PHARMACOLOGY

STUDY GUIDE

FOR THE SPECIALTY «DENTISTRY»

Minsk BSMU 2016

МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ
БЕЛОРУССКИЙ ГОСУДАРСТВЕННЫЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
КАФЕДРА ФАРМАКОЛОГИИ

ФАРМАКОЛОГИЯ

PHARMACOLOGY

ПРАКТИКУМ
для специальности «Стоматология»

2-е издание

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А в т о р ы: д-р мед. наук, доц. Н. А. Бизунок; д-р мед. наук, проф. Б. В. Дубовик; канд. мед. наук, доц. Б. А. Волынец; канд. мед. наук, доц. А. В. Волчек

Р е ц е н з е н т ы: д-р мед. наук, проф. И. В. Василевский; канд. мед. наук, доц. В. В. Давыдов

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Содержит методические рекомендации для подготовки к лабораторным занятиям по фармакологии и задания для самостоятельной работы студентов, обучающихся по специальности 1-79 01 07 «Стоматология». Первое издание вышло в 2015 году.

Предназначен для студентов 2–3-го курсов медицинского факультета иностранных учащихся, изучающих фармакологию на английском языке.

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INTRODUCTION

This study guide is elaborated in accordance with the requirements of the Programme in Pharmacology for students of dental faculties of medical universities and composed for the student's individual work. The guide contains three parts: General Prescription, General Pharmacology and Special Pharmacology.

The part General Prescription contains the rules of making a prescription and writing out a prescription of some medicinal forms. It is the part that starts up the course in Pharmacology.

General Pharmacology studies the principles of medicinal substances actions on human and animal organisms at different levels (molecular, cellular, systemic) – pharmacodynamics as well as general regularities of absorption, distribution, metabolism (biotransformation) and excretion of medicinal substances – pharmacokinetics. This part of the guide contains practical tasks consolidating the knowledge of pharmacokinetic quantitative regularities and drugs dosage principles.

Each topic of the practical lesson of the part Special Pharmacology is dedicated to the study of a special group of drugs and contains a modern classification of drugs in which the major ones for practical medicine are pointed out and the list of questions for individual study for practical class is provided. All the drugs, included into this guide have an international non-patent name (INN).

The appendices to the guide contain brief reference information on the basic drugs from various pharmacological groups and examples of writing out prescriptions for various medicinal forms.

After completing the course in Pharmacology the student is **to know**:

- medical nomenclature of drugs;
- legislative, economic, organizational and deontological aspects of drugs application;
- rules of elaboration and implementation of new drugs into clinical medicine;
- basic parameters and quantitative regularities of drugs pharmacodynamics. Mechanisms and quantitative regularities of pharmacological and toxic actions of drugs;
- pharmacological characteristics and basics of clinical application of drugs used for pharmacotherapy of a number of pathological processes and affecting different body systems;
- toxic syndromes resulting from drugs overdosage and poisoning, therapy principles of drugs poisoning, antidotes;
- problems of drug allergy, prevention and treatment;
- peculiarities and risks of drugs use in children, elderly population, pregnant and nursing women;
- main mechanisms and principles of drugs interaction.

To know how:

- to make efficient use of drugs according to their pharmacological characteristics and clinical indications;
- to make calculation of an individual dosing regimen on the basis of pharmacokinetic parameters of the drug and the patient's individual characteristics;
- to alter the dosing regimen in diseases changing clearance and distribution of drugs in the body;
- to forecast pharmacotherapeutic complications and define ways of their minimization;
- to write out prescriptions for administration of drugs in different medicinal forms.

The authors consider that the study guide will be of help not only in the study of Pharmacology, but also as a source of information in the whole spectrum of modern drugs of different indications and rules of writing out prescriptions in the future study of clinical medicine.

GENERAL PRESCRIPTION

LESSON 1. INTRODUCTION. PRESCRIPTION. SOLID MEDICINAL FORMS

Objective: To study the structure of the prescription, learn the rules and get practical skills in writing out solid medicinal forms in prescription.

Key questions:

1. The concept of medicinal substance, medicinal agent (medicinal drug, drug), medicinal form.
2. The sources of obtaining drugs.
3. International and national pharmacopeia, its content and purpose.
4. Pharmacy. Rules of drug storage and dispensing.
5. Prescription and its structure. Prescription forms. General rules for writing out a prescription. State regulation of writing out and dispensing drugs.
6. Peculiarities of writing out narcotic, poisonous and potent substances in prescription.
7. Drugs under control. Drugs prohibited for prescribing.
8. Solid medicinal forms: tablets, dragee (pills), powders, capsules. Their characteristics, advantages and disadvantages. Rules of prescribing.

Write out prescriptions for:

1. 20 coated tablets of Atenolol 0.05 g. 1 tablet orally twice a day before meals. Tablets should be swallowed with little fluid, no chewing.
2. 25 tablets of Digoxin 0.00025 g. 1 tablet orally once a day.
3. 20 tablets of Baralgin. Combined drug. 1 tablet orally 3 times a day.
4. 20 dragees of Tolperisone 0.05 g. 1 dragee orally 3 times a day.
5. Powder of Amoxicillin in bottles to prepare 60 ml of suspension for internal use 125 mg/5 ml. Dissolve the contents of the bottle in 60 ml of water. Take 1 tea spoonful 3 times a day.
6. Powder of Didanosine 2.0 g in bottles to prepare 125 ml of solution for internal use in children. Take 1 tea spoonful twice a day.
7. 30 powders of Riboflavin 0.001 g. 1 powder orally twice a day.
8. 30 capsules of Rifampicin 0.15 g. 3 capsules orally once a day.

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LESSON 2. LIQUID MEDICINAL FORMS

Objective: To learn the rules and get practical skills in writing out liquid medicinal forms in prescription.

Key questions:

1. General characteristics and rules of writing out liquid medicinal forms. Dosage.
2. Solutions for external and internal use. Solvents. Officinal solutions. Suspensions.
3. Liquid medicinal forms made from plant medicinal material: infusions, broths, teas, galenic (tinctures, extracts) and neogalenic drugs, mucus, emulsions, liniments.
4. Mixtures.

Write out prescriptions for:

1. 10 ml eye drops 0.3% solution of Gentamycin. By 1 drop into both eyes 3 times a day.
2. 10 ml 0.5% spirituous (alcoholic) solution of Ergocalciferol. By 3 drops orally once a day.
3. 180 ml solution of Potassium iodide, for the patient to get 0.45 g Potassium iodide per one dose. 1 table spoonful orally 3 times a day after meals.
4. 100 ml mixture containing 2.0 g of Chloralum hydratum and equal amounts of Amylum and distilled water. For 2 enemas.
5. 200 ml emulsion from 30 ml Oleum Ricini. Orally for 3 doses.
6. 180 ml extract from 6.0 g herba Adonidis vernalis. 1 table spoonful orally 3 times a day.
7. 200 ml broth from 20.0 g cortex Frangulae. 1 table spoonful orally before bedtime.
8. 25 ml tincture of Echinopanacis. 35 drops orally 2-3 times before meals.
9. 15 ml of Adonisidum. 15 drops orally 2-3 times a day.
10. The mixture containing 180.0 ml extract from 0.45 g herba Thermopsidis and 0.2 g Codeini phosphas. 1 table spoonful orally 3 times a day.

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LESSON 3. MEDICINAL FORMS FOR INJECTIONS. SOFT MEDICINAL FORMS

Objective: To learn the rules and get practical skills in writing out prescription for soft medicinal forms and medicinal forms for injections.

Key questions:

1. The base for preparation of soft medicinal forms.
2. Ointments, pastes. Rules of prescribing them.
3. Dosed soft medicinal forms – suppositories. Types of suppositories. Rules of prescribing them.
4. Basic medicinal forms for injections.
5. General characteristics and requirements to medicinal forms for injections.
6. Rules of writing out injection forms manufactured at the plant and made at the pharmacy.

Write out prescriptions for:

1. 5.0 g 1% eye ointment of Pilocarpine. Apply in the conjunctional sac every 4 hours.
2. 15.0 g 0.1% ointment of Triamcinolone. Apply externally 1-3 times a day.
3. 30.0 g (30 000 IU/1.0 g) ointment of Amphoterecin B. Apply a thin layer to the affected skin area 1-2 times a day.
4. 10.0 g paste based on vaseline and lanoline (equally) containing 5% Benzocaine. Apply to the affected skin area.
5. 20 vaginal suppositories containing 0.5 g Metronidazolum. 1 suppository into the vagina at bedtime.
6. 10 rectal suppositories containing 0.1 g Tramadol. 1 suppository into the rectum up to 8 times a day.
7. 20 rectal suppositories of Ultraproct. Combined drug. 1 suppository into the rectum 2 times a day.
8. 10 ampules containing 10 ml 1% solution of Ciprofloxacinum. 10 ml intravenously 2 times a day.
9. 10 amplules containing 1 ml 2.5% solution of Progesterone in oil. 1 ml intramuscularly once a day.
10. 10 ampules containing 0.1 g Doxycycline. The content of the ampule to be dissolved in 100 ml of isotonic solution NaCl 1 mg/ml. Intravenously drip-feed.
11. 6 bottles containing 1 200 000 U Benzylpenicillin-Benzatin. The content of the bottle to be dissolved in 2-3 ml water for injections. 1 200 000 U intramuscularly once per 2 weeks.

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GENERAL PHARMACOLOGY

LESSON 4. PHARMACOKINETICS OF DRUGS

Objective: To master the basic concepts and terms of pharmacokinetics. To learn how to calculate the load dose of the drugs, the steady-state concentration and the maintaining dose in the continuous administration of the drugs.

Key questions:

1. Pharmacokinetics, its definition and role in rational pharmacotherapy.
2. Drug transfer in the body.
   2.1. Aqueous diffusion through epithelial barriers. Its correlation with the membrane structure (mucous membrane epithelium, capillary endothelium, hematoencephalic barrier, placenta) as well as physical and chemical characteristics of medicinal substances.
   2.2. Medicinal substance diffusion through lipid barriers. The driving force, conditions and limitations of the transfer:
   - solubility in lipid and aqueous phases (distribution coefficient water/oil), Fick's diffusion equation;
   - the role of ionization and pH medium in medicinal substances transfer through barriers, Henderson-Hasselbach's equation;
   - the role of concentration gradient;
   - the role of macromolecular plasma and tissue ligands.

   2.3. Medicinal substances transport with participation of carriers in type 2 and 3 membranes.
   2.4. Microvesicular transport (pinocytosis).
3. Routes of drug administration into the body:
   - enteral (oral, sublingual, transbuccal, rectal, via probe);
   - parenteral (subcutaneous, intramuscular, intravenous, intraatrial, subarachoidal, intraosseous, intracavitary, inhalation, transdermal, etc.);
   - local (topical) application of drugs.

   Comparative characteristics of different routes of administration, their advantages and disadvantages. The concept of presystemic drug elimination.
4. Major constituents of pharmacokinetics: bioavailability, distribution, clearance.
   4.1. Bioavailability concept (F), definition, evaluation criteria. Correlation between bioavailability and drug quality.
   4.2. Drug distribution in the body.
   - major distribution compartments, medicinal substance ligands, distribution determinants;
   - volume of distribution (Vd), dimensions, definition;
   - volume of distribution variants of medicinal substances, quantitative ratio between anatomical divisions and body dimensions.

4.3. Clearance (Cl) – concept, dimensions, definition. General clearance and its constituents. Expression via Vd, $T_{1/2}$, Kel parameters.

4.4. Excretion half-life ($T_{1/2}$) – concept, dimensions and calculation options via Kel, Vd, Cl paramenters.

5. Elimination of drugs (biotransformation and elimination). Participation of various organs and tissues in the elimination (liver, kidneys, skin, intestinal wall, lungs, etc.)

5.1. Renal clearance of drugs (filtration, secretion, reabsorption). Dependence on physical and chemical properties of drugs (unpolar, polar, ionogenic substances), functional condition and hemodynamics of kidneys.

5.2. Hepatic clearance of drugs (mechanisms, determinants, restrictions). The concept of enterohepatic circulation of a drug.

- Non-synthetic reactions (microsomal and non-microsomal): oxidation, reduction, hydrolysis – phase 1 biotransformation.
- Synthetic reactions: conjugation with endogenous substrates (glucuronic acid, sulfuric acid, glycine, glutathione, etc.) – phase 2 biotransformation.

5.3. Organism conditions when the clearance of drugs changes: age, pregnancy, diseases of liver, kidneys and other organs and systems, genetic features of drug metabolism; pharmacokinetic drug interaction.

LESSON 5. PHARMACODYNAMICS OF DRUGS

Objective: To study the main terms, concepts and quantitative laws of pharmacodynamics, to be able to use them for the explanation of the principles and mechanisms of action of drugs, quantitative assessment of pharmacological effects.

Key questions:

1. Types of pharmacotherapies (etiotropic, pathogenetic, symptomatic, replaceable therapy).
2. The concept of receptors in pharmacology. Molecular nature of receptors (regulatory proteins, enzymes, transport and structural proteins, nucleic acids). Types of receptors, types of ligand-receptor interactions. Secondary intermediaries of intracellular transfer, signal amplification, consequences.
3. Physical and chemical (non-electrolytic), chemical and biological mechanisms of action of drugs.
4. Terms and concepts of quantitative pharmacodynamics: effect, efficiency, activity. The concept of agonism and antagonism. Full and partial agonists. Pharmacological antagonists: competitive, noncompetitive, agonists-antagonists.
5. Quantitative assessment of pharmacological effect. Gradual and quantum (alternative) assessment of the effects, conditions of their use.
6. Interaction of drugs. Synergy and antagonism, its types and biological essence.
7. Changes of organism sensitivity to drug effects: hyporeactivity (tolerance and tachyphylaxis), hyperreactivity, hypersensitivity, idiosyncrasy.
8. Drug dosage: therapeutic doses – minimum (threshold), average, maximum (single, daily); knock-out, course. Toxic and lethal doses.

9. Dependence of the action of drugs on age, sex, condition of an organism, external influences, individual features of an organism and bad habits. Cumulation (material and functional), reasons. Drug dependence (abuse) – physical and mental.
10. The concept of therapeutic, side and toxic effects of drugs from the position of the concept of receptors and target tissues (hepatotoxicity, nephrotoxicity, neurotoxicity, etc.). Influence of drugs on prenatal fetal development (embryotoxicity, fetotoxicity, teratogenicity). Mutagenic and cancerogenic effects of drugs

LESSON 6. FINAL LESSON ON GENERAL PHARMACOLOGY AND GENERAL PRESCRIPTION

Objective:

1. To reinforce skills of writing out prescriptions and discharging of drugs in various medicinal forms.
2. To consolidate knowledge of the main terms, concepts and patterns of pharmacodynamics and pharmacokinetics.

For the lesson the rules of writing out of the prescription and discharging of drugs in various medicinal forms (lessons No. 1–3); material on a pharmacodynamics and pharmacokinetics (lessons No. 4–5) should be repeated.

Questions for individual study:

1. The concept of pharmacokinetic.
2. Types of drug transfer in organism.
3. Passive diffusion through aqueous pores, its dependence on the membrane structure and physic-chemical properties of the drug.
4. The passive diffusion through the membranes and its determinants.
5. Facilitated diffusion across a biological membranes via specific transmembrane integral proteins.
6. Active transport of drugs.
7. Microvesicular transport of drugs.
8. Routes of drug administration into the body.
9. Enteral route of drug administration into the body. Advantages and disadvantages.
10. Parenteral route of drug administration into the body. Advantages and disadvantages.
11. Local (topical) application of drugs: therapeutic tasks, advantages, disadvantages.
12. Presystemic (first-pass) drug elimination. Ways to reduce presistemic elimination.
13. The main parts of pharmacokinetics.
14. Bioavailability. Bioavailability and quality of drugs.
15. Drug distribution in the body. Volume of distribution and its variants.
16. Clearance as pharmacokinetic parameter, its dimension. The total clearance and its components.
17. Excretion half-life: essence, dimension.
18. The elimination of a drug. The participation of various organs and tissues in the elimination.
19. Biotransformation of drugs, its biological sense, main orientation of metabolic transformations of drugs. Influence of biotransformation on pharmacological activity of drugs.
20. Renal clearance of drugs, mechanisms, qualitative characteristics. Dependence of renal clearance on physical and chemical properties of medicinal substances.

21. Hepatic clearance of drugs, determinants and restrictions. Enterohepatic circulation of drugs, consequences.
22. Routes and mechanisms of elimination of drugs.
23. Factors changing the drugs clearance. Influence of sex, age, body weight, smoking, alcohol, pregnancy, pharmacokinetic drug interactions, diseases of internal organs, genetic features.
24. The concepts of pharmacodynamic.
25. Mechanisms of action of pharmacological substances.
26. Types of action of drugs on the organism.
27. Types of pharmacotherapies.
28. The concepts of: effect, efficiency, activity.
29. The concepts of: agonist (full, partial), antagonist.
30. The concepts of: competitive antagonist, noncompetitive antagonist, agonist-antagonist.
31. Drug interactions (synergism, antagonism, their types).
32. Variability in the drug actions. Hypo- and a hyperreactivity, tolerance and tachyphylaxis, hypersensitivity and idiosyncrasy, drug abuse.
33. Dose. Types of doses. Units of drug dosage.
34. The dependence of action of drugs on age, sex, specific features of an organism, environmental factors, individual characteristics and bad habits.
35. Teratogenic, embriotoxic, fetotoxic, mutagenic, cancerogenic actions of drugs.
36. Medicinal forms.
37. Rules of prescription of solid medicinal forms.
38. Rules of prescription of soft medicinal forms.
39. Rules of prescription of liquid medicinal forms.
40. Rules of prescription of medicinal forms for injections.
41. Nomenclature of drugs. The concept of original and generic drugs.

SPECIAL PHARMACOLOGY

While considering the questions of special pharmacology **the AIM** of every practical class is:

For the groups of mecicinal drugs:

- classification of drugs;
- main action determining pharmacotherapeutical significance of drugs of the given group;
- main use in medicine.

For the main drugs of the group (marked with «*»):

- the place in the classification;
- pharmacodynamics including pharmacological effects, localization and mechanisms of molecular and systemic actions;
- pharmacokinetics including absorption, distribution, biotransformation, excretion;
- main side and toxic effects;
- routes of administration and dosing regimens;
- comparative estimation of a drug among other drugs of the given group.

To carry out practical tasks on prescriptions it is recommended to use Appendix 1 as well as reference literature on drugs (see Literature to study).

DRUGS AFFECTING PERIPHERAL NERVOUS SYSTEM

LESSON 7. CHOLINOMIMETIC AND ANTICHOLINESTERASE DRUGS

Key questions:

1. General scheme of structure, neurotransmitters and receptors of peripheral (somatic and vegetative) nervous system.
2. Cholinergic signal transmission.
   2.1. The structure of cholinergic synapses and mechanism of nerve impulses transmission. Mechanism of acetylcholine release and its regulation.
   2.2. Molecular structure and heterogeneity of muscarinic and nicotinic cholinoreceptors:
      - subtypes of muscarinic cholinoreceptors (M_1-M_5): localization, effects of physiologic and pharmacologic stimulation of M_1-, M_2- и M_3-cholinoreceptors;
      - subtypes of nicotinic cholinoreceptors (N_m, N_n): localization and stimulation effects;
      - presynaptic and extrasynaptic cholinoreceptors.
3. Cholinomimetic drugs (choline ethers and natural alkaloids). Structural and functional dependence – tertiary amines and quaternary ammonium compounds.
   3.1. M-cholinomimetics: pilocarpine*, bethanechol*, aceclidine.
      - Influence on the eye (eye pupil width, intraocular pressure, accommodation), smooth muscles of internal organs, secretion of glands, heart and vessels.
      - Indications to use, side effects and contraindications.
      - Cholinomimetics poisoning, medical aid.

3.2. N-cholinomimetics: nicotine*, cytisine*.

- Nicotine pharmacology and toxicology.
- Nicotinism. Nicotinomimetics use in smoking control.

3.3. M, N-cholinomimetics: acetylcholine chloride*, carbachol. Pharmacological effects, use in medicine.

3.4. Anticholinesterase drugs:

- Reversible cholinesterase inhibitors: neostigmine*, pyridostigmine bromide*, edrophonium chloride*, physostigmine*, donepezil*.
- Irreversible cholinesterase inhibitors (organophosphorous compounds): armin*, insecticides, chemical war gases.
- Acute poisoning with anticholinesterase drugs and medical aid. Atropine*. Cholinesterase reactivators: pralidoxime mesylate*, trimedoxime bromide* (dipiroxime).

3.5. Stimulants of endogenic acetylcholine release (itopride). Inhibitors of acetylcholine release (botulinum A toxin). The possibilities of use in medicine.

Write out the following drugs in different medicinal forms: pilocarpine, aceclidine, neostigmine, pyridostigmine.

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LESSON 8. CHOLINERGIC ANTAGONIST (ANTICHOLINERGIC) DRUGS

Key questions:

1. M-cholinergic antagonist (M-anticholinergic drug). General characteristics, mechanism of action, main pharmacological effects.
   1.1. Classification:
      1.1.1. Natural alkaloids: atropine*, scopolamine* (hyoscine hydrobromide).
      1.1.2. Semisynthetic derrivaties: homatropine*, hyoscine butylbromide, ipratropium bromide*.
      1.1.3. Synthetic compounds:
      - mydriatics (cycloplegics): tropicamide*, cyclopentolate;
      - antisecretory and spasmolytic:
        - quadratiary ammonium compounds – propantheline bromide;
        - tertiary amines: dicycloverine*, pirenzepine* (selective M_1-cholinergic antagonist), darifenacine* (selective M_3-cholinebloker to decrease urinary bladder tonus);
      - antiparkinsonic (central cholinergic antagonists): trihexyphenidyl*, biperiden.

   1.2. Comperative characteristics of M-cholinergic antagonists according to the influence on eye (eye pupil width, intraocular pressure, accomodation), cardiovascular system (automatism, conduction, arterial pressure), smooth muscles of internal organs, secretion of glands, central nervous system.
   1.3. Use in medicine: indications, side effects, contraindications.

1.4. Poisoning with M-cholinergic antagonists and medical aid.

2. Ganglionic blockers (N_n-cholinergic antagonists). General characteristics, mechanism of action, main pharmacological effects.
   2.1. Classification:
   - Short-term action: trepirium iodide (hygronium), trimethaphan* (arfonad);
   - Average-term action: azamethonium bromide* (pentamine);
   - Long-term action: pempidine (pirilene).

   2.2. Use in medicine: indications, side effects, contraindications.
3. Muscle relaxant drugs (curare-type, peripheric muscle relaxants – N_m-cholinergic antagonists). General characteristics, mechanism of action, main pharmacological effects.
   3.1. Classification:
      3.1.1. Non-depolarizing type of action: pipecuronium bromide*, pancuronium bromide, atrakurium*.
      3.1.2. Depolarizing type of action: suxamethonium chloride (dithylin).
   3.2. Use in medicine: indications, side effects, contraindications.
   3.3. Antagonists of muscle relaxant drugs.
   3.4. Drug for the treatment of malignant hyperthermia – dantrolene.
4. Cholinergic antagonists of mixed type action (M, N-cholinergic antagonists) – aprophen. Pharmacological effects. Use in medicine.
5. Drugs, blocking acetylcholine release – botulinum a toxin*.

Write out the following drugs in different medicinal forms: atropine, ipratropium bromide, hyoscine butylbromide, pirenzepine, azamethonium bromide, trihexyphenidyl.

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LESSON 9. ADRENERGIC DRUGS

Key questions:

1. Adrenergic signals transmission.
   1.1. Adrenergic synapse structure, mechanism of nerve impulse transmission. Regulation of mediators release and their metabolism.
   1.2. Receptors heterogeneity:
   - α_1- and α_2-adrenoreceptors – localization, effects of physiologic and pharmacological stimulation;
   - β_1-, β_2- and β_3-adrenoreceptors – localization, effects of physiologic and pharmacological stimulation;
   - extrasynaptic adrenoreceptors, their biological significance.
2. Adrenergic agonists (adrenomimetic drugs, adrenomimetics).
   2.1. Alfa-adrenomimetics:
   - α_1-adrenomimetics – phenylephrine* (mesaton);
   - α_2-adrenomimetics – clonidine*;
   - α_1, α_2-adrenomimetics: naphazoline*, xylometazoline, oxymetazoline.
   2.2. Beta-adrenomimetics:
   - β_1-adrenomimetics – dobutamine*;
   - β_2-adrenomimetics: salbutamol*, salmeterol*, fenoterol, terbutaline*;

- β_1, β_2, β_3-adrenomimetics – isoprenaline* (izadrin).

2.3. Mixed-action adrenomimetics: epinephrine* (adrenalin) – α, β-agonist, norepinephrine* (noradrenalin) – α, β_1, β_3-agonist.

3. Sympatomimetics (indirect adrenomimetics): ephedrine*, amphetamine.
4. Dopaminomimetics – dopamine.

General characteristics of the drugs of the given groups, mechanisms of action, pharmacokinetics, main pharmacological effects. Use in medicine: indications, side effects, contraindications.

Write out the following drugs in different medicinal forms: clonidine, isoprenaline, salbutamol.

LESSON 10. ADRENERGIC ANTAGONISTS (ANTIADRENERGIC) DRUGS

Key questions:

1. Adrenergic antagonists (antiadrenergic drugs, adrenergic blockers).

1.1. Alfa-adrenergic antagonists:

- α_1-adrenergic antagonists: doxazosin*, prazosin*, terazosin, tamsulosin* (α_{1A}-antagonist);
- α_2-adrenergic antagonists – yohimbine*****;
- α_1, α_2-adrenergic antagonists: dihydroergotamine*, phentolamine*.

1.2. Beta-adrenergic antagonists:

1.2.1. β_1, β_2-adrenergic antagonists (nonselective):

- Without intrinsic sympathomimetic activity (ISA): propranolol* – short-term action; nadolol*, sotalol* – long-term action; timolol – for local application in glaucoma.
- With ISA: pindolol* – short-term action.

1.2.2. β_1-adrenergic antagonists (cardioselective):

- Without ISA: metoprolol* – short-term action; atenolol*, betaxolol*, nebivolol* (additionally stimulates NO (nitrogen oxide) release) – long-term action;
- With ISA: acebutolol* – short-term action.

1.3. Mixed-action adrenergic antagonists: labetalol*, carvedilol*.

2. Sympatholytics (antiadrenergic drugs of presynaptic action): guanethidine* (octadine)**,** reserpine.

General characteristics of the drugs of the given groups, mechanisms of action, pharmacokinetics, main pharmacological effects.

Use in medicine: indications, side effects, contraindications.

