboflavin
E. Decamevit

20. What vitamin preparation becomes active after the phosphorylation process?

A. Ascorbic acid B. Nicotinic acid C. Tocopherol acetate
D. Retinol acetate E. Ergocalciferol

21. For the treatment of arthritis of the mandibular joint, the patient was prescribed an agent that causes depolymerization of hyaluronic acid, which increases the elasticity of tissues. Define a remedy.

A. Trypsin B. Lidase C. Indomethacin D. Ribonuclease
E. Prednisolone

22. For the purpose of myocardial revascularization after myocardial infarction, the patient is prescribed a drug that is a tissue plasminogen activator. Identify the drug.

A. Pepsin B. Actilise C. Indomethacin D. Ribonuclease
E. Vikasol

Content module № 6	**Medicinal agents, influencing on metabolism**
Topic № 8	**Fat-soluble vitamin preparations**

1. Relevance of the topic: fat-soluble vitamins are indispensable factors in the human body. They play a huge role in the oxidative processes of the body, the metabolism of carbohydrates, proteins, cholesterol, the provision of the functions of the cardiovascular, nervous, endocrine systems, blood coagulation and bone formation. Vitamin preparations are used as medicines in the complex treatment of many diseases..

2. The specific goals:

1. Explain the difference between natural vitamins and vitamin preparations, give a definition.

2. Describe fat-soluble vitamin preparations, indications for their use and side effects.

3. Create an algorithm to help patients with possible poisoning with individual vitamin preparations. Understand the effects of anti-vitamins.

4. Write out prescriptions and conduct a pharmacotherapeutic analysis of the prescribed drugs.

3. Basic knowledge, skills, skills needed to study the topic (interdisciplinary integration)

Previous disciplines	Acquired skills
1. Latin	Know the Latin terminology and structure of the recipe.
2. General hygiene	Determine the origin and physiological role of vitamins, their daily requirement. Know the causes of hypo | and vitamin deficiencies, their types
3. Bioorganic	Use knowledge on the classification of vitamins by chemical structure and solubility. Draw the chemical structure of vitamins. Describe the participation of vitamins in biochemical processes. Know the role of enzymes and antienzymes

4. Tasks for independent work in preparation for the lesson and in the lesson.

4.1. The list of basic terms, parameters, characteristics that a student must master during preparation for the lesson:

Term	Definition
1. Vitamin preparations water-soluble	Preparations that are similar to water soluble vitamins.
2. Vitamin preparations, fat-soluble	Drugs That Are Similar to Fat-Soluble Vitamins
3. Anti Vitamins	Substances that reduce the absorption of vitamins
4. Enzymes	Enzyme preparations
5. Antiferments	Drugs that inhibit enzyme activity

PREPARATIONS

№	Drug name	Release form	Method of determining
VITAMIN MEDICINES FAT-SOLUBLE			
1.	Tocopherol acetate Tocopheroli acetas	Caps 50% 0.1, 0.2 ml Flak. 5%, 10%, 30%	Inside 0.05-0.1 g per day Inside 15-30 drops per day

		10, 50 ml (oil solution) Amp. 5%, 10%, 30% 1 ml (oil solution)	Intramuscularly 0.1 g once a day
2.	Retinol acetate Retinoli acetas	Flak. 3.44%, 6.88% 10 ml (oil solution) Caps 0.2 g Dragee 3300 ME	Inside 0.01-0.03 g (33000 IU, 100000 IU) per day
3.	Ergocalciferol Ergocalciferolum	Flak. 0.125% 10 ml (masl. rr) Flak. 0.5% 5 ml (alcohol. solution) Dragee 500 IU	Inside 1250 IU 1 time per day Inside 4000 IU 2 times a day Inside 500-3000 IU per day
4.	Vikasol (Menadione) Vikasolum	Tab. 0.015 g	Inside 0.015 g 2 times a day
5.	Cholecalciferol Colecalciferol	Amp. 1% 1 ml	Intramuscularly 0.01 g per day
6.	Calcitriol Calcitriol	Flak. 10 ml (1 drop - 500 IU) (oil solution)	Inside for 500-1000 IU
7.	Decamevite Decamevitum	Caps. 0, 00000025 g	3 times a day
8.	Aevit Aevit	Caps.	Inside 1 caps. in a day

4.2. Theoretical questions for the lesson:

1. Therapy with vitamin preparations and its types.
2. Classification of vitamin preparations.
3. General characteristics of fat-soluble vitamin preparations.
4. Pharmacology **retinol acetate,** indications for use. The concept of retinoids, their pharmacological properties and indications for use **(tretinoin, isotretinoin, etretinate).**
5. Pharmacology **tocopherol acetate.**
6. Pharmacology of phylloquinones and menaquinones. Pharmacology **menadione** (Vitamin K3).
7. Pharmacological properties **phytomenadione,** indications and contraindications to application.
8. Pharmacology of Vitamin D Preparations - Native Vitamins (**ergocalciferol, cholecalciferol)**, structural analogues of vitamin D2 (**dihydrotachysterol**), active Vitamin D metabolites (calcitriol, alfacalcidol).
9. Side effects of fat-soluble vitamin preparations.
10. Multivitamin preparations. The concept of anti-vitamins.

4.3. Practical tasks that are performed in the lesson:

4.3.1. Prescribe recipes and conduct their pharmacotherapeutic analysis (indicate group affiliation, indications for use, possible complications):

1. Tocopherol acetate capsules and ampoules
2. Retinol acetate in vials and capsules
3. Ergocalciferol in vials and dragees
4. Cholecalciferol in oily solution for oral administration
5. Calcitriol capsules

6. Vikasol in ampoules and tablets
7. Decamevit tablets
8. Aevit capsules

4.3.2. Practical tasks performed at the lesson:

1. To familiarize with the preparations on the topic, to determine their affiliation with the pharmacological group and indications for use. Fill in the table:

Preparations	Mechanism of action	Indications for use	Side effects
1. Tocopherol acetate			
2. Retinol acetate			
3. Ergocalciferol			
4. Menadione			
5. Cholecalciferol			
6. Calcitriol			
7. Decamevite			
8. Aevit			

2. To substantiate the choice of the drug, its pharmaceutical form, dosage, concentration, route of administration.

1. The drug for the treatment of rickets.
2. An antioxidant drug for the treatment of atherosclerosis.
3. The drug for the treatment of xerophthalmia.
4. The drug with tetany, which normalizes phosphorus-calcium metabolism.
5. The drug is intended to increase the effectiveness of the treatment of coronary insufficiency.

Materials for self-control.

A. Tasks for self-control:

Using of text books and operative insyructions, syudent must fill in table:

Table N 1. "Pharmacological characteristics of vitamin preparations"

Preparations	Mechanism of action	Indications for use	Side effects
Tretinoin			
Isotretinoin			
Etretinate			
Fitomenadion			
Dihydrotachysterol			
Alfacalcidol			

Table N 2. “Choose vitamin preparations for the treatment of hypovitaminosis”

Hypovitaminosis	Vitamin preparations
1) Rickets	A) Tocopherol acetate
2) Hyperkeratosis	B) Ergocalciferol
3) Myodystrophy	C) Retinol acetate

Table N 3. “Compare vitamin preparations with anti-vitamins”

Vitamins	Anti vitamins
1. Vikasol	A. Isoniazid
2. Folic acid	B. Neodicumarin
3. Pyridoxine	C. Methotrexate

B. Self-control tasks:

Task 1. The patient took a vitamin preparation for a long time in connection with a fracture of the tibia. Over the past week, his condition worsened sharply: muscle weakness, continuous nausea, thirst, abdominal pain, periodic diarrhea appeared, and appetite decreased. Objectively: the patient's condition is suppressed, body temperature is increased, pulse rate is 100 beats. in min., AT 150/103 mm. Hg. Art., the borders of the heart are shifted outward, tones are weakened. Blood test results: elevated calcium levels to 5.46 mmol / L (2.25-2.75 mmol / L); calcium, protein, leukocyte cylinders were found in urine.

A) What drug did the patient take?

B) What is the cause of the complications?

C) What are the assistance measures?

Task 2. A patient with atherosclerosis and hypertension cannot take drugs from the group of statins and fibrates due to their tolerance. The doctor prescribed him a vitamin preparation, which led to the normalization of blood cholesterol during the treatment period, then this indicator increased again.

A) What drug was prescribed to the patient?

B) Is it advisable to continue the prescribed treatment?

C. Tests for self-control:

1. *A 64-year-old woman has impaired twilight vision (hemeralopia). What vitamin preparation should be prescribed?*

A. Riboflavin B. tocopherol S. Pyridoxine D. Retinola E. Rutin

2. Under the influence of ultraviolet radiation in the human skin is formed:

A. Calciferol B. Retinol acetate C. Calcium pantothenate D. Riboflavin E. Cholecalciferol

3. A child with signs of rickets was prescribed a vitamin preparation that promotes calcium deposition in bone tissue. Identify this drug.

A. Tocopherol acetate B. Etretinate C. Ergocalciferol D. Vikasol E. Calcium Pangamat

4. A patient with angina pectoris was prescribed tocopherol. What effect was the doctor counting on?

A. Antihypertensive B. Antihypoxic C. Antioxidant D. Antiplatelet E. Antispasmodic

5. A patient who underwent mastectomy for breast cancer was given a course of radiation therapy. What vitamin preparation should be prescribed as a radioprotector, taking into account its antioxidant activity?

A. Thiamine chloride B. Pyridoxine C. Riboflavin D. Folic acid

E. Tocopherol acetate

6. For the purpose of preserving pregnancy, a woman was prescribed a fat-soluble vitamin, an antioxidant drug. Identify it.

A. Ascorbic acid B. Tocopherol acetate C. Nicotinic acid D. Calcium pantothenate

E. Calcium pangamate

7. The skin consists of a surface layer - the epidermis and a deeper connective tissue layer. What vitamin strengthens the epidermis?

