MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

MINISTRY OF HEALTHCARE OF THE REPUBLIC OF UZBEKISTAN

TASHKENT MEDICAL ACADEMY

DEPARTMENT OF PHARMACOLOGY

EDUCATIONAL-METHODICAL COMPLEX

On the subject of

PHARMACOLOGY

(for the 3rd course)

Field of knowledge: **900000 – Health care and social affairs**
Branch of education: **910000 – Health care**
Direction of education: **60910200 – General medicine**

TASHKENT – 2024

"APPROVED"
Vice-rector for academic affairs
Sh.A.Boymuradov
_____
_____ ___, 2024

Authors:

Allayeva M.J. – Head of the department of Pharmacology, d.b.s, professor;

Mamadjanova M.A. – Associate professor of the department Pharmacology;

Kholmatov J.A. – Assistant teacher of the department of Pharmacology;

Kahharova Sh.B. – Assistant teacher of the department Pharmacology;

Djanaev G.Yu. – Senior teacher of the department Pharmacology, PhD.

Reviewers:

Khakimov Z.Z. – Professor of the department of Pharmacology;

Aminov S.D. – Head of the department of Pharmacology and Phisiology of the Tashkent Pediatric Medical Institute, professor

The educational-methodological complex was reviewed and approved at the meeting №10 of the Central Methodical Council of TMA on June 14, 2024.

Head of the department of Pharmacology — Allayeva M.J.

Head of the Scientific-methodological Council — Usmanov R.J

Head of the Educational-methodical department of TMA — Azizova F.Kh.

CONTENTS OF EDUCATIONAL-METHODICAL COMPLEX

"APPROVED"
Dean of the Faculty of
Pharmacy, Management,
Medical Biology,
Engineering and HEN
_____ S.U.Aliyev
_____ ____, 2024

CALENDAR-THEMATIC PLAN
for 2024-2025 academic year

Department: Pharmacology
Subject: Pharmacology
Faculty: General Medicine - No.1, General Medicine - No.2, International faculty
Course: 3 **Semester:** 5
Allocated hours per semester: lecture training – 12, practical training – 48

Lecture training

№	Lecture Training Topics	Hours
1.	General pharmacology. Pharmacokinetics and pharmacodynamics of drugs.	2
2.	Efferent innervation. Medicines affecting cholinergic synapses.	2
3.	Drugs stimulating the adrenergic synapses.	2
4.	Painkillers.	2
5.	Neuroleptics. Anxiolytics.	2
6.	Means affecting the activity of the respiratory system.	2
	Total	**12**

Practical training

№	Topics of practical training	Hours
1	The importance of the recipe in the preparation of GP. Doses. Recipe and its structure. Hard and soft drug forms and rules for prescribing them.	4
2	Liquid drug forms and rules for prescribing them (I).	4
3	Liquid drug forms and rules for prescribing them (II).	4
4	General pharmacology. Pharmacokinetics and pharmacodynamics of drugs.	4
5	Medicines affecting the afferent nervous system.	4
6	Medicines affecting M- and N- cholinergic receptors. Medicines affecting M-cholinerceptors.	4
7	Anticholinesterase agents. Medicines affecting N-cholinerceptors.	4
8	Medicines that stimulate adrenoreceptors. Adrenoreceptor blockers.	4
9	Narcotics. Ethyl alcohol. Sleep aids.	4
10	Analgesics.	4
11	Neuroleptics. Anxiolytics Psychostimulants. Antidepressants.	4
12	Medicines affecting the activity of respiratory organs.	4
	Total	**48**

Head of the department, professor Allaeva M. J.

Lecture

Topic 1: General pharmacology. Pharmacokinetics and pharmacodynamics of drugs.

A report on the subject of pharmacology is a model of educational technology

Subject: Introduction. General pharmacology

Time: 80 minutes	***Number of students: 50-75***
Form and type of training	***Introduction topic-visualization***
Lecture plan	1. Definition of pharmacology, purpose, tasks, sections of the course. 2. Subject teaching plan. 3. Rating control 4. The place of pharmacology among medical-biological and clinical disciplines 5. Concept of general pharmacology Ways to introduce drugs Chemical transformation of drugs in the body Ways to remove drugs from the body Types of drug effects Factors affecting the pharmacokinetics and pharmacodynamics of drugs
The purpose of the lecture:	the science of pharmacology, the science of pharmacology, its connection with other sciences, the sources of obtaining drugs, the complete formation of the general pharmacokinetic and pharmacodynamic laws of drugs
Pedagogical tasks: **- introduction to the definition of pharmacology, goals, tasks, sections of the course;** **- introduction to the teaching sequence of the subject;** **- providing information on rating control;** **- to describe the sources of obtaining medicines;**	Results of educational activities: the student should know: - pharmacology sections are shown using a systematized scheme and revealed in an orderly manner; - they provide information about the types of rating control and tell specific tasks for each type of them; - define the concepts of pharmacology, general pharmacology, pharmacokinetics, pharmacodynamics, learning, dependence and cumulation; - explain the connection of pharmacology with other medical, biological and clinical sciences; - they tell the sources of obtaining medicines; - show the ways of introducing and removing drugs from the body; - describe the chemical transformation of drugs in the body; - tell about the types of effects of drugs; - tell the factors affecting the pharmacokinetics and pharmacodynamics of drugs;
Educational methods	A report is a visualization Technique: blitz question, thematic questions
Form of education	Team, frontal performance

Educational tools	Report text, laser projector, materiallar, information about deliveries.
Educational conditions	Special equipment instrumentari bilan zhikhozlangan, group formada ishlashga muljalangan house
Monitoring and evaluation	Oral interrogations

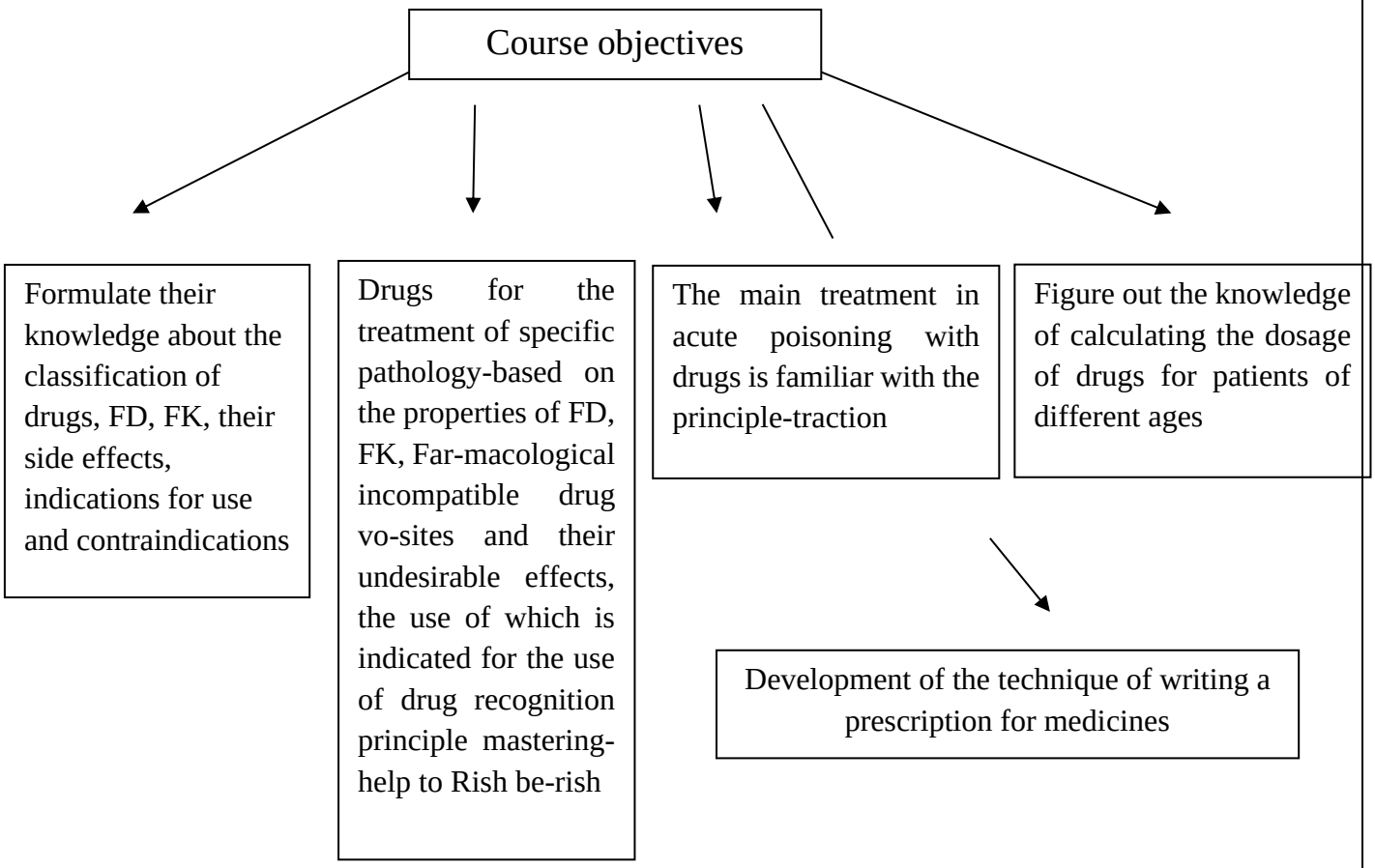
Introduction. General pharmacology

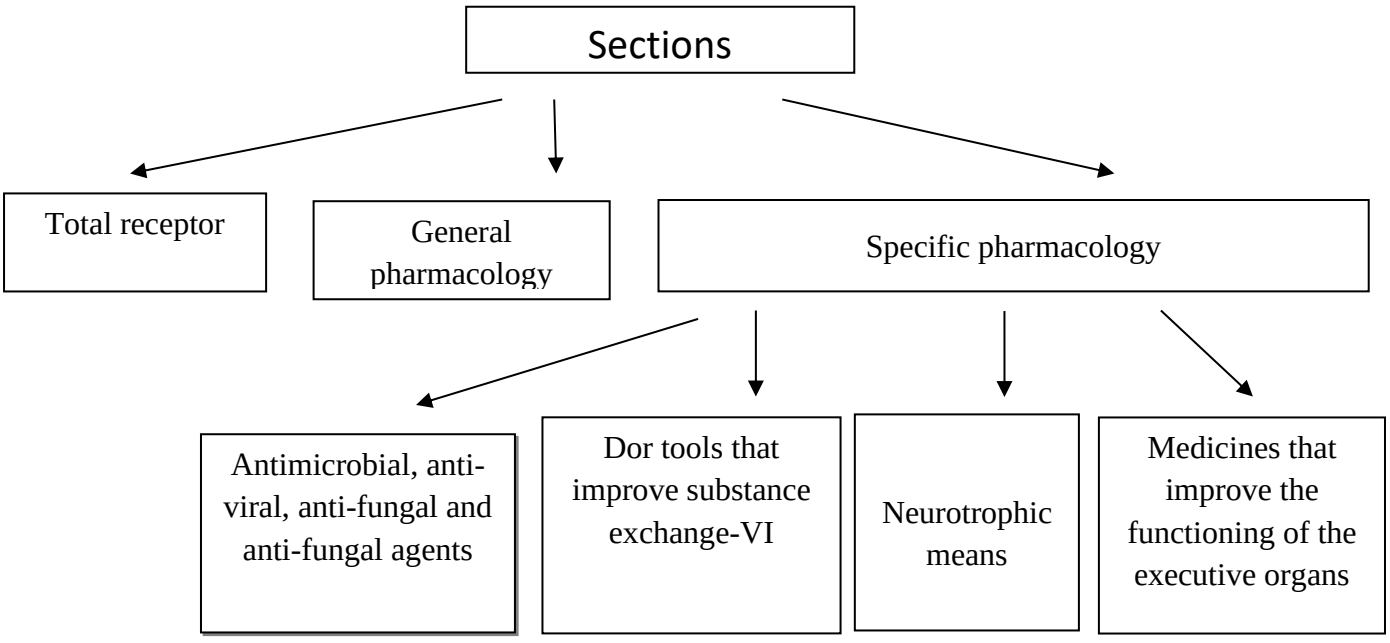
Work stage lari and time	Activity	
	Teacher	Students
Step 1. Introduction (5 minutes)	1.1. The name of the topic, its purpose and expected results.	1.1 They will listen.
2 stages Activity activation (20 minutes)	2.1. Asks thematic questions for the purpose of strengthening students' knowledge - What do you think the science of pharmacology teaches? - What sources of medicines do you know? 2.2. "Course structure" shows the systematized scheme on the screen (appendix #1), - gets acquainted with the sequence of subjects of science, - introduces the subject's rating, indicators and assessment criteria of current, intermediate and final control (appendix #2) - introduces the list of main literature and requirements for students	2.1. They answer questions. 2.2. Get acquainted with slides #1 and #2. Record the rating control requirements
3rd stage. Basic information section (55 minutes)	3.1. The report describes the order of actions for the organization of the educational process according to the plan and structure, shows the slides with this information and analyzes its composition. Gives emphasis to the key words of the topic 3.2. Blitz - conducts a survey and uses a system of thematic questions: According to question 1 of the plan. What are the divisions of pharmacology? According to question 4 of the plan. How does pharmacology relate to other disciplines? According to question 5 of the plan. Do you know how drugs are administered and administered?	3.1. They analyze the content of the scheme and slides. They write down the necessary information in the lecture notebook 3.2. They answer questions.
4th stage. Completer (10 minutes)	4.1. Concludes the topic (appendix #4), draws students' attention to the importance of the work done in their future professional activities.	4.1. They listen and record