Definition of adrenergic antagonist intrinsic sympathomimetic activity (ISA), their advantages compared to absolute antagonists.

Criteria for β-adrenergic antagonist selection: selectivity, ISA, additional vasodilating activity, drug duration, influence on lypide and carbohydrate metabolism, hydrophilia and lipophily.

Write out the following drugs in different medicinal forms: propranolol, nadolol, pindolol, betaxolol.

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LESSON 11. DRUGS AFFECTING AFFERENT NERVES ENDINGS

Key questions:

Drugs affecting the afferent nerve ending area.

1. Local anesthetics: procaine* (novocaine), tetracaine (dicaine), benzocaine (anesthezine), lidocaine*, bupivacaine*, articaine* (ultracaine), ropivacaine*, benzofurocaine.

   Classification, mechanism of action, comparative characteristics, the use in anesthesia of different types, side effects of local anesthetics.

2. Astringent drugs: tannin*, zinc oxide*, oak bark broth, sage leaves infusion.

3. Mucilaginous drugs: amylum and flax seeds mucilages*.

4. Absorbent drugs: activated carbon*, talc.

5. Irritant drugs: mustard plasters, refined terpentine oil, menthol*, ammonia solution*.

General characteristics of the groups, mechanisms of action, pharmacological effects, use in medicine.

Write out the following drugs in different medicinal forms: procaine, lidocaine, activated carbon, menthol.

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FINAL LESSON ON DRUGS AFFECTING PERIPHERAL NERVOUS SYSTEM

Objective: To systematize and consolidate the knowledge of the pharmacological properties and medical use of drugs affecting the peripheral innervation.

During the preparation for the final lesson you should repeat classification, pharmacodynamics, pharmacokinetics, indications and contraindications of the following drug groups:

1. Cholinomimetic and anticholinesterase drugs.
2. Cholinergic antagonist drugs.
3. Adrenergic and antiadrenergic drugs.
4. Drugs affecting the afferent nerve endings (anesthetics, astringents, mucilaginous drugs, absorbents, irritants).

Write out the following drugs in different medicinal forms: lidocaine, pirenzepine, procaine, trihexyphenidyl, pilocarpine, salbutamol, neostigmine, propranolol, atropine, nadolol, hyoscine butylbromide, betaxolol.

Questions for individual study:

1. Draw the peripheral nervous system (PNS) scheme and indicate at it the sympathetic and parasympathetic divisions of the autonomic nervous system, somatic nerve fibers.
2. List the effects caused by increased activity of the sympathetic division of the autonomic nervous system.
3. List the effects caused by increased tone of parasympathetic autonomic nervous system.
4. Draw a generalized scheme of the cholinergic synapses structure.
5. What are the levels at which the pharmacological effect on the nerve impulse transmission in the cholinergic synapse is possible?
6. Draw a generalized scheme of the adrenergic synapse structure.
7. What are the levels at what levels the pharmacological effect on the nerve impulses transmission in the adrenergic synapse is possible?
8. Definition of co-transmitters. Describe their role in synaptic transmission.
9. Heterogeneity of cholinergic, adrenergic and dopamine receptors, their types and subtypes.
10. The role of presynaptic cholinergic, adrenergic and dopamine receptors in the nerve impulses transmission in the cholinergic, adrenergic and dopamine synapses accordingly.
11. The mechanism of transmembrane signal transmission on activating each receptors type: M_1-, M_2-, M_3-, N_n- and N_m-cholinergic; α_1-, α_2-, β_1-, β_2-, β_3-adrenergic; D_1- and D_2-dopamine receptors.
12. Localization and pharmacological effects of stimulation of each receptors type: M_1-, M_2-, M_3-, N_n- and N_m-cholinergic; α_1-, α_2-, β_1-, β_2-, β_3-adrenergic; D_1- and D_2-dopamine receptors.
13. Classify (name groups and drugs) cholinomimetic drugs; anticholinesterase drugs; cholinergic antagonist drugs; adrenergic and antiadrenergic drugs.
14. List the drugs from the group of M-cholinomimetics; N-cholinomimetics; M, N-cholinomimetics of direct action; drugs affecting the acetylcholine release; anticholinesterase drugs; α-adrenergic and antiadrenergic drugs, β-adrenergic and antiadrenergic drugs, sympathomimetics and sympatholytics.
15. Classify and specify the location at the PNS scheme of M-cholinomimetics, N-cholinomimetics, M, N-cholinomimetics of direct action, drugs affecting the acetylcholine release; anticholinesterase drugs; α-adrenergic and antiadrenergic drugs, β-adrenergic and antiadrenergic drugs, sympathomimetics and sympatholytics.

16. Specify the mechanism of action and list the pharmacological effects of M-cholinomimetics, N-cholinomimetics, M, N-cholinomimetics of direct action, drugs affecting the acetylcholine release; anticholinesterase drugs; α-adrenergic and antiadrenergic drugs, β-adrenergic and antiadrenergic drugs, sympathomimetics and sympatholytics.
17. List the side effects of M-cholinomimetics, N-cholinomimetics, M, N-cholinomimetics of direct action, drugs affecting the acetylcholine release; anticholinesterase drugs; α-adrenergic and antiadrenergic drugs, β-adrenergic and antiadrenergic drugs, sympathomimetics and sympatholytics.
18. List the main indications and contraindications for the use of M-cholinomimetics, N-cholinomimetics, M, N-cholinomimetics of direct action, drugs affecting the acetylcholine release; anticholinesterase drugs; α-adrenergic and antiadrenergic drugs, β-adrenergic and antiadrenergic drugs, sympathomimetics and sympatholytics.
19. List the drugs, specify the mechanism of action and the use in medicine for the following groups of drugs: astringents, mucilaginous drugs, absorbents, irritants.
20. Classification of local anesthetics. The mechanism of action of local anesthetics, their side effects.

LESSON 12. GENERAL ANESTHETICS. ETHYL ALCOHOL. ANTICONVULSANTS

1. General anesthetics (GA)
   1.1. The definition of general anesthesia (narcosis). A history of the discovery of anesthesia (diethyl ether). The concept of inhalation anesthesia and non inhalation anesthesia. Varieties of anesthesia (basic, combined, introductory, reinforcing).
   1.2. The determinants of the depth of anesthesia (the concentration or partial pressure of GA in the CNS).
   1.3. The determinants of development speed and anesthesia recovery:
      - concentration of GA in the inspired air;
      - alveolar ventilation;
      - alveole-blood transfer;
      - blood-tissue transfer.
   1.4. Stages of anesthesia.
   1.5. The requirements for an ideal anesthetic.
   1.6. The concept of the activity of inhalation GA (minimum alveolar concentration – MAC). Clinical use.
   1.7. Molecular and neurophysiological mechanisms of action of GA.
   1.8. The main classes of GA
      1.8.1. Drugs for inhalation anesthesia:
         - liquid volatiles – halothane* (fluothane), isoflurane*, sevoflurane*;
         - gases – nitrous oxide*.

      Comparative characteristics of inhalation GA.
      1.8.2. Drugs for non inhalation (intravenous) anesthesia:
         - barbiturates – sodium thiopental*;
         - non barbiturates GA – propofol, etomidate, ketamine* (dissociative anesthesia).

Comparative characteristics of non inhalation GA according to the duration, development speed and anesthesia recovery, side and toxic effects.

2. Ethyl alcohol (ethanol)
   2.1. Local and resorptive effects of ethyl alcohol; use in medicine.
   2.2. Acute intoxication with ethyl alcohol. Medical aid.
   2.3. Chronic intoxication with ethyl alcohol (alcoholism). Principles and drugs for alcoholism: disulfiram (teturam, radoter, esperal), apomorphine, acamprosate.
3. Anticonvulsants (antiepileptic drugs)
   3.1. Drugs effective in generalized seizures:
      - tonic-clonic seizures – sodium valproate*, carbamazepine*, phenytoin, lamotrigine*, phenobarbital, primidone;
      - absence seizures – ethosuximide*, sodium valproate*;
      - myoclonic seizures – sodium valproate*, clonazepam*, ethosuximide, lamotrigine.

   3.2. Drugs effective in partial seizures: carbamazepine*, sodium valproate*, phenytoin*, lamotrigine, gabapentin.
   3.3. Drugs effective in status epilepticus: lorazepam*, diazepam*, clonazepam*, phenytoin.
   3.4. Drugs for the relief of seizures of any etiology: diazepam, clonazepam, magnesium sulfate, GA, antipsychotic drugs, muscle relaxants, paracetamol (hyperthermic convulsions).

   Mechanisms of anticonvulsant action of anticonvulsants. Principles of use. Side effects.
4. Antiparkinsonian drugs
   4.1. Dopaminergic drugs: levodopa*, amantadine, selegiline, bromocriptine.
   4.2. DOPA-decarboxylase inhibitors: carbidopa, benserazide* and their combination with levodopa – nacom*, madopar.
   4.3. Central cholinergic antagonists: trihexyphenidyl*, biperiden.

   Principles of drug correction of extrapyramidal disorders. Mechanisms of action and side effects of antiparkinsonian drugs.
5. Drugs to reduce spasticity – central muscle relaxants: baclofen, tizanidine, tolperisone.

Write out the following drugs in different medicinal forms: sodium valproate, carbamazepine, phenytoin, ethosuximide, lorazepam, tolperisone, nacom, trihexyphenidyl.

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LESSON 13. ANALGETIC DRUGS

1. General concept of pain and pain relief

   1.1. Nociceptive system: specific and nonspecific ways of conducting sensation of pain; pain mediators.

   1.2. Antinociceptive system: antinociceptive system mediators and their precursors; opiate receptors – localization, heterogeneity (μ, κ, δ, σ), effects of their activation.

2. Narcotic analgetics (opioids) and their antagonists

   2.1. Opiod basic pharmacological effects:

   - molecular and cellular mechanisms of action;
   - influence on the CNS (analgesia, euphoria, sedative action, respiratory depression, depression of cough reflex, hypothermal and emetic action, myosis, increase of intracranial pressure, muscular rigidity);
   - cardiovascular effects;
   - influence on the gastro-intestinal tract;
   - urogenital effects;
   - endocrine effects.

   2.2. Opioids pharmacokenetics.

   2.3. Opioids basic groups and their characteristics.

   2.3.1. Full agonists of opioid receptors:
   - natural opium alkoloids (phenanthrene derivatives) – morhine, codeine, dihydrocodeine;
   - phenylpiperidines – trimeperidine (promedol), fentanil;
   - diphenylpropylamines – metadon.

   2.3.2. Partial agonists of opioid receptors − buprenorphine.

   2.3.3. Agonists-antogonists of opioid receptors − pentazocine, nalbuphine.

   2.3.4. Opioid antogonists – naloxone, naltrexone.

   2.4. The fields of medical use: acute and chronic pains, cough, diarrhea, pulmonary edema, premedication in aneasthesia, neuroleptanalgesia.

   2.5. Opioid acute poisoning and medical aid measures.

   2.6. Side and toxic effects. Chronic toxicity and drug abuse (narcomania, morphynism). Narcomania and abstinent syndrome treatment.

   2.7. Drug interaction with sedative-hypnogenic and antipsychotic drugs, cholinergic antagonists, α-adrenergic antagonists, MAO inhibitors, tricyclic antidepressants, amphetamine.

3. Nonnarcotic analgetics

   3.1. Analgetics with mixed (opioid and nonopioid) mechanisms of action – tramadol (included in the list of dangerous psychotropic drugs).

   3.2. Nefopam (central analgetic).

   3.3. Analgetics-antipyretics:
   - central cyclooxygenase (COX) inhibitors – paracetomol;

- cyclooxygenase inhibitors in peripheral tissues and the CNS (peripheral COX inhibitors): acetylsalicylic acid, ibuprofen, keterolac, metamizole (analgin);
- drugs for treating malignant hyperthermia – dantrolene.

Mechanisms of analgesic and antipyretic actions. Use in medicine: indications, side-effects, contraindications. Comparative characteristics of nonnarcotic and narcotic analgetics.

4. Combined analgetics

4.1. Spasmoanalgetics – baralgin, spasmolgon; Novigan.

4.2. Combined drugs, containing analgetics:
- metamizole + caffeine + thiamine (Benalgin);
- paracetomol + propyphenazone + caffeine (Saridon);
- paracetomol + ibuprofen (Brustan);
- paracetomol + caffeine + codeine (Proxol forte);
- dextropropoxifen + paracetomol (Co-proxamol);
- metamizole + paracetomol + caffeine + codeine + phenobarbital (Pentalgin ICN);
- metamizole + naproxen + caffeine + codeine + phenobarbital (Pentalgin-N).

5. Drugs, used in neuropathic painful syndromes

5.1. Migraine.

5.1.1. Drugs for the treatment of acute seizures:
- nonnarcotic analgetics – acetylsalicylic acid, paracetomol and others;
- Serotonine agonists (S_1 ($5HT_1$)-receptors) – sumatriptan, naratriptan;
- Ergot alkaloids – ergotamine;
- Antiemetics – metoclopramide, domperidone.

5.1.2. Seizures prophylaxis – pizotifen, β-adrenergic antagonists, tricyclic antidepressants, sodium valproate, calcium channel blockers, cyproheptadine.

5.2. Neuralgias: postherpetic, trifacial and glossopharyngeal nerves, etc. – carbamazepine, phenytoin, sodium valproate, tricyclic antidepressants.

5.3. Acute and chronic painful syndromes (auxiliary drugs):
- clonidine (myocardial infarction, tumors, postoperative pains, etc.);
- amitriptyline (chronic pains, tumours, phantom pains, etc.);
- ketamine (tumors);
- calcitonin (tumor bones metastases);
- octreotide (hormone-secreting tumors of gastrointestinal area and pancreas);
- glucocorticosteroids (compressive neuropathy);
- benzofurocaine (pancreatitis, peritonitis, acute pleurisy, colics, etc.);
- other drugs with analgetic effect – baclofen (GABA (gamma-aminobutyric acid)-ergic drug), diphenhydramine (antihistamine drug).

Write out the following drugs in different medicinal forms: tramadol, trimeperidine, nefopam, baralgin, ergotamine, sumatriptan.

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LESSON 14. ANXIOLITIC AND SEDATIVE-HYPNOGENIC DRUGS. ANTIPSYCHOTISC

Psychopharmacology in medicine, everyday and social life. Basic groups of psychotropic drugs.

1. Anxiolitic and sedative-hypnogenic drugs
   1.1. Anxiolitic, sedative and hypnogenic effects – essence, similarity and differences.
   1.2. Chemical classes and pharmacological groups of drugs used in psychoneurotic disorders and sleep impairments.
      1.2.1. Anxiolitics (tranquilizers).
         1.2.1.1. Benzodiazepines:
         - an average-term action ($T_{1/2}$ 5-24 hours) – alprazolam*, lopazepam, phenazepam;
         - a long-term action ($T_{1/2}$ > 24 hours) – chlordiazepoxide*, diazepam*;
         - daytime tranquilizers (without sedative component) – oxazepam (an average-term action), medazepam*, dipotassium clorazepate (a long-term action).

         1.2.1.2. Nonbenzodiazepine anxiolitics (atypical) – buspirone*.
      1.2.2. Benzodiazepine antogonists – flumazenil.
      1.2.3. Sedative-hypnogenic drugs:
         1.2.3.1. Sedative (obtundent) drugs:
         - herbal drugs of valerian, motherwort, balm (mellissa), kava;
         - combined drugs – corvalol.

         1.2.3.2. Hypnogenic drugs (hypnotic) drugs (recommended period of drugs use – no more than 3 weeks):
         - benzodiazepines with the marked hypnotic effect:
            - a short-term action ($T_{1/2}$ < 5 hours) – triazolam*;
            - an average-term action – temazepam*, lormetazepam;
            - a long-term action – nitrazepam*, flunitrazepam, flurazepam;
         - nonbenzodiazepines – zaleplon* ($T_{1/2}$ – 1 hours, take up to 2 weeks); zolpidem* ($T_{1/2}$ – 2 hours, take up to 4 weeks); zopiclone*($T_{1/2}$ – 5-6 hours, take up to 4 weeks);
         - antihistamine drugs – diphenhydramine, promethazine;
         - aliphatic derivatives – chloral hydrate, triclofos sodium, clomethiazole;
         - barbiturates – amobarbital (for the treatment of severe obstinate (hard-to-treat) insomnia in patients taken barbiturates).

         1.2.3.3. Drugs used in biorhythm disorders (when changing time zones) – melatonin.
   1.3. Parmacological effects, neurophysiological and molecular mechanisms of action of anxiollitic and sedative-hypnogenic drugs. Pharmocokenetics. Side and toxic effects. The fields of anxiollitic and sedative-hypnogenic drug use, the limits of their use.
2. Antipsychotic drugs (neuroleptics, APD)
   2.1. Neuroleptic distinctive features as a special class of psychopharmacological drugs. The main discovery milestones and creation of neuroleptics. The concept of neuroplegia.
   2.2. Modern antipsychotic drugs:
      - phenothiazine derivatives – chlorpromazine*, thioridazine, fluphenazine, trifluoperazine;

- butyrophenone derivatives – haloperidol*, benperidol (additionally taken to contol antisocial sexual behavior);
- thioxanthene derivatives – flupentixol*, zuclopenthixol;
- benzamide derivatives – sulpiride;
- atypical antipsychotic drugs – clozapine*, risperidone, olanzapine, quetiapine.

2.3. Neurophysiological effects and APD mechanisms of action. APD pharmacokinetics. Principals of APD use. Use of depot injection medicinal forms. Side and toxic effects (influence on the CNS, vegetative functions, endocrine system).

Write out the following drugs in different medicinal forms: alprazolam, phenazepam, diazepam, medazepam, triazolam, nitrazepam, zolpidem, chlorpromazine**.**

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LESSON 15. ANTIDEPRESSANTS. PSYCHOSTIMULANTS. NOOTROPIC DRUGS AND TONICS

1. Antidepressants (thymoleptics)
   1.1. Monoamine reuptake inhibitors.
      1.1.1. Noradrenalin and serotonin reuptake inhibitors.
         - tricyclic antidepressants – imipramine*, amitriptyline*, doxepin, amoxapine;
         - other antidepressants – venlafaxine (without antimuscarine and sedative effects).
      1.1.2. Serotonin reuptake inhibitors: fluoxetine*, sertraline*, paroxetine.
      1.1.3. Noradrenalin reuptake inhibitors: maprotiline, reboxetine.
   1.2. Atypical antidepressants (with additional anxiolytic and sedative effects):
      - mirtazapine (blocks presynaptic α_2-adrenoreceptors in serotonergic and noradrenalinergic synapses);
      - mianserine (blocks presynaptic α_2-adrenoreceptors and $5HT_2$-serotonine receptors);
      - tianeptine (strengthens neuronal serotonin reuptake);
      - trazodone (weakens central amphetamine effects and peripheral noradrenaline effects, but strengthens the effects of serotonin precursor, selectively inhibits serotonin reuptake).
   1.3. Monoamine oxidase (MAO) inhibitors:
      - with irreversible effect – phenelzine;

- with reversible effect – moclobemide*.

1.4. Herbal drugs with mild antidepressant effect: St. John's wort herb (negrustin), hypericin.

Effects of antidepressants on monoaminergic mechanisms of neuronal transmission, receptor and postreceptor effects. Pharmacokinetics of antidepressants. Side effects induced by histamine, muscarine and α_2-adrenoreceptor blocks. Use in medicine: indications and contraindications.

2. Normothymic (antimanic) drugs

2.1. Lithium salts – lithium carbonate*, lithium oxybate, etc.

2.2. Anticonvulsants – carbamazepine, sodium valproate.

2.3. Antipsychotic drugs and benzodiazepines.

Pharmacokinetics and mechanisms of action of lithium salts. Use of lithium salts in medicine: indications, side effects, contraindications.

3. Nootropic drugs (neurometabolic stimulants, neuroprotectors)

3.1. Mainly improving metabolic processes: piracetam* (nootropil), piritinol, meclofenoxate, cerebrolysin.

3.2. Mainly improving cerebral blood flow: vinpocetine* (cavinton), nimodipine*.

3.3. Activators of central cholinergic processes: donepezil hydrochloride*, rivastigmine.

3.4. Activators of central dopaminergic processes – memantine (blocks potential-dependant NMDA-receptors).

Pharmacodynamics and pharmacologic effects. Use in medicine – disorders of intellectual, mnestic and cognitive functions of different genesis: cerebral atherosclerosis, cerebral blood flow disorder, age, Alzheimer's disease, etc. Side effects and contraindications.

4. Psychostimulants:

- methylxanthines – caffeine*;
- arylalkylamines – mesocarb*, methylphenidate (meridil) amphetamine (fenamine).

5. Tonics

5.1. Tonics and adaptogens:

- herbal drugs – ginseng tincture*, schizandra (magnolia-vine) tincture, eleutherococ liquid extract, rhodiola liquid extract, echinopanax (devil's club) tincture;
- animal drugs – pantocrin*, rantarine.

5.2. Cerebrospinal function stimulants – strychnine, securinine.

Molecular mechanisms of action, pharmacological effects of tonics and psychostimulants. Use in medicine: indications, side effects, restrictions.

6. Analeptics: doxapram, bemegride, aethimisol, caffeine sodium benzoate.

Mechanisms of action, pharmacological effects. Use in medicine: indications, side effects, contraindications.

Write out the following drugs in different medicinal forms: amitriptyline, fluoxetine, sertraline, mesocarb, lithium carbonate, piracetam, tianeptine.

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LESSON 16. FINAL LESSON ON DRUGS AFFECTING CENTRAL NERVOUS SYSTEM

Objective: To systematize and consolidate the knowledge of the pharmacological properties and medical use of drugs affecting the central nervous system.

During the preparation for the final lesson you should repeat classification, pharmacodynamics, pharmacokinetics, indications and contraindications of the following drug groups:

1. General anesthetics. Ethyl alcohol. Anticonvulsants
2. Analgetic drugs
3. Anxiolitic and sedative-hypnogenic drugs. Antipsychotisc
4. Antidepressants. Psychostimulants. Nootropic drugs and tonics.

Write out the following drugs in different medicinal forms: alprazolam, amitriptyline, baralgin, carbamazepine, chlorpromazine, diazepam, ergotamine, ethosuximide, fluoxetine, lithium carbonate, lorazepam, medazepam, mesocarb, nacom, nefopam, nitrazepam, phenazepam, phenytoin, piracetam, sertraline, sodium valproate, sumatriptan, tianeptine, tolperisone, tramadol, triazolam, trihexyphenidyl, trimeperidine, zolpidem.

Questions for individual study:

1. General anesthesia. The concept of inhalation anesthesia and non-inhalation. Types of anesthesia (primary, combined, introductory, potentiated).
2. Stages of anesthesia.
3. Requirements for the ideal anestetic.
4. Classification of anestetics.
5. Comparative characteristics of inhaled anestetics.
6. Comparative characteristics intravenous anestetics.
7. Application of anesthesia in dental practice.
8. The main groups of anticonvulsants.
9. The mechanism action of anticonvulsants. Side effects.
10. The main groups of antiepileptic drugs (list drugs).
11. Principles of drug treatment of extrapyramidal disorders.
12. List the drugs for the relief of seizures of any ethilogy.
13. The main groups of opioid drugs.
14. The main pharmacological effects of opioids.
15. The mechanism of the analgesic effects of opioids.
16. Areas of medical use of opioids.
17. Acute poisoning with opioids and assistance measures.
18. Adverse and toxic effects of opioids. Chronic toxicity and drug abuse.
19. Analgesics with mixed (opioid and non-opioid) mechanism of action.
20. The main group of analgesics, antipyretics; called drugs.
21. Mechanisms of analgesic and antipyretic effects of analgesics-antipyretics (NSAIDs).
22. Indications for use and side effects of analgesics-antipyretics.
23. Combined analgetics.
24. Drugs used in migraine.
25. Comparative characteristics of narcotic and non-narcotic analgesics. Strength of the analgesic effect, side and toxic effects.

26. Use of analgesics in dentistry.
27. Anxiolytic, sedative and hypnogenic effects. The essence, similarities and differences.
28. Chemical and pharmacological classes of groups of drugs used in psychoneurotic and sleep disorders.
29. Classification of anxiolytics, name drugs.
30. What are sedative, name drugs.
31. List the hypnotics drugs.
32. Special features of neuroleptics as a special class of psychopharmacological agents.
33. Classification of antipsychotic drugs according its chemical structure.
34. List the atypical antipsychotics.
35. Neurophysiological effects and mechanisms of action of antipsychotic.
36. Adverse and toxic effects of antipsychotic drugs (effect on the central nervous system, autonomic function, endocrine system).
37. Adverse and toxic effects of anxiolytics.
38. The pharmacological effects of anxiolytics.
39. Indications for use of anxiolytics.
40. Indications for use of antipsychotics.
41. List the major groups of antidepressants.
42. The mechanism of action of tricyclic antidepressants.
43. List the atypical antidepressants and specify the features of their properties as opposed to the typical.
44. The use of antidepressants in medicine.
45. Side effects of antidepressants due to the blockade of histamine, muscarinic and α_1-adrenergic receptors.
46. List the group nootropics.
47. Pharmacological and side effects of antidepressants.
48. Mechanisms of action of nootropic drugs.
49. Indications for nootropics.
50. The main groups of psychostimulants.
51. The mechanism of action and pharmacological effects of psychostimulants.
52. Indications for use and side effects of stimulants.
53. List the tonics.
54. The mechanism of action, pharmacological effects and indications for tonics.
55. What is actoprotectors?
56. Pharmacological effects and indications for actoprotectors.
57. List the analeptic agents.
58. The mechanism of action and pharmacological effects analeptics.
59. Indications for use and side effects analeptics.
60. Features of CNS depressants in dentistry.
61. Features of the central nervous system activators in dentistry.

LESSON 17. DRUGS AFFECTING THE RESPIRATORY SYSTEM

1. Bronchodilators and other drugs used in bronchial asthma (BA)
   1.1. Principles of pharmacotherapy of BA and relieving of asthmatic attacks.
   1.2. The major classes of pharmacological drugs used in BA. Mechanisms of action, the main pharmacological effects, side effects, contraindications.
      1.2.1. Adrenergic agonists:
      - Selective β_2-adrenomimetics: short-term action (up to 3-4 hours) – salbutamol*, terbutaline, fenoterol; long-term action (up to 10-12 hours) – salmeterol*, formoterol, clenbuterol.
      - Other adrenomimetics – ephedrine, orciprenaline, isoprenaline, epinephrine (emergency treatment of acute allergic and anaphylactic reactions).

      1.2.2. M-cholinergic antagonists – ipratropium bromide*, oxitropium bromide, tiotropium (long-term action).

      1.2.3. Theophylline drugs:
      - to relieve asthmatic attacks – aminophylline* (euphyllin);
      - long-term action – teotard, teodur, teodur-24, euphylong.