A. Rutin V. Retinol S. Ergocalciferol D. Tocopherol E. Riboflavin

8. A 40-year-old man has an increased risk of an infectious process, hyperkeratosis and hemeralopia. What vitamin preparation should be prescribed?

A. Pyridoxine B. Retinol Acetate C. Tocopherol acetate D. Ergocalciferol
E. Calcium Pangamat

9. In a 6-month-old child, paresthesia, dry skin, protrusion of the fontanel are observed during vitamin therapy. What drug should be used to treat a child?

A. Retinol acetate B. Tocopherol acetate C. Calcium pantothenate D. Ergocalciferol
E. Ascorbic acid

10. A patient suffering from liver disease was prescribed a drug before surgery that activates the synthesis of blood coagulation factors. What is the drug?

A. Rutin V. Retinol S. Vikasol D. Ergocalciferol E. Riboflavin

11. What vitamin preparation has the opposite effect of coumarin on blood coagulation?

A. Retinol acetate B. Tocopherol acetate C. Vikasol D. Ergocalciferol E. Ascorbic acid

12. Identify the drug used in the treatment of hemeralopia and keratomalacia.

A. Retinol acetate B. Vikasol C. Tocopherol acetate D. Ergocalciferol E. Thiamine chloride

13. In the post-infarction period of rehabilitation of the patient, it is necessary to prescribe a drug that protects the formation of aggressive free radicals and impaired lipid metabolism. Identify this remedy.

A. Retinol acetate B. Vikasol C. Tocopherol acetate D. Thiamine E. Ergocalciferol

14. What vitamin preparation should be used to stimulate the formation of granulation tissue and accelerate wound healing?

A. Retinol acetate B. Vikasol C. Tocopherol acetate D. Rutin E. Ergocalciferol

15. What antioxidant increases the effectiveness of therapy while used with cardiovascular drugs?

A. Retinol acetate B. Vikasol C. Tocopherol acetate D. Ergocalciferol E. Pangamic acid

16. The combined use of two fat-soluble antioxidants in large doses favorably affects the course of psoriasis. Select the desired combination.

A. Retinol acetate and ergocalciferol B. Vikasol and tocopherol acetate
C. Tocopherol acetate and retinol acetate D. Ergocalciferol and tocopherol acetate
E. Ergocalciferol and vicasol

17. What vitamin preparation should be used simultaneously with progesterone in case of threatened abortion?

A. Retinol acetate B. Ascorbic acid C. Tocopherol acetate D. Biotin E. Ergocalciferol

18. What vitamin preparation has a therapeutic effect in the treatment of congenital skin pathology (ichthyosis)?

A. Retinol acetate B. Ascorbic acid C. Tocopherol acetate D. Riboflavin
E. Ergocalciferol

19. Acute hypervitaminosis of which vitamin has the following manifestations: significant headache, vomiting, drowsiness, irritability, general peeling of the skin?

A. Ergocalciferol B. Ascorbic acid C. Tocopherol acetate D. Pyridoxine
E. Retinol acetate

20. In a patient with tuberculosis with bleeding phenomena, a decrease in prothrombin in the blood is observed. What drug has a beneficial effect on this indicator?

A. Retinol acetate B. Ascorbic acid C. Tocopherol acetate D. Vikasol
E. Cyancobalamin

21. A child, 2 years old, lags behind in development, is often sick. On examination, the head is disproportionately large, the lower limbs are curved, milk teeth are missing. Prescribe a treatment.

A. Retinol acetate B. Rutin C. Tocopherol acetate D. Ergocalciferol
E. Pantothenic acid

Content module № 6	**Medicinal agents, influencing on metabolism**
Topic № 9	**Hormonal preparations (peptide structure), their substitute medicinal agents and antagonists**

1. Relevance of the topic: Among the endogenous factors involved in maintaining homeostasis, an important role belongs to the products of the activity of the endocrine glands. Affecting the metabolism, hormones regulate the psyche, processes of reproduction, growth, development of the body, modulate its protective reactions and specifically affect the functions of organs and systems of the body. Hormonal drugs are drugs that are obtained from the endocrine glands or synthetically. They are widely used in many fields of medicine (endocrinology, therapy, obstetrics and gynecology, etc.).

2. The specific goals:

1. Classify hormonal drugs by origin.
2. To analyze the pharmacokinetics, pharmacodynamics of hormonal drugs of the hypothalamus and pituitary gland. Know their side effects, indications and contraindications for use.
3. To analyze the pharmacokinetics, pharmacodynamics of hormonal preparations of the thyroid gland. Side effects, indications and contraindications for use.
4. Characterization of antithyroid drugs. Indications and contraindications for use.
5. Analyze the pharmacokinetics, pharmacodynamics of calcitrin. Identify indications and contraindications for its use.
6. To analyze the pharmacokinetics and pharmacodynamics of insulin, side effects, indications and contraindications for use.
7. Pharmacokinetics, pharmacodynamics, side effects of synthetic antidiabetic agents. Indications and contraindications for use
9. Learn the principles of assistance with hypoglycemic and hyperglycemic coma.
10. Prescribe and conduct a pharmacotherapeutic analysis of the prescribed drugs.

3. Basic knowledge, skills, skills needed to study the topic (interdisciplinary integration)

Previous disciplines	Acquired skills
1. Latin language	Master recipes writing skills
2. Normal physiology	The participation of hormones in metabolism, the regulation of the physiological functions of the body
3. Bioorganic chemistry	The structure and synthesis of hormones
4. Pathophysiology	Hypo-, hyper- and dysfunction of the endocrine glands, the role of hormones in the pathogenesis of diseases

4. Tasks for independent work in preparation for the lesson and in the lesson.

4.1. The list of basic terms, parameters, characteristics that a student must master during preparation for the lesson:

Term	Definition
1. Hormonal drugs	Drugs that are similar to endocrine hormones
2. Hormone antagonists	Drugs that inhibit the function of the endocrine glands of internal secretion
3. Hypofunction of the endocrine gland	Decreased endocrine gland function
4. Endocrine hyperfunction	Increased Endocrine Gland Function
5. Endocrine gland dysfunction	Imbalance in endocrine gland function

PREPARATIONS

№	Drug name	Release form	Method of determining
HORMONAL DRUGS OF THE HYPOPHYSIS AND HYPOTHALAMUS			
1	Corticotropin Corticotropinum	Flak. 10, 20, 30,	Intramuscularly 10-20 units 3-4 times a day
2	Human growth hormone Somatotropinum humanum pro ingectionibus	Flak. 2 and 4 UI	Intramuscularly 2-4 units 3 times a week
3	Chorionic gonadotropin for injection / Gonadotropinum chorionicum pro ingectionibus	Flak. 2 and 4 UI	Intramuscularly 500-3000 units 2-3 times a week
4	Menopausal gonadotropin Gonadotropinum menopausticum pro ingectionibus	Flak. 500 UI	Intramuscularly 75-150 units 1 per day
5	Oxytocin Oxytocinum	Flak. 75 UI	Intravenous drip in 500 ml of 5% glucose solution
6	Carbetocin Carbetocinum	Amp. 1 ml (5 UI)	Intravenously slowly 0, 000001 g
7	Triptorelin Triptorelinum	Amp. 1 ml	Subcutaneous 0.001 g 1 per day
8	Octreotide Octreotide	Amp. 1 ml (0.001 g)	Subcutaneously 2-3 times a day
Hormonal preparations of the thyroid and parathyroid glands			
1	L-thyroxine L- thiroxinum	Tablet 0.000025 g	Inside 0.00005 g once a day
2	Triiodothyronine hydrochloride Triiodthyronini hydrochloridum	Tab. 0.00002, 0.00005 g	Inside at 0.00005, 0,00025 g per day
3	Parathyroid Parathyreoidinum	Amp. 1 ml	Subcutaneously, intramuscularly 1 ml each
4	Calcitrin Calcitrinum	Flak. 5 ml (10 and 15 UI)	Intramuscularly 10-15 units 1 per day
HORMONAL PREPARATIONS OF THE Pancreas AND THEIR SYNTHETIC ANALOGUES			
1	Insulin Insulinum	Flak. 5 ml (in 1 ml 40 UI)	Subcutaneously, intramuscularly at a rate of 0.4-1 U / kg / ext.
2	Glibenclamide Glibenclamidum	Tab. 0.005 g	Inside 0.0025-0.01 g 1 time a day after meals
3	Metformin Metforminum	Tab. 0.025 g	Inside while eating 0.25 g once a day
4	Glimepiride Glimepiridum	Tab. 0.001, 0.002, 0, 005 g	Inside while eating 0.25 g once a day
5	Glucagon Glucagonum	Flak. 0.001 g	Subcutaneously, intramuscularly, intravenously, 0.0005-0.001 g
ANTITHYROID PRODUCTS			
1	Merkazolil Mercazolilum	Tab. 0.05 g	Inside 0.005 g 3-4 times a day after meals

4.2. Theoretical questions for the lesson:

1. General characteristics of hormonal drugs.

2. Classification of hormonal drugs by origin.

3. The mechanism of action of hormonal drugs. Indications for use.

4. Hormonal preparations of the hypothalamus: analogues of gonadorelin (**triptorelin**), somatostatin: (**octreotide = sandostatin**), thyrotropin-releasing hormone (**protirelin**), antigonadotropic drugs (danazole).

5. Hormonal drugs of the pituitary gland (**somatropin**), gonadotropin hormones (**folitropin alpha, folitropin beta, chorionic gonadotropin; menopausal gonadotropin).**

6. Analogs of vasopressin (**desmopressin, terlipressin**). Pharmacology of oxytocin and its synthetic substitutes (**desaminooxytocin, carbetocin**).

7. Medicines used in diseases of the thyroid gland thyroid hormones (**levothyroxine, thyrocomb**) antithyroid drugs (**mercazolyl = thiamazole**).

8. Pharmacology of iodine-containing preparations (**potassium iodide**). Indications and contraindications for use, side effects.

9. The preparation of the parathyroid gland (**parathyroidin**), pharmacokinetics, pharmacodynamics, indications for use.