	4.2. Invites students to ask questions and answers these questions	4.2. They clarify and ask questions

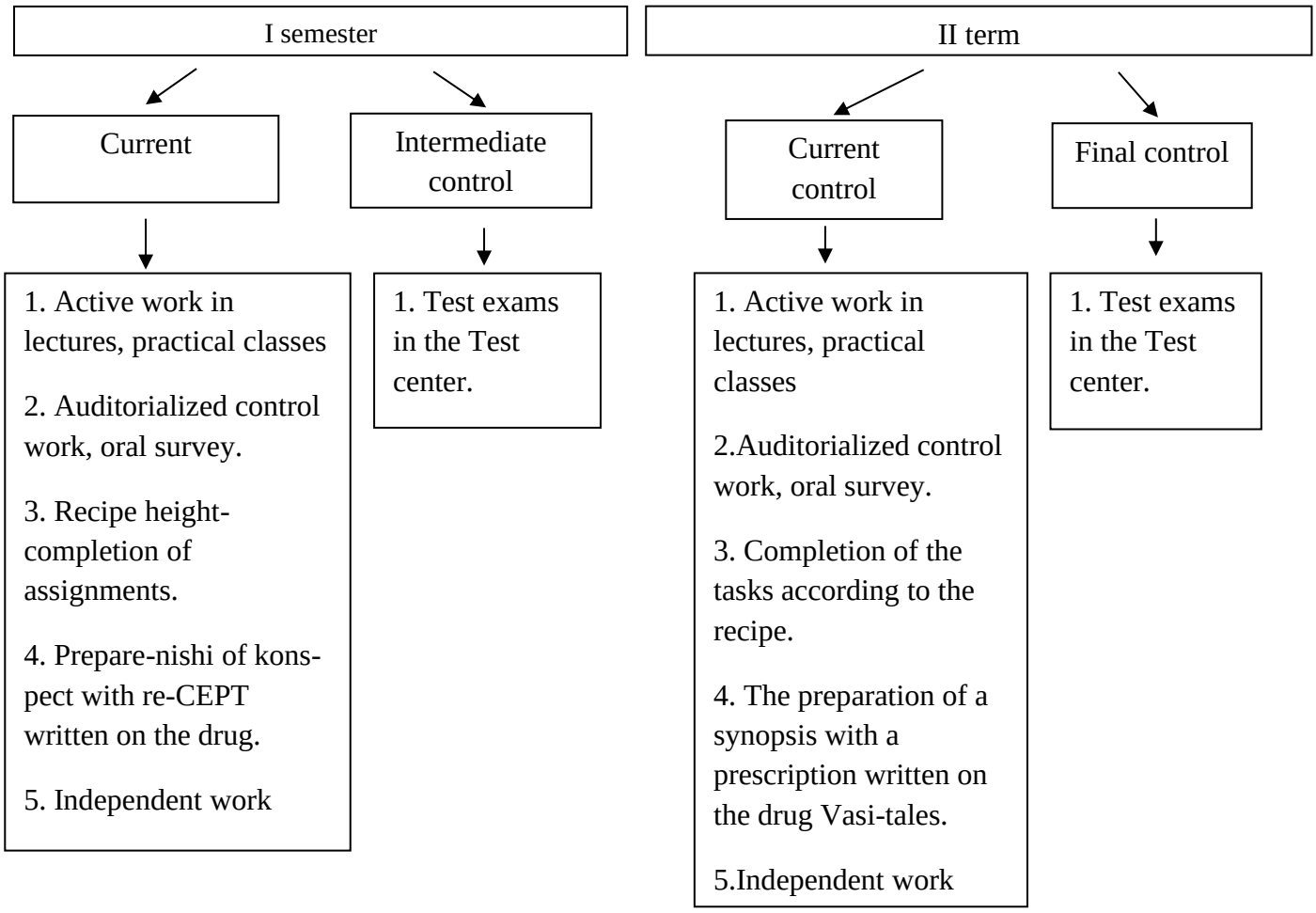
Technological map of training on the topic

Structure of the course" pharmacology"	Application 1



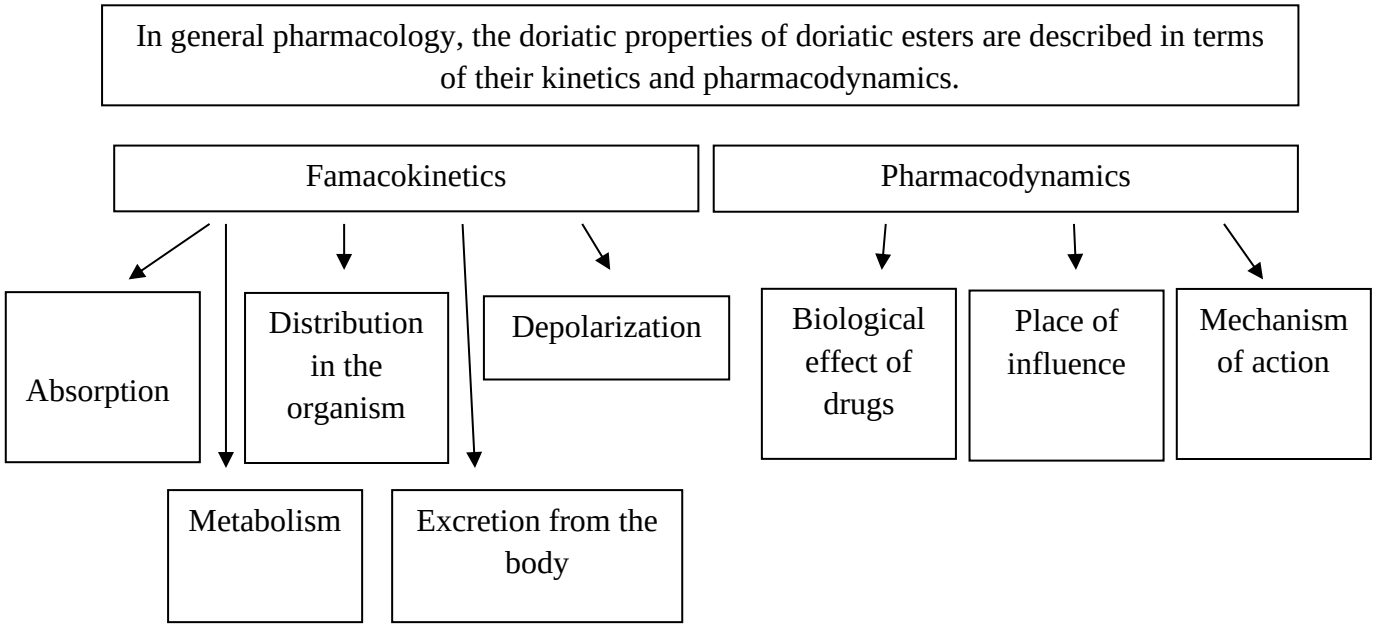


RATING CONTROL



Visual weapons (fragment)

Question 5 concept of general pharmacology



GENERAL PHARMACOLOGY

In the "General pharmacology" section, the ways of administering drugs to the body, the distribution of drug substances in the body, their accumulation, how they undergo changes and their removal from the body are considered. Then, the general laws of pharmacodynamics, the pharmacological effects of drugs, the types of their effects, the dependence of their effects on the characteristics of the organism, how their effects change when they are repeatedly administered and used together with others, and their harmful and side effects are considered.

WAYS OF SENDING DRUGS TO THE ORGANISM

The speed, strength and duration of the effect of drugs largely depend on the way they are administered to the body. At the same time, each of these roads is distinguished by its own characteristics.

All ways of sending drugs into the body are basically divided into groups:

1. Enteral route (stomach-intestinal route)

2. Parenteral route (bypassing the stomach-intestinal route)

Enteral routes include oral, sublingual, duodenal, and rectal administration.

Oral administration is the most common, easy and convenient method. Medicines administered in this way are mainly absorbed in the small intestine, some in the stomach. The effect lasts 15-30 minutes. It starts after , drugs undergo various changes, of course they pass through the liver.

Putting under the tongue - the medicine is quickly absorbed, the effect starts quickly. Medicines bypass the liver. This way is rarely used, with this method active substances are used in small doses (for example, nitroglycerin.

Rectal administration - medicine is introduced with the help of a suppository or enema. Medicines are quickly absorbed and have a strong effect. This also bypasses the liver.

Parenteral routes - these include subcutaneous. including intramuscular, intravenous. These methods ensure rapid and complete absorption of the drug into the bloodstream, especially when administered intravenously.

Subarachnoid route - some substances that cannot pass through the blood-brain barrier are sent through this route. In this way, antimicrobial agents are often used in various infectious diseases.

Inhalation - in this way, various gaseous volatile, vaporous substances, as well as aerosols are introduced. In this case, the blood gets into the circulation circle quickly.

DISTRIBUTION AND ACCUMULATION OF DRUG SUBSTANCES IN THE BODY.

BIOLOGICAL BARRIERS

After the drug is injected into the blood, it quickly spreads in the aqueous environment of the body. They can be distributed in the body in two ways. Most drugs are unevenly distributed, while some may be somewhat evenly distributed.

A number of tibial barriers in the distribution pathways influence drug distribution. These include capillary walls, cell membranes, hematoencephalic, placental barriers.

Accumulation of substances in the organism depends on the strength of their connections with proteins.

CHEMICAL CHANGE OF DRUG SUBSTANCES IN THE ORGANISM.

Many drugs undergo various chemical changes in the body. These processes take place with the participation of various factors, especially microsomal enzymes of the liver. The change of substances - biotransformation can be of two types:

1. Metabolic transformation

2. Conjugation

Metabolic transformation refers to the oxidation-reduction and degradation of medicinal substances.

Conjugation is a complex biological process that occurs as a result of joining a number of chemical groups or biogenic molecules to a drug substance or its metabolites. As a result of metabolic transformation and conjugation, most substances lose their activity, and sometimes their activity can increase.

EXTRACTION WAYS OF DRUGS FROM THE ORGANISM.

Medicinal substances, their metabolites and conjugates leave the body through urine and bile.

Gaseous, gaseous and volatile substances and compounds are released through the respiratory tract. Some substances can also be excreted through saliva, sweat, and milk.

Types of effects of medicinal substances on the body.

Medicinal substances are distinguished by the types of effects.

1. Local effect - all phenomena that come to the surface of the drug substance at the place of application are contaminated by this concept. For example, twisting, hitting, local anesthesia, etc. It is also possible to have a resorptive and reflective effect when the drug is used locally.

2. Resorptive effect - this term refers to the phenomena that occur as a result of the drug being absorbed into the blood and having an effect on an organ.

3. The reflex effect is caused by the local and resorative effects of substances, depends on the stimulation of sensory nerve endings and receptors, which, as a result, causes changes in the activity of internal organs far away from these nerve endings and receptors. These reflexes can be healing or harmful.

4. Main effect - effects that appear to be relevant from the point of view of therapy. This effect on the eyelids is used for therapeutic purposes in practical medicine.

5. Bad taste – therapy

Lecture

Topic 2: Efferent innervation. Medicines affecting cholinergic synapses.