      1.2.4. Antiallergic drugs:
      - mediators of allergy release inhibitors – cromoglicic acid and its sodium salt, nedocromil, ketotifen;
      - Leukotriene receptor antagonists – montelukast, zafirlukast.

      1.2.5. Glucocorticosteroids – beclomethasone*, budesonide, fluticasone.

      1.2.6. Combined bronchodilators:

      fluticasone + salmeterol (Seretide);

      budesonide + formoterol (Symbicort);

      fenoterol + ipratropium bromide (Berodual);

      fenoterol + cromoglicic acid (Ditek).

      1.2.7. Other drugs for the treatment of BA – antihistamines, hyposensitization drugs (allergen extracts), methotrexate, etc.
2. Respiratory stimulants and surfactants
   2.1. Stimulants of the respiratory center – almitrine (peripheral respiratory analeptic), doxapram, nikethamide, bemegride, aethimizolum;
   2.2. Surfactants – colfosceril palmitate (ekzosurf), beractant, poractant alpha and stimulants of their synthesis – ambroxol.
3. Expectorant and mucolytic drugs
   3.1. Drugs to facilitate sputum discharge:
      - reflex action – herbal drugs: ipecacuanha, thermopsis, istoda, marshmallow, licorice;
      - resorptive action – potassium iodide, sodium iodide, terpin hydrate, guaifenesin (with additional mucolytic action), herbal drugs: thyme herb, anise oil, eucalyptus oil, etc.

   3.2. Drugs reducing the viscosity and elasticity of sputum:
      - synthetic mucolytic (secretolytic) drugs: carbocisteine, acetylcysteine, bromhexine, ambroxol, mesna;
      - enzymes: dornase alfa, deoxyribonuclease.

4. Antitussives drugs
   4.1. Drugs of central action:
      - narcotic (opioid) – codeine, morphine;
      - nonnarcotic – dextromethorphan, oxeladin, pholkodin (containing dextromethorphan, terpin hydrate, levomenthol).
   4.2. Drugs of peripheral action – prenoxdiazine, pronilid.
5. Decongestants
   5.1. Local intranasal decongestants:
      - short-term action (up to 4-6 hours) – naphazoline;
      - average-term action (up to 8–10 hours) – xylometazoline;
      - long-term action (more than 12 hours) – oxymetazoline.
   5.2. Systemic decongestants – pseudoephedrine.
6. Drugs, used for the treatment of pulmonary edema
   6.1. Narcotic analgesics (trimepiridine, morphine, fentanil) and neuroleptics (droperidol, haloperidol) – elimination of pain syndrome, anxiety, tachypnea, decrease venous return of blood to the heart.
   6.2. Diuretics (furosemide, toxic pulmonary edema – mannitol) – decrease in blood volume, reducing the load on the heart, tissue dehydration (mannitol).
   6.3. Drugs with positive inotropic effect (dobutamine, dopamine, digoxin).
   6.4. Glucocorticosteroids (prednisolone, hydrocortisone) – bronchial spasmolytic and antiallergic effects.
   6.5. Nitrates and nitrate-like drugs (nitroglycerin, isosorbide dinitrate) – reduction of the hydrostatic pressure in the pulmonary vessels and reduction of preload on the heart.
   6.6. Ganglionic blockers (azamethonium bromide) – reduction of the hydrostatic pressure in the pulmonary vessels (rarely used).
   6.7. Aminophylline – eliminating of bronchospasm and improving of alveolar ventilation.
   6.8. Oxygen therapy, correction of acid-base balance, defoamers (ethyl alcohol).
7. Drugs that induce lung diseases
   7.1. Acetylsalicylic acid and other NSAIDs – aspirin asthma and pneumonites.
   7.2. M-cholinomimetics and β-adrenergic antagonists (including eye drops – pilocarpine, timolol) – bronchospasm.
   7.3. ACE inhibitors – dry cough.
   7.4. Amiodarone – chronic interstitial pneumonites with fibrosis.
   7.5. Cytostatics – pulmonary fibrosis.

Write out the following drugs in different medicinal forms: codeine, salbutamol, salmeterol, ketotifen, beclomethasone, terbutaline, zafirlukast.

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LESSON 18. DRUGS AFFECTING THE GASTROINTESTINAL TRACT

1. Drugs affecting appetite and the processes of digestion
   1.1. Antianorexigenic drugs (stimulating appetite):
      - reflex action – bitters (wormwood tincture, the sap of plantain);
      - central action – cyproheptadine;
      - stimulating anabolic processes – insulin, anabolic steroids (nandrolone).
   1.2. Drugs that improve the processes of digestion:
      - enzymes – pepsin, tilactase;
      - hydrochloric acid;
      - a combination of enzymatic and acidic drugs (acidin-pepsinum, gastric juice).
   1.3. Drugs for the treatment of obesity:
      1.3.1. Drugs affecting the gastrointestinal tract (GIT):
      - antienzymes – orlistat;
      - increasing the volume of intestinal contents – methylcellulose.

      1.3.2. Anorexigenic drugs of central action:
      - sympathomimetics: phenylpropanolamine and phentermine; dexfenfluramine and phentermine – risks (development of heart failure, pulmonary hypertension) and restriction of their use.

      1.3.3. Hypoglycemic drugs (oral) – metformin, acarbose.
2. Antispastic and other drugs affecting gastrointestinal motility
   2.1. Drugs reducing the tone and motility.
      2.1.1. Cholinergic antagonists:
      - tertiary amines – dicycloverine, atropine and other belladonna alkaloids;
      - quaternary ammonium compounds – hyoscine butylbromide, propantheline.

      2.1.2. Spasmolylics of myotropic action: drotaverine, papaverine, mebeverine, pinaverium bromide.
   2.2. Stimulants of motility:
      2.2.1. Cholinomimetics – pyridostigmine bromide, neostigmine.
      2.2.2. Dopamine antagonists – metoclopramide, domperidone.
3. Emetic and antiemetic drugs
   3.1. Emetics – apomorphine, syrup of ipecacuanha, hypertensive (15%) sodium chloride solution.
   3.2. Antiemetics:
      3.2.1. S_3 ($5HT_3$)-serotonin receptors antagonists – ondansetron, granisetron, tropisetron.
      3.2.2. Dopamine D_2-receptors antagonists – metoclopramide, domperidone, dimethpramid, thiethylperazine.
      3.2.3. Histamine H_1-receptors antagonists – promethazine.
      3.2.4. Drugs against sickness syndrome – scopolamine (hyoscine hydrobromide), tablets "Aeron".
      3.2.5. Other antiemetic drugs – nabilone (synthetic cannabinoid), dexamethasone.

   The selection of drugs depending on the mechanism of vomiting and features of its antiemetic action.

4. Antidiarrheal drugs

   4.1. Opiate receptor agonists – loperamide*, diphenoxylate, codeine, Co-phenotrop (diphenoxylate + atropine, 100:1).

   4.2. Adsorbent drugs – activated carbon, ion exchange resins (cholestyramine), diosmectite (smecta).

   4.3. Astringents – oak bark, bilberry fruits, St. John's wort herb, chamomile flowers, sage leaf.

5. Laxative drugs

   5.1. Drugs causing chemical irritation of the intestine:

      5.1.1. The group of anthraquinones – drugs of senna (sennosides A and B) and rhubarb.

      5.1.2. Other drugs – bisacodyl*, castor oil, phenolphthalein, sodium picosulfate.

   5.2. Drugs, causing mechanical irritation of the intestine:

      5.2.1. With osmotic properties – magnesium sulfate, sodium sulfate, lactulose, macrogols.

      5.2.2. Increasing the volume of the contents of the intestine (bulk laxatives) – methylcellulose.

   5.3. Drugs softening stool – liquid paraffin, vaseline oil.

   Localization of action and the onset rate of laxative effect. Indications and contraindications of lacatatives use.

6. Antiflatulent (antifoaming) drugs

   6.1. Herbal drugs – the fruit of fennel, dill, caraway.

   6.2. Synthetic drugs – simethicone, dimethicone, simethicone + alverin (Meteospazmyl).

7. Drugs used in the hyperacidity of gastric content, reflux esophagitis, gastric ulcer and duodenal ulcer

   7.1. Drugs reducing the activity of acid-peptic factor.

      7.1.1. Antisecretory drugs:

      - inhibitors of H^+-K^+-ATPase (of proton pump) – omeprazole*, lansoprazole, rabeprazole, esomeprazole;
      - histamine H_2-receptors antagonists – famotidine*, ranitidine, nizatidine;
      - selective M_1-cholinergic antagonists – pirenzepine*;
      - prostaglandin analogues – misoprostol;
      - gastrin receptor antagonists – proglumide.

   The principles of the actions of the antisecretory drugs, comparative effeciency, speed and duration of action. Indications, side effects and their prevention.

      7.1.2. Antacids:

      - containing aluminium and magnesium – aluminium hydroxide*, aluminium phosphate (phosphalugel), magnesium hydroxide*, magnesium carbonate;
      - combined – aluminium–magnesium complexes (almagel, gastal, hydrotalcite, etc.), simethicone containing antacids (maalox plus, etc.), alginate containing antacids (algicon, etc.);
      - sodium bicarbonate.

Neutralizing activity, speed and duration of action of antacids. Side effects of antacids. Precautions and restrictions of their use.

7.2. Drugs, which have a protective effect on the mucous membrane of the stomach and intestines (gastroprotectors):

- drugs forming a protective layer on the surface of the ulcer – sucralfate*, bismuth tripotassium dicitrate*;
- carbenoxolone.

7.3. Drugs, which have a bactericidal effect on *Helicobacter pylori* – a combination of antibiotics (clarithromycin, amoxicillin, metronidazole) and antisecretory drugs (omeprazole, rabeprazole, lansoprazole, esomeprazol, ranitidine bismuth citrate).

7.4. Other ulcer-healing drugs:

- reparants – solcoseryl, gastrofarm, sea buckthorn oil;
- nandrolone (anabolic steroids);
- drugs of vitamins A, U;
- dalargin.

8. Hepatotropic drugs

8.1. Bile-expelling drugs.

8.1.1. Cholesecretics (choleretics):

- bile acid drugs – dehydrocholic acid, allohol, holenzim;
- synthetic choleretics – osalmid, cyclovalone, hydroxymethyl nicotinamide;
- herbal drugs – corn silk, sandy everlasting, rose hips, common tansy;
- hydrocholeretics – mineral water.

8.1.2. Cholekinetics (cholagogue):

- true cholekinetics – cholecystokinin, magnesium sulfate, barberry drugs;
- spasmolytics – drotaverine, papaverine, M-cholinergic antagonists.

8.1.3. Drugs with bile-expelling and spasmolytic action – himekromon.

8.2. Hepatoprotectors: betaine, methionine, essentiale, silibinin, silibor.

8.3. Cholelitholytic drugs – ursodeoxycholic acid.

9. Drugs affecting the function of the pancreas

9.1. Stimulants of secretion – dilute hydrochloric acid.

9.2. Pancreatic enzyme replacement therapy (PERT) – pancreatin*; panzinorm, festal.

9.3. Drugs decreasing the secretion – M-cholinergic antagonists, antacid drugs.

9.4. Inhibitors of proteolysis – ovomin.

9.5. Diagnostic drugs – secretin, cholecystokinin.

Principles of pharmacotherapy of acute and chronic pancreatitis.

Write out the following drugs in different medicinal forms: drotaverine, granisetron, ondansetron, metoclopramide, loperamide, omeprazole, famotidine, pirenzepine, bismuth tripotassium dicitrate, loperamide, essentiale, pancreatin.

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LESSON 1 (19). DRUGS AFFECTING BLOOD SYSTEM

HEMOPOIESIS MODULATORS

1. Drugs for the treatment of anemias

1.1. . Drugs used for the treatment of iron-deficiency (hypochromic) anemias:

- iron drugs to be administered orally – ferrous sulfate* and other iron (II) salts*;
- iron drugs to be administered parenterally – iron (III) sucrose complex*;
- drugs combining iron with folic acid, ascorbic acid, cyanocobalamin, cobalt and other components – (fefol, ferroplex, speisferron and others);

1.1.1. Causes of hypochromic anemias. Principles of pharmacotherapy.

1.1.2. Pharmacodynamics and pharmacokinetics of iron drugs; side and toxic effects.

1.1.3. Poisoning with iron drugs and aid measures – deferoxamine*

1.2. Drugs used for megaloblastic (hyperchromic) anemias: cyanocobalamin*, folic acid*. Biological role of vitamins B_9 and B_{12}, physiological need, causes of hypovitaminoses, therapeutical use (indications, dosing, routes of administration, side effects).

1.3. Drugs used for hypoplastic, hemolytic, renal anemias: erythropoietins alfa* and beta*; antilymphocyte globulin*; pyridoxine; glucocorticosteroids.

2. Drugs used for leucopenia:

- colony-stimulating factors: molgramostim*, filgrastim;
- pyrimidine derivatives: methyluracil*, pentoxil.

3. Drugs inhibiting hemopoiesis – anticancer drugs: methylthiouracil, bleomycin, etoposide, etc.)

HEMOSTASIS MODULATORS

4. Antithrombotic drugs

4.1. Antiplatelet drugs (antiaggregants).

4.1.1. Drugs affecting arachidonic acid metabolism:

- I type cyclooxygenase (COX-1) inhibitors – acetylsalicylic acid* (low doses);
- thromboxane synthesis inhibitors – dazoxiben.

4.1.2. Drugs increasing cyclic adenosine monophosphate (cAMP) in the thrombocytes:

- phosphodiesterase inhibitors: pentoxifylline*, dipyridamole;
- adenylate cyclase stimulants: epoprostenol* (prostacyclin), alprostadil (prostaglandin E_1 (PGE_1) drug).

4.1.3. Thrombocyte receptor antagonists:

- blockers of adenosine diphosphate (ADP) receptors on thrombocyte membranes: ticlopidine*, clopidogrel*;
- glycoprotein thrombocyte receptor antagonists (GP IIb/IIIa): abciximab*, eptifibatide*, tirofiban*.

4.2. Anticoagulants

4.2.1. Direct anticoagulants (to be administered parenterally):

- heparins: unfractionated heparin – Sodium heparin*, low-molecular-weight heparins (fractionated) – sodium dalteparin, calcium nadroparin*, sodium enoxaparin*;
- heparinoids – sodium danaparoid;
- hirudins – lepirudin (refludan);
- plasma drugs – antithrombin III.

4.2.2. Indirect anticoagulants (to be administered orally) – warfarin*, phenindione, acenocoumarol;

4.2.3. Heparin antagonists – protamine sulfate*.

4.3. Thrombolytic drugs (fibrinolytics)

4.3.1. Direct fibrinolytics – fibrinolysin*:

4.3.2. Indirect fibrinolytics – streptokinase*, tissue plasminogen activator (abbreviated t-PA or PLAT) and its recombinant forms: alteplase*, reteplase.

Principles of the treatment and prevention of acute arterial and venous thromboses.

5. Haemostatic drugs

5.1. Platelet aggregation stimulants (aggregants) – etamsylate*, carbazochrome, calcium salts*.

5.2. Indirect coagulants – vitamin K drugs: phytomenadione*, menadione* (vikasol).

5.3. Fibrinolytic inhibitors:

- amino acids – tranexamic acid*;
- plasma protease inhibitors – aprotinin.

5.4. Plasma drugs – blood clotting factor VIII* and factor IX*.

5.5. Local drugs to stop bleeding: thrombin*, tachocomb, beriplast, etc.

Principles of drug actions of the given groups, administration, side and toxic effects.

Write out the following drugs in different medicinal forms: ferrous sulfate, pentoxil, cyanocobalamin, phytomenadione, tranexamic acid, clopidogrel, ticlopidine, heparin, warfarin.

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LESSON 2 (20). DIURETICS. ANTIHYPERTENSIVE DRUGS

I. Diuretics:

1. Definition of diuretics. Their classification according to the localization of action in nephron, strength and speed of onset and duration of effect.
   1.1. Carbonic anhydrase inhibitors (acting on the proximal renal tubules) – acetazolamide*.
   1.2. Loop diuretics (acting on the ascending part of loop of Henle): furosemide*, bumetanide, torasemide.
   1.3. Thiazide (hydrochlorothiazide*, bendroflumethiazide) and thiazide-like (chlorthalidone*, indapamide*, xipamid, metolazone) diuretics acting on the initial part of the distal renal tubules.
   1.4. Potassium-sparing diuretics (acting on the distal renal tubules and collector renal tubules): triamterene*, amiloride, spironolactone* (aldosterone antagonist).
   1.5. Osmotic diuretics (acting on the proximal renal tubules, the descending part of the loop of Henle and collector renal tubules) – mannitol*.
   1.6. Aquaretics (acting on the collector renal tubules) – demeclocycline* (antagonist of the antidiuretic hormone).
   1.7. Other drugs with diuretic effect:
      - increasing glomerular filtration: xanthines, cardiac glycosides, dopamine;
      - uricosuric drugs: indacrinone, ticrynafen.
2. Side effects of diuretics, including water-electrolyte and metabolic disorders.
3. The use of diuretics: hypertensions, edemas, oliguric renal failure, acute intoxications, hyperaldosteronism, glaucoma, etc.
4. Criteria for diuretics selection:
   - speed of onset and time to maximum diuretic effect;
   - the duration and intensity of the effect;
   - the level of electrolytes and blood coagulation potential;
   - glomerular filtration rate;
   - methods and mechanisms of excretion.
5. Absolute contraindications to the use of diuretics.
6. Combined use of diuretics. Rational combination of different diuretics and diuretics with drugs of other pharmacological groups.

II. Antihipertensives:

1. The main pharmacological approaches to the management of arterial blood pressure.
2. Classification of antihypertensive drugs:
   2.1. Diuretics:
      - thiazide and thiazide-like (hydrochlorothiazide*, indapamide*, chlorthalidone);
      - loop (furosemide*, etc.);
      - potassium-sparing (spironolactone*, triamterene, amiloride).
   2.2. Inhibitors of the renin-angiotensin-aldosterone system (RAAS).

2.2.1. Inhibitors of angiotensin-converting enzyme (ACE):

- short-term action (3 times a day) – captopril*;
- average-term action (1-2 times a day) – enalapril*;
- long-term action (once per day): lisinopril*, ramipril, fosinopril, benazepril, perindopril, quinapril.

2.2.2. Angiotensin II antagonists: losartan*, irbesartan, valsartan*.

2.3. Sympathoplegic drugs.

2.3.1. Central action: clonidine*, methyldopa* (α_2-agonists of adrenergic and I_1-imidazoline receptors), moxonidine* (selective I_1-imidazoline receptor agonist).

2.3.2. β-adrenergic antagonists: propranolol*, atenolol*, acebutolol, betaxolol, bisoprolol, metoprolol*, nebivolol* (additional arteriolar vasodilation).

2.3.3. α-adrenergic antagonists: doxazosin*, prazosin, nicergoline, phentolamine.

2.3.4. Mixed-action adrenergic antagonists: labetalol*, carvedilol*, proxodolol.

2.3.5. Blockers of adrenergic neurons (sympatholytics): reserpine, guanethidine*.

2.3.6. Ganglionic blockers: trimethaphan, azamethonium bromide.

2.4. Calcium L-type channel blockers (CCBs):

- CCB with the predominant effect on the blood vessels (vasodilating) – dihydropyridine derivatives: nifedipine* and its retard forms, amlodipine*, isradipine*, nicardipine, nitrendipine.
- CCB with the predominant effect on the heart (bradycardic): phenylalkilamin derivatives – verapamil*, gallopamil; benzothiazepine derivatives – diltiazem*.

2.5. Vasodilators:

- arteriolar – diazoxide*, minoxidil, hydralazine;
- arteriolar and venous – sodium nitroprusside*.

2.6. Other antihypertensive drugs:

- serotonin receptor antagonists – ketanserin;
- myotropic spasmolytics – bendazol* (dibazol), magnesium sulfate*.

3. Main applications of antihypertensive drugs, molecular and hemodynamic mechanisms of action, side effects, dosage regimen, contraindications and precautions for their use.

4. Drugs for the treatment of arterial hypertension (main groups):
   - diuretics;
   - RAAS inhibitors;
   - β-adrenergic antagonists and mixed-action adrenergic antagonists;
   - CCBs;
   - combination drugs, based on the above drugs: ACE inhibitor + diuretic (kapozid, co-renitec), β-adrenergic antagonists + diuretic (viskaldix), etc.
   - sympathoplegic drugs of the central action;
   - α-adrenergic antagonists;
   - sympatholytics.

5. Criteria for selection of individual treatment of arterial hypertension:
   - efficiency,

- duration of action,
- drug tolerance,
- drug interactions,
- impact on the course and prognosis of arterial hypertension,
- impact on quality of life,
- cost.

6. Drugs for the emergency control of arterial blood pressure.

   6.1. Relief of hypertensive crises: clonidine*, nifedipine, captopril, propranolol, droperidol bendazol, magnesium sulfate, furosemide, sodium nitroprusside, nitroglycerin, azamethonium bromide, diazoxide.

   6.2. Prevention of rupture of an aortic aneurism: vasodilators, β-adrenergic antagonists.

   6.3. Severe heart failure: ACE inhibitors, myotropic vasodilators, α-adrenergic antagonists, CCBs.

   6.4. Controlled hypotension – ganglionic blockers.

Write out the following drugs in different medicinal forms: hydrochlorothiazide, indapamide, propranolol, doxazosin, nifedipine, amlodipine, captopril, enalapril, losartan, clonidine.

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LESSON 3 (21). ANTIANGINAL AND ANTIISCHEMIC DRUGS. HYPOLIPIDEMIC DRUGS

1. Antianginal drugs.

1.1. Definition of antianginal drugs. The concept of ischemic heart disease (IHD). Factors contributing to the development of myocardial ischemia. Principles of action of antianginal drugs and modern strategy of IHD pharmacotherapy.

1.2. Main antianginal drugs.

1.2.1. β-adrenergic antagonists: propranolol*, nadolol, oxprenolol, atenolol*, metoprolol*, acebutalol.

1.2.2. Calcium-channel blockers (CCB): diltiazem*, verapamil*, nifedipine* (retard forms with delayed release of the active substance), amlodipin*, nisoldipine.

1.2.3. Organic nitrates and nitrate-like drugs:

- organic nitrates: nitroglycerin*, isosorbide mononitrate*, isosorbide dinitrate;
- sydnonimines of nitrate-like action – molsidomine*.

Medicinal forms for relief of angina attacks – sublingual and chewing tablets, solutions, aerosols.

Drugs of long-term action (for prevention of attacks): oral, transdermal and buccal forms – tablets, capsules, ointments, lotions, plates, patches.

1.3. Other antiischemic drugs.

1.3.1. Potassium channel activators – nicorandil*.

1.3.2. If-inhibitors − ivabradine* (angina treatment in patients with normal sinus rhythm if β-adrenergic antagonists are contraindicated or ineffective).

1.3.3. Antihypoxants and antioxidants: trimetazidine*, mildronate*, ubidecarenone (coenzyme Q).

1.3.4. Drugs of reflex action – validol.

1.4. Pharmacodynamics, pharmacokinetics, side effects of antianginal drugs.

1.5. Comparative characteristics of nitrates, CCB, β-adrenergic antagonists and their various medicinal forms. Withdrawal syndrome. Tolerance to nitrates. Coronary steal phenomenon.

1.6. Principles of drug selection for relief and prevention angina attacks. Criteria of selection:

- clinical form of IHD;
- heart rate;
- BP level;
- presence of heart failure;
- impairments of hepatic and renal functions;
- hyperlipidemia;
- pregnancy.

1.7. Drugs used for the treatment of myocardial infarction.

1.7.1. Drugs for restoration of coronary blood flow: thrombolytic drugs, anticoagulants, antiaggregants.

1.7.2. Drugs for limitation the size of impairment focus – nitroglycerine.

1.7.3. Drugs for pain relief: narcotic analgesics, droperidol.

1.7.4. Drugs for the treatment of myocardial infarction complications:

- cardiogenic shock – dopamin, norepinephrin, phenylephrine;
- rhythm disturbances – antiarrhythmic drugs;
- acute heart failure – dopamine, dobutamine, nitroglycerine, sodium nitroprusside, furosemide.

2. Hypolipidemic drugs.

2.1. Lipoprotein classes and hyperlipoproteinemia types.

2.2. Classification of hypolipidemic drugs.

2.2.1. Sequestrants of bile acids and drugs inhibiting cholesterol absorption in the intestine: cholestyramine*, colestipol.

2.2.2. Drugs lowering the formation of atherogenic lipoproteins:

- nicotinic acid* (niacin, vitamin PP) and its derivatives (enduracin);
- statins – inhibitors of an early phase of sterol synthesis (3-hydroxy-3-methyl-glutaryl-CoA reductase): atorvastatin*, simvastatin;
- fibric acid derivatives (fibrates) – lipoprotein lipase activators: gemfibrozil*, fenofibrate (lipanthyl 200M long-term form);
- antioxidants and oxidized-low density lipoprotein (LDL) inhibitors in foamy cells – probucol.

2.2.3. Physiological correctors of lipid exchange containing essential phospholipids and unsaturated fatty acids, raising the high density lipoprotein (HDL) level: essentiale, lipostabil.

2.3. Mechanism of action, indications for use and side effects of hypolipidemic drugs.

2.4. Comparative characteristics of efficiency of hypolipidemic drugs – main and reserve drugs.

Write out the following drugs in different medicinal forms: propranolol, nadolol, verapamil, amlodipine, isosorbide dinitrate, isosorbide mononitrate, molsidomine, atorvastatin.

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LESSON 4 (22). DRUGS USED FOR THE TREATMENT OF HEART FAILURE. ANTIARRHYTHMIC DRUGS

I. Principles of pharmacotherapy of heart failure (HF). Main groups of drugs for HF treatment.

1. Drugs influencing on renin-angiotensin-aldosterone system (RAAS).

1.1. Angiotensin-converting-enzyme (ACE) inhibitors:

- short-term action (6-12 hours) – captopril*;
- average-term action (12-24 hours) – enalapril*;
- long-term action (≥ 24 hours): lisinopril*, ramipril, trandolapril.

ACE inhibitors mechanisms of action in HF and pharmacological effects: influence on afterload (total peripheral vascular resistance), preload, blood pressure in pulmonary circulation, heart rate and cardiac output, myocardial remodeling and mortality.

Therapeutic use:

- in chronic heart failure,
- in postmyocardial infarction period for preventing myocardial hypertrophy;

Side effects.