10. Preparations of **calcitonin**, pharmacokinetics, pharmacodynamics. indications for use.

11. Hypoglycemic drugs. Classification of hypoglycemic agents. pharmacokinetics, pharmacodynamics, indications and contraindications for the use of insulin.

12.. Classification of natural insulin by duration of action. Pharmacology of human genetically engineered insulin. Side effect. Features of use in hyperglycemic coma. An overdose of insulin, help with hypoglycemic coma.

13. Synthetic antidiabetic drugs sulfonylurea derivatives (**glibenclamide, glimepiride, glyclazide),** biguanide derivatives (**metformin**), prandial glycemic regulators (repaglinide), insulin sensitizers (**pioglitazone, rosiglitazarose glucose inhibitors**). Comparative characteristic, side effects.

4.3. Practical tasks that are performed in the lesson:

4.3.1. Prescribe recipes and conduct their pharmacotherapeutic analysis (indicate group affiliation, indications for use, possible complications):

1. Corticotropin in vials
2. L-thyroxine tablets
3. Insulin in vials
4. Glibenclamide tablets
5. Metformin tablets
6. Glimepiride tablets
7. Parathyroidin in ampoules
8. Thiamazole (merkazolil) in tablets
9. Oxytocin ampoules
10. Carbetocin ampoules
11. Glucagon in bottles
12. Calcitonin in vials

4.3.2. Practical tasks performed at the lesson:

1. To familiarize with the preparations on the topic, to determine their affiliation with the pharmacological group and indications for use. Fill in the table:

A drug	Mechanism of action	Indications for use	Side effects
Corticotropin			
L-thyroxine			

Insulin			
Glibenclamide			
Glimepiride			
Metformin			
Parathyroidin			
Merkazolil			
Oxytocin			
Carbetocin			
Glucagon			
Calcitonin			

2. To substantiate the choice of the drug, its pharmaceutical form, dosage, concentration, route of administration.

1. A drug for the treatment of hyperglycemic coma.
2. A drug for the treatment of hyperthyroidism.
3. A drug for the treatment of myxedema.
4. The drug for the treatment of tetany.
5. An antidiabetic agent is a sulfonylurea derivative.
6. A drug for the treatment of hypoglycemic coma.
7. A drug for the treatment of acromegaly.
8. The drug to stimulate childbirth during pregnancy.

Materials for self-control.

A. Tasks for self-control:

Table N1. "Features of the mechanism of action and indications for the use of hormonal agents"

Preparations	Mechanism of action	Indications for use
Human Genetic Engineering Insulin		
Triptorelin		
Protirelin		
Okreotide		
Danazole		
Folithropin alfa		
Folithropin beta		
Desmopressin		
Terlipressin		
Desaminooxytocin		
Tireocomb		
Potassium iodide		
Gliclazide		
Repaglinide		
Pioglitazone		
Rosiglitazone		
Acarbose		

Table N 2. “Indications for the appointment of hormonal drugs”

Show	Insulin	Calcitonin	L-thyroxine	Parathyroidin
Type 1 diabetes				

Hypercalcemia				
Myxedema				
Tetany				

B. Self-control tasks: Identify drugs:

N 1. Determine the hormonal drug: it stimulates the production of hormones in the adrenal cortex, has indications for use similar to glucocorticoids.

N 2. Determine the hormonal preparation: increases the calcium content in the blood, increases the absorption of calcium in the gastrointestinal tract, the reabsorption of calcium in the renal tubules, and promotes calcification of bone tissue.

N 3. Determine the hormonal drug: it affects the metabolism, increases the basic metabolism and oxygen consumption of tissues, enhances the breakdown of fats, proteins, carbohydrates and is used for myxedema and cretinism.

N 4. Determine the hormonal drug: it causes a decrease in blood sugar and glycogen accumulation in the tissues, reduces the level of glucosuria, the manifestations of polyuria and polydipsia.

C. **Tests for self-control**:

1. After subtotal resection of the thyroid gland, the patient was prescribed a replacement therapy drug. Indicate this hormonal drug.

A. Methyluracil B. L-thyroxine C. Insulin D. Calcitonin E. Vasopressin

2. The patient has hypoglycemic coma due to an overdose of simple insulin. What drug must be administered to stop this condition?

A. Glucose B. Glucagon C. Insulin tape D. Butamide E. Prednisolone

3. A 47-year-old patient suffering from thyrotoxicosis has been prescribed a drug that suppresses the enzyme systems involved in the synthesis of thyroid hormones. Indicate this remedy.

A. Thyroxine B. Merkazolil C. Oxytocin D. Triiodothyronine E. Vasopressin

4. Indicate an antithyroid drug that suppresses the production of thyroid-stimulating hormone of the pituitary gland:

A. Thyroxine B. Merkazolil C. Diiodotyrosine D. Triiodothyronine E. Corticotropin

5. The patient was prescribed a drug that stimulates the release of endogenous insulin. Indicate this agent if it is a sulfonylurea derivative with a duration of action of 8-24 hours?

A. Pituitrin B. Somatostatin C. Butamide D. Calcitrin E. Glucagon

6. A 45-year-old patient came to the endocrinologist with complaints of increased appetite, dry mucous membranes, and increased urine output. Examination revealed glucose in the urine. What remedy should be prescribed?

A. Glibenclamide B. Vasopressin C. Insulin D. Glibutide E. Adiurekrin

7. A woman, 25 years old, has a term pregnancy with weak labor. What hormonal drug will accelerate childbirth?

A. Retabolil B. Progesterone C. Chorionic gonadotropin D. Marvelon E. Oxytocin

8. In a patient, 52 years old, after a thyroidectomy operation, numbness of the extremities, paresthesia appeared and hypocalcemia was diagnosed. What hormone should be prescribed?

A. Butamide B. Insulin C. Calcitonin D. Parathyroidin E. Oxytocin

9. The patient has progressive weight loss, limb yeast, fever, protrusion of the eyeball. The doctor has identified signs of gland overfunction. Choose a treatment drug.

A. Butamide B. Insulin C. Glibutid D. Merkazolil E. Oxytocin

10. What drug is a physiological insulin antagonist and is used in the treatment of hypoglycemic coma?

A. Glibenclamide B. Insulin C. Triiodothyronine D. Glucagon E. Oxytocin

11. A 7-year-old child was diagnosed with pituitary dwarfism. Hormone drug that stimulates skeletal bone growth should be prescribed to a sick child?

A. Corticotropin B. L-thyroxine C. Insulin D. Calcitonin E. Somatotropin

12. What anti-thyroid drug disrupts the process of tyrosine amino acid iodination in the thyroid gland?

A. Butamide B. Insulin C. Glibutid D. Merkazolil E. Oxytocin

13. A woman has hypofunction of the gonads (dysmenorrhea, anovulatory infertility, habitual miscarriage), which is caused by hypothalamic-pituitary disorders. What hormone should be prescribed?

A. Chorionic gonadotropin B. Somatotropin C. Triiodothyronine D. Glucagon

E. Oxytocin

14. The patient has significant polyuria and polydipsia of central origin. Blood sugar and urine are normal. The doctor diagnosed diabetes insipidus. What hormonal drug is used to treat such patients?

A. Glibenclamide B. Insulin C. Vasopressin D. Glucagon E. Calcitonin

15. Indicate the hormonal drug of the anterior pituitary gland?

A. Corticotropin B. Vasopressin C. Pituitrin D. Insulin E. Merkazolil

16. Indicate the hormonal drug of the back of the pituitary gland?

A. Oxytocin B. Thyrotropin C. Insulin D. Prednisolone E. Corticotropin

17. Specify a drug that corresponds to the action of luteinizing hormone?

A. Chorionic gonadotropin B. Prolactin C. Oxytocin D. Pituitrin

E. Triiodothyronine hydrochloride

18. The patient has thyrotoxicosis. Specify an antithyroid drug that suppresses the synthesis of thyroid hormones?

A. Merkazolil B. Thyroxin C. Iodine preparations D. Triiodothyronine

E. Diiodotyrosine

19. Indicate an antidiabetic agent - a sulfonylurea derivative:

A. Butamide B. Insulin C. Glibutid D. Merkazolil E. Oxytocin

20. After subcutaneous administration of a hormonal drug to a patient with diabetes, after an hour, he developed the following symptoms: hunger, palpitations, sweating, loss of consciousness. What drug was administered to the patient?

A. Calcitonin B. Insulin C. Oxytocin D. Pituitrin

E. Triiodothyronine hydrochloride

21. What hormone of the anterior pituitary gland can be prescribed for women with infertility, and for men with impaired spermatogenesis?

A. Adrenocorticotropin B. Prolactin C. Chorionic gonadotropin D. Pituitrin

E. Triiodothyronine hydrochloride

22. What hormonal thyroid preparation improves bone tissue, reduces osteoporosis in it and increases fracture resistance?

A. Insulin B. Calcitonin C. Oxytocin D. Pituitrin

E. Triiodothyronine hydrochloride

23. What hormone preparation of the anterior pituitary gland has a regulatory effect on the secretion of hormones in the adrenal cortex?

A. Corticotropin B. Thyrotropin C. Insulin D. Prednisolone E. Oxytocin

24. Indicate what effect insulin has on blood sugar.

A. Increases B. Improves C. Does not change D. Decreases E. Raises temporarily

Content module № 6	**Medicinal agents, influencing on metabolism**
Topic № 10	**Hormonal preparations (steroide structure), their substitute medicinal agents and antagonists**

1. Relevance of the topic. An important role in the body is played by the adrenal glands and gonads, the activity of which is regulated by adrenocorticotropic and gonadotropic hormones of the pituitary gland. Steroid hormones circulate in the blood in a state bound to plasma proteins, a small amount penetrates into the cells, where they carry out a biological effect. The clinic widely uses anti-inflammatory, desensitizing, metabolic and anti-shock effects of steroid hormonal drugs. Sex hormones are prescribed for violations of their formation in the treatment of hypogonadism, menopause in women and men, etc. Anabolic steroids are advisable for postoperative depletion, myocardial infarction, osteoporosis. Due to the significant activity and polymorphism of the pharmacological effects of hormonal drugs, strict implementation of the principles of hormone therapy is required.