Lecture educational technology model of pharmacology

Time *: 80 minutes*	*Number of students: 50-70*
Lecture plan	*1. Introduction* *2. General characteristics of agents affecting efferent innervation3. Mechanism of action and main effects of cholinomimictics. 4. Use of anticholinesterase drugs. 5. Instructions for the use of M and N cholinomimetics. 6. Instructions for the use of M and N cholinoblockers.*
The purpose of the lecture:	*Consolidation and deepening of students' knowledge of the means affecting efferent innervation.*
Pedagogical tasks *:* - to give an understanding of the means affecting efferent innervation.. - to explain the mechanism of action of agents affecting efferent innervation. - Use of M and N-cholinemimetics and anti-use agents.- Poisoning with anticholinesterase agents. - use of anticholinesterase drugs in pediatrics.	**Results of educational activities *:*** **The student should know:** - *They describe the classification of agents affecting efferent innervation, their main properties, mechanism of action, instructions for use, side effects and complications.* - *First aid for acute poisoning with anticholinesterase agents is explained.* - *The effect of M and N-cholinoblockers on the activity of the brain is described.* - *They provide an understanding of irreversible ant-oxylolinesterase agents.*
Educational methods	*Lecture, problem method, brainstorming, discussion, rapid inquiry*
Form of education	*Teamwork, working in groups*
Educational tools	*Lecture text, computer, multimedia, slides, visual materials, marker,*

Teaching condition	*A room designed and equipped for lectures at TTA.*
Monitoring and evaluation _ _	*Oral request : express request , write request*

Thematic technological map of the lecture

Job stage - lari and time 80 minutes	Activity	
	education giver	education receivers
1st stage . _ Enter 5 min	1.1. It conveys the topic's name, purpose, and expected results. Topic Basics: Introduces the keywords and topic outline for the topic. Gives a list of references.	They listen and record.
Stage 2. Activity activation 10 minutes	2.1. Asks stimulating questions to engage students in brainstorming: - When is Carboxolin used? - Why is acetylcholine not used in medicine? - What group does phosphocol belong to? - Do you prescribe drugs that have an adverse effect? - When are M and N-cholinoblockers used? 2.2. Answers will be heard and a survey will be conducted with the students . 2.3. Giving students an idea about the plan of lectures and intermediate, final controls, rating control in the department of private pharmacology.	
Stage 3. Basic information section 60 minutes	3.1. Using multimedia slides according to the plan of the lecture, the subject of the lecture will be conveyed to the students in a certain order and specific questions will be addressed. 3.2 Emphasis is placed on the necessary, necessary questions on the topic and students are invited to write them down: 1. What are the side effects of M and N-cholinomimetics? 2. When is Prozerin used ? 3. What is the mechanism of action of anticholinesterase agents? 4. Which drug is used to treat polymyelitis complications and why? 5. What are the anticholinesterase agents that have a reversible effect?	They listen to the lecture, see schemes, tables and visual materials, discuss and ask clarifying questions. they ask and ask questions where they don't understand. They record the necessary

		and basic information.
Step 4. Finisher 5 minutes	4.1. Makes a final conclusion on the topic. It requires students to pay attention to the main part of the subject. 4.2. Invites students to ask questions and answers them.	4.1. They listen and record. 4.2. Clarifies, asks questions.

DRUGS AFFECTING EFFERENT INNERVATION .

From the center 2 large efferent nerve fibers _ _ to the group are divided into :

1. Vegetative nervous system (internal organs , vessels , glands , smooth muscles activities manages _ Him different autonomic , visceral nervous system that called).
2. Somatic nervous system (base movement system governs skeletal muscles activities manages).

Vegetative nervous system own in turn from 2 different nerves consists of :

- parasitic
- sympathetic

They are from each other anatomical structure , which performs work and physiological activity with differs .

ANATOMICAL DIFFERENCES:

- Central nerve from the system exit place different .

sympathetic nerve fibers back of the brain from the chest -lumbar (S 8, Tn -1-12, L -1-3) segments parasympathetic nerve fibers cranial (brain) (111, V 11, I X, X) and back of the brain sacred from the parts they will leave

- Ganglia location various :
  - that of sympathetic nerve fibers back from the brain output in place , paravertebral chain harvest does (trunk sympathetic).
  - parasympathetic nerve fibers a member in the body or to him near in the place will be
- Ganglia took and back of fibers length different :
  - sympathetic nerve fibers received ganglia short , from ganglia the next one long _
  - in the parasympathetic of this the opposite .
- Mediators various :
  - sympathetic nerve fibers at the end neuroeffector noradrenaline is released in synapses .
  - Acetylcholine is released in the parasympathetic . Noradrenaline is released at the end of the nerve in it II nerve fiber adrenergic , acetylcholine production if it comes out cholinergic that is called

So , the nerve fiber behind the ganglion sympathetic in the nerves andrenergic , parasympathetic - cholinergic .

- Neuroeffector of synapses postsynaptic in the membranes is located receptors or reactive structures various :
  - in sympathetic they are adrenoreactive structures, in parasympathetic - cholinergic structures .

Internal organs in innervation from this except purinergic There are also fibers , at the end of which . ATF is separated . Intestine and of the bronchi smooth innervates muscles - there are R_1 (adenosine), R_2 (ATF) purinoreceptors .

DIFFERENCES IN PHYSIOLOGICAL FUNCTIONS:

Sympathetic and when the parasympathetic nerve is stimulated opposite or to each other opposite changes surface will come M-n: sympathetic if stirred snow expands , parasympathetic when it moves, it narrows and so ...

Somatic nervous system from the autonomic nervous system too anatomically , too physiological in terms of special .

- Somatic nerve fibers back of the brain previous from the branches and from the brain outgoing some nerve from the centers begins .
- From center to cross to skeletal (skeletal) muscles are not interrupted , that is they have no ganglia .
- These are nerve fibers acetylcholine is released during it , therefore for their everything cholinergic are nerves .
- Nerve- muscle of synapses postsynaptic the membrane is N- cholinereactive to the structure have _
- Function in terms of somatic nerves locomotion system basically transversely promotion muscles and a person at will bends , innervates the joints .

AGENTS AFFECTING CHOLINERGIC SYNAPSES .

Cholinergic in synapses arousal impulses are mediated by acetylcholine (AX). done increases . AX choline acetyltransferase enzyme through choline and from acetyl coenzmA in mitochondria is synthesized and in synaptic vesicles is collected . The nerve to the AX synapse cavity when tickled separated and postsynaptic in the membrane is located cholinergic to the structure effect enough , his conformation changing , ions conductivity increases . Outside Na + enters the cell and the membrane depolarization take will come In this way movement potential harvest is the whole cell stirs up . But of AX effect very short will be because acetylcholinesterase (cholinesterase) enzyme him decomposes (hydrolyzes). This is the result Choline is presynaptic to the part again absorbed (50%).

To various compounds sensitivity looking cholinergic structures (receptors) are divided into 2 :

1. Muscarine sensitive r e ceptors (M- cholinergic structure):
2. To nicotine sensitive receptors (N- cholinergic structure):

M- cholinergic receptors neuroeffector of synapses postsynaptic membrane of parasympathetic nerve fibers postganglionic part finished in a place , in a member located , and . MNS bark in the part and reticular in formation located _ M- cholinergic receptors in general heterogeneity defined because _ pharmacological to tools their sensitivity not the same .

N- cholinergic receptors all of ganglia postsynaptic membrane , kidney over diaper the brain in part , cinocarotid in the zone , neuromuscular of synapses postsynaptic in membranes (somatic neuro at the end), located in the MNS (neurohypophysis) . N-cholino receptors to various substances sensitivity different . For example : in the ganglia and in skeletal muscle cholinergic

receptors sensitivity differently from being separately ganglioblockers and to muscle relaxants separated .

Pharmacological tools cholinergic from synapses arousal impulses to be held the following stages effect reach can :

1. AX synthesis .
2. Mediators separation .
3. Cholinergic receptors with AX to merge .
4. AX hydrolysis .
5. Presynaptic to the membrane the product of the fragmented AX has been choline again absorption

to cholinergic receptors effect doer substances there are two types .

1. Cholinergic receptors stimulant (mimetics).
2. Cholinergic receptors besieger (lithics) - blocker .

Medicine tools as cholinergic receptors and to acetylcholinesterase effect pointer substances big important they have

Cholinergic to synapses effect pointer drugs effect directions looking the following to groups are divided into :

I. M- and N- cholinergic receptors effect doer drugs :
   1. M- and N- cholinomimetics (*acetylcholine, carbocholine*).
   2. M- and N- cholinolytics (*cyclodol*).

II. Anticholinesterase means (*physostigmine salicylate, prozerin , galantamine hydrobromide, phosphacol*).

III. M- to cholinergic receptors effect doer drugs :
   1. M- cholinomimetics (*pilocarpine hydrochloride, aceclindin*)
   2. M- cholinolytics (*atropine sulfate, platifillin hydrotartrate , scopolamine hydrobromide, methacin*).

IV. N- cholinergic receptors effect doer drugs
   - N- cholinergic receptors stimulants (*N- cholinomimetics cytotone, lobeline*)
   - *N- cholinoblockers :*

With ganglioblockers	***Curare-like substances***
pyrylene , dimecoline ,	*(peripheral muscle relaxants):*
benzohexonium , hygronium ,	*tubocurarine , anaturuxonium ,*
arfonad _	*diplacin , ditilin .*

M- and N- cholinergic receptors stimulating tools

(M- and N- cholinomimetics).

Such Acetylcholine and _ his derivatives enters _ AX cholinergic function of a mediator in synapses passes . He is calm and vinegar of acid complicated air is considered But effect short from being drug as does not apply . Pharmacology and in physiology in experiments is used . AX to cholinergic receptors direct (direct) trigger effect reaching , M- and N- cholinergic receptors stimulates , but M- cholinergic receptors in excitement surface coming changes superiority does , that is parasympathetic nerves when provoked changes surface comes : pupil it narrows , the fontanel space expands , Shlemov channel opens , eyes from within liquid flowing exit increases , intraocular pressure _ decreases , ciliated muscle that has shortened for cinn connection relaxes and the eye gem bubble-shaped enters _ Accommodation in this spasm to the body come , close bodies sure sees _ Salivary glands activity increases , liquid and a lot saliva separated . Bronx secretion increase in smooth muscles that has shortened for breath get it becomes difficult . Bradycardia, blood pressure decline and heart conductivity decrease observed . Gastrointestinal tract glands secretion and peristalsis increases (diarrhea), grass bladder and grass ways is

shortened . Urine bladder , uterus and right intestine shrinks , from desire except urine separation and defication to be can _ AX sympathetic nerve ganglia too provokes , but in this case outgoing changes M- cholinemimetic under the influence of changes in the shadow remains . Transverse promotion under the influence of AX in the muscles arousal impulses transfer increases .

CARBOXOLINE is _ The drug is similar to AX , but cholinesterase enzyme him does not hydrolyze , therefore for it is stable and effect is continuous . Carboxolin M- and N- cholinergic receptors to the bar triggers AX called changes happened will be In medicine carbacholin in glaucoma , intestine and urine bladder atonia eliminate in doing is used .

ANTICOLINESTERASE AGENTS.

They are AX hydrating cholinesterase enzyme activity weakening ganglia and neuroeffector in synapses AX to accumulate take they come AX's in this strong and continuous effect surface comes out , like M- and N- cholinergic receptors as if excited , but The effect is direct not indirectly , ie _ this group preparations to cholinergic receptors themselves effect they don't show .

Acetylcholinesterase enzyme with harvest who does of the compound nature looking anticholinesterase tools are divided into 2 :

- return impressive drugs (*physostigmine, proserin , galantamine*)
- do not return impressive drugs (*phosphocol , phosphorus organic compounds*)

Anticholinesterase of means acetylcholinesterase enzyme paralysis anion of the enzyme or esterase -ester part with to be connected depends . Hydrophobic in this mutually effects plays an important role . Practice point of view in terms of anticholinesterase of means eye , gastrointestinal tract tract tone and motility , urine bladder , neuromuscular conductivity and to MNS effect is important . Medicines choosing , their activity , toxicity , effect continuity , from various barriers transition ability importance is given

Anticholinesterase tools the following diseases in treatment applies to :

- glaucoma (proserin , physostigmine, phosphacol). Galantamine this in diseases is not used because local tickling feature with swelling of the conjunctiva comes ;
- conducted polymyelitis residual cases and with myasthenia transient another neurological in diseases is used . Because anticholinesterase substances MNS observes and neuromuscular _ synapses conductivity they increase . Such in cases galantamine to proserin relatively is more active ;
- intestines , urine bladder in atony , in pregnant women uterus reduction increasing ;
- antidepolarizing curare-like substances with when poisoned or their influence in reduction (edrophonium).

This of circumstances in most of them relatively less poisonous has been Proserine and galantamine is used . Galantamine in this to proserin relatively longer effect shows , but effect to him relatively slowly begins . Village in the farm applied organophosphorus of compounds most of them acetylcholinesterase enzyme paralyzes . With them poisoned M- and N- cholinergic receptors in animals when triggered changes surface comes , him M- cholinoblockers , central M- and N- cholinolytics in treatment and cholinesterase reactivators used (diproxim , paldom , isonitrozin). The last ones organophosphorus compounds with unite them _ cholinesterase from the enzyme separate takes , in which the enzyme physiological function full will be restored .

M- and N- cholinergic receptors blocking agents (cyclodol) . This about to parkinsonism against tools in the department stopping let's go

PHYOSTIGMIN - calabar beans named poisonous plant contained alcoloid _ in Africa grows . Otherwise because the name is ezerin local people in the language calabar Beans are called " ezere " . is called

PROSERIN IS A synthetic substance being to physostigmine relatively less poison to MNS less effect reach , skeleton to the muscles strong effect shows ..

GALANTAMIN - from chuchmoma isolated alkaloid . This drug is strong anticholinesterase to activity has , few poison _ From memory release need not : in therapeutic doses anticholinesterase substances effect reach for of course the separation of AX need , that is arousal impulse to be need , big in doses they directly M- and N- cholinergic receptors provoke .

AGENTS AFFECTING M-CHOLINORECEPTORS.

M- cholinergic receptors instigator tools
(M- cholinomimetics).

This group M- cholinergic receptors directly , directly instigator compounds enters _ Poisonous mushroom mushroom It contains alkaloid-muscarine group of substances the most main manifestation is considered But muscarine is a drug tool as does not apply . In medicine , pilocarpine and aceclidine are M- cholinomimetics is used .