1.2. Vasopeptidase inhibitors – omapatrilat. Pharmacodynamics, use in HF.

1.3. Angiotensin II antagonists: losartan*, irbesartan, valsartan, candesartan. Indications and characteristic features of use in HF.

2. Diuretics.

Characteristic features of use of diuretics (thiazide, loop, aldosterone antagonists) in HF.

Influence of hydrochlorothiazide*, indapamide*, furosemide, spironolactone* diuretics on the quality of life and life expectancy, HF course and prognosis.

3. β-adrenergic antagonists:

- cardioselective: bisoprolol, metoprolol;
- nonselective (β_1, β_2, α_1-adrenergic antagonists) – carvedilol*.

Specific features of β-adrenergic antagonists action in HF, indications, contraindications, side and toxic effects.

4. Drugs with positive inotropic effect.

4.1. Classification.

4.1.1. Cardiac glycosides (CG):

- short-term action – strophanthin;
- average-term action – digoxin*;
- long-term action – digitoxin*.

4.1.2. β-adrenomimetics: dopamine*, dobutamine*.

4.1.3. Phosphodiesterase inhibitors: milrinone*, enoximone, theophylline drugs.

4.2. History of cardiac glycoside discovery and use (W.Withering, E.V.Pelikan). Their sources. Basic structural determinants of pharmacological activity.

4.3. The mechanism of CG action on contractile and bioelectric functions of the heart (heart force and heart rate, conduction, excitability, automatism, myocardial bioenergy, parasympathetic tone, sensitivity to sympathetic stimulation). ECG changes under CG influence.

4.4. The essence of CG therapeutic action in cardiac decompensation (influence on stroke and minute blood volume, arterial and venous pressure, blood flow rate, diuresis). Areas of CG use.

4.5. CG pharmacokinetics.

4.6. Side and toxic effects of CG (arrythmogenic effect, influence on the gastrointestinal tract, neurotoxicity). Withdrawal phenomenon. Possible causes of digitalis intoxications in view of effect onset rate, width of therapeutic range, cumulative properties. Factors increasing CG toxicity: hypokalemia, alkalosis, hypoxia, hypercalcemia, hypomagnesemia, hypothyroidism, hyponatremia; drugs: verapamil, quinidine, corticosteroids, thiazide and loop diuretics. Principles of treatment of digitalis intoxications.

4.7. Mechanisms of inotropic effect of nonglycoside drugs, peculiarities of use in HF.

5. Peripheral vasodilators

5.1. Direct action: venous – isosorbide dinitrate; arteriolar – hydralazine; mixed – sodium nitroprusside.

5.2. CCB – amlodipine.

5.3. α_1-adrenergic antagonists: prazosin, doxazosin.

Characteristic features of their pharmacodynamics and use in HF.

6. Metabolic drugs used in HF: inosine, pyridoxine, anabolic steroids.

II. Antiarrythmic drugs (AAD). Definition, classification according to electrophysiological and pharmacological effect on myocardium.

1. Drugs used in tachyarrhythmias.

1.1.1. Classification.

1.1.2. Membrane stabilizers (sodium-channel blockers, class I);

- increasing effective refractory period (ERP) (class IA): quinidine*, procainamide*, disopyramide;
- decreasing ERP (class IB): lidocaine*, mexiletine, phenytoin*;
- does not significantly affect ERP (class IC): propafenone*, flecainide, moracizine (moricizine), etacizin.

1.1.3. β-adrenergic antagonists (class II): propranolol*, oxprenolol, pindolol, atenolol, metoprolol*, esmolol.

1.1.4. Prolonging repolarisation and an action potential (class III): amiodarone*, bretylium tosylate* (ornidum), sotalol* (β-adrenergic antagonist).

1.1.5. CCB (bradicardiac, class IV): verapamil*, gallopamil, diltiazem.

1.2. Basic mechanisms of antiarrhythmic action: influence on ionic currents, action potential, spontaneous diastolic depolarisation, rest potential, threshold potential, ERP of myocardial cells.

1.3. Comparative characteristics of AAD according to their influence on the basic heart functions (automatism, excitability, conduction, contractility), ECG, BP, stroke volume, neurovegetative innervation.

1.4. Use of other drugs as AAD: adenosine* and sodium adenosine triphosphate (purine receptor stimulators), cardiac glycosides, potassium and magnesium drugs.

1.5. Indications for AAD administration:

- supraventricular arrhythmias – adenosine, digoxin, verapamil, etc.;
- supraventricular and ventricular arrhythmias – amiodarone, β-adrenergic antagonists, disopyramide, procainamide, flecainide, propafenone, etc.;
- ventricular arrhythmias – lidocaine, mexiletine, moracizine, etc.

1.6. Arrhythmogenic (proarrhythmic) and other AAD side effects and their correction.

1.7. Contraindications for AAD administration.

1.8. Combined use of AAD and their interaction with other drugs (cardiac glycosides, indirect anticoagulants, diuretics, potassium and calcium drugs).

1.9. Criteria for AAD selection: type of arrhythmia, impact on electrophysiological component of arrhythmia (vulnerable parameter and a pharmacological target), cost (during long-term therapy).

2. The drugs used in bradyarrhythmias:
   - M-cholinergic antagonists – atropine;
   - adrenomimetics – isoprenaline.

Write out the following drugs in different medicinal forms: enalapril, hydrochlorothiazide, furosemid, metoprolol, digoxin, procainamide, lidocaine, amiodarone.

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LESSON 5 (23). FINAL LESSON ON DRUGS AFFECTING THE CARDIOVASCULAR SYSTEM AND KIDNEY RENAL FUNCTION

Objective: To systematize and consolidate knowledge on the pharmacological properties of drugs acting on the function of kidneys and cardiovascular system; to systematize and consolidate skills of writing out the main drugs of the above-mentioned groups in prescriptions.

While preparing for the lesson it is necessary to revise the classification, mechanisms of action, peculiarities of pharmacokinetics, main and side effects, indications and contraindications for drug administration of the following groups:

1. Diuretics.
2. Antihypertensive drugs.
3. Antianginal and hypolipidemic drugs.
4. Drugs used for the treatment of heart failure.
5. Antiarrhythmic drugs.

Be able to write out the following drugs: adelphane, amiodarone, amlodipine, atorvastatin, betaxolol, verapamil, hydrochlorothiazide, digoxin, doxazosin, isosorbide dinitrate, isosorbide mononitrate, indapamide, captopril, clonidine, lidocaine, losartan, metoprolol, nadolol, nifedipine-retard, procainamide, propranolol, sotalol, spironolactone, quinidine, furosemide, enalapril.

Questions for individual study:

1. Diuretics, definition. Classification of diuretics according to the site and character of their action in the nephron. Classification of diuretics according to their efficiency.
2. List thiazide and thiazide-like diuretics; loop diuretics; potassium-sparing diuretics.
3. Draw a scheme of a nephron and indicate on it the action site of diuretics enhancing the filtration of primary urine; carbonic anhydrase inhibitors; loop diuretics; thiazide and thiazide-like diuretics; potassium-sparing diuretics; aquaretics.
4. Mechanism of action of osmotic; loop; thiazide and thiazide-like diuretics; spironolactone; potassium-sparing diuretics; demeclocycline.
5. Arrange the following drugs in decreasing order according to their diuretic action power: spironolactone, chlorthalidone, furosemide, hydrochlorothiazide, mannitol.
6. Effect of loop; thiazide and osmotic diuretics on the rate of glomerular filtration.
7. Effect of loop; potassium-sparing; thiazide and thiazide-like diuretics on electrolyte excretion.
8. Side effects of loop; potassium-sparing; thiazide and thiazide-like diuretics.
9. Indications for administration of carbonic anhydrase inhibitors; osmotic; potassium-sparing; loop; thiazide and thiazide-like diuretics.
10. Contraindications to the administration of osmotic; loop; thiazide and thiazide-like diuretics.
11. Therapeutically significant combinations of diuretics.
12. Groups of drugs used for the treatment of heart failure.
13. Principles of pharmacotherapy of heart failure. Purposes of heart failure treatment.
14. List angiotensin-converting-enzyme (ACE) inhibitors. Explain why ACE inhibitors are used for the treatment of heart failure.
15. Effect of ACE inhibitors on the processes of remodelling myocardium and vessels; quality of life, and mortality.
16. Give proof of using diuretics for the treatment of heart failure.
17. Peripheral vasodilators (groups, drugs).
18. Classification of direct vasodilatators.

19. Side effects of calcium channel blockers that limit their use for the treatment of heart failure.
20. Drugs with positive inotropic effect on the heart (groups, drugs).
21. Give proof of administering β-adrenergic antagonists for the treatment of heart failure.
22. Classification of cardiac glycosides according to the duration of their effect.
23. Basic structure determinants of the pharmacological activity of cardiac glycosides.
24. Mechanism of positive inotropic effect of cardiac glycosides.
25. Mechanism of negative chronotropic effect of cardiac glycosides.
26. List cardial effects of cardiac glycosides.
27. List extracardiac effects of cardiac glycosides.
28. State the characteristic changes of ECG while using cardiac glycosides.
29. Essence of cardiac glycosides therapeutic effect in cardiac decompensation.
30. Indications for administration of cardiac glycosides.
31. Contraindications for cardiac glycosides administration. Side effects of cardiac glycosides.
32. Central and peripheral nervous system toxic effects caused by cardiac glycosides.
33. Which cardiac glycoside can be used for the treatment of acute and chronic heart failure? Why?
34. Why do toxic effects often appear while taking cardiac glycosides?
35. What symptoms of the intoxication with cardiac glycosides require their withdrawal?
36. Side effects of cardiac glycosides on the gastrointestinal tract (GIT).
37. Cardiac glycosides effect on the cardiac rhythm in therapeutic and toxic doses.
38. What antiarrhythmic drugs are used for the treatment of glycosidic arrhythmia?
39. What antiarrhythmic drugs cannot be used for the treatment of glycosidic arrhythmia? Why?
40. Mechanisms of unithiol and Na_2-EDTA action in case of intoxication with cardiac glycosides.
41. What pharmacological drugs are used for electrolyte balance correction in case of intoxication with cardiac glycosides?
42. Metabolic drugs used for the treatment of heart failure.
43. Antiarrhythmic drugs for the treatment of tachyarrhythmia (groups, drugs).
44. Antiarrhythmic drugs for the treatment of bradyarrhythmia (groups, drugs).
45. Name antiarrhythmic drugs of subgroups IA, IB, and IC.
46. Effect of antiarrhythmic drugs of subgroups IA, IB, IC on the effective refractory period.
47. Mechanism of antiarrhythmic cardiac glycosides action.
48. Draw the scheme of action potential (AP) of normal pacemaker myocardial tissue. Show with dashed line how the form of AP phase changes under the influence of antiarrhythmic drugs of subgroups IA, IB, IC, groups II, III, IV.
49. Indications for administration potassium-containing preparations as antiarrhythmic drugs.
50. Therapeutic use of antiarrhythmic drugs of subgroups IA, IB, IC, groups II, III, IV.
51. Risks of using antiarrhythmic drugs.
52. Interaction of antiarrhythmic drugs with cardiac glycosides.
53. Effect of antiarrhythmic drugs of subgroups IA, IB, IC, groups II, III, IV on the basic cardiac functions.
54. Side effects of procainamide; amiodarone.
55. Using which antiarrhythmic drugs does arrhythmia develop more frequently?

56. Indications for administration of adenosine as an antiarrhythmic drug.
57. Determinants of systolic and diastolic arterial blood pressure (ABP).
58. Mechanisms of controlling normal ABP and in case of arterial hypertension.
59. Aims of antihypertensive therapy.
60. List the main groups of antihypertensive drugs.
61. Sympathoplegic drugs (groups, drugs).
62. Drugs used for relief of hypertensive crises.
63. Criteria of choosing drugs for individual therapy of arterial hypertension.
64. List diuretics used for the treatment of arterial hypertension.
65. Mechanisms of antihypertensive action of diuretics.
66. Why is indapamide considered to be an “ideal” diuretic drug for the treatment of hypertensions?
67. List renin-angiotensin-aldosterone system (RAAS) inhibitors (groups, drugs).
68. List ACE inhibitors which can be administered to the patients with severe pathology of the liver.
69. Main indications for administration of ACE inhibitors.
70. Mechanism of ACE inhibitors antihypertensive action.
71. Main pharmacological effects of ACE inhibitors.
72. Hemodynamic mechanisms of ACE inhibitors antihypertensive effect.
73. Side effects of ACE inhibitors.
74. Absolute contraindications for ACE inhibitors administration.
75. Advantages of using ACE inhibitors as antihypertensive drugs.
76. Molecular and hemodynamic mechanisms of antihypertensive action of losartan; enalapril; aldosterone.
77. List β-adrenoreceptor blockers used for the treatment of arterial hypertension.
78. Mechanism of β-adrenergic antagonists antihypertensive action.
79. Criteria of choosing β-adrenergic antagonists for the treatment of arterial hypertension.
80. Pharmacological effects of β-adrenergic antagonists.
81. Side effects of β-adrenergic antagonists.
82. Pharmacological properties and side effects of carvedilol.
83. Peculiarities of hemodynamic action of carvedilol.
84. Pharmacological properties and side effects of doxazosin.
85. Mechanism of antihypertensive action of reserpine and guanethidine.
86. Side effects of reserpine and guanethidine.
87. Pharmacological effects of clonidine.
88. Indications for administration and side effects of clonidine.
89. Mechanisms of antihypertensive action of clonidine.
90. List CCBs with the predominant effect on the blood vessels (vasodilating).
91. List CCBs with the predominant effect on the heart (bradycardic).
92. Mechanisms of antihypertensive, antianginal and antiarrhythmic actions of CCBs.
93. Fields of CCBs clinical use.

94. Choose CCBs for the treatment of arterial hypertension; ischemic heart disease (IHD); tachyarrhythmia. Explain your choice for each case.
95. Side effects and undesirable effects of therapy with CCBs.
96. Preferable combinations of antihypertensive drugs.
97. Determinants of myocardial oxygen consumption.
98. Determinants of myocardial oxygen supply.
99. Principles of antianginal pharmacotherapy.
100. Criteria for antianginal drug selection.
101. Classification of organic nitrates according to their effect duration.
102. Mechanisms of antianginal action of nitrates; β-adrenergic antagonists; CCBs.
103. Side effects and undesirable effects of therapy with nitrates.
104. Antihypoxants and antioxidants used for IHD. Mechanisms of their action.
105. Main drugs used for the treatment of myocardial infarction:
    - to restore coronary blood flow;
    - to limit the lesion focus.
106. Main drugs used for the treatment of myocardial infarction:
    - to relieve pain syndrome;
    - to treat complications.
107. Hypolipidemic drugs (groups; drugs).
108. Hypolipidemic mechanisms of action of nicotinic acid; statins; fibrates.
109. Side effects of nicotinic acid; statins; fibrates.
110. Drugs used for the treatment of to treat erectile dysfunction (groups; drugs).
111. What are phlebotonics? List the drugs.
112. Drugs used for pulmonary hypertension.
113. Principles of pharmacotherapy of peripheral blood flow disturbance (Raynaud's disease, vibration disease; claudication).
114. Write out the the prescriptions for:
    - An antiarrhythmic drug prolonging the repolarization phase.
    - A CCB of long-term action belonging to the dihydropyridine class.
    - A thiazide derivative to lower ABP.
    - A cardiac glycoside to treat acute and chronic heart failure.
    - An isosorbide derivative for sublingual administration.
    - A α_2-adrenomimetic to relieve a hypertensive crisis.
    - An antiarrhythmic drug shortening effective refractory period.
    - An angiotensin II-receptor antagonist.
    - An ACE inhibitor drug of rapid and short-term action (active agent).
    - A nonselective long-term action β-adrenergic antagonist.
    - A hypolipidemic drug.
    - A potassium-sparing diuretic.
    - A group IV antiarrhythmic drug.
    - A cinchona bark alkaloid with antiarrhythmic action.
    - A powerful loop diuretic.
    - A drug from ACE inhibitor group (prodrug).
    - A group III antiarrhythmic drug of β-adrenergic antagonist group.

LESSON 6 (24). HORMONAL AND ANTIHORMONAL DRUGS

1. Hypothalamic and pituitary (hypophysis) hormones
   1.1. Hypothalamic hormones and their synthetic analogues:
      - sermorelin – somatorelin synthetic analogue; octreotide, lanreotide – somatostatine synthetic analogues;
      - gonadorelin and its synthetic analogues: goserelin*, triptorelin, buserelin;
      - protirelin* – synthetic analogue of thyrotropin-releasing hormone.
   1.2. Hormones of the anterior pituitary lobe (adenohypophysis), their synthetic analogues and antagonists:
      - growth hormone – somatropin; growth hormone receptor antagonist – pegvisomant;
      - corticotropins – tetracosactide*;
      - gonadotropins:
         - with follicle-stimulating activity – urofollitropin*, follitropin alfa and beta;
         - with luteinizing activity – chorionic gonadotropin*, choriogonadotropin alpha, lutropin alfa;
         - menotropins* (FSH & LH, ratio 1:1).
      - thyrotropic hormone – thyrotropin alfa;
      - prolactin inhibitor – bromocriptin;
      - gonadotropic hormone inhibitor – danazol.
   1.3. Posterior pituitary lobe (neurohypophysis) hormone drugs and their synthetic analogues: oxytocin*, terlipressin* (V_1 vasopressin receptor agonist), desmopressin* (V_2 vasopressin receptor agonist).
2. Pineal gland (epiphysis) hormone drugs – melatonin*.
   Pharmacological effects of pituitary and pineal gland hormone drugs. Use in medicine.
3. Thyroid and antithyroid hormone drugs:
   3.1. Thyroid hormone drugs: sodium levothyroxine* (T_4), liothyronine* (T_3).
   3.2. Antithyroid drugs:
      - thioamides – thiamazole* (mercazolilum), propylthiouracil*;
      - iodine drugs, radioactive iodine;
      - β-adrenergic antagonists (propranolol, etc), calcium channel blockers.

   Principles of action of thyroid and antithyroid drugs, indications, side effects and complications.
4. Pancreatic hormones and antidiabetic drugs
   4.1. Insulin drugs
      4.1.1. Human insulins:
      - short-term action – ultra-short-acting (insulin lispro*), short-acting – human insulin;
      - average-term action: insulin-zinc suspension combined (amorphous + crystalline)*, insulin isophane;
      - long-term action: insulin-zinc suspension (crystalline)*, insulin glargine.

      4.1.2. Animal insulins:
      - short-term action: insulin neutral for injections* (monosuinsulin);
      - average-term action: insulin zinc suspension combined (amorphous + crystalline)*,insulin zinc suspension (amorphous)* (semilong), insulin isophane;

- long-term action: insulin zinc suspension (crystalline)* (ultra long).

4.1.3. Biphasic insulins.

Pharmacodynamics and pharmacokinetics of insulin drugs. Comparative characteristics of different kinds of insulin drugs. Principles of use. Side effects and their prophylaxis.

4.2. Oral hypoglycemic drugs.

4.2.1. Sulfonylurea derivatives – glybenclamide*, glipizide, gliclazide,glimepiride.

4.2.2. Biguanides – metformin*.

4.2.3. Other drugs: acarbosa – intestinal alfa-glucosidase inhibitor; pioglitazone and rosiglitazone – increase tissue sensitivity to insulin; repaglinide – insulin secretion stimulant.

Principles and mechanisms of action of oral hypoglycemic drugs. Indications, side effects, restrictions in their use.

4.3. Insulin antagonists: glucagon, epinephrine, glucocorticoids, diazoxide (orally in case of chronic hypoglycemia).

5. Adrenal cortex (adrenocortical) hormone drugs

5.1. Glucocorticosteroids (GCS):

- short-term action – hydrocortisone*, methylprednisolone*, prednisolone*;
- average-term action – triamcinolone*;
- long-term action – dexamethasone*, betamethasone;
- glucocorticoids for local application – triamcinolone (kenalog, ftorocort); fluocinolone acetonide (synaflanum), mometasone.

5.2. Mineralocorticoid drugs – deoxycortone*, fludrocortisone.

5.3. Corticosteroid synthesis inhibitors – aminoglutethimide.

Pharmacodynamics of corticosteroid drugs. Pharmacological effects. Principles of GCS dosage. Use in medicine. Side effects and toxicity. Indications for mineralocorticoids and aminoglutethimide use.

6. Female sex hormones, their analogues and antagonists

6.1. Estrogen drugs:

- steroid structure – estradiol, ethinyl estradiol;
- non-steroid structure – hexestrol (synestrol), diethylstilbestrol;
- estrogen receptors selective modulators – raloxifene.

6.2. Gestagen drugs: progesterone*, hydroxyprogesterone, medroxyprogesterone, norethisterone, dydrogesterone.

Physiological role of estrogens and gestagens, their synthesis and secretion regulation. Pharmacologic effects and pharmacodynamics of estrogen and gestagen drugs. Use in medicine.

6.3. Contraceptives.

6.3.1. Combined oral contraceptives:

- monophase – Cilest, Marvelon, Regulon, etc.; Diane-35;
- biphase – Anteovin, etc.;
- thriphase – Tri-merci, Tri-regol etc.

6.3.2. Containing only progestins:

- oral – norethisterone (Micronor), etc.;

- implantable, depot drugs – levonorgestrel (Norplant).

6.3.3. Postcoital contraceptives – levonorgestrel (Postinor).

6.4. Estrogen and progestin antagonists – tamoxifen, clomiphene, myfepristone.

Principles of action of different contraceptive groups, indications, side effects and precautions in their prescription.

7. Male sex hormones and their derivatives

7.1. Androgen drugs – testosterone* and its aethers, methyltestosterone, mestterolone.

7.2. Anabolic steroids – nandrolone* (retabolil), etc.

7.3. Antiandrogen drugs – flutamide.

Principles of action. Indications, dangerous and side effects.

8. Hormonal regulators of mineral homeostasis and other drugs, influencing on bone tissue metabolism.

8.1. Parathyroid hormones – teriparatide (parathyroid hormone recombinant fragment).

8.2. Antiparathyroid hormones – calcitonin.

8.3. Bisphosphonates – alendronic acid, rizendronic acid.

Principles of pharmacologic management of bone tissue metabolism,the role of parathyroid regulation. Mechanisms of action of bisphosphonates, indications and restrictions.

Write out the following drugs in different medicinal forms: thiamazole, sodium levothyroxine, glybenclamide, metformin, ethinyl estradiol, progesterone, testosterone, nandrolone, methylprednisolone, dexamethasone, mometasone, alendronic acid.

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LESSON 7 (25). ANTI-INFLAMMATORY DRUGS

Anti-inflammatory drugs

1. Non-steroidal anti-inflammatory drugs (NSAIDs).
   1.1. Nonselective cyclooxygenase (COX) inhibitors:
   - salicylic acid derivatives – acetylsalicylic acid* (in small doses is a nonselective COX-1 inhibitor), diflunisal;
   - anthranilic acid derivatives (fenamates) – mefenamic acid;
   - arylacetic acid derivatives: diclofenac*, aceclofenac;
   - arylpropionic acid derivatives: ibuprofen*, naproxen*;
   - indoleacetic derivatives: indomethacin*, sulindac;
   - pyrazolidinedione derivatives – phenylbutazone;
   - oxicams – piroxicam*.

   1.2. Selective COX-2 inhibitors:
   - relatively selective COX-2 inhibitors: meloxicam*, nimesulide, nabumetone* (prodrug);
   - highly selective COX-2 inhibitors: celecoxib*, valdecoxib.

   1.3. Combined drugs – Arthrotec (diclofenac + misoprostol).
   1.4. Pharmacological effects of NSAIDs. Mechanisms of anti-inflammatory effect – the effect on the mediators and inflammatory cells, including:
   - synthesis of prostaglandins (COX-1 and COX-2), monoamines (histamine, serotonine), kinins, acid mucopolysaccharides, proliferation of fibroblasts;
   - activity of NF-kB nuclear transcription factor (regulates the synthesis of anti-inflammatory cytokines);
   - cartilage metabolism.

   1.5. Indications for use of NSAIDs, side effects (effects on the gastrointestinal tract, kidneys, central nervous system, bronchi, Reye's syndrome in children), preventive measures.
2. Steroidal anti-inflammatory drugs – glucocorticosteroids (GCS).
   2.1. Systemic glucocorticosteroids:
   - short-term action: prednisolone*, methylprednisolone*;
   - average-term action: triamcinolone*;
   - long-term action: dexamethasone*, betamethasone;

   2.2. Glucocorticosteroids for intra-articular injections – soluble salts of hydrocortisone, methylprednisolone, prednisolone, dexamethasone.
   2.3. Pharmacological effects of GSC. Mechanisms of anti-inflammatory action:
   - influence on the synthesis of prostaglandins and leukotrienes;
   - regulation of the activity of genes coding the synthesis of anti-inflammatory cytokines (IL-1 and IL-6, TNF-a and GM-CSF, etc.) and metalloproteinases;
   - modulating effect on the release of endothelin, the synthesis of hyaluronic acid, the induction of NO synthase.

2.4. Indications and contraindications for use. Basic injections schemes, side effects and the measures to prevent them:

3. Development areas of anti-inflammatory drugs that control the progression of systemic connective tissue diseases:
    - monoclonal antibodies against membrane antigens of immunocompetent cells and inflammatory cytokines;
    - soluble cytokine receptors and cytokine release inhibitors;
    - anti-inflammatory cytokines;
    - drugs inhibiting the generation of reactive oxygen species and nitrogen.

Write out the following drugs in different medicinal forms: prednisolone, ibuprofen, nabumetone, diclofenac, piroxicam, celecoxib.

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LESSON 8 (26). ANTIALLERGIC AND IMMUNOMODULATING DRUGS. VITAMINES

1. Drugs used for allergic reaction of immediate type (immediate type hypersensitivity)
   1.1. Glucocorticosteroids (GCS):
      1.1.1. Systemic GCS:
      - short-term action: hydrocortisone, methylprednisolone, prednisolone;
      - average-term action: triamcinolone;
      - long-term action: dexamethasone, betamethasone.

      1.1.2. Glucocorticoids for local application: fluticasone, beclomethasone, budesonide, mometasone, fluocinolone acetonide.

      Mechanisms of antiallergic action, influence on mediators and allergy cells:
      - processes of prostaglandins and leukotrienes synthesis;
      - FC-receptors on the surface of cells, basophils, macrophages and other mesenchymal cellular elements;
      - activity of components of complement system (C3-C8);
      - T- and B-lymphocyte cooperation, leucocyte migrations.

      Indications and contraindications.