2. The specific goals:

1. Know the classification and characteristics of gluco- and mineralocorticoids, learn the side effects, indications and contraindications for their use.
2. Know the classification and characteristics of sex hormone preparations. Side effects, indications and contraindications for their use.
3. To study the mechanism of action and indications of anabolic steroids and non-steroidal anabolic drugs. Analyze side effects, indications and contraindications for their use.
4. To study the principles of the appointment of hormonal drugs in emergency conditions.
5. Write out prescriptions and conduct a pharmacotherapeutic analysis of the prescribed drugs.

3. Basic knowledge, skills, skills needed to study the topic (interdisciplinary integration):

Previous disciplines	Acquired skills
1. Latin language	Master recipes writing skills
2. Normal physiology	The participation of hormones in metabolism, the regulation of the physiological functions of the body
3. Bioorganic chemistry	The structure and synthesis of hormones
4. Pathophysiology	Hypo, hyper dysfunction of the endocrine glands, the role of hormones in the pathogenesis of diseases

4. Tasks for independent work in preparation for the lesson and in the lesson.

4.1. The list of basic terms, parameters, characteristics that a student must master during preparation for the lesson:

Term	Definition
1. Hormonal drugs	Drugs that are similar to endocrine hormones
2. Hormone antagonists	Drugs that inhibit the function of the endocrine glands of internal secretion
3. Hypofunction of the endocrine gland	Decreased endocrine gland function
4. Endocrine hyperfunction	Increased Endocrine Gland Function
5. Endocrine gland dysfunction	Imbalance in endocrine gland function

PREPARATIONS

№	Drug name	Release form	Method of determining

HORMONAL DRUGS OF THE ADRENAL Glands			
1	Hydrocortisone acetate Hydrocortisoni acetas	Ointment 1% 5.0 g	Lubricate skin
2	Hydrocortisone hemi succinate Hydrocortisoni hemisuccinatis	Amp. 0.025, 0.1 g	Dissolve the contents of the ampoule in 10 ml of distill. water, injected in / in slowly
3	Prednisone Prednisolonum	Tab. 0.005 g Flak. 0.3% 5ml	Inside 0.01-0.05 g per day 1 drop 3 times a day in the conjunctival cavity
4	Dexamethasone Dexamethasonum	Tab. 0,0005 г	Inside 0.001 g 2 times a day after meals
5	Methylprednisolone Methylprednisolonum	Amp. 0.02, 0.04 g Tab. 0.004, 0.016 g	Dissolve the contents of the ampoule in 10 ml of distill. water into a vein Inside 1 tab. 4 times a day
6.	Betamethasone Betamethasonum	Amp. 1 ml (4 mg / ml)	Dissolve the contents of the ampoule in 10 ml of distill. water administered intravenously
7.	Beclomethasone Beclomethasonum	Nasal spray (50 mcg / dose) Aerosol 50 mcg / dose	Spray nose 3 times a day Inhale 3 times a day
8.	Budesonide Budesonidum	Nasal spray (50 mcg / dose)	Aerosol injection into the bronchi 3 times a day
9.	Mometasone Mometasonum	Nasal spray (50 mcg / dose)	Nasal spray
10.	Fluticasone Fluticasonum	Aerosol 50, 125 and 250 mcg / dose	Aerosol sprays in the bronchi 3 times a day
PREPARATIONS OF SEX HORMONES			
1	Ethinyl estradiol Aethinyloestradiol	Tab. 0.00001 and 0.00005 g	Inside 0.00005 g per day
2	Progesterone Progesteronum	Amp. 1% and 2.5% 1 ml (oil. solution)	Intramuscularly, subcutaneously
3	Levonorgestrel Levonorgestrel	Tab. 0.015 g	1 time a day or every other day
4	Dydrogesterone Dydrogesteronum	Tab. 0.01 g	Inside 1 tablet. in a day
5	Testosterone Propionate Testosteroни propionas	Amp. 1% and 5% 1 ml (oil. solution)	Intramuscularly, subcutaneously
SYNTHETIC ANABOLIC DRUGS			
1	Nandrolone Nandrolonum	Amp. 5% 1ml oily. solution	Intramuscularly 1ml every 3 weeks
SYNTHETIC ANTAGONISTS OF SEX HORMONES			
1	Tamoxifen Tamoxifenum	Tab. 0.01 and 0.02 g	Inside 0.02 g per day
2	Mifepristone Mifepristonum	Tab. 0.05 and 0.2 g	Inside 0.6 g once a day
3	Cyproterone Cyproteronum	Tab. 0.05, 0.1 g	Inside 0.05 g once a day

4.2. **Theoretical questions for the lesson:**

1. General characteristics of hormonal drugs. Classification of hormonal drugs by origin. The

mechanism of action of hormonal drugs. Indications.

2. Hormonal preparations of the adrenal cortex. Pharmacological effects, indications, contraindications, dosage regimen for substitution therapy (**hydrocortisone, prednisone, dexamethasone, methylprednisolone, triamcinolone, betamethasone, budesonide, mometasone furoate, beclomethasone dipropionate, fluticasone, fluocinolone acetonide**). Comparative characteristics. Side effects.

3. Sex hormone preparations. Classification. General characteristics of female sex hormones. The mechanism of action and indications for the use of estrogen (**estradiol**) and gestagen **(progesterone, dydrogesterone, levonorgestrel**) drugs depending on age-related hormonal changes in women.

4. Estrogen antagonists (**clomiphene, tamoxifen**) and gestagen (**mifepristone**) hormones. Inhibitors of estrogen biosynthesis (**anastrazole, letrozole**). Combined drugs (**gestagens + estrogens**). Indications and contraindications, side effects.

5. Hormonal birth control (**contraceptive**) drugs.

6. Drugs of male sex hormones. Pharmacological characteristics of **testosterone propionate, methyltestosterone.** Indications, side effects.

7.Антагонисты андрогенных гормонов (**cyproterone, bicalutamide, flutamide).** Testosterone 5α-reductase inhibitors **(finasteride, dutasteride).**

8. Pharmacological characteristics of anabolic steroids. The mechanism of action, indications for use (**nandrolone**). Side effects of anabolic steroids.

4.3. Practical tasks that are performed in the lesson:

4.3.1. Prescribe recipes and conduct their pharmacotherapeutic analysis (indicate group affiliation, indications for use, possible complications):

1. Prednisone in ampoules, tablets
2. Methylprednisolone in ampoules, tablets
3. Dexamethasone in ampoules, tablets
4. Betamethasone in ampoules, tablets
5. beclomethasone dipropionate in aerosol
6. Fluticasone in aerosol
7. Mometasone furoate in aerosol
8. Budesonide in aerosol
9. Levonorgestrel tablets
10. Dydrogesterone tablets
11. Mifepristone tablets

4.3.2. Practical tasks performed at the lesson:

1. To familiarize with the preparations on the topic, to determine their affiliation with the pharmacological group and indications for use. Fill in the table:

Preparations	Mechanism of action	Indications	Side effects
1. Prednisone			
2. Methylprednisolone			
3. Dexamethasone			
4. Betamethasone			
5. beclomethasone			
6. Fluticasone			
7. Mometasone			
8. Budesonide			

9. Levonorgestrel			
10.Dydrogesterone			
11. Mifepristone			

2. To substantiate the choice of the drug, its pharmaceutical form, dosage, concentration, route of administration.

1. A hormonal drug that has an anti-inflammatory effect for the treatment of glomerulonephritis.
2. A hormonal drug that has progestational activity for the treatment of infertility.
3. A hormonal drug that has estrogenic activity to treat the condition after surgical removal of the ovaries.
4. A hormonal drug that has androgenic activity for the treatment of infertility in men.
5. A hormonal drug for the treatment of anaphylactic shock.
6. Anabolic steroids for the treatment of asthenic conditions in older men.
7. Hormonal ointment for the treatment of psoriasis.
8. A hormonal drug for the treatment of vasomotor rhinitis.
9. Hormone medication for the prevention of asthma attacks.

Materials for self-control.

A. Tasks for self-control:

Using of text books and operative insyructions, syudent must fill in table:

Table N1. "Features of the mechanism of action and indications for the use of hormonal agents"

Preparations	Mechanism of action	Indications for use	Side effect
Triamcinolone			
Fluocinolone Acetonide			
Clomiphene			
Anastrozole			
Letrozole			
Methyltestosterone			
Bicalutamide			
Flutamide			
Finasteride			
Dutasteride			

Table N 2. “Indications of hormonal drugs”

Indications	Prednisone	Beclomethasone	Nandrolone	Progesterone
Cachexia				
Bronchial asthma				
Endometriosis				
Anaphylactic shock				

B. Self-control tasks. Identify the drug:

1. A patient after a bee sting with severe edema is hospitalized in a hospital Quincke. What drug is indicated for the pathogenesis of the condition?
2. The patient was diagnosed with lupus erythematosus. Which group of drugs are indicated?
3. For the treatment of skin eczema, a drug from the group of glucocorticoids in the form of an ointment is prescribed.
4. Choose a hormonal drug for breast cancer (in menopause).

5. The drug for the induction of labor in term pregnancy.
6. The drug, which is indicated for habitual abortion.

C. Tests for self-control:

1. *A patient with osteoporosis for the treatment of bronchial asthma was prescribed prednisone inside. Can a side effect occur?*

A Scleroderma B. Eczema C. Stomatitis D. Anaphylaxis E. Viral hepatitis

2. What side effect can occur with prolonged use of glucocorticoids?

A Gastric Ulcer B. Dermatitis C. Stomatitis D. Collapse E. Hypoglycemia

3. What drugs are inappropriate to prescribe to a patient with diabetes?

A. NSAIDs B. Antiseptics C. Antihypertensives
D. Steroidal anti-inflammatory E. Analgesics

4. In a patient with severe diabetes mellitus, it became necessary to prescribe anti-inflammatory drugs. Which drug prescribes dose adjustment for insulin?