PILOCARPIN (Pilocarpini hydrochloride). South in America growing tropical plant Pilocarpus pianatipholus victimized _ from the leaf an extractable alkaloid. Synthesis pathway with too received _ Pilocarpine M- cholinergic receptors directly stimulating the parasympathetic nervous system when triggered surface outgoing changes calls _ Pilocarpine, especially of the glands secretion strengthens (saliva , sweat). Practice in terms of of pilocarpine to the eye effect important has (pupil narrows the eye pressure reduces spasm of accommodation calls). Pilocarpine solution or don't rub as glaucoma in treatment is used . Other instructions according to toxicity high from being is not used .

ATSECLIDINE (Aceclidium) is a synthetic drug local and resorptive from the effect is used . That is glaucoma in treatment (conjunctiva influence can) and MIT members , urine bladder , uterus in atonia is used .

M- cholinomimetics with use of M - cholinolytics (atropine group) in case of poisoning need _

M- cholinergic receptors besieger tools
(M- cholinoblockers)

This group substances basically peripheral M- cholinergic receptors block (i.e parasympathetic nerve endings neuroeffector of synapses postsynaptic in membranes is located cholinergic receptors) and AX with them to merge hindrance does _ This group drugs AX synthesis , decomposition , separation to exit effect ca n't M- cholinoblockers parasympathetic nervous system when provoked happened giving changes they lose or sharp weaken , as well as M- cholinemimetics , anticholinesterase means , acetylcholine and flour similar eliminate the effects of compounds they will

M- cholinoblockers the most special representative and the most a lot that studied was atropine because of this group atropine group of drugs that too is called

ATROPINE is an alkaloid - Atropa Belladonnae , Hyocy a mus Niger , Datura stramonium (mingdevona , bangidevona from plants is obtained). Chemical in terms of tropin and D,L-tropic acid complicated is ethereal . Atropine two : right and left spinning stereo has isomers . Plants processing in giving , this active stereo isomers racemic to form (activity slow has been atropine) . mother that's it used in medicine . Atropine synthetic route with too is taken .

Selective atropine only M- cholinergic receptors besieges _ Atropine with it connected to AX to him effect to reach road does not put and therefore for parasympathetic nerve endings neuroeffector from synapses arousal impulses does not pass . As a result parasympathetic nerves in paralysis observable changes surface comes out Parasympathetic nerve tone if it decreases , it is sympathetic increases and follows changes surface comes : pupil the fontanel space expands narrows , Schlemov canal closes , eyes internal of liquid output reduced pressure _ increases , ciliar muscles relaxes , tsinn connection tense up the eye gem flat to form enters , distant items

sure apparently , the nearby ones becomes dim , that is, accommodation paralysis occurs comes , photophobia develops . Low and viscous saliva separated , mouth dry looks like Tachycardia, heart conductivity increases , but blood in pressure change not observed . Stomach intestine tract of members secretion and tone decreases , food digestion to do worsens , constipation surface will come Sweating , heat _ distribution the body subsides temperature increase can _ Bronx width usually does not change , but atropine bronchi spasm tambourine and because of that breath squeeze attack eliminate is enough Small in the groin is located members Atropine lowers the tone . That's why for urine separation , defecation and pregnancy of a woman uterus reduction it gets worse . Atropine chemical structure in terms of to cocaine like for call for local anesthesia feature have _ Atropine M- cholinergic receptors in the central nervous system blocks , but relatively bigger dose of the brain bark on the floor arousal calls and crazy quality movement and speech excitement , and hallucinations calls _

Atropine follows in cases used :

- eye your ball checked
- gem real the light listening the ability determining
- eye inflammation and injuries
- stomach and duodenum in the wound
- left when
- grass bladder , urine tracts and intestines in colic
- in attacks of bronchial asthma
- M- cholinomimetics with when poisoned .

Atropine in glaucoma support can't be .

Atropine breaks down in the body very quickly and M- cholinergic receptors long caught remains . That's why for too his effect continuous will be For example : accommodation paralysis 2-3 days, pupil dilation lasts 5-6 days is enough Atropine effects M- cholino-mimetics and anticholinesterase tools with lost will not be , that is antagonism one sided _

SCOPOLAMINE (Scopolamini hydrobromidum) Skopin va trope acid sining murakkab ether .

Atropine being a similar alkaloid , M- cholinoreceptors siege does _ Atropindan different as scopolamine eyes and glands secretion strong impact does , but impact continuity atropine relatively less. To MNS was influence to atropine opposite be more attenuating to the effect has _ That's it for he is spiritual diseases sedation and parkinsonism treating patients _ to the operation it is used in preparation , sea and air (sickness) diseases ("Aeron" tab.).

HOMOTROPIN **is** a synthetic drug , similar to atropine impact shows , but influence short , for example : accommodation paralysis approximately 15-20 hours continue will do Autumn korachigini short for a while in expansion is used .

PLATYPHILLIN (Platyphyllini hydrotortras) alkaloid Senecio platyphyllus from the plant is taken . From atropine weaker , average ganglioblocker , good spasmolytic feature have (directly effect is enough). Basically stomach , intestine , kidney , gall puff colic attack eliminate in reaching is used . Atropine when using mouth erection , tachycardia , mydriasis , accommodation to the paralytic similar unpleasant effects less will be , if too weak will be To the eye of influence to the continuation looking preparations as follows is located : **atropine → scopolamine → homotropin → platifillin .**

METHAZINE (Methacinum). Synthetic compound mainly _ _ peripheral M-cholinoblocking feature have because _ hematoencephalic from everywhere does not pass . To atropine relatively to the eye slow effect enough , but broncholytic effect according to stronger . Metacin as an antispasmodic bronchial in asthma , stomach and 12 fingers intestine in ulcer , kidney and liver in colic , in anesthesiology - (to surgery patients in preparation , bronchi secretion reduce for) is used .

Final conclusion on the topic of the lecture (appendix #1)

It is necessary to take into account the individual characteristics and condition of the organism when taking drugs, because the sensitivity to drugs changes depending on the patient's age, gender, and genetic factors. The effect of drugs depends more on the state of the organism, in particular, on the pathology to which they are given, accordingly, their anticipated effects also change.

Thus, the general practitioner should analyze their pharmacodynamic and pharmacokinetic properties and the factors affecting them when using M-cholinemimetic and M-cholinoblocker drugs.

Lecture

Topic 3: Drugs stimulating the adrenergic synapses.

Lecture educational technology model of pharmacology

Topic: Adrenomimetics

Time: 80 minutes	***Number of students: 50-75***
Lecture plan	1. Introduction. 2. Adrenoceptors and their types. 3. Classification of adrenomimetic agents 4. Pharmacodynamics and pharmacokinetics of adrenomimetic agents 5. The main principles of using adrenomimetic agents.
The purpose of the report:	***about adrenomimetic means .***
Pedagogical: tasks - Explain about adrenomimetic means. - Classification of adrenomimetic drugs ; - Full knowledge about the mechanism of action of adrenomimetic drugs ; - Deepening the knowledge about the main effect of adrenomimetic means ; - Expanding and deepening knowledge about side effects of adrenomimetic drugs . - Interest in expanding the range of knowledge about the use and contraindications of adrenomimetic means and acquisition of practical skills;	***Results of educational activities:*** ***A student perform need*** - adrenomimetic means ; - Adrenomimetic agents are clearly classified. - They tell the side effects of adrenomimetic drugs ; - They tell when to use adrenomimetics . - of adrenomimetics and to reveal the necessary measures in such a case .
Educational methods	***Lecture, problem method, brainstorming, discussion, rapid inquiry***
Form of education	***Teamwork, working in groups***
Educational tools	***Lecture text, computer, multimedia, slides, visual materials, marker,***

Teaching condition	*A room designed and equipped for lectures at TTA.*
Monitoring and evaluation	***Oral request : quick-request , write request***

Subjective technological map of the report

Stage and the time	***Activity***	
	Education _ giver	***Education _ receivers***
Stage 1. Introduction (5 minutes each)	***1.1. It conveys the topic's name, purpose, and expected results. Topic Basics: Introduces the keywords and topic outline for the topic. Gives a list of references.***	***1.1 They listen***
Stage 2. Activity activation (5 minutes)	***2.1. In order to strengthen students' knowledge, he asks themed questions:*** ***- How are adrenomimetics classified ?*** ***- What are the requirements for adrenomimetics?*** ***- What are the drugs that mainly stimulate alpha adrenoreceptors?*** ***- What are the drugs that mainly stimulate beta adrenoreceptors?*** ***- Mechanism of action of adrenomimetic agents?***	***2.1 They answer the questions.***
Stage 3. Basic information section (65 minutes)	3.1. The report describes the order of actions for the organization of the educational process according to the plan and structure, shows the slides that reflect this information, and analyzes its composition. It emphasizes the key words of the topic. 3.2. Blitz - conducts a survey and uses a system of thematic questions: 1. Mechanism of action of adrenomimetic drugs 2. Use of adrenomimetic means 3. Side effects of adrenomimetics	3.1. They analyze the scheme, the content of the slides. They write down the necessary information in the lecture notebook. 3.2. They answer questions.
Step 4. Finisher (5 minutes)	4.1. By asking short questions on the topic, it is determined how the students mastered the topic. ***4.2. Invites students to ask questions and answers these questions***	4.1. They listen and record 4.2. They clarify and ask questions.

α, β -ADRENOMIMETICS.

ADRENALIN - kidney over diaper the brain in the part chromaffin in the cells harvest hormone . Synthetic way with too received _ Slaughtered black of goods kidney over from the diaper separate is taken .

Adrenaline a and b- adrenoreceptors directly provokes . Physiological in concentrations only β- adrenoreceptors provokes , big concentrations of α adrenoreceptors too provokes . Of this as a result heart the number and force of contractions increases (of the heart minute and systolic volume increases), blood pressure rises , eye pupil expands , but of the eye internal pressure does not increase because veins narrows and liquid work exit decreases . Bronx smooth muscles relaxes . If bronchospasm if lost , MIT _ sphincters tone increases , but members tone and movement decreases . Karatalok is shortened , in it blood to veins passes . Skin , intestine , kidney blood veins narrows , brain , lungs , skeletal muscles , heart blood veins expands . Hyperglycemia and hyperlipidemia develops . Heart to O_2 of the muscles demand increases . In the blood milk acid quantity increases . MNS is stimulated by adrenaline (restlessness , tremors occur is coming), getting an adrenaline rush at MIT leaving due to , him only local or parenterally road with enter - (t/o, m/i, t/i), adrenaline effect continuous not (5 min to vein , 30 min to muscle if entered), because extraneuronal swallowed and breaks down .

Application :

- anaphylactic shock (bronchi kengayishi , land pressure raise for)
- bronchial asthma attacks daf verb
- hypoglycemic coma
- local in anesthesia (blood veins increase for)
- open angular glaucoma , eye korachigini expansion for _

Adrenaline heart ventricles to extrasystole take coming can , especially myocardium to him sensitivity increasing substances under the influence of (fluoroethane, cyclopropane).

NORADRENALIN. α and β adrenoreceptors (weaker β_2) directly provokes _ blood pressure strong , but short oshadi (bir how many minutes), because skin , slimy floors , MIT members , kidneys blood veins expanding , theirs general peripheral resistance increases _ It does not stimulate β_2 -adrenoreceptors the reason is NOT influenced by to adrenaline like later blood pressure does not decrease .

NA bradycardia take because it comes carotid in the ball baroreceptors moving , reflector way with a stray nerve center stirs , but of the heart systolic volume increases . MNS, internal of members to the muscles and substance exchange NA to adrenaline like , but weaker effect shows . NA breakdown at MIT for him parenterally road with is entered . Skin under when entered ,

veins strong from narrowing , to daffodil take will come , that's why for t/i drip , blood pressure attention received without is entered .

In the body NOT fast is broken and his leftovers kidney through urine in the composition separated . In the body Don't main quantity presynaptic membrane harvest will be Only 15% of the kidney top gland mia in part is synthesized .

Application : blood by the name sharp decreased in cases (traumatic shocks , surgery treatments and etc ...).

Unpleasant effects reduce less occurs (headache , arrhythmia, shortness of breath get damage).

MAINLY α -ADRENORECEPTORS REPLACING MEDIA

(α-adrenomimetics)

MEZATON - basically postsynaptic membrane location α_1 adrenoreceptors directly provokes , from this except oz in quantity presynaptic NO separation from the membrane will increase . From adrenaline chemical of 1 hydroxyl radical in the structure lack of with difference does , therefore under the influence of KOMT not disintegrating , continuous effect shows the stomach intestine tract does not decompose . Adrenomimetic effect from adrenaline slower . But small in concentrations too only α- adrenoreceptors stirring up the veins narrows the blood pressure raises (t/i –20min.t/o-40-50 minutes). Reflective road with bradycardia take will come MNS weak provokes .

Application : in hypotonic conditions (similar to NA), rhinitis (local).

OIL _ Imidazoline derivative is , NA and mesaton relatively longer blood veins narrows . MNS is a sedative effect is enough In rhinitis (local used), many when applied effect subsides in 5-7 days after one how many days to rest need _

GALAZOLIN **.** This drug too oil like imidazoline derivative and the effect in terms of oil similar _ blood veins Toraytir , Shilik floor swelling decreases .