   1.2. Antagonists of leukotriene receptors: zafirlukast*, montelukast.

   1.3. Mast cell membrane stabilizers: chromoglycic acid (nalcrom, intal), nedocromil, ketotifen.

   1.4. Antihistamine drugs:
      1.4.1. Histamine H_1-receptors antagonists:
      - first generation: diphenhydramine (dimedrol)*, promethazine*, clemastine, quifenadine (phencarol);
      - second generation: loratadine*, desloratadine, fexofenadine, cetirizine;
      - histamine H_1-receptors antagonists with antiserotonin activity – cyproheptadine.

      1.4.2. Allergy mediator activity inhibitors – fenspiride.

   Pharmacodynamics of antihistamine drugs. Comparative characteristics. Use in medicine, side effects.

   1.5. Antiallergic effect of theophylline drugs (aminophylline, teotard, euphylong) and adrenomimetics (epinephrine, ephedrine, salbutamol), their administration.

   1.6. Drugs used for anaphylactic shock: epinephrine, salbutamol, GCS, dopamine, antihistamine drugs.

2. Drugs used for allergic reactions of delayed type (delayed type hypersensitivity) – autoimmune processes, tissue incompatibility
   2.1. Disease-modifying antirheumatic drugs – DMARDs (slow effect):
   - gold salts – auranofin;
   - penicillamine;
   - aminoquinolines – chloroquine;
   - sulphasalazine.

   2.2. Immunosuppressants:
   - GCS;

- cytotoxic drugs: azathioprine, methotrexate, leflunomide, cyclophosphamide;
- drugs, inhibiting interleukin-2 expression or action: cyclosporine, tacrolimus, sirolimus;
- polyclonal antibodies drugs: antilymphocyte immunoglobulins;
- monoclonal antibodies drugs: basiliximab, daclizumab – interleukin-2 receptor antagonists.

2.3. Non-steroidal anti-inflammatory drugs (see Lesson 9).

Pharmacodynamics, main pharmacological effects of DMARDs and immunosuppressants. Their use. Side and toxic effects.

3. Immunomodulators

3.1. Exogenous:

- microbial – IRS-19, broncho-munal, ribomunil;
- herbal – echinacea drugs (Immunal); Belarussian combined herbal drugs – Ehingin, Trimunal.

3.2. Exogenous immunoregulatory peptides:

- thymic peptide drugs: thymalin, tactivin;
- cytokines: betaleukine, aldesleukin;
- interferons: gamma interferon, thyloron (interferonogen);
- immunoglobulin drugs – normal human immunoglobulin.

3.3. Synthetic immunomodulators: thymogen, inosine, pranobex.

Mechanisms of immunomodulator action (influence on the monocyte-macrophage system cells, T- and B-lymphocytes, cytokine synthesis, antibody formation, use in medicine, side effects and precautions.

4. Definition of vitamins; classification; sources. Causes of hypovitaminoses; pathogenesis of vitamin deficiency. Types of vitamin therapy.

4.1. Water-soluble vitamin drugs: thiamine, benfotiamine, riboflavin, flavinat, calcium pantothenate, folic acid, nicotinic acid, pyridoxine, cyanocobalamin, ascorbic acid, rutin, quercetin.

4.2. Fat-soluble vitamin drugs: retinol, ergocalciferol, phytomenadione, menadione, tocopherol. Hypervitaminosis caused by the treatment of retinol and ergocalciferol.

4.3. Vitamin-like compound drugs: choline chloride, calcium pangamate, methionine methylsulfonium chloride, inosine.

4.4. Polyvitamins and combined drugs: “Undevit”, “Centrum”, “Supradin”.

Write out the following drugs in different medicinal forms: diphenhydramine, promethazine, penicillamine, methotrexate, ribomunil, thymogen, thyloron.

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LESSON 9 (27). FINAL LESSON ON DRUGS AFFECTING METHABOLIC PROCESS, INFLAMMATION AND IMMUNE RESPONSE

Objective: To systematize and consolidate the knowledge of the pharmacological properties and medical use of drugs affecting methabolic process, inflammation and immune response.

During the preparation for the final lesson you should repeat classification, pharmacodynamics, pharmacokinetics, indications and contraindications of the following drug groups:

1. Hormonal and antihormonal drugs
2. Anti-inflammatory drugs
3. Antiallergic and immunomodulating drugs.

Write out the following drugs in different medicinal forms: alendronic acid, celecoxib, dexamethasone, diclofenac, diphenhydramine, ethinyl estradiol, glybenclamide, ibuprofen, metformin, methotrexate, methylprednisolone, mometasone, nabumetone, nandrolone, penicillamine, piroxicam, prednisolone, progesterone, promethazine, ribomunil, sodium levothyroxine, testosterone, thiamazole, thyloron, thymogen.

Questions for individual study:

1. List preparations of hypothalamic hormones and their synthetic analogues.
2. List the drugs of anterior pituitary hormones and their synthetic analogs and antagonists.
3. List the drugs of posterior pituitary hormones and their synthetic analogues and hormones of the pineal gland.
4. The pharmacological effects of pituitary hormones drugs and pineal gland hormones drugs.
5. Application of medical preparations of pituitary hormones and pineal gland hormones.
6. List the preparations of thyroid hormones.
7. List the group of antithyroid agents.
8. Effects of thyroid and antithyroid drugs, indications for use.
9. Adverse effects of thyroid and antithyroid drugs.
10. Human insulin preparations.
11. Iinsulins of animal origin.
12. Pharmacodynamics and pharmacokinetics of insulin.
13. Comparative characteristics of different insulin preparations.
14. The principles of the use of insulin.
15. Side effects of insulin and their prevention.
16. List the main groups of oral hypoglycemic funds.
17. List of insulin antagonists.
18. Principles and mechanisms of action of oral hypoglycemic agents.
19. Indications for use of oral hypoglycemic agents.
20. Side effects of oral hypoglycemic agents and limitations of their use.
21. Classification of corticosteroids according the duration of the action.
22. List the mineralocorticoid drugs.
23. Pharmacodynamics of corticosteroids.
24. Principles of dosing and use of corticosteroids.
25. Side effects and toxicity of corticosteroids.
26. Indications for use mineralocorticoids.

27. List the group of estrogen drugs.
28. List progestin preparations.
29. Side effects that occur with prolonged use of corticosteroids.
30. The physiological role of estrogens and progestogens, the regulation of their synthesis and secretion.
31. Pharmacological effects and pharmacodynamics of estrogen and progestogen preparations.
32. Application of estrogen and progestogen preparations.
33. List the group of contraceptives.
34. The principles of action of the various groups of contraceptives.
35. Indications for contraceptives.
36. Side effects and precautions for the appointment of contraceptives.
37. List the preparations of male sex hormones and their derivatives.
38. List the anabolic steroids.
39. Principles of of action of the male sex hormones and their derivatives.
40. Indications for use for male sex hormones and their derivatives.
41. The risks and side effects of male sex hormones and their derivatives.
42. List the hormonal regulators of mineral homeostasis.
43. List the bisphosphonates.
44. Principles of pharmacologic management of bone metabolism. Role of parathyroid regulation.
45. The mechanisms of action of bisphosphonates, indications and limitations.
46. Features of the application of hormonal preparations of various groups in dentistry.
47. List the group of non-steroidal anti-inflammatory drugs (NSAIDs).
48. List the group of non-selective inhibitors cyclooxygenase (COX).
49. List the group of selective COX-2 inhibitors.
50. The pharmacological effects of NSAIDs.
51. The mechanisms of anti-inflammatory action of NSAIDs.
52. Indications for use for NSAIDs.
53. Side effects of NSAIDs, measures to prevent them.
54. List the group of steroid anti-inflammatory drugs - glucocorticosteroids (corticosteroids or GCS).
55. The pharmacological effects of corticosteroids.
56. The mechanisms of action of anti-inflammatory corticosteroids.
57. Indications and contraindications for the use of corticosteroids.
58. Side effects of corticosteroids and measures to prevent them.
59. Features of anti-inflammatory drugs in the dental practice.
60. List the drugs, used in allergic reactions of immediate type.
61. Mechanisms of anti-allergic effect of GCS.
62. Indications and contraindications for the use of corticosteroids.
63. List the leukotriene receptor antagonists.
64. List the mast cell stabilizers.
65. List the group antihistaminic drugs.
66. Pharmacodynamics of antihistamine agents. Comparative characteristics.

67. The use of antihistamine agents, side effects.
68. List the drugs, used in the delayed-type hypersensitivity.
69. List the drugs, used in anaphylactic shock.
70. List the group of immunosuppressants.
71. List the basic antirheumatic drugs.
72. Pharmacodynamics, the main pharmacological effects of basic antirheumatic drugs and immunosuppressants.
73. The use, side effects and toxic properties of antirheumatic and immunosuppressive agents.
74. List the group of immunomodulators of exogenous nature.
75. List the immunoregulatory peptides of exogenous nature.
76. List the synthetic immunomodulators.
77. The mechanisms of action of immunomodulators.
78. The use of immunomodulators, their side effects and precautions.
79. The use of antiallergic agents and immunomodulators in dentistry.
80. Vitamins, its classification.
81. Causes for hypovitaminosis, pathogenesis of vitamin A deficiency. Types of vitaminotherapy.
82. List the preparations of water-soluble vitamins.
83. List the drugs soluble vitamins.
84. List the drugs vitamin-like compounds.
85. Features of use of vitamin and vitamin-like preparations in dental practice..

LESSONS 10, 11 (28, 29). ANTIMICROBIAL DRUGS. ANTIBIOTICS

1. General issues of chemotherapy of infections
   1.1. Definition of chemotherapeutic drugs, their general characteristics, classification.
   1.2. History of discovery and use of antimicrobial drugs. Antibiotics. Biological significance of antibiosis (works by D. Romanovsky, P. Erlich, G. Domagk, A. Fleming, G. Flory, E. Chain, Z. Yermolyeva, S. Waxman). Role of antibiotics in medicine and biology.
   1.3. Basic definitions of chemotherapy of infections:
      - empirical (probable) antimicrobial therapy, combined antimicrobial therapy, antimicrobial chemoprophylaxis;
      - antibiotic, probiotic (eubiotic);
      - bactericidal / bacteriostatic effect;
      - first-line (drugs of choice) and second-line drugs;
      - minimal inhibitory concentration, minimal bactericidal concentration;
      - postantibiotic effect;
      - sensitivity/resistance of infectious agents;
      - nosocomial infection, superinfection, mixed infection, dysbacteriosis.
   1.4. Characteristic differences between chemotherapeutic drugs and pharmacological drugs of other pharmacotherapeutic groups.
   1.5. Modern sources of obtaining and prospective trends of antimicrobial drugs development.
   1.6. Criteria and principles of rational chemotherapy of infections.
   1.7. Clinical and microbiological indications for determining the infectious agent sensitivity to antibiotics.
   1.8. Principles of combined antibiotic therapy. Rational combinations of antimicrobial drugs.
   1.9. Critical analysis of reasons for ineffient antimicrobial therapy.
   1.10. The concept of the properties of an "ideal" antimicrobial drug as criteria for celection of new antimicrobial drugs.
   1.11. Principles of antibiotic classification.
   1.12. Basic mechanisms of antibiotic action.
   1.13. Side effects and complications of antibiotic therapy, their prevention and treatment.
   1.14. Resistance of microorganisms to antibiotics; mechanisms and ways to decrease it.
2. Antibiotics inhibiting the synthesis of bacterial cellular wall (bactericidal)
   2.1. β-LACTAM:
      2.1.1. Penicillins:
      - biosynthetic penicillins: <u>for parenteral administration</u> – benzylpenicillin* (sodium and potassium salts), benzylpenicillin procaine*, benzathine benzylpenicillin* (Bicillin-1); <u>for oral administration</u> – phenoxymethylpenicillin* (Penicillin V);
      - isoxazolylpenicillins (antistaphylococcal penicillins resistant to β-lactamases): oxacillin*, flucloxacillin*, cloclacillin;
      - aminopenicillins (broad spectrum): amoxicillin*, ampicillin;
      - carboxypenicillins (antipseudomonal): carbenicillin*, ticarcillin*;
      - ureidopenicillins (antipseudomonal): piperacillin*, azlocillin;

- mecillanams (active to gram-negative (G-) flora, inefficient against pseudomonads); pivmecillinam;
- combined drugs of penicillin and β-lactamase inhibitors: Amoxiclav (amoxicillin + potassium clavulanate), Unasin (ampicillin + sulbactam), Tazocin (piperacillin + tazobactam).

2.1.2. Cephalosporins and cephamycins – classification by antimicrobial spectrum, resistance to β-lactamases and routes of administration (parenteral / oral administration):

- *1st generation* – relatively narrow spectrum, highly effective against G+ bacteria and cocci (except enterococci, methicillin resistant staphylococci (MRSA)), considerably less active against G- flora (escherichia coli, klebsiella pneumoniae, indole negative proteus): cephradine*, cephazolin* / *cephalexin, cephradine.*
- *2nd generation* – broad spectrum, more active against G- flora (hemophilic bacillus, neisserias, enterobacterias, indol-positive proteus, klebsiella, moraxella, serratia), resistant to β-lactamases: cefuroxime*, cefoxitin* (cephamycin) / *cefaclor*, cefuroxime axetil.*
- *3rd generation* – broad spectrum, highly effective against G- flora, including that producing β-lactamases; active against pseudomonads, acinetobacter, citrobacter; penetrating the CNS: cefotaxime*, ceftazidime*, ceftriaxone* / *cefixime*, cefpodoxime.*
- *4th generation* – broad spectrum, highly effective against bacteroids and other anaerobic bacteria; highly resistant to broad spectrum β-lactamases; in terms of their efficacy against G- flora are equal to the 3rd generation of cephalosporins; in terms of their efficacy against G+ flora are less efficient than the 1st generation of cephalosporins: cefepime*, cefpirome / –.
- combined drugs of cephalosporins with β-lactamase inhibitors: Sulperazon (cefoperazone + sulbactam).

2.1.3. Carbapenems: imipenem*, meropenem*, ertapenem (ultrabroad spectrum).

2.1.4. Monobactams: aztreonam (active against G- bacteria).

2.2. GLYCOPEPTIDES: vancomycin*, teicoplanin (active against G+ bacteria).

2.3. Cycloserine (antituberculous antibiotic).

3. Antibiotics that interfere with plasma membrane structure (bactericidal).
   3.1. POLYPEPTIDES: polymyxin B*, colistin.
   3.2. POLYENES: nystatin*, amphotericin B*.
4. Antibiotics inhibiting RNA synthesis (bactericidal).
   4.1 ANSAMYCINS: rifampicin*, rifabutin.
   4.2 Griseofulvin (fungicidal).
5. Antibiotics inhibiting protein synthesis (bacteriostatic).
   5.1 AMINOGLYCOSIDES – bactericidal (exception):
   - 1st generation: streptomycin*, neomycin;
   - 2nd generation – gentamicin*;
   - 3rd generation: amikacin*, netilmicin, tobramycin, spectinomycin.

   5.2 TETRACYCLINES:
   - biosynthetic: tetracycline*, oxytetracycline;

- semisynthetic: doxycycline*, minocycline.

5.3 MACROLIDES AND AZALIDES:

- 14-membered: erythromycin*, clarithromycin, telithromycin;
- 15-membered (azalides): azithromycin*;
- 16-membered: spiramycin.

5.4 AMPHENICOLS – chloramphenicol* (levomycetin).

5.5 LINCOSAMIDES: clindamycin*, lincomycin.

5.6 STEROIDAL ANTIBIOTICS – fusidic acid* (Fusidin).

5.7 OXAZOLIDINONES – linezolid* (G- flora + MRSA + vancomycin- resistant enterococci).

5.8 STREPTOGRAMINS – quinupristin / dalfopristin.

The characteristic of each group of antibiotics should include:

- classification of the drugs of this group;
- characterictics of the antimicrobial effect (bactericidal / bacteriostatic), targets and mechanisms of action;
- general characteristic of the antimicrobial spectrum;
- peculiarities of pharmacokinetics, route of administration, medicinal forms;
- main indications for clinical use;
- side and toxic effects, ways of their prevention and treatment.

LESSON 10 (28) – questions 1-2.

Write out the following drugs in different medicinal forms: benzylpenicillin, benzathine benzylpenicillin, phenoxymethylpenicillin, oxacillin, piperacillin, amoxicillin, cefaclor, ceftazidime, cefixime, imipenem.

LESSON 11 (29) – questions 3-5.

Write out the following drugs in different medicinal forms: tetracycline, doxycycline, chloramphenicol, gentamicin, amikacin, erythromycin, azithromycin, vancomycin, clindamycin, nystatin.

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LESSON 12 (30). SYNTHETIC ANTIMICROBIAL DRUGS. ANTIMYCOBACTERIAL DRUGS

I Syntetic antimicrobial drugs

1. Sulfonamide drugs (sulfonamides) and trimethoprim

   1.1. The history of sulfonamide therapy discovery and development.

   1.2. Classification based on location and duration:

      1.2.1. Systemic sulfonamides:

      - short-term action ($T_{1/2}$ < 10 hours): sulfanilamide (streptocide), sulfadimidine (sulfadimezinum);
      - average-term action ($T_{1/2}$ – 10-24 hours) – sulfadiazine*;
      - long-term action ($T_{1/2}$ – 24-48 hours and longer): sulfamethoxypyridazine, sulfadimethoxine, sulfadoxine* (in combination with pyrimethamine is a drug of choice in the treatment of malaria caused by *Plasmodium falciparum*, resistant to chloroquine), sulfalene.
      - combination of sulfanilamides with trimethoprim* – co-trimoxazole* (Bactrim, Biseptol, Sumetrolim – trimethoprim + sulfamethoxazole), etc. Mechanisms to increase antimicrobial activity and antimicrobial spectrum expansion.

      1.2.2. Sulfonamides, acting in the lumen of the intestine: phthalylsulfathiazole (phthalazol), phthalylsulfapyridazine (phthazin); salazosulfanilamides – sulfasalazine*, etc.

      1.2.3. Sulfonamides for local application: sulfacetamide*, silver sulfadiazine*, mafenide.

2. Oxyquinolines: nitroxoline, chlorquinaldol.
3. Nitrofurans: nitrofurantoin* (furadonin), furazolidone, furagin.
4. Quinolones: nalidixic acid* (nevigramon), oxolinic acid (gramurin) pipemidic acid (palin).
5. Fluoroquinolones: ciprofloxacin*, ofloxacin*, norfloxacin, sparfloxacin, levofloxacin*, moxifloxacin*, etc.
6. Nitroimidazoles: metronidazole* (trihopol), tinidazole.
7. Methenamine (urotropine).

Pharmacodynamics and pharmacokinetics of synthetic antimicrobial drugs. The antimicrobial spectrum. Indications for use, side and toxic effects and their prevention. Contraindications. Features of urinary antiseptics.

II. Antimycobacterial drugs

1. Antimycobacterial drugs

   1.1. Antituberculosis drugs.

      1.1.1. First drugs: isoniazid, rifampicin (rifampin), ethambutol, pyrazinamide, streptomycin.

      1.1.2. Reserve drugs: capreomycin, kanamycin, amikacin; ethionamide, prothionamide; cycloserine, fluoroquinolones; azithromycin, clarithromycin; rifabutin; thioacetazone (thiacetazone); clofazimine; PAS (para-aminosalicylic acid).

   1.2. Antileprotic drugs: dapsone, clofazimine, rifampicin.

The principles of tuberculosis pharmacotherapy. The mechanisms of action of antituberculosis drugs, side effects and their prevention. The concept of hemoprophylaxis of tuberculosis.

Write out the following drugs in different medicinal forms: sulfacetamide, co-trimoxazole, nitrofurantoin, ofloxacin, ciprofloxacin, metronidazole, isoniazid, rifampicin.

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LESSON 13 (31). ANTIVIRAL DRUGS. ANTIFUNGAL DRUGS

1. Antiviral drugs

1.1. Inhibitors of adsorption, penetration and deproteinization (stripping) of viruses.

1.1.1. Gamma globulins against measles, hepatitis B, rabies, and cytomegalovirus infection.

1.1.2. Anti-influenza drugs:

- aminoadamantanes – rimantadine (remantadine);
- neuraminidase inhibitors – oseltamivir, zanamivir.

1.2. Inhibitors of intracellular synthesis of viral components.

1.2.1. Inhibitors of nucleic acid synthesis.

1.2.1.1. Antiherpetic drugs:

- nucleoside analogues: acyclovir*, famciclovir, valacyclovir*; penciclovir, idoxuridine*;
- phosphonoformic acid derivative – foscarnet.

1.2.1.2. Drugs for the treatment of HIV infection:

- reverse transcriptase inhibitors (nucleoside analogues): zidovudine*, stavudine; lamivudine, zalcitabine; didanosine*; abacavir;
- reverse transcriptase inhibitors of a non-nucleoside structure: nevirapine*, efavirenz, etc.;
- protease inhibitors: saquinavir*, indinavir, ritonavir;
- other antiretroviral drugs: enfuvirtide* – inhibitor of fusion (the process of tightening of the virus particles to the lymphocytes).

1.2.1.3. Antiviral drugs for cytomegalovirus:

- nucleoside analogues – ganciclovir*, valganciclovir;
- phosphonoformic acid derivative – foscarnet.

1.2.1.4. Drugs used in respiratory syncytial infection:

- ribavirin (ribofuranosyl-triazole-carboxamide);
- palivizumab (monoclonal antibodies for the prevention of respiratory syncytial infections in children at high risk of disease).

1.2.2. Inhibitors of RNA and late viral proteins synthesis:

- interferons – low-molecular-weight glycoproteins: interferon alpha*, interferon alpha-2a, interferon alpha-2b – monocytic, interferon beta (fibroblastic) interferon gamma-1b* (T- lymphocytic);
- interferonogens: tilorone, arbidol*;
- inhibitors of the late viral proteins synthesis – thiosemicarbazone derivatives – metisazon (for the prevention and treatment of smallpox (variola)).

1.3. Inhibitors of virus self-assemblance – rifampicin.

1.4. Virucidal drugs for local application: oxoline, tebrofen, butaminofen (Belarusian), bonafton (used topically and orally).

Features of a virus as the pharmacodynamic target. Problems of viral infections pharmacotherapy. The mechanisms of action of antiviral drugs. The characteristics of drugs for

the treatment of influenza, cytomegalovirus, respiratory syncytial and herpetic infection, HIV infection. Pharmacodynamics of interferons and interferonogens. Medicinal forms, the principles of antiviral drugs use.

2. Antifungal (antimycotic) drugs

2.1. Destroying the cell wall of the fungus.

2.1.1. Polyene antibiotics: amphotericin B, nystatin, natamycin, mycoheptin.

2.1.2. Azoles:

- imidazole derivatives for local and system application: ketoconazole, miconazole; for local application: clotrimazole, econazole, isoconazole, etc.;
- triazole derivatives: fluconazole.

2.1.3. Allylamines – terbinafine.

2.1.4. Morpholinos – amorolfin (for local application only).

2.2. Inhibiting fungal cell mitosis – griseofulvin (an antibiotic).

2.3. Inhibiting the synthesis of DNA – flucytosine.

Pharmacodynamics and the spectrum of antifungal activity. Pharmacokinetics (for the drugs of systemic application), medicinal forms. Side effects, toxicity.

Write out the following drugs in different medicinal forms: rimantadine, acyclovir, idoxuridine, zidovudine, amphotericin B, fluconazole, terbinafine, clotrimazole.

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LESSON 14 (32). ANTISEPTICS AND DISINFECTANTS. ANTICANCER DRUGS

1. Antiseptics and disinfectants

   1.1. The concept of antisepsis (antiseptic) and disinfection. The differences of antiseptics from other antibacterial drugs. Requirements for antiseptics.

   1.2. Classification of antiseptics according to their chemical structure.

      1.2.1. Detergents: cetylpyridinium chloride*, miramistin.

      1.2.2. Metal compounds – protargol, zinc sulfate.

      1.2.3. Halogen compounds: chloramine B*, iodine drugs*.

      1.2.4. Acids and bases: boric acid, ammonia drugs*.

      1.2.5. Antiseptic of aromatic series: phenol, resorcin, biclotymol*.

      1.2.6. Antiseptics of aliphatic series: ethyl alcohol*, formaldehyde.

      1.2.7. Oxidizers: potassium permanganate, hydrogen peroxide*.

      1.2.8. Nitrofuran derivatives – nitrofural*.

      1.2.9. Dyes: methylthioninium chloride, brilliant green*.

      1.2.10. Biguanides – chlorhexidine*.

      1.2.11. Polyguanidines: biopag, phosphag.

1.2.12. Multi-purpose antiseptics – virkon.

1.3. The conditions determining the antimicrobial activity of antiseptics, the mechanisms of action of antiseptics of different chemical groups.

1.4. Features of the use of certain antiseptics. The principles of the treatment of acute poisonings with antiseptics.

2. Anticancer (antiblastomic) drugs

2.1. The principles of chemotherapy of malignant neoplastic diseases.

2.2. Main anticancer drugs.

2.2.1. Alkylating drugs: cyclophosphamide*, melphalan, busulfan.

2.2.2. Antimetabolites: methotrexate, fluorouracil*, cytarabine, mercaptopurine.

2.2.3. Drugs that arrests mitosis: vincristine, paclitaxel*, etoposide*.

2.2.4. Antibiotics: bleomycin, doxorubicin*, mitomycin.

2.2.5. Enzymes – L-asparaginase.

2.2.6. Platinum drugs – cisplatin*.

2.3. Mechanisms of action of anticancer drugs.

2.4. Features of the spectrum of anticancer action of alkylating drugs, antimetabolites, platinum drugs, antibiotics, hormones and antagonists of hormones, enzymes.

2.5. Complications arising from the use of anticancer drugs, their prevention and treatment.

LESSON 15 (33). FINAL LESSON ON CHEMOTHERAPEUTIC DRUGS

Objective: To systematize and consolidate the knowledge of pharmacological properties, indications, principles of use of chemotherapeutic drugs. Consolidate the skills of writing prescriptions for basic chemotherapeutic drugs.

When preparing for the final class on chemotherapeutic drugs it is recommended to review the material of the following lessons:

- 10-11 (28, 29) – Antimicrobial drugs. Antibiotics.
- 12 (30) – Synthetic antimicrobial drugs. Antimycobacterial drugs.
- 13 (31) – Antiviral and antifungal drugs.
- 14 (32) – Antiseptics and disinfectants. Anticancer drugs.

Be able to write out in various medicinal forms: azithromycin, nitrofurantoin, amikacin, oxacillin, amoxicillin, ofloxacin, acyclovir, pipemidic acid, benzipenicillin benzathine (bicillin 1), piperacillin, benzylpenicillin, rimantadine, gentamicin, rifampicin, doxycycline, streptomycin, zidovudine, terbinafine, isoniazide, fluconazole, idoxuridine, chloramphenicol, imipenem, chloroquine, clindamycin, cefaclor, co-trimoxazole, ceftazidime, metronidazole, ciprofloxacin, nystatin, erythromycin.