A. Diclofenac-sodium B. Ibuprofen C. Indomethacin D. Prednisolone
E. Piroxicam

5. Despite the wide range of therapeutic effects of glucocorticoids, there are a number of contraindications to their prescription. Identify one of them.

A. Scleroderma B. Eczema C. Stomatitis D. Anaphylaxis
E. Viral hepatitis

6. Given the pharmacological effects and side effects, what are the indications for the use of prednisone?

A. Acute nephritis B. Hypertension C Diabetes mellitus
D. Stomach ulcer E. Unstable angina pectoris

7. The production of aldosterone in the adrenal cortex can stimulate:

A. Renin V. Kallikrein C. Angiotensin I D. Angiotensin II
E. Kininogen

8. A patient, 40 years old, after amputation of the uterus, a hormonal drug was prescribed. Choose this drug.

A. Diclofenac Sodium B. Estradiol Valerate C. Indomethacin D. Prednisolone
E. Tamoxifen

9. Select contraindications for the administration of female sex hormone preparations.

A. Thrombophlebitis B. Eczema C. Hypotension D. Chronic bronchitis
E. Viral hepatitis

10. Determine the drug that is appropriate for the patient after prolonged treatment of a burn disease.

A. Diclofenac Sodium B. Ibuprofen C. Nandrolone D. Prednisolone E. Tamoxifen

11. A patient with acute renal failure was prescribed a drug that reduces protein catabolism. Identify the drug.

A. Retabolil B. Ibuprofen C. Estradiol D. Prednisolone E. Tamoxifen

12. In childbirth there is inhibition of labor. What estrogenic drug should be prescribed to enhance labor?

A. Estron B. Ibuprofen C. Proginova D. Prednisolone E. Tamoxifen

13. A woman has hypofunction of the gonads (dysmenorrhea, anovulatory infertility, habitual miscarriage), which is caused by hypothalamic-pituitary disorders. What hormone should be prescribed?

A. Chorionic gonadotropin B. Didrogesterone C. Estron
D. Tamoxifen E. Estradiol Valerate

14. Choose the pharmacological effects of corticosteroids

A. Anti-allergic B. Anti-arrhythmic C. Anti-inflammatory
D. Antihypertensive E. Metabolic

15. Explain the mechanism of antishock action of corticosteroids.

A. Phospholipase blockade B. Inhibition of antibody formation
C. An increase in blood glucose
D. An increase in the concentration of catecholamines in tissues
E. Reducing tissue oxygen demand

16. The patient has a systemic lesion of connective tissue. Which anti-inflammatory drug will help reduce the manifestations of all phases of inflammation?

A. Prednisolone B. Butadion C. Indomethacin D. Contrical E. Paracetamol

17. The patient has Addison's disease. Specify a hormonal drug that must be prescribed for the pathogenesis of the disease?

A. Deoxycorticosterone B. Dexamezatone C. Flumethasone D. Prednisolone
E. Beclomethasone

18. The patient has polycystic ovary due to dishormonal disorders. Indicate the antiestrogen drug that she needs to be prescribed.

A. Klomifen B. Retabolil C. Ovidon D. Prednisolone E. Beclomethasone

19. Indicate which properties are NOT typical for glucocorticoids:

A. Reduce blood pressure B. Increase the number of neutrophils in the blood
C. Cause hyperglycemia D. Have anti-allergic effect
E. Have an immunosuppressive effect

20. A 50-year-old man suffers from skin tuberculosis. Is the drug used for skin diseases contraindicated in this patient?

A. Prednisolone B. Indomethacin C. Methyluracil D. Tetracycline
E. Retinol Acetate

21. With aseptic inflammation, the activity of COX in its focus increases dozens of times. This phenomenon is reduced by prednisone. The inhibition of what is due to the action of prednisolone?

A. Broadcasts B. Transcriptions C. COX activation D. Phospholipase activation
E. Activation of phosphodiesterase

22. A patient with infertility was diagnosed with hyperestrogenemia. Indicate which agent blocks estrogen receptors?

A. Tamoxifen B. Pregnin C. Retabolil D. Prednisolone
E. Estradiol

23. What drug should always be prescribed for asthmatic status?

A. Prednisolone B. Indomethacin C. Methyluracil D. Diclofenac sodium
E. Retinol Acetate

24. What drug should be prescribed in order to eliminate common disorders in a woman during menopause?

A. Estron B. Pregnin C. Retabolil D. Prednisolone E. Flunisolid

Content module № 6	**Medicinal agents, influencing on metabolism**
Topic № 11	**Anti-inflammatory, anti-allergic and immutropic medicinal agents.**

1. Relevance of the topic: Inflammation as a universal type process is characteristic of many diseases. The pathogenesis of inflammation consists of stages sequentially arising under the influence of mediators (alteration, exudation, proliferation). Medicines have an inhibitory effect on the inflammatory process by inhibiting the formation of prostaglandins and mediators. For the rational treatment of inflammation, knowledge of the mechanisms of action and pharmacological properties of drugs is needed. Allergic processes associated with exposure to the body of allergens of various origins, which contributes to the formation of biologically active substances, especially histamine, are currently very common. Antihistamines compete with histamine for receptors on the cell membrane and thus inhibit allergy symptoms. Immunotropic drugs play a role in maintaining the protective reactions of the body and a positive effect on the course of most diseases. Knowledge of the mechanisms of their action and pharmacological properties are necessary for their rational use.

2. The specific goals:

1. Know the classification and pharmacology of non-steroidal and steroidal anti-inflammatory drugs. To learn the mechanisms of action, side effects, indications and contraindications for use.
2. Know the classification and characteristics of antiallergic drugs. To learn the mechanisms of action, side effects, indications and contraindications for use.
3. Know the classification and characteristics of immunotropic drugs. To learn the mechanisms of action, side effects, indications and contraindications for use.
4. To study the principles of prescribing drugs for inflammatory processes, allergies, and immune system disorders.
5. Write out prescriptions and conduct a pharmacotherapeutic analysis of the prescribed drugs.

3. Basic knowledge, skills, skills needed to study the topic (interdisciplinary integration);

Previous disciplines	Acquired skills
1. Latin	Master recipes writing skills
2. Normal physiology	Regulation of the physiological functions of the body
3. Pathological physiology	The pathogenesis of inflammation and allergic reactions. The mechanism of reducing the body's immunity

4. Tasks for independent work in preparation for the lesson and in the lesson.

4.1. List of main terms, parameters, characteristics, which should be taken by the student in preparation for the lesson:

Term	Definition
1. Alteration	The process of tissue death under the influence of damaging factors
2. Exudation	The exit of fluid into the focus of inflammation
3. Proliferation	The process of restoring tissue destroyed by inflammation with scar formation
4. Allergy	The state of hypersensitivity to substances that have antigenic activity
5. Immunodeficiency	A condition that is characterized by impaired immune response of the body under the influence of harmful factors

PREPARATIONS

№	Name of the drug	Form release	How to use
NON-STEROID ANTI-INFLAMMATORY PRODUCTS			
1.	Acetylsalcylic acid Acidum acetylsalicylicum	Tab. 0.5 g	Inside 0.5 g 3 times a day
2.	Diclofenac Sodium Diclofenac-natrium	Amp. 2.5% 3 ml Tab. 0.05 g	3 ml intramuscularly Inside 0.05 g 2 times a day

3.	Ibuprofen Ibuprofenum	Tab. 0.2, 0.4 g	Inside, 1 tab. 2 times a day
4.	Naproxen Naproxenum	Tab. 0.1 g	Inside, 1 tab. 2 times a day
5.	Meloxicam Meloxycamum	Amp. 1.5% 1 ml Tab. 0.015 g	Intramuscularly 1 ml Inside 0.015 g once a day
6.	Celecoxib Celecoxibum	Caps. 0.1, 0.2 g	Inside, 1 tab. 1 per day
7.	Fenspiride Fenspiridum	Tab. 0.08 g	Inside 0.08 g 2 times a day
STEROID ANTI-INFLAMMATORY PRODUCTS			
1.	Prednisolone Prednisolonum	Amp. 3% 1 ml Tab. 0.005 g	Intravenous drip 30mg per day Inside 10 mg in the morning
ANTIHISTAMINE MEDICINES			
1.	Diphenhydramine (diphenhydramine) Diphenhydraminum Dimedrolum	Tab. 0.01, 0.05 g Amp. 1%, 5% 1ml	Inside, 1 tab. 2 times a day Intramuscularly, 1 ml of 1% r –a 2 times a day
2.	Chloropyramine (Suprastin) Chloropyraminum Suprastinum	Tab. 0.025 g Amp. 1%, 2% 1 ml	Inside 0.025 g 3 times a day Intramuscularly 1 ml
3.	Loratadine Loratadinum	Tab. 0.01 g	Inside 0.01g once a day
4.	Levocetirizine Levocetyrisinum	Tab. 0.005 g	Inside, 0.005 g once a day
5.	Ketotifen Ketotyfenum	Tab. 0.001 g	Inside, 0.001 g 2 times a day
IMMUNOTROPIC MEDICINES			
1.	Omalizumab Omalyzumabum	Flak. z lyophilic. powder 0.15 g	Subcutaneously 0.15 g in the form of a solution 1 time per day
2.	Interferon alfa-2b Interferonum alfa-2b	Amp., Flak. 1,000,000, 3,000,000, 5,000,000 IU	Subcutaneously, intramuscularly, 5,000,000 IU every day
3.	Methyluracil Metyluracylum	Tab. 0.5 g	Inside 1 g 3 times a day
4.	Montelukast Montelucastum	Tab. 0.01 g	Inside 0.01 g once a day
5.	Methotrexate Metotrexatum	Amp., Flak. with lyophilic. powder 0.05, 0.1 g Tab. 0.0025 g	Subcutaneously, intramuscularly 0.25 g in solution every 12 hours Inside 1 tab. 3 times a day

4.2. Theoretical questions for the lesson:

1. Classification of anti-inflammatory drugs. The main focus of the action. Pharmacology of non-steroidal anti-inflammatory drugs and comparative characteristics of drugs (**acetylsalicylic acid, mefenamic acid, ketorolac, indomethacin, diclofenac sodium, ibuprofen, naproxen, dexketoprofen, meloxicam, celecoxib, nimesulide**) by the degree of inhibition of COX (cyclooxygenase) -1 and -2 and the severity of anti-inflammatory action. Side effects of drugs and measures to prevent them.