Application : rhinitis , laryngitis , sinusitis , sinusitis , allergic diseases of the nasal cavity . When the drug is used, the nose and to the knee cutting and to put like impact . _ Surunkali in Tumov support it will not happen . Naphthysin such as in depression , tachycardia and strong developed not used in atherosclerosis .

PRIMARY β-ADRENORECEPTOR-STIMULATING AGENTS

(β- adrenomimetics)

ISADRINE **.** It is a synthetic drug phenylalkyl Amen derivative (isopropyl noradrenaline), b_1 and b_2 adrenoreceptors directly provokes . As a result heart reduction speed and the power increases (b_1). Heart automatism and conductivity accelerated . Skeletal muscles blood veins (b_2) expand blood pressure decreases . Bronchi , gastrointestinal tract tract , uterus smooth muscles relaxes . Bronchiolytic the effect begins quickly and 1 hour continue is enough MNS provokes . Substance exchange to adrenaline similar , but weaker effect shows (especially hyperglycemia).

Use : in bronchospasms , (inhalation in aerosol form), atrioventricular block (tongue Ostiga).

Unpleasant side effects : tachycardia , empty stomach, tremor, arrhythmia (rarely).

SULBUTAMOL - mainly stimulates β2 - adrenoreceptors . Effect on b_1 that he did not tachycardia does not develop . Blood pressure does not change . From the gut good is absorbed , the effect is longer.

Application : in bronchospasms , uterus shortening weakening for _

TERBUTALIN **,** ***FENOTEROL*** (barotek) - salbutamol like impact are beta 2 - adrenomimetics . Broncholytic as is used .

DOBUTAMIN - β- adrenoreceptors choose provokes . Chemical structure according to to dopamine looks like to β- adrenoreceptors directly effect is enough Heart to the muscles strong inotropic effect shows . Arrhythmia does not cause (rare). Your heart systolic size increases . In the kidney blood rotation strengthens and therefore at the expense of urine separation increases (especially the heart in deficiency). Dobutamine of the heart crown in the veins blood rotation increases , peripheral blood veins resistance reduces , but blood pressure does not change .

Application : heart activities in decompensation , especially in organic damage , heart activities short to time strengthen for .

ADRENORETCEPTOR BLOCKING AGENTS.

(adrenoblockers)

Drugs of this group block the adrenoreceptors in the postsynaptic membrane, preventing NA and other direct adrenomimetics from causing depolarization. Synthesis of NA is not affected by adrenoblockers.

α -ADRENOBLOCKERS.

Under the influence of α -adrenoblockers, adrenaline stimulates only β -adrenoreceptors. Blood vessels (blood vessels of skeletal muscles, liver, lungs, brain, heart muscles) expand, blood pressure decreases, the opposite of the usual effect of adrenaline appears.

PHENTHOLAMINE **.** Blocks α1 and presynaptic $_{\alpha 2}$ - $_{\text{adrenoceptors}}$ in the postsynaptic membrane . As a result, despite the blockade of postsynaptic adrenoreceptors, the release of NA in the presynaptic membrane increases, and the passage of excitatory impulses through the synapse is quickly restored. Therefore, phentolamine has a short-term effect (10-15 min. v/v), $_{\text{tachycardia}}$ occurs due to the blocking of α2 receptors. Because phentalamine dilates arterioles and precapillaries, blood pressure decreases. Since the sympathetic nerve fibers are blocked, the tone of the parasympathetic nervous system increases, and therefore the movement and secretion of the MIT-organs increases. Phentolamine is poorly absorbed from the intestine (poorly soluble in water).

Application:

- in disorders of peripheral blood circulation (rehino-disease, obliterating endoarteritis, at the initial stage of gangrene with atherosclerosis),
- pheochromocytoma
- in hypertensive crises (attacks of frustration)
- in slow-healing wounds (trophic wounds, especially on the legs, because it improves blood circulation and increases insulin secretion).

Side effects : dizziness, swelling of the nasal mucosa, nausea, vomiting, sometimes diarrhea.

There is also a parenteral form of phentolamine.

DIHYDROERGOTOXIN **is** a mixture of dehydroergocriptine, dihydroergocornine and dihydroergocristine, obtained by partial reduction of water- insoluble alkaloids of the blackberry plant . Unlike the natural alkaloids of the blackberry plant, dihydroergotoxin does not affect the uterus, but on the contrary, it lowers blood pressure by relaxing the smooth muscles of blood vessels and reducing the activity of the blood circulation center.

Application:

- disease of offenders
- toxicosis of pregnant women
- Peripheral blood circulation disorder (Raynaud's disease...)
- pheochromocytoma, pheochromoblastoma

- migraine

TROPAFEN is a complex ester of tropine and phenylpropionic acid, that is, it has a structure similar to atropine. It has a strong α-adrenoblocker and a weak M- cholinolytic effect . Completely eliminates the effect of adrenergic nerves or adrenomimetics, expands peripheral blood vessels and lowers blood pressure. Effects of phentolamine and dihydroergotoxine differ in duration (hours).

Application: same as above-mentioned preparations.

SERMION (nicergoline). From the chemical point of view, it is a derivative of the alkaloid of blackberry, and it contains a residue of nicotinic acid. Has a spasmolytic (α-adrenoblocker) effect, especially in relation to cerebral and peripheral vessels.

Usage:

- acute and chronic blood circulation disorders of the brain
- diabetic retinopathy
- in dystrophic diseases of the cornea

Unpleasant effects : hypotension, dizziness, sleep disturbances, itching of the skin (nicotinic acid).

PRAZOSIN is an adrenoblocker that acts mainly on α1 $_{\text{- adrenoreceptors.}}$ It is 10 times stronger than phentolamine. At the same time, it expands arterial and venous blood vessels and reduces blood flow to the heart, thus reducing the load on the myocardium and easing the work of the heart. It does not cause tachycardia, reduces the activity of phosphodiesterase, as a result of which tsAMF accumulates, reduces the concentration of intracellular Ca^{++}. The effect is about 30-60 min. starts after and lasts 6-8 hours after drinking.

Application:

- heart disease
- heart failure (especially if it occurs due to dampness of the circulation).
- adenoma (hypertrophy) of the prostate gland -has α adrenoreceptors.

Adverse effects: -collapse (first dose phenomenon), dizziness, headache, weakness, dizziness, sleep disturbance, nausea, vomiting, constipation. The dose of the drug should be determined individually for each patient.

β -ADRENORETCEPTOR BLOCKING AGENTS

(β-adrenoblockers)

Most of this group of substances are chemically similar to isadrin (β-adrenomimetic), but they do not bind to β-adrenoceptors and cause excitation , but instead block and therefore prevent NA from acting on the receptors.

ANAPIRLIN blocks β_1 and β_2 adrenoreceptors. -Due to blockade of β-adrenoreceptors in the heart , it reduces heart rate and force, reduces atrioventricular conduction and automaticity. As it blocks β-adrenoreceptors of skeletal muscles, liver and other vessels, it reduces total peripheral resistance of vessels, lowers blood pressure. In this case, the effects of the drug, such as reducing the systolic volume of the heart, reducing the amount of renin and reducing the activity of the MNS, are also important. Anaprilin develops bronchospasm due to the blockade of β_2 -adrenoceptors of the bronchi, but reduces the oxygen demand of the myocardium. The drug increases uterine contractions, slows down glycolysis and lipolysis. Anaprilin from MIT is rapidly absorbed. Blood max. concentration comes to the surface after 1-1.5 hours. The placenta easily passes through the barrier. Treatment with anaprilin is continuous.

Application :

- in ischemic heart disease;
- in case of depression;
- in arrhythmias such as sinus and paroxysmal tachycardia;
- in extrasystoles;
- thyrotoxicosis (prevents tachycardia);
- in case of diffuse toxic goiter disease (prevents cardiovascular, neuro-psychic changes);
- in primary weakness of the uterus, in order to strengthen and stimulate its contraction;
- in order to prevent postpartum complications (bleeding);
- in open-angle glaucoma, fluid production slows down (individual drug form TOPIM eye drops).

Adverse effects : general weakness, nausea, vomiting, diarrhea, bradycardia, dizziness, brochospasm, allergic reactions (itching of the skin), restlessness and slowness of thinking (it is impossible to drive a car).

Contraindications : Sinus bradycardia, atrioventricular block, hypotensive, severely developed heart failure, bronchial asthma, diabetes, pregnancy, peripheral blood circulation disorders, spastic colitis.

OXPRENOLOL (trazicor) The effect is similar to that of anaprilin, but the effect on the speed and force of heart contraction is weaker. Has sympatholytic activity. Reduces

bronchospasm. Compared to anaprilin, oxprenolol is better tolerated by patients. It is used in the same way as Anaprilin and has similar side effects.

METOPROLOL **is a selective blocker of** β1 - adrenoreactive structures. (cardioselective effect). Absorbed quickly from MIT. The effect lasts about 12 hours. during the passage through the liver, most of it is broken down, and its metabolites are excreted in the urine.

Application : heartburn, angina pectoris, arrhythmias (supraventricular tachycardia, ventricular fibrillation, ventricular extrasystole), hyperthyroidism, prevention of heart attack.

Unpleasant effects : headache , fatigue , sleep disturbance, increased bronchial tone, especially in bronchial asthma.

α AND β - ADRENORECEPTORS MEDIATORS

(α, β -adrenoblockers).

LOBETALOL HAS A BINARY EFFECT, THAT IS , it blocks both β and α 1 -adrenoreceptors at the same time , but β-adrenoreceptors are more sensitive to the effect of lobetalol than α. Lobetalol reduces the neuronal uptake of NA. It is weaker than anaprilin and phentolamine. The drug does not significantly affect the number and strength of heart contractions . But the ability to expand peripheral blood vessels with β-blocking properties makes the drug reliable hypotensive effect. The drug lowers peripheral vascular resistance well. Compared to β-blockers, the blood pressure-lowering effect develops quickly and lasts 8-10 hours, does not cause bronchospasm. It is quickly absorbed from MIT, most of it is broken down in the liver, inactive metabolites are excreted in the urine. Intravenous administration is performed with the patient lying down, as blood pressure drops quickly.

Application : depression (antihypertensive agent).

Side effects: headache, nausea , vomiting, constipation or diarrhea, weakness, skin itching.

Contraindications : in severe development, heart failure, atrioventricular block.

PROXODOLOL α and β-adrenoblocker. It has antihypertensive, antiarrhythmic and antiischemic effects. Reduces the peripheral resistance of blood vessels. It reduces the systolic volume of the heart. It reduces the internal pressure of the eye. (reduces fluid production). Lobetalol is used in similar indications.

DIRECT INFLUENCE OF ADRENOMIMETICS.

1. Sympathomimetics.
2. Sympatholytics.

SYMPATHOMIMETICS.

EPHEDRINE is an alkaloid contained in the ephedra wild plant (cowthorn grass) - Ma xuan (China). In plants, ephedrine is a levorotatory isomer and is more active than synthetic ephedrine. Ephedrine increases NA release by acting on the presynaptic membrane. In addition, ephedrine directly stimulates adrenoreceptors in the postsynaptic membrane. Ephedrine causes changes in the activation of α and β adrenoreceptors due to the fact that it increases the release of NA and some of the NA is converted to adrenaline. That is, the activity of the heart increases, blood vessels narrow, blood pressure rises, the bronchi expand, the movement and secretion of MIT organs decrease, the pupil expands (the internal pressure of the eye does not change), hyperglycemia, hyperlipidemia develops. The effect of ephedrine is 50-100 times weaker than that of adrenaline. M-n: duration of hypertensive effect is 7-10 times longer than that of adrenaline. If ephedrine is continuously injected into the body (10-30 min.). blood pressure falls instead of rising (tachyphylaxis) because ephedrine depletes NA stores in the presynaptic membrane . Ephedrine reduces the activity of MAO. Therefore, it has a strong stimulatory effect on the MNS compared to adrenaline and NA (loss of sleep, high mood, hyperglycemia, loss of appetite). Ephedrine, unlike NA and Adrenaline, is not broken down in MIT, is resistant to the effects of MAO, is broken down in the liver, about 40% is excreted unchanged in the urine.

Application : bronchial asthma (broncholytic), hypotonia, rhinitis (local), prevention of hypotonia in spinal anesthesia, blood loss, to raise blood pressure in trauma, in allergic cases, in case of poisoning with sleeping pills and narcotics, in ophthalmology diagnosis.

Adverse effects: agitation, insomnia, tremors, hyperglycemia, loss of appetite.

Prolonged use of ephedrine is prohibited. ***Cannot be used*** : thyrotoxicosis, irritability, insomnia, atherosclerosis, pheochromocytoma.

SYMPATHOLYTICS.

This group of drugs affects the presynaptic membrane of adrenergic synapses, blocking the passage of excitation impulses. They do not affect α, β, β_2 -adrenoreceptors located in the postsynaptic membrane. The basis of the mechanism of action of sympatholytics is to reduce the amount of NA. But the origin of this is different, that is, sympatholytics reduce the amount of NA in different ways.