Questions for individual study:

1. Definition of chemotherapeutic drugs.
2. Difference of chemotherapeutic drugs from antiseptics and disinfectants.
3. Essence of concepts: empirical (probable) antimicrobial therapy, combined antimicrobial therapy, antimicrobial chemoprophylaxis; antibiotic, probiotic (eubiotic); bactericidal and bacteriostatic effect; first-line (drugs of choice) and second-line drugs; minimal inhibitory

concentration and minimal bactericidal concentration; sensitivity and resistance of infectious agents, postantibiotic effect.

4. Determinants of selective toxicity of chemotherapeutic drugs.
5. Essence of differences of pharmacodynamic and chemotherapeutic action.
6. Principles of a rational chemotherapy of infections.
7. Indications for the combined antibiotic therapy.
8. Principles of the combined antibiotic therapy.
9. Principles of classification of antibiotics.
10. The basic mechanisms of antibiotic action.
11. Name the side effects of antibiotics caused by their allergic action.
12. Name the side effects and the complications of an antibiotic therapy connected with their pharmacodynamic action.
13. Name the side effects and the complications of an antibiotic therapy connected with their chemotherapeutic action.
14. Mechanisms of development of a resistance of microorganisms to antibiotics.
15. Ways to decrease a resistance of microorganisms to antibiotics.
16. The reasons of an inefficiency of antimicrobial therapy.
17. Name the groups of the antibiotics inhibiting the synthesis of bacterial cellular wall, antibiotics that interfere with plasma membrane structure; inhibiting RNA synthesis; inhibiting protein synthesis; with bactericidal action on based microbial cells; with bactericidal action on sharing microbial cells; bacteriostatic antibiotics; β-lactam antibiotics.
18. Classification of penicillins.
19. Classification of cephalosporins.
20. Name the basic antibiotics of monobactams and carbapenems; glycopeptides and polypeptides; ansamycins and amphenicols; aminoglycosides; tetracyclines and lincosamides; macrolides and azalides.
21. Name the antifungal antibiotics.
22. Specify the accessory to group, an antimicrobial spectrum, resistance to β-lactamases and a route of administration of the following antibiotics:
    - cephazolin, cephalexin, cephradine;
    - cefuroxime, cefoxitin, cefuroxime axetil, cefaclor;
    - cefotaxime, ceftazidime, cefixime, ceftriaxone;
    - cefepime, cefpirome.
23. Specify the accessory to group, features of distribution, an antimicrobial spectrum and side effects of fusidic acid.
24. Specify the accessory to group, an antimicrobial spectrum of cycloserine.
25. Name the first-line drugs for the treatment of the infections caused by methicillin resistant staphylococci.
26. Name the groups of chemotherapeutic drugs active against intracellular microorganisms.
27. Name the basic chemotherapeutic drugs active against anaerobes.
28. Name the chemotherapeutic drugs with high antipseudomonal activity.
29. Indications for tetracyclines; chloramphenicol; streptomycin; carbapenems.
30. The characteristic of imipenem and meropenem on an antimicrobial spectrum, resistance to β-lactamases and dehydropeptidase 1.
31. The side effects of penicillins; cephalosporins; carbapenems; aminoglycosides; tetracyclines; chloramphenicol; macrolides.

32. Name the groups of synthetic antimicrobial drugs.
33. The classification of sulfonamides on duration of action.
34. Name the sulfonamides acting in the lumen of the intestine.
35. Name the sulfonamides for local application.
36. The features of therapeutic action of sulfonamides combined with salicylic acid.
37. Indications for sulfasalazine.
38. The mechanism of the antimicrobial action of sulfonamides.
39. An antibacterial spectrum of sulfonamides.
40. The mechanism of the antimicrobial action of trimethoprim.
41. How chemotherapeutic properties of sulfonamides will change at their combination with trimethoprim and why?
42. Name the sulfonamides the most dangerous concerning crystalluria.
43. The complications of therapy by sulfonamides.
44. Why do local anesthetics decrease bacteriostatic action of sulfonamides?
45. The precautions for therapy by sulfonamides.
46. Name the drugs of 8-oxyquinoline derivatives.
47. An antimicrobial spectrum of chlorquinaldol and nitroxoline.
48. The features of pharmacokinetics of 8-oxyquinoline derivatives with nitro group and containing halogens.
49. Indications for chlorquinaldol and nitroxoline.
50. The side effects of chlorquinaldol and nitroxoline.
51. Name the drugs of nitrofurans.
52. The mechanism of action of nitrofurans.
53. Indications for furazolidone and nitrofurantoin.
54. Why is it necessary to limit the use of the products containing a lot of tyramine during the treatment by furazolidone?
55. The influence of furazolidone on a metabolism of ethyl alcohol.
56. Complications during therapy by nitrofurantoin.
57. The side effects of furazolidone.
58. Difference in an antibacterial spectrum of acids: nalidixic, oxolinic and pipemidic.
59. Difference in the antimicrobial activity of oxolinic and nalidixic acids.
60. Difference and similarity of pharmacokinetic properties of acids: nalidixic, oxolinic and pipemidic.
61. The side effects of nalidixic acid.
62. Indications for quinolones.
63. Basic difference of fluoroquinolones from quinolones frames radically changing their pharmacological properties and the antimicrobial action.
64. Name the widely used fluoroquinolones in clinical practice.
65. The mechanism of action of fluoroquinolones.
66. The antimicrobial spectrum of fluoroquinolones.
67. The pharmacokinetic properties of fluoroquinolones.
68. Indications for fluoroquinolones.
69. The side effects of fluoroquinolones.
70. Absolute contraindications for fluoroquinolones.
71. Name the drugs of nitroimidazoles.

72. The mechanism of action of metronidazole.
73. An antibacterial and antiprotozoal spectrum of metronidazole.
74. The pharmacokinetics of metronidazole.
75. Indications for metronidazole.
76. The side effects of metronidazole.
77. Name targets of action of antimalarial drugs.
78. Name the drugs influencing on erythrocyte schizonts; pre-erythrocytic forms of a malarial plasmodium; on sexual forms of a malarial plasmodium.
79. The principles of use of antimalarial drugs for individual chemoprophylaxis, treatments of malaria; for prophylaxis of relapses of malaria (radical treatment); social chemoprophylaxis.
80. A spectrum of antimalarial action:
    - mefloquine, chloroquine, quinine;
    - pyrimethaminum and proguanilum;
    - primachinum.
81. Name the antimalarial drugs for individual chemoprophylaxis, treatments of malaria; for prophylaxis of relapses of malaria (radical treatment); social chemoprophylaxis.
82. What kind of a malarial plasmodium does not create exoerythrocytic forms?
83. What form of malaria does not relapse after treatment and why?
84. Name the drugs, efficient at any localization of amoebas; at intestinal localization of amoebas; acting on the tissue forms of amoebas.
85. The mechanism of action of chiniofon.
86. The pharmacokinetic properties of chiniofon used for the treatment of amoebiasis.
87. The pharmacokinetic properties of diloxanide.
88. The side effects of chiniofon; emetine; diloxanide.
89. Name the drugs for the treatment of trichomoniasis for oral application; for oral and intravaginal application; for intravaginal application.
90. The principles of the treatment of trichomoniasis.
91. Name the drugs for the treatment of giardiasis.
92. The mechanism of action of mepacrine.
93. The side effects of mepacrine.
94. The drugs for the treatment of toxoplasmosis.
95. The percularities of drug use for the treatment of toxoplasmosis associated with HIV infection.
96. The percularities of drug use for the treatment of toxoplasmosis when there is a risk of infection of a fetus.
97. The drugs used for the treatment of visceral leishmaniasis; cutaneous leishmaniasis.
98. The side effects of sodium stibogluconate.
99. The side effects of pentamidine.
100. Name the drugs for the treatment of pneumocystosis.
101. Specify the problems of the pharmacotherapy of viral infections.
102. Stages of a virus reproduction as a target for action of antiviral drugs.
103. Name the inhibitors of adsorption, penetration and deproteinization (stripping) of viruses; inhibitors of nucleic acid synthesis; inhibitors of RNA and late viral proteins synthesis; inhibitors of virus self-ssemblance.
104. Name the anti-influenza drugs; antiherpetic drugs; antiviral drugs for cytomegalovirus; drugs for the treatment of HIV infection, Drugs used in respiratory syncytial infection; antiviral drugs of a broad spectrum of action.

105. Name the virucidal drugs for local application.
106. Name the gamma globulins for the treatment of viral infections.
107. The mechanism of action of aminoadamantanes, ribavirin, zidovudine, ganciclovir, foscarnet, acyclovir, nevirapine, saquinavir, interferons, tilorone.
108. Indications for acyclovir, idoxuridine, foscarnet, ganciclovir, zidovudine, rimantadine, ribavirin.
109. An antirabic drug.
110. First-line drug for the treatment of anogenital warts; herpetic keratitis, herpetic conjunctivitis.
111. Belarusian virucidal drug for local application.
112. First-line drug for the treatment of genital herpes.
113. The side effects of acyclovir, foscarnet, ganciclovir, zidovudine, aminoadamantanes, interferons, ribavirin.
114. An antibiotic with antiviral activity.
115. Efficiency and therapeutic potential of drugs for the treatment of HIV infection.
116. Name the basic antispirochetal drugs.
117. First-line drugs for the treatment of lues.
118. The principles of classification of antituberculosis drugs.
119. Name the first antituberculosis drugs.
120. Name the reserve antituberculosis drugs.
121. Name the most efficient antituberculosis drugs.
122. Name the antituberculosis drugs of average efficiency.
123. Name the antituberculosis drugs of low efficiency.
124. Name the most active synthetic antituberculosis drug.
125. Name the most active antituberculosis antibiotic.
126. Name the bacteriostatic antituberculosis drugs.
127. Name the antituberculosis drugs affecting micobacterias with intracellular localization.
128. Name the bactericidal antituberculosis drugs.
129. The mechanism of action of isoniazid; ethambutol; pyrazinamide; rifampicin; streptomycin.
130. Why treatment by isoniazid can be complicated by polyneuritis?
131. What drugs should be administered for prophylaxis of polyneuritis during treatment by isoniazid?
132. What antibacterial drugs are used for the treatment of lepra?
133. Kinds of chemoprophylaxis of tuberculosis.
134. Primary chemoprophylaxis of tuberculosis. Who to carry out at and which drugs to use?
135. Secondary chemoprophylaxis of tuberculosis. Who to carry out at and which drugs to use?
136. What is the difference between chemoprophylaxis and chemotherapy of tuberculosis?
137. The principles of a pharmacotherapy of tuberculosis.
138. Duration of tuberculosis treatment courses.
139. What and how does the duration of tuberculosis treatment changes depend on?
140. The side effects of isoniazid; ethambutol; pyrazinamide; rifampicin.
141. The prophylaxis of side effects of antituberculosis drugs.
142. The principles of the pharmacotherapy of mycoses.
143. Name the antifungal antibiotics.
144. Name the antifungal polyene antibiotics.
145. The mechanism of antifungal action of polyene antibiotics; griseofulvin; azoles.

146. Can the resistance to antifungal drugs appear?
147. Name the antifungal drugs − imidazole derivatives for local application.
148. Name the antifungal drugs − imidazole derivatives for systemic and local application.
149. Name the triazole derivatives.
150. Terbinafine, features of action and use.
151. Nystatin, features of action and use.
152. What fungi can be attacked with the help of penicillins and tetracyclines?
153. What mycosis sulfonamides and streptomycin are effective at?
154. Why do systemic and deep mycoses are difficult to treat?
155. Why keratolytic and depilatory drugs are applied together with antifungal drug?
156. Which of the following fungi are most sensitive to polyene antibiotics: yeastlike microorganisms, causative agents of deep mycoses (coccidia, histoplasma, cryptococci and sporotrichum), mycelial fungi, dermatophytes?
157. What fungi are less sensitive to polyene antibiotics: yeastlike microorganisms, causative agents of deep mycoses (coccidia, histoplasma, cryptococci and sporotrichum), mycelial fungi, dermatophytes?
158. What protozoa do polyene antibiotics affect?
159. What determines the choice of administration route of polyene antibiotics?
160. The difference of antiseptics from disinfectants.
161. The difference of antiseptics from other antibacterial drugs.
162. The requirements for antiseptics.
163. The classification of antiseptics according to their chemical structure (groups, drugs).
164. Name the antiseptics of detergents; metal compounds; halogen compounds; acids and bases; aromatic compounds; aliphatic derivatives; oxidizers; nitrofuran derivatives; dyes; biguanides.
165. The mechanism of action of the antiseptics of detergents; metal compounds; halogen compounds; acids and bases; aromatic compounds; aliphatic derivatives; oxidizers; nitrofuran derivatives; dyes; biguanides.
166. The features of use of the antiseptics of detergents; metal compounds; halogen compounds; acids and bases; aromatic compounds; aliphatic derivatives; oxidizers; nitrofuran derivatives; dyes; biguanides.
167. The toxicity of antiseptics and disinfectants.
168. The principles of the treatment of acute poisonings with antiseptics.
169. The principles of chemotherapy of malignant neoplastic diseases.
170. Main anticancer drugs (groups, drugs).
171. Name the anticancer drugs of different groups: alkylating drugs; antimetabolites; drugs that arrests mitosis; antibiotics; enzymes; platinum drugs.
172. The mechanisms of action of anticancer drugs of different groups: alkylating drugs; antimetabolites; drugs that arrests mitosis; antibiotics; enzymes; platinum drugs.
173. The features of a spectrum of anticancer action of alkylating drugs; antimetabolites; antibiotics; enzymes; platinum drugs.
174. The side effects of anticancer drugs of different groups: alkylating drugs; antimetabolites; drugs that arrests mitosis; antibiotics; enzymes; platinum drugs.
175. The complications and consequences of anticancer chemotherapy.

DRUGS USED IN DENTISTRY

LESSON 16 (34). MEANS, WHICH REGULATE THE METABOLISM OF THE HARD TOOTH TISSUE. ENZYMATIC AND ANTIFERMENTAL PREPARATIONS. DRUGS THAT AFFECTS THE REGENERATION PROCESS.

1. Drugs for preventing the formation of dental plaque and antigingivitive drugs

1.1. Chemotherapeutic agents for the local application (antibiotics - vancomycin, kanamycin, polymyxin B etc; metronidazole),

1.2. antiseptics - triclosan, hexetidine, ambazone, allantoin, biklotimol, chlorhexidine, sanguinarine, efkalimin etc.

1.3. Properties of an ideal agent for preventing the formation of dental plaque. Rational use of chemotherapeutic agents.

2. Enzyme preparations as regulators of tissue and cell metabolism

2.1. Improves digestion - pepsin, gastric juice natural, pancreatin.

2.2. Used in necrotic processes - trypsin, chymotrypsin, ribonuclease.

2.3. Different enzyme preparations - hyaluronidase ronidase, penicillinase, dextranase.

3. Antifermental preparations

3.1. Inhibitors of proteolysis - aprotinin (pantripina, contrycal).

4. Drugs, influencing the processes of regeneration

4.1. Drugs, that accelerate regeneration

4.1.1. Which suppress inflammation and eliminate factors that hinder regeneration:
- etiotropic agents (antiseptics, chemotherapeutic drugs);
- anti-inflammatory agents for local and resorptive action.

4.1.2. True stimulants of regeneration:
- vitamins - folic acid, cyanocobalamin, pyridoxine, thiamine, ascorbic acid;
- anabolic steroids - nandrolone (retabolil) fenobolin;
- non-steroidal anabolic - potassium orotate, riboxinum, metiluratsil;
- means of animal and vegetable origin: apilak, sea buckthorn oil;
- biogenic stimulators – aloe, gumizol;
- improving microcirculation - pentoxifylline, vinpocetine;
- hormones - calcitonin, growth hormone, lactin;
- tissue-specific drugs - cerebrolysin.

4.2. Depressants of the regeneration
- antineoplastic agents;
- preparations of adrenal hormones (glucocorticoids), and the pituitary gland;
- radioprotective - cystamine;
- immunosuppressants - azathioprine, methotrexate.

5. Drugs, that regulate the metabolism of the hard tooth tissues

5.1. Calcium preparations: calcium chloride, calcium gluconate, calcium lactate, calcium hydroxide ("Calmecin").

5.2. Phosphorus preparations: calcium glycerophosphate, phytin.

5.3. Fluoride preparations: sodium fluoride, "Vitaftor" Ftorlac.

5.4. Combined calcium and phosphorus preparations: osteogenon.

5.5. Preparations of thyroid and parathyroid hormones: teriparatide, calcitonin (calcitrine, miacalcic).

5.6. Vitamin D preparations - ergocalciferol, alfacalcidol, videhol, calcitriol, oksidevit.

5.7. Anabolic steroids - nandrolone (retabolil).

5.8. Glucocorticosteroids - prednisone.

5.9. Sex hormones - estrogens, androgens.

5.10. Bisphosphonates - alendronate.

6. The main indications, side effects, contraindications to the use of drugs, that regulate metabolism in the hard tooth tissues. Their use in dentistry.

LESSON 17 (35). MEDICINES USED TO INFLUENCE THE ORAL MUCOSA AND DENTAL PULP

1. Antiinflammatory drugs:

- Astringents: tannin, sage leaf, chamomile flowers, romazulan, oak bark.
- Enzyme preparations: trypsin, chymotrypsin, ribonuclease, deoxyribonuclease, lidaze.
- GCS: ointment hydrocortisone, prednisolone, flumethasone pivalate (lokakorten) flyuocinolone acetonide (sinaflane).
- NSAIDs: ointments with fenilbutasone, indomethacine, mefenamine sodium salt, dimexide, heparin ointment.

2. Antibacterial and antifungal agents

- Antiseptics: chloramine, Lugol's solution, iodinol, potassium permanganate, sodium tetraborate, boric acid, ethacridine lactate, furacilin, brilliant green, methylene blue, chlorhexidine, triclosan, novoimanin, sangviritrin, calendula tincture, lysozyme.
- Antibiotics: neomycin, polymyxin, gramicidin, sintomitsina, nystatin, amphotericin B.

3. Antiviral agents: oxoline, bonafton, tebrofen, acyclovir, gossypol.

4. Drugs that stimulate tissue regeneration: vitamins A, E; sea buckthorn oil and wild rose oil, carotolin, Shostakovskiy balm, methyluracilum ointment, propolis, actovegin, solkoseril.

5. Drugs that suppress pain:

а) local action: local anesthetics, astringents, enveloping means.

б) resorbtive action: non-narcotic analgesics (paracetamol, ibuprofen, metamizol).

6. Means used to eliminate unpleasant odors from the mouth (deodorant): peppermint oil, menthol, metronidazole (gargle).

LESSON 18 (36). DRUG INTERACTION. PRINCIPLES OF THE TREATMENT OF ACUTE DRUG POISONING. EMERGENCY AID DRUGS

I. Drug interaction

Objective: To study the main ways of interaction, mechanisms and possible effects of drug interactions.

1. Combined administration of drugs (polypharmacotherapy or combined therapy, polypragmasia). Drug interaction (definition).
2. Indications for combined pharmacotherapy.
3. Possible results of drug interaction (synergism, antagonism, their types).
4. Pharmacodynamic properties of drugs increasing the rate of clinically significant interactions.
5. The main mechanisms of drug interaction.

5.1. Pharmaceutical interaction. Requirements to carry out infusion therapy.

5.2. Pharmacological interaction (types).

5.2.1. Pharmacokinetic interaction:

5.2.1.1. At the absorption stage:

- during enteral administration (determining factors – acidity, direct interaction in the lumen of the gastrointestinal tract, motion activity of the gastrointestinal tract, changes in intestinal flora, changes in absorption mechanisms);
- during parenteral administration (ways of the absorption control).

5.2.1.2. During distribution and storage:

- direct interaction in blood plasma;
- competitive exclusion from the connections with blood plasma albumins;
- exclusion from the connections with tissue proteins.

5.2.1.3. During the process of metabolism:

- hepatic microsomal enzyme induction;
- hepatic microsomal enzyme inhibition;
- disulfiram-like reactions.

5.2.1.4. During the process of elimination:

- by passive diffusion;
- by active transport.

5.2.1.5. Pharmacodynamic interaction

- at the level of specific receptors;
- at the level of enzymes;
- at the level of ion channels;
- at the level of transport systems.

Examples of clinically significant drug interactions.

II. Principles of the treatment of acute drug poisoning

Therapeutic principles of acute drug poisoning.

1. Classification of drugs according to their toxicity and hazards (List A, List B), storage conditions of drugs and their dispensing from the pharmacy.

2. The concept of toxicokinetics and toxicodynamics. Quantitative assessment of toxic effect.
3. The main mechanisms of toxic effect of drugs.
4. Principles of the treatment of acute drug poisoning:
    - emergency first aid;
    - slowing-down of absorption and detoxification of unabsorbed poison;
    - accelerated elimination, inactivation of absorbed poison;
    - restoration of physiological functions.
5. First aid tactics depending on the way the poison gets into the organism.
6. Antidotes, definition, classification.

    6.1. Toxicotropic antidotes:
    - acting on physical and chemical principles: activated carbon;
    - acting on chemical principle: unitiol, mecaptide, dexrazoxane, calcium trisodium pentetate, penicillamine.

    6.2. Toxicokinetic antidotes (accelerating biotransformation of poisons): trimedoxime bromide, methylene blue (methylthioninium chloride), sodium thiosulfate, ethyl alcohol, antioxidants.

    6.3. Pharmacological antagonists: atropine, naloxone, esmolol, flumazenil, acetylcysteine, etc.

    6.4. Specific antitoxin sera: monovalent anti-digoxin, anti-botulinum, anti-ophidic sera.

7. The main mechanisms of antidote action. Principles of use.

    Name the drug of choice for the treatment of poisoning with the drugs named below; explain the mechanism of action:
    - barbiturates;
    - benzodiazepine sedative-hypnogenic drugs;
    - paracetomol;
    - heparin;
    - non-depolarizing muscle relaxants (pancuronium bromide, etc);
    - narcotic analgesics;
    - neuroleptics (extrapyramidal effects);
    - cardiac glycosides (negative chronotropic effect).

III.Emegency aid drugs

a. Emergency aid drugs for acute heart failure.
b. Emergency aid drugs for angina.
c. Emergency aid drugs for hypertensive crises.
d. Emergency aid drugs for bronchospasms.
e. Emergency aid drugs for acute hypoglycemia.
f. Emergency aid drugs for anaphylactic shock.

Emergency aid principles in case of the above-mentioned conditions, drugs of choice, medicinal forms and routes of administration.

EXAMINATION QUESTIONS

CHAPTER I.

GENERAL PHARMACOLOGY AND PRESCRIPTION

1. Essence of pharmacology as a science. Parts and fields of modern pharmacology.
2. The chemical nature of the drug. Factors providing the therapeutic effect of drugs - the pharmacological effect and placebo effect.
3. Sources of drugs. Definition: medicinal agent (medicinal drug, drug), medicinal substance, medicinal form.
4. Stages of development of new medicines and therapeutic dental appointment toothpastes.
5. Types of pharmacotherapy. Deontological problems of pharmacotherapy.
6. Routes of drug administration into the body and their characteristic.
7. Pathological changes in the mucosa of mouth and dental tissues as a result use of medicines.
8. Absorption and distribution of drugs in the body. Bioavailability. Volume of distribution.
9. Transformation of drugs in the body.
10. Routes of elimination of drugs and their characteristics. Clearance. Semi-elimination period.
11. Excretion of drugs through the oral mucosa, the possible consequences.
12. Mechanisms of drug interactions with the receptors. The concept of receptors in pharmacology.
13. Pharmacodynamic drug interactions. Antagonism, synergism, their types. Character of change of drug effect (activity, efficacy), depending on the type of antagonism.
14. Types of action of drugs.
15. Dependence of action of drugs on the chemical structure and physico-chemical properties.
16. The concept of dose. Types doses. Principles and units of drug dosage.
17. The dependence of the action of drugs on the dose, age, gender, individual characteristics of the organism. Idiosyncrasy.
18. Change of action of drugs in their re-introduction. Addictive. Tachyphylaxis. Cumulation. Medicinal dependence.
19. Medical and social aspects of the drug addiction control.
20. Drug interactions. Interaction types, the concept of synergy and antagonism.
21. Side effects of drugs.
22. Toxic effects of drugs. Embryotoxicity. Fetotoxicity. Teratogenicity. Mutagenic and carcinogenic (blastomogenic) effects of drugs.
23. Prescribtion and its structure. General rules for drawing up a prescription.
24. The solid medicinal forms. Rules of prescribing.
25. Liquid medicinal forms. Rules of prescribing.
26. Soft medicinal forms. Rules of prescribing.
27. Medicinal forms for injection. Rules of prescribing.
28. 31. Rules of writing out narcotic, poisonous and potent substances. State regulation of writing out and dispensing drugs.
29. Medicines to emergency care at a reception at the dentist.

CHAPTER II.
SPECIAL PHARMACOLOGY

Characteristics of each group of drugs should include:

- classification with indicating of drugs;
- mechanism of action;
- pharmacological effects;
- main pharmacokinetic characteristics of the drugs of the group;
- use in clinical medicine (indications);
- main side and toxic effects;
- main contraindications.

For antimicrobial drugs in addition to know:

- antimicrobial spectrum;
- effect (bactericidal / bacteriostatic);
- tactics of rational dosing.

1. The scheme of the functional organization of the peripheral nervous system. Excitation transmission in cholinergic and adrenergic synapses.
2. Drugs, operating in the cholinergic synapses. General characteristics. Classification.
3. M-cholinomimetics and anticholinesterase agents.
4. N-cholinomimetics.
5. M-cholinergic antagonists.
6. Ganglionic blockers.
7. Muscle relaxant drugs (curare-type).
8. Toxic effects of nicotine. Drugs for smoking control.
9. Adrenergic and antiadrenergic drugs. Classification.
10. Adrenomimetics.
11. Adrenergic antagonists.
12. Sympatomimetics and sympatholytics.
13. Drugs affecting the afferent innervation. General characteristics. Classification.
14. Astringent, mucilaginous drugs, absorbents and irritants.
15. Local anesthetic drugs.
16. General anesthetics. Definition. Classification. The requirements for an ideal anesthetic.
17. Drugs for inhalation anesthesia.
18. Drugs for non inhalation anesthesia.
19. Narcotic analgesics. Acute and chronic poisoning. Principles of the treatment and medical aid.
20. Nonnarcotic analgesics and antipyretics.
21. Ethyl alcohol. Acute and chronic poisoning. Treatment.
22. Chronic poisoning with ethyl alcohol. Social aspects. Principles of pharmacotherapy of chronic alcoholism.
23. Psychotropic drugs. General characteristics. Classification.
24. Sedative-hypnogenic drugs.
25. Antipsychotic drugs.