2. Pharmacology of NSAIDs and comparative characteristics of drugs (**hydrocortisone, prednisone, dexamethasone, methylprednisolone, triamcinolone, betamethasone, budesonide, mometasone furoate, beclomethasone dipropionate**). Indications, contraindications for use, dosage regimen. Side effects of glucocorticoids.

3. Classification and general characteristics of antiallergic drugs. The concept of histamine receptors. Medicines used for immediate type hypersensitivity (glucocorticoids, antihistamines, fibrinolysis inhibitors, adrenergic agonists, anticholinergics, antispasmodics, bronchodilators). Features of the application.

4. Pharmacology of antihistamines - H1 receptor blockers (**diphenhydramine = diphenhydramine, chloropyramine = suprastin, clemastine = tavegil, mebhydroline = diazolin, loratadine = claritin, desloratadine, cetirizine, levocetirizine = zodac, fenspiride, dimethindene maleate = fenistil**). Comparative characteristics of drugs of different generations, side effects.

5. Pharmacological characteristics of leukotriene receptor blockers (**montelukast**). Pharmacokinetics, pharmacodynamics, indications for use **cromoglycetic acid, ketotifen**. Principles of relief from anaphylactic shock. Medicines used for delayed hypersensitivity.

6. Classification of immunomodulators. Pharmacology of thymus preparations (thymalin), leukopoiesis stimulants (**sodium nucleinate, methyluracil), interferons and vaccines**. Immunosuppressive drugs: antimetabolites **(azathioprine, methotrexate**), azathioprine, methotrexate (**cyclophosphamide**), 4-aminoquinoline derivatives (**chloroquine**), glucocorticoids, enzyme preparations, selective immunosuppressants (**cyclosporin**), monoclonal antibody preparations (**adalimumab, omalizumab**). Pharmacological characteristics, indications for use, side effects.

4.3. Practical tasks that are performed in the lesson:

4.3.1. Prescribe recipes and conduct their pharmacotherapeutic analysis (indicate group affiliation, indications for use, possible complications):

1. Prednisone in ampoules, tablets
2. Diclofenac sodium in ampoules
3. Ibuprofen tablets
4. Naproxen tablets
5. Meloxicam in ampoules, tablets
6. Celecoxib capsules
7. Diphenhydramine in ampoules, tablets
8. Chloropyramine in ampoules
9. Loratadine tablets
10. Levocetirizine tablets
11. Fenspiride tablets
12. Ketotifen tablets
13. Omalizumab in vials
14. Interferon alfa-2b ampoules
15. Methyluracil tablets
16. Montelukast tablets

4.3.2. Practical tasks performed at the lesson:

1. To familiarize with the preparations on the topic, to determine their affiliation with the pharmacological group and indications for use. Fill in the table:

Preparations	Mechanism of action	Indications for use	Side effects
Prednisone			
Diclofenac Sodium			
Ibuprofen			
Naproxen			
Meloxicam			
Celecoxib			

Ketotifen			
Diphenhydramine			
Chloropyramine			
Loratadine			
Levocetirin			
Fenspiride			
Omalizumab			
Interferon alfa-2b			
Methyluracil			
Montelukast			

2. To substantiate the choice of the drug, its pharmaceutical form, dosage, concentration, route of administration.

1. Nonsteroidal anti-inflammatory drug with antiaggregatory action.
2. Non-steroidal anti-inflammatory drug of selective action for parenteral administration for arthritis of the knee joint.
3. Nonsteroidal anti-inflammatory drug for oral administration in persistent bronchial asthma of the 4th degree.
4. Glucocorticoid for the treatment of severe anaphylactic shock.
5. Immunotropic drug with antiviral activity for the treatment of hepatitis C.
6. An immunotropic drug with regenerative properties to stimulate the healing of gastric ulcers.

Materials for self-control.

A.Tasks for self-control:

Using of text books and operative insyructions, syudent must fill in table:

Table N 1. “Features of the mechanism of action and indications for use”

Preparations	Mechanism of action	Indications for use
Acetylsalicylic acid		
Mefenamova		
Ketorolac		
Indomethacin		
Nimesulide		
Dexketoprofen		
Betamethasone		
Timalin		
Azathioprine		
Clemastine		
Mebhydrolin		
Desloratadine		
Cetirizine		
Dimetinden		
Adalimumab		

Table N 2. “Indications for the use of antiallergic and immunotropic preparations "

Show	Mycosis	Bronchial asthma	Leukopenia	Chronic. Herpes infection	Melanoma
Methyluracil					
Interferon alfa-2b					
Methotrexate					
Omalizumab					
Timalin					

B. Self-control tasks. Identify the drug and its mechanism of action:

N1. Patient with rheumatism appointed NSAIDs selective action. What drug is prescribed? Indicate the mechanism of action.
N2. A patient after a bee sting with severe Quincke edema was hospitalized in the hospital. What drug is indicated for the pathogenesis of the condition?
N3. A glucocorticoid agent has been prescribed for the treatment of periarteritis nodosa. What drug is indicated for the pathogenesis of the disease?
N4. After suffering a severe viral infection, the patient developed leukopenia. What drug should be used to treat this symptom?
N5. An HIV-infected patient with manifestations of Kaposi's sarcoma is prescribed a broad-spectrum immunotropic drug. What drug is prescribed? Consider the mechanism of action**.**

C. Tests for self-control:

1. A patient with acute radiculitis was prescribed NSAIDs of selective action for parenteral administration. What is the drug?

A. Indomethacin B. Ibuprofen C. Aspirin D. Celecoxib E. Meloxicam

2. For a woman with algodismenorrhea, the doctor recommended short-acting NSAIDs from the propionic acid group to eliminate pain. What is the drug?

A. Indomethacin B. Ibuprofen C. Acetylsalicylic acid D. Celecoxib E. Meloxicam

3. The second-generation antihistamine drug, a piperidine derivative, without m-choline-blocking and adrenergic blocking effect. Apply 1 time per day. Indicate it:

A. Diphenhydramine B. Diazolin C. Tavegil D. Loratidine E. Timalin

4. Explain the mechanism of antishock action of corticosteroids.

A. Phospholipase blockade B. Inhibition of antibody formation
C. Increased blood glucose D. Increased tissue catecholamine concentration
E. Reducing tissue oxygen demand

5. A patient with osteoporosis for long-term treatment of bronchial asthma was prescribed prednisone inside. What side effect may occur?

A Hypoglycemia B. Hypotension C. Stomatitis D. Allergy E. Fracture of the limbs

6. What complication often occurs with prolonged use of glucocorticoids?

A. Diabetes mellitus B. Dermatitis C. Angina pectoris D. Collapse E. Hypoglycemia

7. Considering the pharmacological effects and side effects, what are the indications for the use of prednisone?

A. Acute nephritis B. Arterial hypertension C. Diabetes mellitus
D. Stomach ulcer E. Unstable angina pectoris

8. Indicate NSAIDs that selectively affect COX-2 and have virtually no irritating effect on the gastric mucosa.

A. Indomethacin B. Ibuprofen C. Acetylsalicylic acid D. Celecoxib E. Diclofenac Sodium

9. What drugs are inappropriate to prescribe to a patient with diabetes?

A. NSAIDs B. Antiseptics C. Antihypertensives D. Steroidal anti-inflammatory E. Analgesics

10. In a patient with severe diabetes mellitus, it became necessary to prescribe an anti-inflammatory agent. Which drug choice requires dose adjustment of insulin?

A. Diclofenac B. Ibuprofen C. Indomethacin D. Prednisolone E. Piroxicam

11. Despite the wide spectrum of pharmacological action of glucocorticoids, sometimes they cannot be prescribed. Identify contraindications.

A. Scleroderma B. Eczema C. Stomatitis D. Anaphylactic shock E. Cushingoid Syndrome

12. A patient with a polyvalent allergy was prescribed an antihistamine, which is a levorotatory isomer. In therapeutic doses, it does not have a sedative effect. Identify the drug.

A. Diclofenac B. Ibuprofen C. Levocetirizine D. Prednisolone E. Piroxicam

13. A 50-year-old man suffers from skin tuberculosis. Which drug used to treat skin diseases is

contraindicated for this patient?

A. Prednisolone B. Indomethacin C. Methyluracil D. Tetracycline E. Retinol Acetate

14. What side effect of NSAIDs is associated with the non-selective nature of their action?

A. Gastric ulcer B. Cytopenia C. Allergy D. Irritability E. Hyperglycemia

15. Select the pharmacological effect of acetylsalicylic acid if it is prescribed for angina pectoris.

A. Anti-aggregation B. Anti-arrhythmic C. Anti-allergic D. Antihypertensive E. Metabolic

16. Select the pharmacological effect of corticosteroids, which is used in the treatment of bronchial asthma.

A. Anti-allergic B. Antiarrhythmic C. Hypertensive D. Antihypertensive E. Metabolic

17. In a patient with severe diabetes mellitus, it became necessary to prescribe anti-inflammatory drugs. Which drug requires insulin dosage adjustment?

A. Diclofenac-sodium B. Ibuprofen C. Indomethacin D. Prednisolone E. Paracetamol

18. With aseptic inflammation, the activity of COX increases tenfold. This phenomenon is reduced by prednisone. The inhibition of which process is due to the action of prednisone?