OCTADINE is a derivative of guanitidine and is a strong sympatholytic. At the onset of its action, octadin reduces the release of NA from the presynaptic membrane into the synaptic cleft, while at the same time inhibiting NA neuronal uptake, as it is reabsorbed by the transport system involved in NA uptake . In this way, octadine takes the place of stored NA and reduces its amount. Free NA is degraded by interneuronal MAO. Therefore, the amount of octadin increases in the presynaptic membrane, and the amount of NA decreases. Therefore, under the influence of

an excitatory impulse, a sufficient amount of NA is not released from the presynaptic membrane and the impulse does not pass. Octadine does not pass through the blood-brain barrier, so the amount of NA there does not change. The same is true of the medulla of the adrenal gland. Under the influence of Octadin, blood pressure decreases slowly (several days), but steadily. It is also important to reduce the bradycardia and the systolic volume of the heart . Under the influence of Octadine treatment , the resistance of peripheral blood vessels decreases, while the drug has short-term ganglioblocking properties. At the beginning of its effect , octadin increases blood pressure for a short time due to tachycardia and an increase in the systolic volume of the heart. (transient hypertension). But blood pressure gradually decreases in 2-3 days. This effect reaches its peak in 7-8 days and is maintained for another 4-14 days despite stopping the drug. Octadine from MIT is absorbed slowly (about 50%), the dose of the drug should be selected individually for each patient. (individual), because the sensitivity of patients to octadine is not the same.

Application: in various forms of glaucoma, both in severe forms and in large-angle glaucoma.

Side effects : dizziness, weakness, low mobility, nausea, vomiting, swelling of the mucous membrane of the nose, diarrhea (with increased MIT motility), fluid accumulation in the body, (because the drug reduces blood circulation and filtration in the kidney, especially when starting to take the drug). In the first weeks of treatment with the drug, orthostatic hypotension and collapse may occur. Conditions in which Octadine ***cannot be used*** :

- strongly developed atherosclerosis
- acute violation of cerebral circulation
- pheochromocytoma (because octadin first raises blood pressure)
- in myocardial infarction, hypotonic conditions
- in renal filtration disorders (because unchanged drug or its metabolites are excreted in the urine).

RESERPINE **is an alkaloid** with pronounced sympatholytic properties, extracted from the leaves and roots of Rauwolfiaserpentina , a complex ester of reserpine acid, an indole derivative. Reserpine disrupts the storage of NA, sharply reduces the amount of the mediator in the vesicles, which are the richest in NA reserves in the axoplasm. The release of NA from toxins in the presynaptic membrane increases under the influence of the drug, but under the influence of MAO, it is broken down and insufficient NA is released into the synaptic cleft. As a result, there is no adrenergic effect on the vessels, blood pressure drops, and this result is maintained for a long time. Reserpine lowers blood pressure gradually (maximum effect occurs after several days). On the one hand, it is associated with a decrease in the systolic volume of the heart and peripheral vascular resistance, and on the other hand , it is associated with a decrease in pressor reflexes.

Reserpine does not have direct adrenolytic and ganglioblocking properties, but it leads to a decrease in the tone of sympathetic nerves, the dominance of the influence of parasympathetic nerves . bradycardia, increased secretion and movement of MIT organs, pupil constriction and headache occur. Reserpine has a calming effect on the MNS (neuroleptic), increases blood circulation and filtration in the kidney, has a positive effect on fat and protein metabolism (especially in patients with heart disease and coronary atherosclerosis).

Application:

- sad, in the mild form of heart failure
- in late toxicosis of pregnancy
- in thyrotoxicosis (reduces the dose of antithyroid drugs)
- in mental disorders (schizophrenia, alcoholic psychosis)
- in insomnia.

Side effects are redness of the mucous membrane of the eyes, pain in the stomach, diarrhea, weakness, dizziness, nausea , vomiting , nightmares, exacerbation of bronchospasm (especially in patients with bronchial asthma). Drowsiness (drowsiness), parkinsonism, loss of appetite.

Circumstances that cannot be used :

- in severe and organic injury of the cardiovascular system (decompensation)
- in bradycardia
- in nephrosclerosis
- stomach and duodenal ulcers
- bronchial asthma and other allergic conditions
- in cerebral sclerosis.

RAUNATIN IS a collection of alkaloids (reserpine, aymolin, serpentine, etc.) contained in the root of the Rauwolfia plant , the pharmacological effect of which is mainly related to the content of reserpine. The main effect is lowering blood pressure and antiarrhythmic properties. It has a weaker sedative effect on the CNS than reserpine. The onset of hypotension relative to reserpine is slower. Less ***side effects*** , better effect than reserpine. Sometimes sweating, drowsiness, weakness, swelling of the nasal mucosa are observed. used as a blood pressure lowering agent .

OF ORNID **- s** impatolytic effect is different from octadin and resirpine, mainly it reduces the release of the mediator from the presynaptic membrane. Reduces MAO activity, reduces neuronal absorption. Moderately lowers blood pressure only with long-term use . It reduces the amount of NA at the end of adrenergic nerve fibers. It is less effective than reserpine and octadine.

(5-6 hours). It has a strong antiarrhythmic effect. (related to sympatholytic properties). Badly absorbed from MIT, rapid learning develops.

Application: arrhythmia of heart ventricles (tachycardia, extrasystole).

Side effects : orthostatic hypotension, weakness, body heat, swelling of the nasal mucosa , moderate visual impairment, pain in the calf muscles.

Contraindications : acute circulatory disorders in the brain, hypotension, severe renal failure .

Final conclusion on the topic of the lecture (appendix #1)

It is necessary to take into account the individual characteristics and condition of the organism when taking drugs, because the sensitivity to drugs changes depending on the patient's age, gender, and genetic factors. The effect of drugs depends more on the state of the organism, in particular, on the pathology to which they are given, accordingly, their anticipated effects also change.

Thus, when using adrenoblocker and sympatholytic agents, the general practitioner should analyze their pharmacodynamic and pharmacokinetic properties and their influencing factors.

Lecture

Topic 4: Painkillers. (Analgesics)

Lecture

Time *: 80 minutes*	*Number of students: 50-70*
Lecture plan	*1. Introduction.* *2. Use of analgesics* *3. Classification of narcotic analgesics, mechanism of action Pharmacodynamics and pharmacokinetics of morphine, use* *4. Acute poisoning with morphine and first aid* *5. Omnopon - difference from morphine* *6. Drug addiction, its treatment and fight against it* *7. Classification of nonnarcotic analgesics*
The purpose of the lecture:	*Introducing students to narcotic and nonnarcotic analgesics. Review of the mechanism of action, use, side effects and complications of this group of drugs.*
The student should know:	*Classification of analgesics. The difference between narcotics and non-narcotics. The mechanism of action of analgesics. Use of analgesics. Side effects of analgesics.*

Pedagogical *: tasks*	**Results of educational activities *:***
Explain about analgesics. Classification of analgesics; Complete knowledge about the mechanism of action of analgesics; Deepening the knowledge about the main effect of analgesics; Expanding and deepening knowledge about side effects of analgesics. Interest in broadening the scope of knowledge about the use of analgesics and non-supportive situations and acquiring practical skills;	*Analgesics have a concept of pain ;* *Analgesics are clearly classified.* *Narcotic and non-narcotic analgesics are clearly distinguished from each other;* *They are well aware of the side effects of analgesics;* *They know when to use analgesics.* *to develop mental thinking in students, to correctly visualize the sequence of events by comparative comparison, to form critical thinking;* *students know how to use first aid measures in case of acute and chronic poisoning with analgesics*
Educational methods	*Lecture, problem method, brainstorming, discussion, rapid inquiry*
Form of education	*Teamwork, working in groups*
Educational tools	*Lecture text, computer, multimedia, slides, visual materials, marker,*
Educational conditions	*A room designed and equipped for lectures at TTA.*
Monitoring and evaluation	*Verbal inquiry: quick inquiry , written inquiry*

Technological map of the thematic lecture

Work stage - and time 80 minutes	Activity	
	teacher	learners
1st stage . Enter 5 min	1.1. It conveys the topic's name, purpose, and expected results. Topic Basics: Introduces the keywords and topic outline for the topic. Gives a list of references.	They listen and record.
2 stages Activity activation 10 minutes	2.1. Asks stimulating questions to engage students in brainstorming: - What is the classification of narcotic analgesics? - How do narcotic analgesics differ from non-narcotic analgesics? - What drugs are included in narcotic analgesics? - What is neuroleptoanalgesia? - Which drugs are included in Pyrazalon products? - Mechanism of action of nonnarcotic analgesics? 2.2. Answers will be heard and a poll will be conducted with the students.	

	2.3. Giving students an idea about the plan of lectures and intermediate, final controls, rating control in the department of private pharmacology.	
Stage 3. Basic information section 60 minutes 5 minutes break	3.1. According to the plan of the lecture, using multimedia slides (slides No. 1.2, etc.), the topic of the lecture will be conveyed to the students in a certain order, and specific questions will be addressed. Classification of analgesics according to question 1 Application of analgesics according to question 2 Acute poisoning with morphine according to question 3 Use of nonnarcotic analgesics according to 4 questions Side effects of narcotic analgesics according to question 5 3.2 Emphasis is placed on the necessary, necessary questions on the topic and students are invited to write them down:	They listen to the report, see diagrams, tables, and visual materials, make judgments, and ask clarifying questions. they ask and ask questions where they don't understand. They write down the necessary and basic information.
4th stage. Completer 5 minutes	By asking short questions on the topic, it is determined how the students understood the topic. - Mechanism of action of morphine? - Show the most powerful narcotic analgesics? - What are the side effects of salicylic acid products? - What group does paracetamol belong to? Final conclusions on the topic are made.	Answers questions.

PAIN RELIEF MEDICINES

is realized through special receptors in the body - **nociceptors** (*noceo - hurt).* These receptors are stimulated by exogenous and endogenous influences. Pain impulses reach the cerebral cortex through separate pathways. But the MNS has an antinociceptive system against pain. This system acts from top to bottom and reduces pain perception. In addition, the body contains a number of biologically active substances that change the perception of pain (anesthetic endogenous peptides - enkephalins, β -endorphin, dynorphins, endomorphins; endogenous peptides that increase pain perception - R-substance). In recent years , a new endogenous peptide called *nociceptin has been isolated, which has antinociceptive activity.*

These endogenous neuropeptides - opioids bind to specific and functionally important receptors and cause the following changes by stimulating them:

μ-(mu) – analgesia, sedative effect, euphoria, physical dependence, shortness of breath, decreased motility of the brain, bradycardia, miosis.

d-(delta) – analgesia, shortness of breath, decreased motility of the brain.

κ -(kappa) - analgesia, sedative effect, dysphoria, miosis, lower level of motility of brain organs, physical dependence may occur.

There are several different subtypes of these receptors in the body.

So, a complex antinociceptive system against pain is functioning in the body. If the activity of this system decreases or it is not able to leave the pain , it is necessary to use painkillers.
Analgesics - by their resorptive effect selectively reduce only pain perception, and do not affect other sensibility, consciousness and movements in therapeutic doses .

Analgesics are divided into the following groups based on their pharmacodynamics:

I. Mainly centrally acting means

1. Narcotic analgesics (opioids):

A. A agonists ***are morphine, promedol, fentanyl*** , ***sufentanil, alfentanil***

B. Agonist-antagonists and partial agonists

pent a zocin, nalbuphine, butorphanol, buprenorphine , nalorphine,

V. ***A***ntagonists naloxone***, naltrexone***

2. Non-opioid analgesics: ***paracetamol,***

clofeline, amitriptyline, dimedrol, carbamazepine

3. Analgesics with a mixed mechanism of action: ***tramadol***

P. Mainly peripherally acting means:

Anti-inflammatory drugs _ _

NARCOTICS, ANALGESICS AND THEIR ANTAGONISTS

Narcotic analgesics are characterized by the following :

- excitement;

- emergence of dependence (physical and mental) and habituation;
- severe pain, especially injuries and severe pain (myocardial infarction, cancer, etc.);
- abstinence syndrome occurs when administration is stopped to patients who have developed dependence;
- to eliminate the analgesic and toxic effects only by their own antagonists.

OPIOID RECEPTOR AGONISTS

All narcotic drugs belonging to the group of agonists have analgesic properties (some agonist-antagonists too).

Morphine - poppy - *Papaver somniferum* - air-dried milky juice released when the unripe pods are scratched - opium (black). It has been used since ancient times as a stimulant and laxative. The composition of blackberry is complex , it contains more than 20 alkaloids. In addition, there are proteins, polysaccharides, etc.

Depending on their chemical structure, opium alkaloids are divided into phenanthrene and isoquinoline products. Phenanthrene products (morphine, codeine, etc.) are depressant (analgesic, antitussive), and isoquinoline alkaloids (pa-paverine, etc.) have direct spasmolytic properties on smooth muscles. Morphine is the main alkaloid of blackberry. The amount of morphine in opium intended for medical use should be 10%.

The basis of morphine pharmacodynamics is the analgesic effect, which does not affect other types of sensitivity (tactile, temperature, hearing, vision) in therapeutic doses. In many ways, the analgesic effect of morphine is related to changing the patient's attitude to pain. Because morphine has a sedative effect on the CNS.