26. Antidepressants (thymoleptics). Normothymic (antimanic) drugs.
27. Anxiolytic drugs.
28. Psychostimulants, tonics, nootropic drugs.
29. Cardiotonic drugs.
30. Principles of IHD pharmacotherapy. Antianginal drugs.
31. Antihypertensive drugs.
32. Drugs affecting hematopoiesis and leucopoesis.
33. Topical and resorbtive haemostatic drugs.
34. Antithrombotic drugs.
35. Drugs affecting appetite and the processes of digestion.
36. Principles of pharmacotherapy of gastric ulcer and duodenal ulcer. Antiulcerogenic drugs.
37. Stimulants of motility of the gastrointestinal tract. Antispastic and antidiarrheal drugs.
38. Hepatotropic drugs. Drugs affecting the exocrine and endocrine functions of the pancreas.
39. Laxative and antiflatulent (antifoaming) drugs.
40. Emetic and antiemetic drugs.
41. Drugs for the prevention and relief of bronchospasm.
42. Antitussives, expectorant and mucolytic drugs.
43. Drugs, influencing on calcium and phosphorous metabolism.
44. Antidiabetic drugs.
45. Estrogen, progestin and androgen drugs.
46. Anabolics.
47. Glucocorticoids and their synthetic analogs.
48. Vitamin drugs. General characteristics. Classification.
49. Water-soluble vitamin.
50. Fat-soluble vitamin drugs and vitamin-like compound drugs.
51. Drugs affecting the processes of regeneration.
52. Enzyme and antifermental drugs.
53. Salts of alkaline and alkaline-earth metals.
54. Drugs affecting on calcium metabolism.
55. Preparations fluorine. Application. Acute poisoning and their treatment.
56. Preparations of calcium and phosphorous. Application in dentistry.
57. Non-steroidal anti-inflammatory drugs.
58. Steroid anti-inflammatory drugs.
59. Antiallergic drugs. Classification. Antihistamine drugs.
60. Immunomodulators (immunostimulators, immunosuppressants).
61. Antiseptics and disinfectants. General characteristics. Classification.
62. Antiseptics and disinfectants: aliphatic and aromatic polyguanidines and multicomponent agent (general characteristics). Requirements to disinfectants.
63. Antiseptics used in infectious diseases of the oral cavity and pharynx. Requirements for antiseptics.
64. Basic principles of chemotherapy.
65. Antimicrobial drugs. General characteristics. Basic definitions of chemotherapy of infections.

66. Penicillins.
67. Cephalosporins.
68. Macrolides and azalides.
69. Tetracyclines and amphenicols.
70. Aminoglycosides.
71. Ansamycines and peptide antibiotics.
72. Lincosamides. Fusidic acid.
73. Principes of rational chemiotherapy. Combinations of antibacterial drugs.
74. Sulfonamide drugs.
75. Synthetic antimicrobial drugs: oxyquinolines, quinolones, fluoroquinolones.
76. Synthetic antimicrobial drugs: nitrofurans, nitroimidazoles.
77. Antituberculosis drugs.
78. Antiviral drugs.
79. Antifungal (antimycotic) drugs.
80. The principles of treatment of acute drug poisoning. Antidote therapy.

CHAPTER III.

LIST OF DRUGS OF CHAPTER II

1.–
2.–
3. Pilocarpine, aceclidine, bethanechol. Neostigmine, pyridostigmine bromide, edrophonium, donepezil hydrochloride, trimedoxime bromide (dipiroxime).
4. Nicotine, cytisine, anabasine.
5. Atropine, hyoscine hydrobromide (scopolamine), homatropine, tropicamide, dicycloverine, pirenzepine, darifenacine, tolterodine.
6. Trimethaphan, azamethonium bromide.
7. Atrakurium besylate, pipecuronium bromide, suxamethonium chloride.
8. “Tabex”, “Lobesil”, anabasine.
9.–
10. Epinephrine (adrenalin hydrochloride), norepinephrine (noradrenaline hydrotartrate), phenylephrine, dobutamine, salbutamol, isoprenaline.
11. Propranolol, nadolol, pindolol, atenolol, metoprolol, nebivolol, acebutolol, labetalol.
12. Ephedrine, guanethidine, reserpine.
13. -
14. Tannin, sage leaves infusion, activated carbon, menthol, ammonia solution.
15. Benzocaine (anesthezine), procaine (novocaine), tetracaine, lidocaine, bupivacaine, articaine.
16. -
17. Halothane, isoflurane, sevoflurane, dinitrogen monoxide.
18. Sodium thiopental, propofol, ketamine.
19. Morphine, trimepiridine, fentanyl, buprenorphine, pentazocine, metadon, naloxone, naltrexone.
20. Tramadol, nefopam, paracetomol, acetylsalicylic acid, ibuprofen, keterolac.
21. -
22. Disulfiram.
23. Nitrazepam, temazepam, triazolam, zolpidem, zopiclone.
24. –

25. Chlorpromazine, thioridazine, fluphenazine, flupentixol, haloperidol, benperidol, chlorpromazine, risperidone.
26. Amitriptyline, venlafaxine, fluoxetine, maprotiline, tianeptine, moclobemide.
27. Alprazolam, diazepam, chlordiazepoxide, oxazepam, medazepam, buspirone.
28. Caffeine, mesocarb. Eleutherococ liquid extract, ginseng tincture, pantocrin. Piracetam, vinpocetine, nimodipine, donepezil hydrochloride, memantine.
29. Strophanthin, digoxin, digitoxin. Dopamine, dobutamine.
30. Propranolol, atenolol; diltiazem, verapamil, amlodipine; nitroglycerin, nitrong, trinitrolong, isosorbide dinitrate, isosorbide mononitrate; nicorandil, ivabradine.
31. Propranolol, betaxolol, clonidine, captopril, enalapril, lisinopril, doxazosin, labetalol, diltiazem, verapamil, nifedipine, amlodipine.
32. Ferrous sulfate and other iron (II) salts, iron (III) sucrose complex, cyanocobalamin, folic acid, erythropoietins alfa and beta, molgramostim, methyluracil, anticancer drugs.
33. Etamsylate, calcium salts, menadione, tranexamic acid, blood clotting factor VIII and factor IX, thrombin.
34. Acetylsalicylic acid, clopidogrel, ticlopidine, pentoxifylline, abciximab, epoprostenol, sodium heparin, calcium nadroparin, sodium enoxaparin, phenindione, antithrombin III, lepirudin, warfarin, streptokinase, alteplase.
35. Bitters, pepsin, hydrochloric acid, orlistat, methylcellulose, metformin, acarbose.
36. Aluminium hydroxide, magnesium hydroxide, pirenzepine, famotidine, omeprazole, bismuth tripotassium dicitrate, sucralfate, metronidazole, amoxicillin, clarithromycin.
37. Pyridostigmine bromide, dicycloverine, hyoscine butylbromide, loperamide, domperidone, metoclopramide.
38. Allohol, osalmid, essentiale, silibinin, ursodeoxycholic acid. Cholecystokinin, pancreatin, atropine, ovomin, insulin drugs, glybenclamide, metformin, acarbose, pioglitazone, repaglinide.
39. Drugs of senna, bisacodyl, sodium sulfate, magnesium sulfate, lactulose; the fruit of dill, simethicone.
40. Apomorphine, ondansetron, metoclopramide, promethazine, hyoscine hydrobromide, nabilone, dexamethasone.
41. Epinephrine, salbutamol, salmeterol, ipratropium bromide, theophylline, ketotifen, zafirlukast, beclomethasone.
42. Codeine, dextromethorphan, oxeladin, prenoxdiazine, pronilid (falimint). Thermopsis drugs, potassium iodide, acetylcysteine, dornase alfa.
43. Teriparatide, calcitonin, estrogens, ergocalciferol, alendronic acid.
44. Insulin, glibenclamide, metformine.
45. Ethinyl estradiol, hexestrol, raloxifene; progesterone, norethisterone, levonorgestrel; tamoxifen, testosterone.
46. Nandrolone, potassium orotate, methyluracil, sodium nucleinate.
47. Hydrocortisone, methylprednisolone, triamcinolone, deoxycortone, dexamethasone, aminoglutethimide.
48. –
49. Thiamine, riboflavin, calcium pantothenate, folic acid, nicotinic acid, pyridoxine, ascorbic acid, rutin.
50. Retinol, ergocalciferol, tocopherol, choline chloride, inosine.
51. Methyluracil, liquid extract of Aloe, apilak, nandrolone, potassium orotate, riboxinum, vitamins (thiamine, pyridoxine, folic acid, cyanocobalamin, ascorbic acid), glucocorticosteroids, colhamin, cystamine.

52. Pepsin, natural gastric juice, pancreatin, trypsin, chymotrypsin, ribonuclease, streptokinase, lidaza, ronidaza, penicillinase, aprotinin, aminocaproic acid.
53. Sodium chloride, potassium chloride, calcium chloride, calcium gluconate, magnesium sulphate.
54. Parathyreoidin, calcitonin, ergocalciferol, anabolic steroids, glucocorticoids.
55. Sodium fluoride, "Vitaftor" fluorlac, fluorprotector.
56. Calcium chloride, calcium gluconate, calcium glycerophosphate, phytin.
57. Diclofenac, aceclofenac, ibuprofen, naproxen, indomethacin , meloxicam, celecoxib, nabumetone.
58. Prednisolone, methylprednisolone, dexamethasone, mometasone, fluocinolone acetonide.
59. Hydrocortisone, methylprednisolone, triamcinolone, beclomethasone, cromolyn, nedocromil, ketotifen, diphenhydramine, hifenadine, clemastine, loratadine, famotidine, epinephrine, salbutamol, aminophylline, penicillamine, cyclosporine, azathioprine.
60. Ribomunil, gamma interferon, aldesleukin, thymogen, thyloron; azathioprine, methotrexate, cyclosporine, basiliximab.
61. –
62. Ethyl alcohol solution of formaldehyde, hexamethylenetetramine (methenamine), beta-1-lysoform, pure phenol, o-phenylphenol, o-benzyl-p-chlorophenol, p-tert-aminophenol, eugenol, biklotimol, triclosan, resorcinol, Biopag (chloride polyhexamethyleneguanidine), Phosphopag (polyhexamethyleneguanidine phosphate), Virkon.
63. Chloramine, iodine alcoholic solution, hydrogen peroxide solution, potassium permanganate, brilliant green, nitrofurazone, cetylpyridinium chloride, benzalkonium chloride, miramistin, boric acid, ammonia, chlorhexidine, metronidazole.
64. –
65. -
66. Benzylpenicillin (sodium and potassium salts), phenoxymethylpenicillin, benzathine benzylpenicillin (bicillin-1). Oxacillin, amoxicillin, carbenicillin, piperacillin, pivmecillinam, co-amoxiclav.
67. Cephazolin, cephradine; cefuroxime, cefoxitin, cefaclor; cefotaxime, ceftazidime, cefixime; cefepime.
68. Erythromycin, clarithromycin, telithromycin, azithromycin, spiramycin.
69. Tetracycline, doxycycline. Chloramphenicol.
70. Streptomycin, gentamicin, amikacin, spectinomycin.
71. Rifampicine, vancomycin, polymixines.
72. Lincomycin, clindamycin, fusidic acid.
73. –
74. Sulfadimidine, sulfadiazine, sulfadimethoxine, co-trimoxazole, phthalylsulfathiazole (phthalazol), sulfacetamide, sulfasalazine.
75. Nitroxoline, pipemidic acid, ciprofloxacin, ofloxacin.
76. Nitrofurantoin,furazolidone, metronidazole.
77. Isoniazid, rifampicin, pyrazinamide, ethambutol, streptomycin.
78. Rimantadine (remantadine), oseltamivir, ribavirin, acyclovir, idoxuridine, ganciclovir, zidovudine, nevirapine, indinavir, enfuvirtide, interferons, thyloron, oxoline.
79. Griseofulvin, clotrimazole, ketoconazole, fluconazole, ciclopirox, amphotericin B, flucytosine, terbinafine.
80. -

LITERATURE TO STUDY

Main

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Appendix 1.

BRIEF REFERENCE INFORMATION ON THE MAIN DRUGS OF VARIOUS PHARMATHERAPEUTIC GROUPS

DRUG NAME	MEDICINAL FORMS	AVERAGE THERAPEUTIC DOSES AND THE ROUTES OF ADMINISTRATION
ACECLIDINUM	Powder (for eye drops); 0.2% solution in 1 ml, 2 ml ampoules.	1-2 drops of 2-5% solution instilled into conjunctival sac; 2 mg s/c (maximal doses: single dose – 0.004 g, daily dose – 0.012 g).
ACICLOVIR	Bottles 0.25; tablets 0.2.	Adults and children over12 yrs.: 5 mg/kg i/v every 8 hrs. (to be injected slowly). Children 3 mo-12 yrs.: 5mg/kg; the contents of bottle to be dissolved in 10 ml of 0.9% NaCl solution. *Herpes simplex* – Adults: orally 200 mg 5 times a day; prophylaxis: 1 tab 4 times a day. *Herpes zoster* – 800 mg 5 times a day.
ALENDRONIC ACID	Tablets 0.01.	Orally 10 mg once a day 30 min before meals.
ALPRAZOLAM	Tablets 0.00025, 0.0005 (0.25-0.5 mg).	Orally 0.25-0.5 mg 3 times a day.
AMIKACIN	0.1, 0.25, 0.5 bottles (the contents of the bottle to be dissolved in 2-3 ml of water for injections).	I/m or i/v 500 mg 3 times a day.
AMIODARONE	Tablets 0.2; 5% solution in 3 ml ampoules.	Orally 200 mg 2-3 times a day; i/v 5 mg/kg (to be injected slowly in 250 ml of 5% glucose solution).
AMITRIPTYLINE	Tablets 0.025; 1% solution in 2 ml ampoules.	Orally 15-25 mg a day, i/v or i/m in 3-4 doses (injections).
AMLODIPINE	Tablets 0.005.	Orally 5 or 10 mg once a day.
AMOXICILLIN	Tablets 0.5, 0.75, 1.0; soluble tablets 0.125, 0.25, 0.5; capsules 0.25, 0.5; 1.0 g/1 ml solution (per os); 0.125 g/, 0.25 g/5 ml suspension (per os).	Adults: orally 500 mg 3 times a day; children under 2 yrs.: orally 20 mg/kg 3 times a day; children 2-5 yrs.: orally 125 mg 3 times a day; children 5-10 yrs.: orally 250 mg 3 times a day.
AMPHOTERICIN B	Powder 50 000 IU in bottles: a) for i/v injection; b) for inhalations; 30 000 IU/1.0 g ointment in tubes 15.0 and 30.0.	I/v, by drop infusion,: the contents of the bottle to be dissolved in 10 ml of water for injections, then in 450 ml of 5% glucose solution (122 IU/1ml) during 4-6 hrs. (250 IU/kg). 50000 IU/10 ml inhalations 1-2 times a day. A thin layer of the ointment to be applied 1-2 times a day on the affected area of the skin.
ATORVASTATIN	Tablets 0.01, 0.02.	Orally 10-40 mg once a day.
ATROPINE	Powder, tablets 0.0005; 0.05% - 0.1% solution in 1 ml ampoules; 1% eye ointment.	Orally, s/c, i/v or i/m 0.25-1.0 mg, or 1-2 drops of 0.5-1% solution (eye drops) instilled into conjunctival sac; 1% eye ointment; maximal single dose 1 mg; maximal daily dose 3 mg.
AZAMETHONIUM BROMIDE	5% solution in 1ml and 2 ml ampoules.	I/v (0.3-0.5 ml to be injected slowly!) or up to 2 ml i/m.
AZITHROMYCIN	Tablets 0.125, 0.5; capsules 0.25; syrup in bottles (0.1 g, 0.2 g/5 ml).	Orally once a day. Adults: 500 mg; children: 10 mg/kg.
BARALGIN	20 tablets blister strips; 5 ml ampoules.	Orally 1-2 tablets 2-3 times a day; 5 ml i/m or i/v (by slow injection).

BECLOMETASONE	Nebulizer (aerosol container with a metering valve), for 200 inhalations, 50 mcg.	Adults 2 inhalations (total 100 mcg) 3-4 times a day, in severe cases up to 12-16 inhalations a day; children 1-2 inhalations 2-4 times a day.
BENZATINE BENZYLPENICILLIN	Bottles 300 000 IU, 600 000 IU, 1200 000 IU, 2 400 000 IU.	I/m 300 000-600 000 IU i/m once a week, or 1 200 000-2 400 000 IU (in 2-3 ml of water for injections) once per 2 weeks.
BENZYLPENICILLIN NATRIUM	Bottles 250 000 IU, 500 000 IU, 1000 000 IU.	I/m 250 000-500 000 IU 4-6 times a day; by slow i/v injection 1-2 million IU in 5-10 ml; i/v 2-5 million IU in 100-200 ml of NaCl isotonic solution; (1000 IU/1 ml) once a day.
BETAXOLOL	Tablets 0.01 and 0.02; 0.25-0.5% solution in 2.5 ml, 5 ml, 10 ml, 15 ml bottles.	Orally 10-20 mg once a day; 1 drop of 0.25-0.5% solution instilled into conjunctival sac 2 times a day.
CALCITONIN	Solution for injection in 1 ml ampoules (100 IU); nasal spray in 2 ml aerosol bottles (200 IU) with pump-sprayer.	I/m 100 IU every other day (if there are severe pains in the bones every day), intranasal 200 IU daily.
CALCIUM CHLORIDE	Powder; 10% solution in 5 and 10 ml ampoules; 5 % and 10% solution for oral administration (200 ml).	Orally 10-15 ml 2-3 times a day; i/v introduced 6 drops per min, having diluted before infusion; 5-10 ml of 10% solution in 100-200 ml of isotonic solution NaCl or 5% solution of glucose; i/v slowly 5 ml of 10% solution (during 3-5 min.).
CAPTOPRIL	Tablets 0.025 and 0.05.	Orally 12.5-50 mg 3 times a day.
CARBAMAZEPINE	Tablets 0.2.	Orally 100-200 mg 2-4 times a day.
CEFACLOR	Capsules 0.25; 0.5; granulated material to prepare oral suspension (0.025g/0.05 g/1 ml); oral suspension (0.125 g/, 0.25 g/5 ml); dry substance to prepare suspension 1.5 g (0.125 g/5 ml) and 3.0 g (0.5 g/5 ml).	Orally 250 mg 3 times in 24 hours; children 10 mg/кg per dose.
CEFEPIM	Bottles 0.5; 1.0; 2.0.	I/m, i/v 500-1000 mg every 12 hours.
CEFTAZIDIME	Bottles 0.25; 0.5; 1.0 and 2.0.	I/m, i/v 1000 mg every 8 hours or 2000 mg every 12 hours.
CELECOXIB	Capsules 0.1 and 0.2.	Orally 100-200 mg 1-2 times a day.
CELECOXIB	Capsules 0.1 and 0.2.	Orally 100-200 mg 1-2 times a day.
CHLORAMPHENICOL	Tablets 0.25; 0.5; coated tablets 0.25; capsules 0.1; 0.25; 0.5; 0.25% solution of eye drops in 10 ml bottles.	Orally 250-500 mg 3-4 times in 24 hours; eye drops:1 drop 3 times in 24 hours.
CHLOROCHIN	Tablets 0.25; 5% solution in 5 ml ampoules.	Orally (after meal) 200-250 mg per one course of treatment, the 1-st intake 100 mg, in 6-8 hrs. 500 mg, for 2-nd or 3-d day 500 mg; i/m 500 mg every 6-8 hrs.; i/v slowly 500 mg, dissolved in 10-20 ml of 0.9% NaCl solution.
CHLORPROMAZINE	Dragees 0.025; 0.05 and 0.1; coated tablets 0.01 for children; 2.5% solution in 1; 2; 5 and 10 ml ampoules	Orally (1 dragees 3 times a day); i/m up to 0.6 g a day; i/v 0.025-0.05 g (no more than 0.1 g) in 24 hours. Children depending on their age 0.04-0.075 g in 24 hours.
CIPROFLOXACIN	Coated tablets 0.25; 0.5; 0.75; 0.2% solution in 50 and 100 ml bottles; 1% solution in 10 ml ampoules.	Orally 125-500 mg 2 times a day; i/v 100-200 mg 2 times a day.

CLINDAMYCIN	Capsules 0.15; 0.075 (for children); 15% solution in 2, 4, 6 ml ampoules; syrup in 80 ml bottles (75 mg\5 ml).	Orally, adults: 150 mg every 6 hours; children: 10-20 mg/kg in 3-4 doses; i/m and i/v (driply): adults: 600 mg 2-4 times a day; children: 1-30 mg/kg a day in 2-4 doses.
CLONIDINE	Tablets 0.000075 and 0.00015; 0.01% solution in 1 ml ampoules; 0.125%; 0.25% and 0.5% solution (eye drops) in 1.5 ml tube-droppers.	Orally 0.075 mg 2-4 times a day; i/v or s/c 0.5-1.5 ml of 0.01% solution; i/v dissolved by 0.5-1.5 of 0.01% solution in 10-20 isotonic solution NaCl and infused slowly during 3-5 min. Instillations in conjunctival sac 0.25-0.5% solution 1 drop 2-4 times a day.
CLOPIDOGREL	Coated tablets 0.075.	Orally 1 tablet once a day without regard to food.
CLOTRIMAZOLE	1% cream in 20.0 g tubes; 1% solution in 15 ml bottles; vaginal tablets 0.1.	Cream or solution is applied on the damaged areas 2-3 times a day; tablets are introduced into vagina at night; instill 1% solution in urethra 6 days.
CODEINE	Powders and tablets 0.015.	Orally, adults: 10-20 mg; children: over 2 years 1-7.5 mg once a day depending on the age (under 2 years are not administered); maximal single dose for adults orally 50 mg; maximal daily dose 200 mg.
CO–TRIMOXAZOLE	For adults: tablets sulphametoxazole 0.4 and trimetoprim 0.08; for children 0.1/0.02; oral suspension (0.2/0.04/5 ml) 480 ml; 3 ml ampoules (0.08/0.015/1 ml).	Orally 2 tablets 2 times a day; suspension 5 ml 2 times a day; i/m for adult and child under 12 years 3 ml 2 times a day.
CYANOCOBALAMIN	0.003%; 0.01%; 0.02% and 0.05% solutions in 1 ml ampoules.	I/m, s/c or i/v per 30-500 mcg once in 2 days.
DEXAMETHASONE	Tablets 0.0005.	Orally 0.5-1 mg once a day.
DIAZEPAM	For children: tablets 0.001, 0.002; 0.005, 0.01; 0.5% solution in 2 ml ampoules.	Orally 5-10 mg 1-2 times a day; children (depending on age): daily dose 2-10 mg. I/m or i/v 10 mg 3 times a day.
DICLOFENAC	2.5% solution in 3 ml ampoules.	I/m 75 mg 1-2 times a day.
DIGOXIN	Tablets 0.00025, 0.0001; 0.025% solution in 1 ml ampoules.	Orally, the 1st day 0.25 mg 4-5 times a day, later 0.25 mg 3-1 times a day. I/v slowly 0.25-0.5 mg in 10 ml of 5% or 20% glucose solution 1-2 times a day.
DIPHENHYDRAMINE HYDROCHLORIDUM	Powder; tablets 0.02, 0.03, 0.05; suppositories 0.005, 0.001, 0.015, 0.02; 1% solution in 1 ml ampoules.	Orally 30-50 mg 1-3 times a day; i/m 10-50 mg; i/v 20-50 mg in 75-100 ml of 0.9% NaCl solution.
DOXAZOSIN	Tablets 0.001.	*Prostate hyperplasia* – orally 1-16 mg once a day; Hypertension – orally 1-8 mg once a day.
DOXYCYCLINE	Capsules 0.05, 0.1; film-coated tablets 0.1; ampoules 0.1 (to be dissolved in 0.9% NaCl solution mg/ml).	Orally and i/v 100-200 mg once a day.
DROTAVERINE	2% solution in 2 ml ampoules.	I/m or i/v slowly 2-4 ml.
ENALAPRIL	Tablets 0.005; 0.01; 0.02.	Orally 10-20 mg once a day.
ERGOTAMINE	0.05% solution in 1 ml ampoules; 0.1% solution in 10 ml bottles; tablets (dragées) 0.001.	Orally 1 mg 1-3 times a day; s/c and i/m 0.25-0.5 mg; i/v slowly 0.5 ml of 0.05% solution.
ERYTHROMYCIN	Tablets 0.1 and 0.25; enterosoluble tablets 0.1 and 0.25; 2.5% and 5% oral suspension; rectal suppositories for children 0.05 and 0.1;1% ointment 3.0; 7.0; 10.0; 15.0; 30.0.	Orally 250-500 mg 4-6 times per day; for children depending on the age (from 1 yr. to 12 yrs. of age) 0.4 g in 24 hrs. in 4 doses; ointment: to rub into the affected areas 2-3 times a day; eye ointment 3 times a day.