A. Broadcasts B. Transcriptions C. COX activation

D. Activation of phospholipase E. Activation of phosphodiesterase

19. With medical dermatitis, the patient was prescribed an antihistamine drug that does not have a sedative effect on the central nervous system and lasts a long time. What is the drug?

A. Loratadin B. Diprazin C. Diphenhydramine D. Suprastin E. Tavegil

20. The patient took an antihistamine in tablets, after a while he felt a dry mouth, lethargy, drowsiness. What drug did the patient take?

A. Diazolin B. Phenobarbital C. Diphenhydramine D. Diazepam E. Paracetamol

21. Despite the wide range of therapeutic effects of glucocorticoids, there are a number of contraindications to their prescription. Identify one of them.

A. Scleroderma B. Eczema C. Stomatitis D. Anaphylactic shock E. Viral hepatitis

22. In a patient with allergic dermatosis with signs of itching, swelling, insomnia developed. What drug should be prescribed?

A. Diphenhydramine B. Paracetamol C. Analgin D. Phenobarbital E. Nitrazepam

23. The patient has urticaria, for the treatment of which chloropyramine was chosen. With the action on which of the listed elements of the pathogenesis of allergy is the therapeutic effect of the drug associated?

A. Synthesis of immunoglobulins B. Isolation of histamine

C. Formation of the antigen-antibody complex

D. Interaction of histamine with receptors in organs

E. Activation of B-lymphocytes

24. In a patient, a systemic lesion of connective tissue. Which anti-inflammatory drug will help reduce the manifestations of all phases of inflammation?

A. Prednisolone B. Butadion C. Indomethacin D. Contrical E. Paracetamol

25. What hormone-like drug of natural origin is prescribed for acute and chronic purulent infection?

A. Prednisolone B. Butadion C. Timalin D. Contrical E. Meloxicam

26. What drug increases non-specific and specific immunoreactivity, accelerates tissue regeneration in case of burn and radiation injuries?

A. Analgin. Butadion C. Methyluracil D. Contrical E. Prednisolone

Literature.

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http://www.freebookcentre.net/medical_books_download/Antihypertensive-drug.html

6. Pharmacology Anticoagulants & Antiplatelet blood thinners explained clearly by Mike Linares from https://simplenursing.com/nursing-school-desktop/

7. Antimicrobial drugs
http://www.freebookcentre.net/medical_books_download/Antimicrobial-drugs.html

Methodical guidelines has been composed by Assoc. Prof. _____ Sidorenko AG,
Assoc. Prof. _____Devyatkina NN

GRAPH OF LOGICAL STRUCTURES.

Comparative characteristics of antiemetics

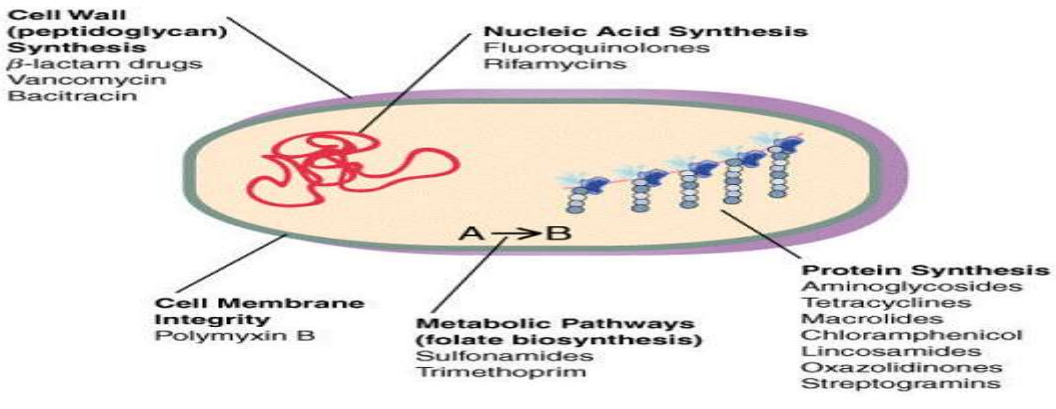
Preparations	Use for		
	motion sickness	chemo and radiation therapy	toxicosis
Scopolamine	+		
Diphenhydramine	+	+	+
Metoclopramide		+	+
Tropisetron		+	
Haloperidol		+	

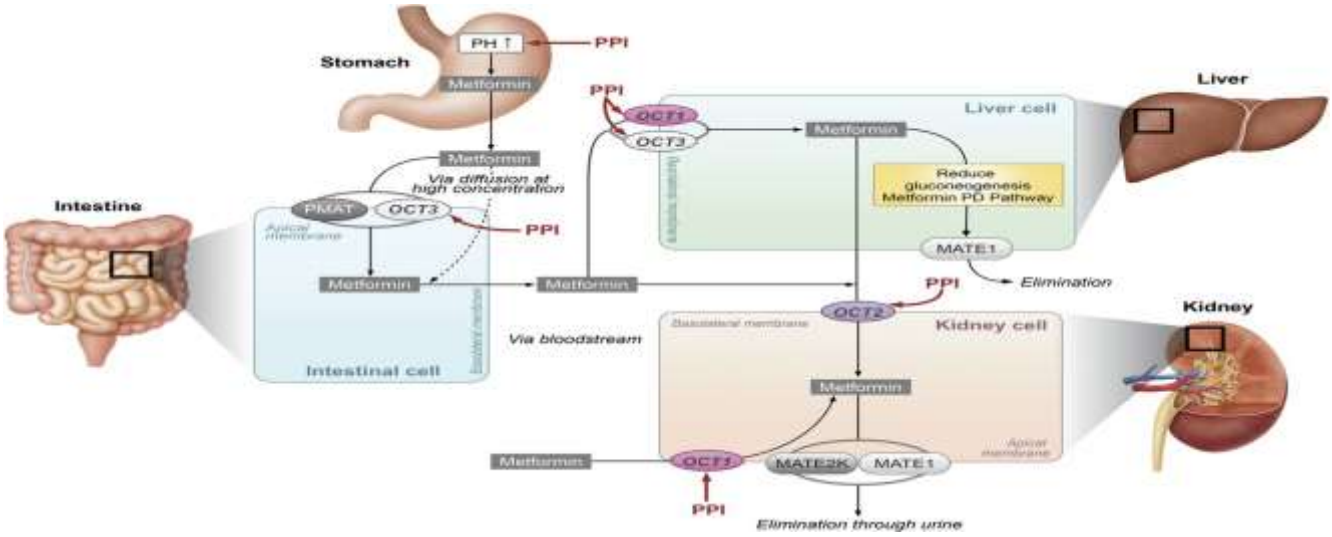
Comparative characteristics of laxatives

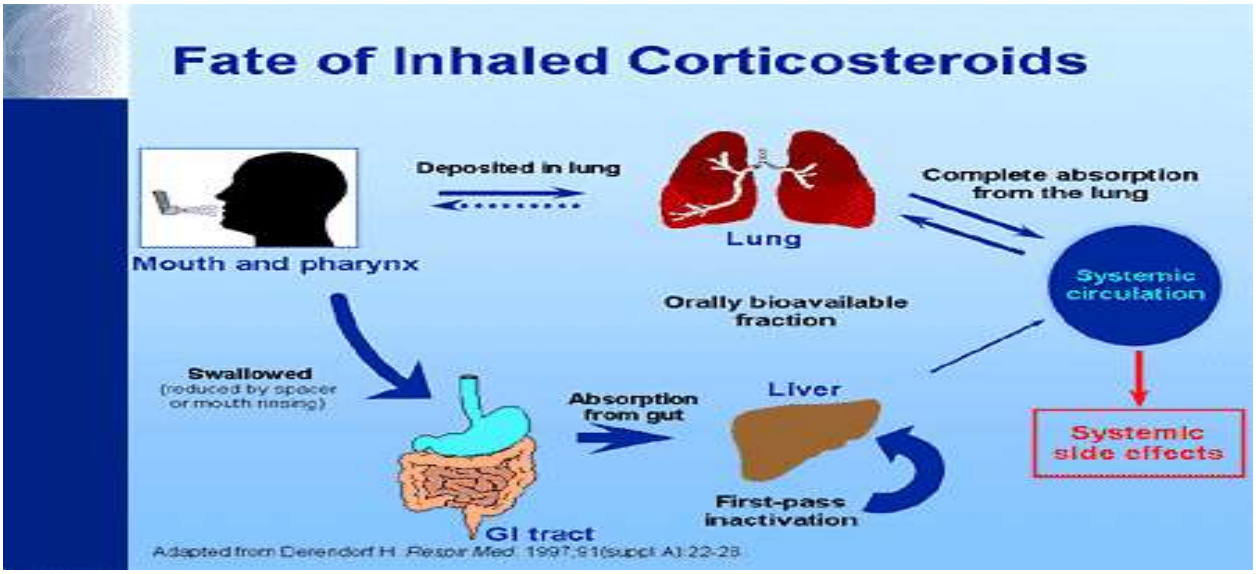
Preparations	The onset of effect (h)	Features of use
Castor oil	2-6	Acute constipation, X-ray diagnosis of the digestive tract, stimulation of labor.
Bisacodyl	5-7	Chronic constipation, preparation for operations.
Sodium picosulfate	6-10	Chronic constipation, urography, rectoscopy and coproscopy.
Macrogol	24-48	Chronic constipation, food poisoning.
Lactulose	24-48	Hepatic encephalopathy, coma and precoma, dysbiosis.