Mechanism of action of morphine : not fully studied. Despite this, the mechanism of its effect is probably the following: 1) it slows down the process of interneuron transmission of pain impulses in the central parts of afferent pathways; 2) disrupts subjective-emotional perception of pain assessment and reaction to it. The mechanism of its analgesic effect depends on increasing the activity of the antinociceptive system as a result of interaction with opioid receptors. The strengthening of opioid receptors by morphine occurs as a result of its disruption of the interneuronal transmission of pain impulses in the MNS.

Effects of morphine on the MNS

I. Attenuating effects:

1. O leaves the pain;
2. T soothes (sedative effect);
3. He cries;
4. N weakens the respiratory center (the number of breaths decreases, but the breath is deep, then it decreases again , but it is shallow, then periodic breathing appears, and death can occur due to the paralysis of the respiratory center);
5. Y has a strong antitussive activity due to weakening of the cough center;
6. G weakens the temperature control center located in the hypothalamus and lowers the body temperature (however, strongly expressed hypothermia can occur only in large doses);
7. Q weakens the center of gravity;
8. It reduces satiety;
9. G reduces the secretion of onadotropic hormones.

II. Reinforcing effects:

1. Euphoria emerges;
2. Myosis occurs due to the stimulation of the nerve center that moves the head ;
3. Bradycardia occurs due to strengthening of the affected nerve center ;
4. increasing the production of ADH in the hypothalamus , it reduces diuresis;
5. Increases the secretion of prolactin ;
6. *(trigger zone)* of the chemoreceptors of the vomiting center located at the bottom of the IV ventricle, it strengthens the vomiting center and induces vomiting.

Peripheral effects of morphine

I. Attenuating effects:

1. O weakens the motility of the stomach and intestinal peristalsis, as a result of which food products in the intestine are retained for a long time and can lead to constipation - **constipation** ;
2. secretion of stomach , pancreas and intestinal glands .

II. Reinforcing effects:

1. increases the tension of the sphincters of the brain;
2. the I jaw;
3. Increases the tension of the normal sphincter (increases the pressure in the gallbladder , bile ducts and pancreatic duct) ;
4. bronchial muscles (due to the direct effect on opioid receptors in the muscles and increasing the release of histamine);
5. tension of urinary tract and bladder sphincter , makes urination difficult .

Morphine is poorly absorbed from the brain, most of it is broken down in the first pass through the liver, so it is often administered parenterally (t/o). The analgesic effect of morphine lasts for 4-6 hours. Passes GET poorly. Unchanged morphine (10%) and its conjugates (90%) are excreted mainly by the kidneys and partially (7-10%) by the brain.

Acute poisoning with morphine : the patient loses consciousness, coma is observed. Breathing becomes difficult and its number decreases. In severe cases, periodic breathing is observed. Skin layers become pale, cool, mucous membranes become cyanotic. Strongly expressed miosis is observed. Blood circulation is disturbed. Body temperature decreases. Heart failure and pulmonary edema cause death. Death occurs within 6-12 hours. If the patient does not die during this period, he will remain alive, because morphine is quickly broken down in the body.

Aid measures : the stomach is washed, adsorbing agents and saline plasters are given. Oxygen is inhaled , artificial respiration is performed . **Naloxone is introduced** as an **antagonist** of morphine . Such patients should be treated in warm rooms.

Chronic poisoning with morphine is called **morphinism** . This leads to mental and physical dependence and addiction. Abstinence syndrome is observed if the administration of the drug is suddenly stopped. This causes symptoms such as fear, panic, restlessness, insomnia, agitation, increased aggressiveness. Sometimes a collapse can be observed. Chronic poisoning gradually worsens. Mental and physical work capacity decreases, skin sensitivity decreases, weight loss, strong thirst, constipation, hair loss occur. Since treatment is a very complex task, it is carried out in a psychiatric hospital.

Omnopon (pantopon) is a mixture of 5 alkaloids of phenanthrene (morphine, codeine, thebaine) and isoquinoline (papaverine, narcotine) in blackberry. 50% of it is morphine. The pharmacodynamics of Omnopon is very similar to that of morphine, but it increases smooth muscle tension to a lesser extent than morphine. Getting used to it and dependence also occurs.

Codeine is an opium alkaloid. It does not induce euphoria, habituation is rare, the ability to anesthetize pain is 7 times weaker than that of morphine. It does not have a negative effect on the respiratory center, it has no effect on the brain, it suppresses the cough center less than morphine.

Ethylmorphine (Dionin) is a semi-synthetic substance with codeine-like effects.

Promedol is a synthetic piperidine product. Analgesic effect is 2-4 times slower than morphine , the effect lasts 3-4 hours. It does not slow down breathing , does not cause bronchospasm, relaxes the urinary tract, but is well absorbed by the brain, increasing the tension of its sphincters . It increases the contraction of the uterus, the placenta easily passes through the placenta and causes asphyxia of the fetus . In terms of spasmogenic effect, it is weaker than morphine. It causes less nausea and vomiting than morphine. As a result of biotransformation of promedol in the body, a neurotoxic N-demethylated metabolite is formed. This metabolite stimulates the CNS (tremors, muscle spasms, hyperreflexia , convulsions are observed). Since its $t_{1/2}$ is 15-20 hours, it is recommended to use promedol for short periods (up to 48 hours).

Fentanyl (sentonil) is a product of piperidine , a synthetic drug. It has a very strong analgesic activity (100-400 times stronger than morphine), but the effect is short: when administered v /o , the effect begins in 1-3 minutes and lasts 20-30 minutes. It weakens the respiratory center strongly and for a short time (may even cause apnea). It increases the tension of skeletal muscles, including chest muscles . Antidepolarizing myorelaxants are used to reduce muscle tone . Bradycardia often prevails . It is broken down in the liver. Addiction and addiction to fentanyl occurs. It is mainly used as a pain reliever in neuroleptic analgesia (along with neuroleptic droperidol - thalamonal or innovar), combined narcosis, myocardial and pulmonary infarction, angina pectoris , kidney and liver spasms , etc.

Sufentanil citrate and **alfentanil** are more active analogues of fentanyl and are similar in pharmacological properties. However, when administered parenterally, their effect appears even faster. Depending on the duration of the analgesic effect and half-life, they can be placed as follows: fentanyl ($t_{1/2}$ = 3.6 hours) > sufentanil ($t_{1/2}$ = 2.7 hours) > alfentanil ($t_{1/2}$ = 1, 3 hours). The effect of sufentanil and alfentanil is also faster . Unlike fentanyl and sufentanil, alfentanil has a hypotensive effect. It should also be taken into account that the duration of the effect of fentanyl and its analogues depends on the age of the patient (longer in the elderly) and liver function (increases the effect in liver cirrhosis) .

ANALGESICS WITH MIXED EFFECT MECHANISM

This group includes **tramadol (tramol)** . It interacts with opioid receptors, while also affecting the monoaminergic system , which is involved in controlling the transmission of pain impulses . The affinity to opioid receptors is much lower than that of morphine . The non-opioid component of pain is probably related to the reduction of re - neuronal reuptake of serotonin and noradrenaline .

Tramadol has 5-10 times less activity than morphine, but in its used therapeutic doses it can be compared with agonists of opioid receptors. It has less effect on breathing and activity of the brain. The narcotic properties are very low compared to agonists of opioid receptors.

It is well absorbed from the intestine. The duration of action is similar to that of morphine. It is broken down in the liver. Its metabolite O-desmethyltramadol is 2-4 times more active than tramadol. Tramadol and its metabolites are excreted through the kidneys .

The drug is used in acute and chronic pains of moderate and strong character. It is administered orally, rectally and v/o 4 times a day.

Side effects: headache, dizziness, inhibition, slowing of the speed of movement reactions, increased sweating, hypotension, tachycardia, dry mouth, constipation, abdominal pain, skin rash, convulsions when administered in large doses.

Naloxone can be used as a weak antidote to Tramadol.

Opioid receptor agonists and agonists

partial agonists

Pentazocine (lexir, fortral) is a synthetic preparation, differs from the products of the phenanthrene series by the lack of one cycle in its content. Preparat is an agonist of d- and k -receptors, and an antagonist of m -receptors. In terms of analgesic activity and duration of action, it is weaker than morphine. It is very unlikely that it will cause addiction. Compared to morphine, it slows down breathing less, causes less constipation and disturbs the excretion of urine, increases the pressure in the pulmonary artery, causes tachycardia. It is well absorbed from the brain. Abstinence syndrome occurs when morphine is used in cases of addiction.

Butorphanol (Moradol, Stadol) and **Nalbufene (nuba - in)** drugs are also agonist-antagonists.

Butorphanol is similar to pentazocine in its pharmacological properties. It is an agonist of k -receptors and a weak antagonist of m -receptors, 3-5 times more active than morphine. Like pentazocine, it increases the pressure in the pulmonary artery and increases the work of the heart, so it is not used in myocardial infarction. Less depressant than morphine. Less addictive than morphine. It is introduced v/o and m/i, and sometimes intra - nasally (every 3-4 hours).

Nalbufene is an agonist of κ -receptors and a weak antagonist of μ -receptors, its activity is approximately equal to morphine. Pharmacokinetics is similar to morphine. It almost does not affect hemodynamics. In rare cases, it can cause dependence. It is administered parenterally (every 3-6 hours).

Buprenorphine (buprenex) is a partial agonist of m-receptors, 20-60 times superior to morphine in terms of analgesic activity and has a longer-lasting effect. The effect develops slowly compared to morphine. It has less effect on the brain than morphine. It does not increase the pressure in the gall bladder and pancreatic ducts. Reduces the movement of food products in the intestine to a lesser extent. It is relatively well absorbed from the brain. The main part of the drug is excreted unchanged through the intestines and metabolites through the kidneys. Narcogenic properties are very low. Withdrawal is easier than that of morphine. The drug is administered parenterally and sublingually (every 6 hours). Bioavailability is about 50% when sublingually administered.

Nalorphine is chemically similar to morphine. It has a pain-relieving effect, this effect is weaker than Morfin, but it is not used as an analgesic, because it can cause mental agitation. It slightly disturbs breathing, causes bradycardia and miosis. It does not increase the tension of the sphincters of the brain, does not cause constipation. There is no dependence on it. As an antagonist of morphine, nalorphine is used to eliminate respiratory disorders, bradycardia, vomiting, strong contraction of brain sphincters caused by narcotic analgesics. But the drug does not affect the

antidiuretic and hypothermic effects of analgesics. The effect lasts 1-4 hours. If used in cases of dependence on agonists, it causes abstinence . It is mainly used as an antidote to opioids.

Antagonists

Naloxone (Narcan) blocks all opioid receptors and does not have agonistic properties. No analgesic effect. It not only eliminates the respiratory depression caused by all agonists and agonist-antagonists, but also loses its other effects. Naloxone is less effective in buprenorphine overdose. When ingested, it is absorbed in the brain, but most of it is broken down in the primary passage through the liver. Therefore v/o and m/i are introduced. The effect appears quickly (after 1 minute) and lasts 2-4 hours.

If naloxone is administered to drug addicts , an attack of abstinence syndrome occurs . This property is used in the diagnosis of drug addiction . Strict control is required in the storage , distribution and sale of narcotic analgesics in pharmacies . In this regard , there is a law of the Republic of Uzbekistan " On Psychotropic Drugs " (" Family doctor " , October 1999).

nalmefene with a long duration of action (10 hours) has been created for intravenous administration .

Naltrexone is also a universal antagonist of opioid analgesics, it is about 2 times more active and has a longer duration of action (24-48 hours) than naloxone. Side effects: insomnia, nausea, sharp pains in the abdomen, pain in the joints. It is recommended to drink. It is mainly used in the complex treatment of drug addicts.

NONARCOTIC ANALGESICS

Nonnarcotic analgesics are characterized by :

- Analgesic effect is best shown in pain associated with inflammation. It does not work well for injuries and severe pain.

- Has antipyretic and anti-inflammatory properties.

- It does not affect the breath and cough centers .

- Euphoria and addiction do not occur.

Following nonnarcotic analgesics

including synthetic drugs.

- Salicylatlar: acetylsalicylate acidase, methyl - salicylate

- Pirozolon derivatives – amidopyrin, butadione, analgin

- Paraaminophenol derivatives – phenacetin, paracetamol

The mechanism of action of nonnarcotic analgesics is mainly related to inhibition of synthesis of prostaglandins (PGs), as they inhibit the activity of cyclooxygenase enzyme, which produces cyclic endoperoxides from arachidonic acid. PGE is synthesized from cyclic endoperoxides under the action of prostaglandin synthetase. PGs usually cause hyperalgesia,

because they increase the sensitivity of nociceptors to chemical (including inflammatory mediators - histamine, bradykinin, serotonin) and mechanical effects. Therefore, reduction of synthesis of PGs (PGE_2, PGG'_2, PGI_2) prevents pain perception and hyperalgesia. Therefore, the analgesic properties of non-narcotic analgesics are mainly manifested in diseases related to inflammation. In addition, their analgesic effect is associated with the elimination of swelling, which reduces the pressure on nociceptors. Anti-inflammatory effect of non-narcotic analgesics is also manifested by reduction of synthesis of PGs. Their antipyretic mechanism is related to the release of heat (expansion of blood vessels of the skin and mucous membranes, increased sweating). If the amount of PGs increases, they have a pyrogenic effect on the temperature control center located in the hypothalamus.