ESSENTIALE	5 ml ampoules (№5).	I/v by drop infusion (in 5% solution of glucose) 5-10 ml a day
ETHINYLESTRADIOL	Tablets 0.00001 and 0.00005	Orally 0.01-0.05 mg 2 times a day.
ETHOSUXIMIDE	Capsules 0.25; 100 ml bottles of solution for oral administration (contains 5 g of the preparation).	Orally 250 mg 15 drops 1-4 times a day; maintaining dose 250 mg a day.
FAMOTIDINE	Tablets 0.02 or 0.04; ampoules 0.02 in set with solvent.	Orally for therapeutic purposes 40 mg a day (before bedtime); for preventive purposes 20 mg a day; i/v 20 mg every 12 hrs.
FERROUS SULFATE	Powder.	Orally 300-500 mg after meals 3-4 times a day.
FLUCONAZOLE	0.2% solution based on isotonic solution NaCl; capsules 0.05; 0.1; 0.15 and 0.2; syrup 5 mg/1 ml (0.5%).	I/v, orally 200-400 mg once a day.
FLUOXETINE	Capsules 0.02.	Orally 20 mg once a day.
FORMOTEROL	Powder for inhalation in capsules 0.000012.	0.012-0.024 mg 2-4 times in 24 hours. The medicine is used with the help of the special device «Airolaser».
FUROSEMIDUM	Tablets 0.04; 1% solution in 2 ml ampoules.	Orally 40 mg once a day (in the morning); In case of insufficient effect the dose should be increased up to 80-120 mg (up to 160 mg) a day in 2-3 doses with 6 hrs. interval). I/m or i/v slowly by stream infusion 20-60 mg 1-2 times in 24 hours.
GENTAMYCIN	Powder in 0.08 g bottles; 4% solution in 1 ml, 2 ml ampoules; 0.1% ointment in 10.0, 15.0 tubes; 0.3% eye drops in tube instillator.	I/m or i/v 0.4 mg/kg 2-3 times a day Ointment for external application 2-3 times a day. Eye drops: 1 drop instilled 3-4 times a day.
GLIBENCLAMIDE	Tablets 0.005.	Orally after meals 1-2 times a day, initially 2.5-5-10 mg.
GRANISETRON	Tablets 0.001; concentrate solution for infusion in 3 ml ampoules containing 0.003 g of the preparation.	Orally 1 mg 2 times a day. i/v: the contents of an ampule (3 mg) to be dissolved in 20-30 ml of sterile 0.9% NaCl solution or 5% glucose solution. Infuse during 5 minutes.
GRISEOFULVIN	Tablets 0.125; 10% suspension in 100 ml bottles; 2.5% liniment in 30.0 g tubes.	Orally 8 tablets once a day during meals (to be mixed with 1 teaspoonful of vegetable oil); children: 21-22 mg/kg a day. A thin layer of 30 000 mg of the liniment to be applied over the affected area daily.
HYDROCHLOROTHIAZIDE	Tablets 0.025, 0.1.	Orally 25-50 mg once a day, up to 200 mg a day. As a single dose (in the morning) or divided into two doses (before noon).
HYOSCINE BUTYLBROMIDE	Film-coated tablets 0.01; 2% solution in 1ml ampoules; rectal suppositories 0.01, 0.0075.	Orally 10-20 mg, or 1-2 rectal suppositories 3-5 times a day (adults and children >6 yrs.). Children 1-6 yrs.: orally 5-1 mg of suspension, or 1 rectal suppository (7.5 mg) 3-5 times a day. Adults: 1-2 ml s/c, i/m or i/v, children: 0.25-0.5 ml s/c, i/m or i/v 3 times a day
IBUPROFEN	Film-coated tablets 0.2.	Orally 200-400 mg.
IDOXURIDINE	0.1% in 10 ml bottles (eye drops).	2 drops instilled into conjunctival sac every hr. in the day time and every 2 hrs. at night.
IMIPENEM	Imipenem bottles 0.25 and cilastatin bottles0.5.	I/v 250-500 mg of imipenem every 6 hrs. The contents of the bottle to be dissolved in 10 ml of solvent and then to be diluted in 100 ml of 0.9% NaCl solution.
INDAPAMIDE	Coated tablets, capsules 0.0025.	Orally 2.5 mg once a day, in the morning and before meals.

INDOMETACIN	Tablets, dragees and capsules 0.025 and 0.1; tablets of retard 0.075.	Orally 2.5-50 mg 2-3 times a day.
IPRATROPIUM BROMIDE	Aerosol containers 15 ml (300 unit doses).	Administered in 2 breaths (2 times x 20 mcg) 3-4 times a day.
ISONIAZID	Tablets 0.1, 0.2, 0.3; 10% solution in 5 ml ampoules.	Orally 5-15 mg/kg 1-3 times a day, i/m 5-12 mg/kg once a day.
ISOPRENALINE	0.5%, 1% solution in 25 ml, 100 ml bottles (for inhalation); tablets 0.005.	Inhalations: 0.1-0.2 ml of 0.5-1% solution; sublingually: 1 tablet 3-4 times a day.
ISOSORBIDE DINITRATE	Tablets 0.005, 0.01, 0.02, 0.04, 0.08.	Sublingually 5-10 mg; orally 20-120 mg/day, divided into 2-3 doses.
ISOSORBIDE MONONITRATE	Tablets 0.02, 0.04.	Orally, initial dose 20 mg 2-3 times a day or 40 mg 2 times a day (up to 120 mg/day) with the interval not less than 6 hrs.
KETOTIFEN	Capsules and tablets 0.001; syrup (0.0002 g in 1 ml, 0.02 g in 100 ml).	Orally, adults: 1-2 mg 2 times a day (during meals); children: depending on their age and body mass administered 1/3-1/2-1 tablet 2 times a day.
LEVOTHYROXINE SODIUM	Tablets 0.000025; 0.00005; 0.000015; 0.000175; 0.00025.	Orally 0.025 mg once a day 20-30 min before a meal.
LIDOCAINE	Solutions in ampoules; 1% 10ml; 2% 2 and 10 ml; 10% 2 ml.	For anesthesia: infiltrative 0.25-0.5%; conductive 0.5 -2%; terminal 1-5% solution; i/m 200-400 mg; i/v 50-100 mg, then driply at the rate of 2mg/min.
LITHIUM CARBONATE	Coated tablets 0.3.	Orally 300-600 mg 2-3 times a day.
LOPERAMIDE	Capsules 0.002; 0.02% solution in 100 ml bottles (0.0002 g/1 ml)	Orally in case of acute diarrhea at first 4 mg then after each liquid stool 2 mg.
LORAZEPAM	Tablets 0.001; 0.002.	Orally in case of insomnia 1-2 mg 30 min before sleep; in psychiatry practice 1-2 mg 3 times a day.
LOSARTAN	Tablets 0.05.	Orally 50 mg once a day.
MADOPAR	Capsules containing: levodopa 50 mg + benserazide 12.5 (madopar-62.5); levodopa 100 mg + benserazide 25 mg (madopar-125); levodopa 200 mg + benserazide 50 mg (madopar-250).	Orally 4-8 capsules (rarely 10 capsules of madopar-125) a day (in 3-4 doses).
MEDAZEPAM	Tablets 0.01.	An average single dose 10-20 mg; an average daily dose 3-40 mg.
MEFLOQUINE	Tablets 0.25.	Orally for prophylaxis 250 mg once a week then again 4 weeks once a week, for medical purposes 15 mg/kg as a single dose.
MENTHOLUM	Powder; 1% and 2% oily solution; 1% and 2% alcohol solution; mint pencil.	Externally 0.5-2% alcohol solution; 1% ointment; 5% alcohol solution 2-3 drops on a piece of sugar under the tongue.
MEROPENEM	Powder for preparing injection solutions in 0.5 and 1 bottles.	I/v (driply) (as infusions) or bolusly. Adults: 0.5 g every 6 hrs. or 1 g every 8 hrs.; children: 10-20 mg/kg 3 times a day.
MESOCARB	Tablets 0.005; 0.01; 0.025	Orally 5-25 mg 2 times a day.
METFORMIN	Tablets 0.25; 0.5 and 0.85.	Orally 500 mg (during meals, swallow it whole) 2-3 times a day. Maximum daily dose 2500 mg.
METHOTREXATE	Coated tablets 0.0025.	Orally 5-7.5- 5 mg once a week.
METHYLPREDNISOLONE	Tablets 0.004 and 0.016.	Orally 2-20 mg once a day.
METOCLOPRAMIDE	Tablets 0.01; 0.5% solution in 2 ml ampoules.	Orally 10 mg 3 times a day (before meals); i/m (or i/v) 2 ml (10 mg/2 ml).
METRONIDAZOL	Tablets 0.25, 0.5; vaginal suppositories 0.5; 0.5% solution in 100 ml bottles.	Orally 250-500 mg 2 times a day; i/v (driply) 500 mg; suppositories 2 times a day.
METRONIDAZOLE	Tablets 0.25; 0.5; vaginal suppositories 0.5; 0.5% solution in 100 ml bottles.	Orally 250-500 mg 2 times a day; i/v (driply) 500 mg; suppositories 2 times a day.

METOPROLOL	Tablets 0.05 and 0.1; 1% solution in 5 ml bottles.	Orally 100-200 mg a day in 2-3 doses; i/v (in emergency cases) beginning from 5 mg (at the rate of 0.001-0.002 mg per min).
MOLSIDOMINE	Tablets 0.002.	Orally 1-2 mg (1/2 - 1 tablets) 4 times a day after meals; sublingually ½- 1 tablet.
NABUMETONE	Coated tablets 0.5 and 0.75.	Initial dose 1000 mg once a day without regard to food. In some cases the dose may be increased up to 1500-2000 mg a day.
NAKOM	Tablets containing levodopa 0.25 and carbidopa 0.025.	Orally 1-2 tablets 2-3 times a day.
NANDROLONE	5% oily solution in 1 ml ampoules.	I/m 25-50 mg once in 2-3 weeks.
NAPROXEN	Tablets 0.25.	Orally 500-750 mg daily in 2 doses (in the morning and evening).
NATRII VALPROAS	Tablets 0.15, 0.2, 0.3.	Adults: daily dose of 300-600 mg at the beginning of the treatment, later up to 900-1500 mg.
NEFOPAM	Tablets 0.03; solution for injections in 1 ml ampoules (0.02 g/1 ml).	Orally 30-60 mg (max. daily dose 300 mg); i/m 20 mg every 6 hrs.
NEOSTIGMINE	Powder; tables 0.015; 0.05% solution in 1 ml ampoules.	Orally 10 mg 2-3 times a day; s/c 0.5 mg 1-2 times a day; 1-2 drops 0.5% solution in conjunctive cavity 1-4 times a day.
NIMESULIDE	Tablets 0.1; suspension in 60 ml bottles (5 ml/50 mg).	Orally 100 mg 2 times a day.
NITRAZEPAM	Tablets 0.005.	Orally as sleeping pills 30 min before sleep. Single dose 5-10 mg.
NITROFURANTOINUM	Tablets 0.03; 0.05; 0.1.	Orally, adults: 100-150 mg 3-4 times a day; children: 5-8 mg/kg daily in 3-4 doses.
NITROXOLINE	Tablets 0.05.	Orally 100mg 4 times a day.
NADOLOL	Tablets 0.02; 0.04; 0.08; 0.12 and 0.16.	Orally 40 mg (initial dose) once a day. Maximum daily dose is 240 mg.
OFLOXACIN	Tablets 0.2.	Orally 200 mg 2 times a day.
OMEPRAZOLE	Tablets and capsules 0.02; 0.04.	Orally, adults: 20-40 mg once a day.
ONDANSETRON	Tablets 0.004; 0.008; suppositories 0.0016; 0.08% syrup in 50 ml bottles (2.5 and 5 ml measure spoons); 0.2% solution in 2 ml ampoules.	Orally, in rectum, i/v or i/m 8-32 mg a day.
OXACILLIN	Bottles 0.25 and 0.5; tablets 0.25 and 0.5; capsules 0.25 g.	Orally; i/m and i/v 250-500 mg 4 times a day.
PANCREATIN	Tablets 0.25.	Orally 500-1000 mg as a single dose; daily dose 4000 mg.
PENICILLAMINE	Capsules 0.15.	Orally 150-300 mg once a day.
PENTOXYL	Tablets 0.025 and 0.2.	Orally 200-300mg to 400mg at one time 3-4 times a day after meals.
PHENAZEPAM	Tablets 0.0005; 0.001 and 0.0025.	Orally 0.25-0.5 mg 2-3 times a day.
PHENOXYMETHYL PENICILLIN	Coated tablets 0.25.	Orally 250 mg 4-6 times a day.
PHENYTOIN	Tablets in 20 tablets pack.	Orally $^{1/2}$-1 tablet 2-3 times a day.
PHYTOMENADIONE	Capsules 0.01 (0.1 ml of 10% solution).	Orally 10-20 mg 3-4 times a day.
PILOCARPINE	Powder; 1% and 2% solution in 5 and 10 ml bottles; 1% and 2% eye ointment; eye covers 0.0027.	In conjunctive cavity per 1-2 drops of 1-2% solution; ointment should be put under eyelid before bedtime.
PINDOLOL	Tablets 0.005; 0.01, 0.015; delayed–action tablets 0.02; 0.5% solution for oral administration (0.005 g/1 ml); 0.02% solution in 2 ml ampoules.	Orally 5-10 mg 1-3 times a day, 30 minutes after meal; i/v slowly 0.4 mg during 5 min (2 ml of 0.02% solution).
PIPEMIDIC ACID	Capsules 0.2; 0.4; tablets 0.4; vaginal suppositories 0.2; suspension for children in 100 ml bottles (0.1 g/5 ml).	Orally, adults: 400 mg 2 times a day. Vaginally 1 suppository a day. Children: from 1 to 15 yrs. 15 mg/kg in 2 doses.

PIPERACILLIN	Bottles 1.0; 2.0	I/v (by stream infusion slowly or driply) or i/m 1000-2000 mg in 8-12 hrs.
PIRACETAM	Capsules 0.4; coated tablets 0.2, 20% solution in 5 ml ampoules.	Orally, i/m and i/v per 200-1200 mg 3 times in 24 hours.
PIRENZEPINE	Tablets 0.025 and 0.05; 0.5% solution in 1 ml ampoules.	Orally 0.050 g 3 times a day 30 min before meals; i/v or i/m per 5 mg every 12 hours.
PIROXICAM	Tablets 0.01; capsules 0.02.	Orally 10-20 mg once a day during or after meal.
PREDNISOLONE	Tablets 0.001 and 0.005; 0.5% ointment in of 10.0 g and 20.0 g tubes.	Orally 5-10 mg; apply ointment to the affected parts of the body.
PROCAINAMIDE	Tablets 0.25 and 0.5; 10% solution in 10 ml bottles and 10% solution in 5 ml ampoules.	Orally 1 tablet 6 times a day; i/m 5-10 ml (up to 20-30 ml/in 24 hours); i/v of ampoules dissolve in 15 ml of 5 % solution of glucose or isotonic solution, introduce at 2 ml/min.
PROCAINE	Powder; 0.25% and 0.5% solution in 1; 2; 5; 10 and 20 ml ampoules; 1% and 2% solution of 1; 2; 5 and 10 ml; 0.25% and 0.5 % sterile solution in 200 and 400 ml bottles; 5% and 10% ointment; suppository containing 0.1 g of procaine.	For in-filter anesthesia 0.25 of 0.5% solution; for conduction aesthesia 1-2% solution; for peridural anesthesia 2% solution; for spino-cerebral anesthesia 5% solution; for thermal anesthesia 10-20% solution; orally 30-40 ml of 0.25-0.5% solution; i/v slowly 5-15 ml of 0.25-0.5% solution.
PROGESTERONE	1% and 2.5% oil solution in 1 ml ampoules.	I/m 5-15 mg once a day.
PROMETHAZINE	Coated tablets 0.005; 0.01; 0.025; 0.05, dragees 0.25 and 0.05; 2.5% solution in 2 ml ampoules.	Orally after meal, adults 12.5-25 mg 3-4 times a day; i/m1-2 ml 2.5% solution once a day; i/v per 2 ml of 2.5% solution once a day.
PROPRANOLOL	Tablets 0.01 and 0.04; 0.25% solution in 1 ml ampoules.	Orally 10-40 mg 3-4 times a day; i/v slowly 1 mg.
PYRIDOSTIGMINE BROMIDE	Tablets or dragee 0.06; 0.5% solution in 1 ml ampoules.	Orally 60 mg 1-3 times a day; s/c or i/m 0.4-1 ml of 0.5% solution.
QUINIDINE	Tablets 0.1and 0.2.	Orally 100-600 mg every 4 hrs. (30 min before meal).
RIBOMUNYL	Tablets 0.25 and 0.75 mg of ribosomal fractions.	Orally 3 tablets 0.25 mg or 1 tablet 0.75 mg in the morning fasting 4 days a week during a month.
RIFAMPICIN	Capsules 0.05 and 0.15; ampoules 0.15.	Orally 450 mg once a day; i/v in drops (150 mg dissolve in 2.5 ml of water for injection, after that shake and further dissolve 125 ml in 5% solution of glucose).
SALBUTAMOL	Aerosol can 10 ml (200 single doses), 1 inhalation – 0.1 mg; tablets 0.002 or 0.004.	Inhalation 0.1 mg. Orally 1-2 mg 3-4 times a day.
SERTRALINE	Tablets 0.05 and 0.1.	Orally 50-200 mg once a day.
SOTALOL	Coated tablets 0.08; 0.12; 0.16; 0.24.	Orally 80-200 mg 4-2 times a day.
STREPTOMYCIN	Bottles 0.25; 0.5; 1.0.	I/m 500 mg 2 times a day (in 5 ml of isotonic solution NaCl).
SULFACETAMIDE	30% solution in 5 ml ampoules and 5 and 10 ml bottles; 20% eye drops solution in 1.5 ml drip-tube; 30% ointment 10.0.	I/v slowly 3-5 ml of 30% solution 2 times a day; eye drops: 1-2 drops 3 times a day; eye ointment is put under inferior eyelid 3 times a day.
SUMATRIPTAN	0.5 ml ampoules (6 mg of the preparation); coated tablets 0.05 and 0.1.	S/c 6.0 mg; orally 50-100 mg during the migraine attack. The maximum daily dose is 300 mg.

SPIRONOLACTONUM	Tablets 0.025.	Orally, a daily dose may range from 50 mg to 300 mg, usually 100-200 mg (in 2-4 doses).
TERBINAFINE	Tablets 0.125; 0.25; 1% ointment in tubes cream, gel 15.0 and 30.0.	Orally 125 mg 2 times a day or 250 mg once a day. Ointment is applied to the affected parts of the body 1-2 times a day until absorbed.
TERBUTALINE	Tablets 0.0025; 0.05% solution in 1 ml ampoules; 0.0005 powder capsules for inhalation.	Orally, adults: 5 mg every 6 hrs.; children: above 12 yrs. – 2.5 mg 3 times a day. S/c 0.25 mg, the following application should be not earlier than in 4 hours. Inhale dualfold (interval 60 sec) every 4-6 hrs.
TESTOSTERONE	1% or 5% oil solution in 1 ml ampoules	I/m 10-25 mg once a day.
TETRACYCLINE	Coated tablets 0.05; 0.1; 0.25; 1% eye ointment 3.0; 7.0; 10.0; 3% ointment 5.0; 10.0; 30.0; 50.0.	Orally 200-250 mg 3-4 times a day; eye ointment: is put under inferior eyelid 3-5 times; ointment is applied to the affected parts of the body 1-2 times a day.
THIAMAZOLE	Tablets 0.005.	Orally 5-10 mg after meal 3-4 times a day.
THYMOGEN	0.01% solution in 1 ml ampoules.	I/m 50-100 mcg once a day.
TIANEPTINE	Tablets 0.0125.	Orally (before meal) 12.5 mg 3 times a day.
TICLOPIDINE	Coated tablets 0.25.	Orally 250 mg once a day, during or immediately after meal.
TILORONE	Tablets 0.125; 0.25.	Orally 125-250 mg once a day.
TINIDAZOLE	Tablets 0.15; 0.5.	Orally 150-500 mg 2-3 times a day.
TOLPERISONE	Dragees 0.05.	Orally 50-100 mg 2-3 times a day.
TRAMADOL	Capsules 0.05; drops (0.1 g/1 ml) in bottles; ampoules 1 ml and 2 ml (0.05 g/1 ml); rectal suppositories 0.1.	I/v (slowly in drops) 50-100 mg up to 400 mg. The same dose is injected i/m or s/c. Orally in capsules up to 400 mg a day or in drops 20 drops (50 mg) per dose up to 8 times in 24 hours.
TRANEXAMIC ACID	Tablets 0.25 g; 5% solution in 5 ml ampoules.	Orally 250 -500 mg 3-4 times a day; i/v, slowly 10-15 ml. The maximum daily doze is 200 mg.
TRIAZOLAM	Tablets 0.00025 of blue color and 0.0005 of white color.	Orally 0.25-0.5 mg 30 min. before bedtime.
TRIHEXYPHENIDYL	Tablets 0.001; 0.002; 0.005.	Orally 0.5-1 mg 1-5 times a day.
TRIMEPERIDINE	Tablets 0.025.	Orally 25-50 mg.
TRIPOTASSIUM DICITRATOBISMUTHATE	Tablets 0.12.	Orally 1-2 tablets 4 times a day: ½-1 h before breakfast, lunch and dinner and 1-2 tablets before bedtime.
VANCOMYCIN	Capsules 0.125, 0.25; bottles 0.5, 1.0, 5.0.	Orally 125-500 mg 4 times a day; i/v 500 mg every 6 hrs. or 100 mg every 12 hrs. Preparation: basic solution of 500 mg/10 ml further to be dissolved in 200 ml of 0.9% NaCl solution.
VERAPAMIL	Tablets, dragees or capsules 0.04, 0.08, 0.12; 0.25% solution in 2 ml ampoules.	Orally 40-80 mg 3-4 times a day; i/v 5-10 mg.
WARFARIN	Tablets 0.0025.	Orally 1-3 tablets 1-2 times a day.
ZAFIRLUKAST	Film-coated tablets 0.02, 0.04.	Orally 20-40 mg 2 times a day.
ZIDOVUDINE	Capsules 0.1, 0.25.	Orally 200-250 mg 5-6 times a day.
ZOLPIDEM	Tablets 0.01.	Orally 10 mg before bedtime.

Appendix 2.

EXAMPLES OF WRITING OUT PRESCRIPTIONS FOR VARIOUS MEDICINAL FORMS

SOLID MEDICINAL FORMS

Tablets

Rp.: *Tab. Atenololi 0,05 N. 20*
D.S. Orally 1 tablet once a day.

Rp.: *Atenololi 0,05*
D.t.d. N. 20 in tab.
S. Orally 1 tablet once a day.

Rp.: *Tab. «Co–trimoxazolum» N. 20*
D.S. Orally 1 tablet 2 times a day.

Dragées

Rp.: *Dragee Ibuprofeni 0,2*
D.t.d. N. 100
S. Orally 1 tablet 4 times a day.

Powders

Simple, undivided into dosages *Rp.:* *Magnesii oxydi 30,0*
D.S. Take ¼ tablespoonful 2 hours after meals.

Simple, divided into dosages *Rp.:* *Colestyramini 3,0*
D.t.d. N. 24
S. Orally (during meals) as a suspension (the content of 1 package should be dissolved in 80 ml of water) 3 times a day.

Compound, divided into dosages *Rp.:* *Riboflavini 0,01*
Thiamini bromidi 0,02
Sacchari 0,3
M.f. pulvis
D.t.d. N. 30
S. 1powder 3 times a day.

Capsules

Rp.: *Omeprazoli 0,02*
D.t.d. N. 14 in caps.
S. 1 capsule once a day.

LIQUID MEDICINAL FORMS

Solutions

Concentration of the solution in percent *Rp.:* *Sol. Nitrofurali 0,02% – 500 ml*
D.S. Gargle the throat 4 times a day.

Concentration of the solution in proportions *Rp.:* *Sol. Nitrofurali 1:5000 – 500 ml*
D.S. Gargle the throat 4 times a day.

Concentration of the solution in the mass–and volume ratio *Rp.:* *Sol. Nitrofurali 0,1 – 500 ml*
D.S. Gargle the throat 4 times a day.

Spirituous (alcoholic) solution *Rp.:* *Sol. Acidi borici spirituosae 1% – 10 ml*
D.S. 3 drops into the ear 2 times a day.

Detailed prescription *Rp.:* *Mentholi 0,1*
(in cases when a certain oil or alcohol of a certain concentration is required) *Olei Vaselini ad 10 ml*
M.D.S. 5 drops into the nose.

Suspensions

Rp.: *Susp. Hydrocortisoni acetatis 0,5% – 10 ml*
D.S. Drop 2 drops into each eye 4 times a day. Shake before using.

Emulsions

Rp.: *Emulsi olei Ricini 20ml – 100ml*
D.S. For 1 administration.

Broths and teas

Rp.: *Inf. herbae Thermopsidis 0,5 – 200ml*
D.S. 1 tablespoonful 4 times a day.

Galenic drugs

Tinctures

Rp.: *Tinct. Valerianae 25 ml*
D.S. 25 drops 3 times a day.

Exctracts

Rp.: *Extr. Frangulae fluidi 25 ml*
D.S. 25 drops before bedtime.

Neogalenic drugs

Rp.: *Adonisidi 15 ml*
D.S. 15 drops 3 times a day.

Mixtures

Rp.: *Sol. Natrii bromidi 2% – 180ml*
Coffeini–natrii benzoatis 0,6
M.D.S. 1 tablespoonful 3 times a day.

SOFT MEDICINAL FORMS

Liniments

Manufactured

Rp.: *Lin. Synthomycini 5% – 25ml*
D.S. Apply on the wound 2 times a day.

Prepared at the pharmacy

Rp.: *Chloroformii 20 ml*
Olei Hyoscyami 40ml
M.f. linimentum
D.S. Rub into the joint.

Ointments

Short prescription

Rp.: *Ung. Acicloviri 5% – 5,0*
D.S. Apply to the affected skin areas 5 times a day.

Detailed prescription

Rp.: *Benzocaini 0,25*
Mentholi 0,1
Vaselini ad 20,0
M.f. unguentum
D.S. Smear the nasal mucosa 6 times a day.

Pastes

Manufactured

Rp.: *Pastae Zinci oxydi 40,0*
D.S. Apply to the affected surface of the skin.

Prepared at the pharmacy

Rp.: *Benzocaini 2,5*
Zinci oxydi 20,0
Vaselini ad 50,0
M.f. pasta
D.S. Apply to the affected surface of the skin

Suppositories

Manufactured

Rp.: Supp. cum Metronidazolo 0,5
D.t.d. N.10
S. 1 suppository before bedtime.

Rp.: Supp. «Bethiolum» N. 10
D.S. 1 suppository 2 times a day.

Prepared at the pharmacy

Rp.: Aminophyllini 0,36
Olei Cacao q.s.
ut f. supp. rectale
D.t.d. N. 12
S. 1 suppository 3 times a day.

MEDICINAL FORMS FOR INJECTIONS

Solutions in ampules

Rp.: Sol. Diphenhydramini 1% – 1 ml
D.t.d. N. 10 in amp.
S. 1 ml subcutaneously.

Oil solution

Rp.: Sol. Oestradioli dipropionatis oleosae
0.1% – 1 ml
D.t.d. N. 6 in amp.
S. 1 ml intramuscularly once a day.

Bottled drug

Rp.: Benzylpenicillini 300 000 ЕД
D.t.d. N. 12
S. 300000 units in 2 ml of 0,5 % procaine solution 4 times a day.

Prepared at the pharmacy

Rp.: Sol. Glucosi 5 % – 500 ml
Sterilisetur!
D.S. Intravenously drip-feed.

AEROSOLS

Rp.: Aerosolum «Camphomenum» N. 1
D.S. For inhalations 3 times a day.

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Бизунок Наталья Анатольевна
Дубовик Борис Валентинович
Волынец Борис Александрович
Волчек Александр Владимирович

ФАРМАКОЛОГИЯ

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для специальности «Стоматология»

На английском языке

2-е издание

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