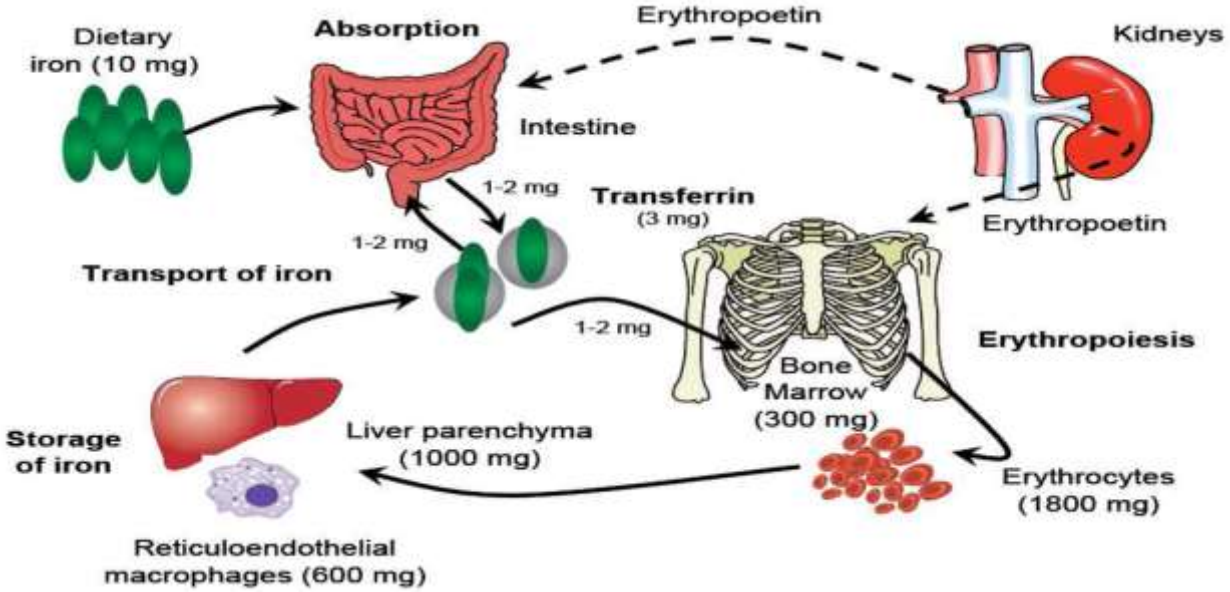
Comparative characteristics of diuretics

Preparations	Act			Cause	
	severity	Start	duration	acidosis	alkalosis
Furosemide	++++	5 hv iv 30-40 hv per os	4-8 year		+
Triamteren	+	2-4 year	8 year		
Acetazolamide	+	2-4 year	8-14 year	+	
Spironolactone	+	2-4 year	24-48 year	+	
Hydrochlorothiazide	++	1-2 year	10-12 year		+
Indapamide	++	2- year	12-24 year		+




Stomach
PH ↑
PPI
Metformin
Liver
Liver cell
OCT1
OCT3
Reduce gluconeogenesis Metformin PD Pathway
MATE1
Elimination
Intestine
PMAT
Via diffusion at high concentration
Intestinal cell
Via bloodstream
OCT2
Kidney
Kidney cell
MATE2K
Elimination through urine


Fate of Inhaled Corticosteroids
Deposited in lung
Complete absorption from the lung
Mouth and pharynx
Lung
Systemic circulation
Orally bioavailable fraction
Swallowed
(reduced by spacer or mouth rinsing)
Absorption from gut
Liver
Systemic side effects
First-pass inactivation
GI tract
Adapted from Derendorf H. Respir Med. 1997;91(suppl A):22-28.


Dietary iron (10 mg)
Absorption
Erythropoetin
Kidneys
Intestine
1-2 mg
Transferrin
(3 mg)
Erythropoetin
1-2 mg
Transport of iron
1-2 mg
Erythropoiesis
Bone Marrow
(300 mg)
Storage of iron
Liver parenchyma
(1000 mg)
Erythrocytes
(1800 mg)
Reticuloendothelial macrophages (600 mg)

Vitamins may be

- Fat soluble (vitamins A, D, E, and K)
- Water soluble (B vitamins and vitamin C)

The B vitamins include biotin, folate, niacin, pantothenic acid, riboflavin (B2), thiamin (B1), B6 (eg, pyridoxine), and B12 (cobalamins).

For dietary requirements, sources, functions, effects of deficiencies and toxicities, blood levels, and usual therapeutic dosages for vitamins, see table Recommended Daily Intakes for Vitamins and Sources, Functions, and Effects of Vitamins.

Dietary requirements for vitamins (and other nutrients) are expressed as daily recommended intake (DRI). There are 3 types of DRI:

- **Recommended daily allowance (RDA):** RDAs are set to meet the needs of 97 to 98% of healthy people.
- **Adequate intake (AI):** When data to calculate an RDA are insufficient, AIs are based on observed or experimentally determined estimates of nutrient intake by healthy people.
- **Tolerable upper intake level (UL):** ULs are the largest amount of a nutrient that most adults can ingest daily without risk of adverse health effects.

In developed countries, **vitamin deficiencies** result mainly from the following:

- Poverty
- Food faddism
- Drugs (see Nutrient-Drug Interactions and table Potential Vitamin-Drug Interactions)
- Alcoholism
- Prolonged and inadequately supplemented parenteral feeding
- Malabsorption

Mild vitamin deficiency is common among frail and institutionalized elderly people who have protein-energy undernutrition.

In developing countries, vitamin deficiencies can result from lack of access to nutrients.

Deficiencies of water-soluble vitamins (except vitamin B12) may develop after weeks to months of undernutrition. Deficiencies of fat-soluble vitamins and of vitamin B12 take > 1 year to develop because the body stores them in relatively large amounts. Intakes of vitamins sufficient to prevent classic vitamin deficiencies (such as scurvy or beriberi) may not be adequate for optimum health. This area remains one of controversy and active research.

Vitamin dependency results from a genetic defect involving metabolism of a vitamin. In some cases, vitamin doses as high as 1000 times the DRI improve function of the altered metabolic pathway.

Vitamin toxicity (hypervitaminosis) usually results from taking megadoses of vitamin A, D, C, B6, or niacin.

Because many people eat irregularly, foods alone may provide suboptimal amounts of some vitamins. In these cases, the risk of certain cancers or other disorders may be increased. However, routine daily multivitamin supplements have not been proved to reduce cancer. Supplementation with vitamins does not appear to prevent cardiovascular disease or falls.

Anti-vitamins are chemical compounds that inhibit the absorption or actions of vitamins. For example, avidin is a protein in raw egg whites that inhibits the absorption of biotin; it is deactivated by cooking. Pyrithiamine, a synthetic compound, has a molecular structure similar to thiamine, vitamin B_1, and inhibits the enzymes that use thiamine.

Nomenclature of reclassified vitamins		
Previous name	**Chemical name**	**Reason for name change**[52]
Vitamin B_4	Adenine	DNA metabolite; synthesized in body
Vitamin B_8	Adenylic acid	DNA metabolite; synthesized in body
Vitamin B_T	Carnitine	Synthesized in body
Vitamin F	Essential fatty acids	Needed in large quantities (does not fit the definition of a vitamin).
Vitamin G	Riboflavin	Reclassified as Vitamin B_2
Vitamin H	Biotin	Reclassified as Vitamin B_7
Vitamin J	Catechol, Flavin	Catechol nonessential; flavin reclassifiedas Vitamin B_2
Vitamin L_1[53]	Anthranilic acid	Nonessential
Vitamin L_2[53]	Adenylthiomethylpentose	RNA metabolite; synthesized in body
Vitamin M or B_c[54]	Folate	Reclassified as Vitamin B_9
Vitamin P	Flavonoids	Many compounds, not proven essential
Vitamin PP	Niacin	Reclassified as Vitamin B_3
Vitamin S	Salicylic acid	Nonessential
Vitamin U	S-Methylmethionine	Protein metabolite; synthesized in body

The discovery dates of the vitamins and their sources		
Year of discovery	**Vitamin**	**Food source**
1913	Vitamin A (Retinol)	Cod liver oil
1910	Vitamin B_1 (Thiamine)	Rice bran
1920	Vitamin C (Ascorbic acid)	Citrus, most fresh foods
1920	Vitamin D (Calciferol)	Cod liver oil
1920	Vitamin B_2 (Riboflavin)	Meat, dairy products, eggs
1922	Vitamin E (Tocopherol)	Wheat germ oil, unrefined vegetable oils
1929	Vitamin K_1 (Phylloquinone)	Leaf vegetables
1931	Vitamin B_5 (Pantothenic acid)	Meat, whole grains, in many foods
1931	Vitamin B_7 (Biotin)	Meat, dairy products, Eggs
1934	Vitamin B_6 (Pyridoxine)	Meat, dairy products
1936	Vitamin B_3 (Niacin)	Meat, grains
1941	Vitamin B_9 (Folic acid)	Leaf vegetables
1948[59]	Vitamin B_{12} (Cobalamins)	Meat, organs (Liver), Eggs

Table 2

EXAMPLES OF SYSTEMIC ANTIHISTAMINE/DECONGESTANT COMBINATION PRODUCTS	
Brand	**Active Ingredients**
Actifed Cold and Allergy	Phenylephrine HCl, chlorpheniramine maleate
Advil Allergy Sinus	Ibuprofen, pseudoephedrine HCl, chlorpheniramine maleate
Allerest PE	Phenylephrine HCl, chlorpheniramine maleate
Allegra-D	Fexofenadine HCl, pseudoephedrine HCl
Benadryl Allergy Plus Cold Kapgels	Acetaminophen, diphenhydramine HCl, phenylephrine HCl
Benadryl-D Allergy Plus Sinus	Diphenhydramine HCl, phenylephrine HCl
Claritin-D	Loratadine, pseudoephedrine sulfate
Dimetapp Elixir	Brompheniramine maleate, phenylephrine HCl
Sudafed PE Sinus and Allergy	Chlorpheniramine maleate, phenylephrine HCl
Triaminic Cold and Allergy Liquid	Phenylephrine HCl, chlorpheniramine maleate
Tylenol Severe Allergy	Acetaminophen, diphenhydramine HCl
Tylenol Allergy Multi-Symptom	Acetaminophen, chlorpheniramine maleate, phenylephrine HCl
Tylenol Allergy Multi-Symptom Nighttime	Acetaminophen, diphenhydramine HCl, phenylephrine HCl
Zyrtec-D	Cetirizine HCl, pseudoephedrine HCl