SALICYLATE ACIDS DERIVATIVES (SALICYLATES)

Salicylates - acetylsalicylic acid - have three properties characteristic of nonnarcotic analgesics, in addition, they also affect other systems and organs, including a direct stimulating effect on the respiratory center and increase it due to an increase in the production of carbon dioxide (especially in doses). In this case, respiratory alkalosis may develop. Disturbance of acid-alkaline balance caused by salicylates is not limited to compensated alkalosis, because K^+ and Na^+ ions are quickly removed from the kidney in the urine.

In this case, the buffer capacity of tissues decreases. Salicylates have almost no effect on the vascular system , only in large doses they expand blood vessels . They strengthen the liver's ability to digest bile, reduce the reabsorption (reabsorption) of urates and phosphates by the kidneys. In large doses, it increases the excretion of uric acid due to slowing down the reabsorption of uric acid in the urine (this is good for gout). Unfortunately , in small doses, the opposite happens and the amount of uric acid in the blood increases. Large doses of salicylate reduce the number of platelets . Acetylsalicylic acid slows thromboxane biosynthesis and reduces thrombocyte aggregation . Sodium salicylate does not have this property .

Salicylates in large doses increase the release of ACTG and therefore the amount of glucocorticoids in the blood due to the strengthening of the hypothalamus. Under their influence, the breakdown of protein, fatty acids and amino acids accelerates, and their synthesis slows down, and hyperglycemia in the blood decreases in diabetes. Salicylates are well absorbed from the brain and pass through tissue barriers. 50-55% of absorbed salicylates bind to proteins. They form conjugates in the liver and are excreted together with the unchanged part in the urine. $t_{1/2}$ =10-12 hours.

Indication: it is used in acute and chronic rheumatoid diseases, neuralgia, myalgia and arthritis as an analgesic, as an antipyretic when the body temperature exceeds 38 $^{o}C.$

Side effects: nausea, vomiting, stomach ulcers, tinnitus, allergic reactions.

Acute poisoning: headache, tinnitus, mental disorders, visual disturbances, nausea, vomiting, respiratory alkalosis, hypokalemia, tissue dehydration, body temperature rise.

Chronic poisoning: salicylicism, extra-hylar hemorrhages (thrombocytopenia), vitamin K should be given. Symptomatic treatment.

Tsitramon, Cofecil, Sedalgin and many other complex tablets contain aspirin.

Methyl salicylate is a colorless liquid with a characteristic aromatic smell, slightly soluble in water, mainly used on the body surface as an anti-inflammatory and pain-relieving agent alone or in combination with chloroform, turpentine and oils (in rheumatism, arthritis, pleurisy) "Sanitas" ", "Naftalgin", "Saliniment" liniments and Bon-Bengi ointment (ointment) contain methyl salicylate.

PYRAZOLONUMS

Substances belonging to this group have anti-inflammatory, analgesic and antipyretic effects. Analgesic effect is greater in analgin and amidopin, and anti-inflammatory effect in butadione. Butadione increases the excretion of uric acid , as it reduces its reabsorption in the kidneys (in gout). Amido - pyrin is poorly soluble in water (4%), analgin is well soluble (50%). Pyrozolone products are full and well absorbed from the brain. Butadione ($t_{1/2}$ = 72 hours) is their longest - lasting effect , followed by amido - pyrin, while analgin has a shorter duration of action. Butadione is well bound to serum proteins. Pyrozolone products are mainly analgesic (analgin and amidopyrin) is used for headache and toothache, neuralgia , myalgia .

As an anti-inflammatory agent, butadione is used in infectious polyarthritis, acute gout and others.

Side effects: amidopyrin, analgin - agranulocytosis, a sharp decrease in the number of neutrophils, phagocytosis, loss of protection, can lead to death.

Butadione causes dyspeptic disorders (nausea, vomiting, bleeding, ulcers in the stomach and intestines), swelling (increases the reabsorption of sodium ions), allergic reactions, agranulocytosis, aplastic anemia, liver damage in 50% of patients. causes injury. Butadione is not used in stomach ulcers, cardiovascular insufficiency , and liver diseases .

PARAAMINOPHENOL (ANILINE) PRODUCTS

Compounds of this group mainly have analgesic and antipyretic properties. Anti-inflammatory effects are very weak.

Phenacetin is less effective than acetylsalicylic acid in reducing fever. It is more toxic than paracetamol and has strong visible side effects, especially if the dose is increased: formation of methemoglobin (bruising, decrease in blood pressure, shortness of breath), phenacetin nephritis, hemolytic anemia, jaundice, rashes on the skin may occur. In case of severe poisoning, hand - lap occurs. That is why it is rarely used in practice. Phenacetin turns into paracetamol in the body, and the pharmacological effect of the resulting active metabolite occurs.

paracetamol is probably related to its blocking effect on TsOG-3 in the MNS, in which the synthesis of PGs in the MNS decreases, but the amount of PGs in the periphery does not change. This is why preparat has no anti-inflammatory effect. In terms of analgesic and antipyretic effects, it is almost the same as acetylsalicylic acid. It is well absorbed from the brain. The maximum concentration in the blood occurs after 30-60 minutes. 25-35% binds to serum proteins. $t_{1/2\ of\ paracetamol}$ = 1-3 hours. It is broken down in the liver. It is excreted by the kidneys in the form of conjugates.

The drug is used for headache, myalgia, neuralgia, pain after operations, pain in tumors, to lower body temperature. It is well received by patients. In therapeutic doses, it does not cause any side effects. Sometimes skin allergic reactions may occur. Unlike acetylsalicylic acid, it does not have a negative effect on the gastric mucosa and does not affect platelet aggregation. Its main drawback is the small width of the therapeutic effect. A toxic effect occurs as a result of a 2-3 times increase in the high therapeutic dose. Acute poisoning with paracetamol causes serious damage to the liver and kidneys. This is due to the formation of a toxic metabolite - N-acetyl-p-benzoquinonimine. When taken in therapeutic doses, this metabolite loses its activity due to conjugation with glutathione, and when taken in high doses, the metabolite cannot be completely inactivated.

The remaining parts of the active metabolite interact with cells and cause their death. It causes necrosis of liver and kidney cells (24-48 hours after poisoning). In the treatment of acute poisoning with paracetamol, the stomach is washed, activated charcoal is given, and acetylcysteine (to enhance the formation of glutathione in the liver) and methionine (to enhance the conjugation process) are administered during the first 12 hours.

used in pediatric practice as an analgesic and antipyretic . The safety of use in children under 12 years of age is due to the predominance of the sulfate pathway in the biotransformation of paracetamol due to the lack of cytochrome R-450 system in them . It does not produce toxic metabolites.

PREPARATIONS WITH AN ANALGESIC COMPONENT INCLUDING DIFFERENT PHARMACOLOGY GROUPS

Many drugs belonging to different pharmacological groups have an analgesic component. Such drugs include **clofeline, which** is also widely used as a hypotensive agent . In experiments conducted on animals, it is superior to morphine in terms of analgesic effect . The drug suppresses the hemodynamic response to pain. Does not cause shortness of breath. Does not produce dependence. In clinical observations, it was found that clofeline has an analgesic effect (myocardial infarction, postoperative period, cancer, etc.). However, its hypotensive and sedative effects prevent it from being used on a large scale for this purpose.

Ami-triptyline, which is considered a tricyclic antidepressant, **has** strong analgesic activity. Mechanisms of their analgesic action may be related to the reduction of neuronal uptake of serotonin and noradrenaline in the descending pathways. These drugs are effective in chronic pain. However, it is also used in severe pain along with some antipsychotics.

Anesthetics such as nitric oxide **and** ketamine **also** have analgesic effects. Antihistamines include **diphenhydramine** , anticonvulsants include **carbamazepine, sodium valproate, diphenine, lamotrigine, gabapentin** , etc. It is used in chronic pain due to its analgesic effects. For example , carbamazepine is used to reduce pain in trigeminal neuralgia, gabapentin in neuropathic pain (diabetic neuropathy , postherpetic and trigeminal neuralgia, migraine) . In the same way, somatostatin and cal - cytonins from hormonal agents have been found to have an analgesic effect .

Lecture

Topic 5: Neuroleptics. Anxiolytics.

Time: 80 minutes	***Number of students: 50-70***
Report plan	*1. Introduction* *2. General characteristics of psychotropic substances* *3. Mechanism of action of neuroleptics* *4. Mechanism of action of tranquilizers 5. Use of psychotropic substances. 6. Side effects of psychotropic substances. 6. Importance of psychotropic substances in the operation of children.*
The purpose of the report:	***Consolidation and deepening of students' knowledge about psychotropic substances.***
Pedagogical tasks: -understanding of psychotropic substances, sources of their acquisition. - use of neuroleptics and tranquilizers. - the importance of tranquilizers in psychotria - the use of psychotropic substances and their contraindications. - side effects of psychotropic substances. - the use of psychotropic substances in pediatrics.	***Results of educational activities:*** ***The applicant should know:*** - *They tell the classification of psychotropic substances* - *They reveal the main features of neuroleptics* - *Instructions for the use of tranquilizers are given* - *Neuroleptics are distinguished from tranquilizers* - *They explain the side effects of psychotropic substances* - *They explained the importance of psychotropic substances in pediatrics.*
Educational methods	***Lecture, problem method, brainstorming, discussion, rapid inquiry***
Form of education	***Teamwork, working in groups***
Educational tools	***Lecture text, computer, multimedia, slides, visual materials, marker,***
Educational conditions	*A room designed and equipped for lectures at TTA.*
Monitoring and evaluation	***Oral survey : rapid survey , written survey***

Technological map of the thematic report

Work step - larval time 80 minutes	***Activity***	
	Educationer	**Learners**
1st stage . Enter 5 min	***1.1. It conveys the topic's name, purpose, and expected results. Topic Basics: Introduces the keywords and topic outline for the topic. Gives a list of references.***	***They listen and record.***
2 stages Activity activation 10 minutes	***2.1. Asks stimulating questions to engage students in brainstorming:*** ***- When are neuroleptics used?*** ***- What are type k neuroleptics?*** ***- What are the side effects of tranquilizers?*** ***2.2. Answers will be heard and a blitz survey will be conducted with the students.*** ***2.3. Giving students an idea about the plan of lectures and intermediate, final controls, rating control in the department of private pharmacology.***	
Stage 3. Basic information section 60 minutes	3.1. According to the plan of the report, using multimedia slides, the scheme will convey the topic of the report to the students in a certain order and address certain questions. 3.2 Emphasis is placed on the necessary and necessary questions on the topic and students are invited to write them down: 1. What are the special features of Aminazine? 2. What are buterophenone products? 3. How do tranquilizers affect benzodiazepine receptors? 4. What are the pharmacokinetics and pharmacodynamics of Sibazon? 5. When are psychotropic substances not used?	They listen to the report, see diagrams, tables and visual materials, discuss and ask clarifying questions. they ask and ask questions where they don't understand. They write down the necessary and basic information.
4th stage. Completer 5 minutes	4.1. Makes a final conclusion on the topic. How does requiring students to focus on the core of the subject affect their higher performance? 4.2. Invites students to ask questions and answers them.	4.1. They listen and record. 4.2. Clarifies, asks questions.

NEUROLEPTICS

By exerting a strong sedative and antipsychotic effect, they alleviate the development of the disease by sharply reducing delusions and hallucinations in mental patients. The mechanism of antipsychotic action of neuroleptics is related to the suppression of dopamine receptors in the limbic system (neostriatum), that is, the release of NA and dopamine from the presynaptic membrane in the limbic system and hypothalamus, as well as their neuronal release. The sedative effect of neuroleptics is due to the weakening of the activating effect on the cerebral cortex of the reticular formation, because neurons reduce the sensitivity of reticular formation neurons to NA.

1 **"Typical" antipsychotics** :

- Phenothiazines are ***aminazine , tryphtazine , fluorophenazine***
- Thioxanthenenderivatives ***chlorprotexin***
- Buterophenonums ***are haloperidol, droperidol***

2 **"Atypical" antipsychotic drugs :**

- Benzamides ***Sulpiride***
- Dibenzodiazepinenumlari ***clozapine***

Aminazine -kengta'sirspektrigaega. Aminazinenteralvaparenteralkullanadi6 with ta'siretadi.

Antipsychotic, sedatist, hypnotics, marcasia morelaxantlik, hypothermim, kite Kilishga Karsha, drug, Ukhlatuvchi, drug Analgetiklar Tasirini Kuchitrish, peripheral alpha adrenergic pool, antiarrhythmic, m-cholin-blocking anesthesia, anti-enamolist, anti-gistemolist, anti-gistemolist. R κLADI.

Etaperazine - Antipsychotic effect is better than Aminazine. It has a muscle relaxant effect. It slightly enhances the effect of depressants on the MNS, its hypothermic, adrenolytic, cholinergic, spasmolytic effect is 2 times less than that of Aminazine. It is effective in patients who are not affected by Aminazine.

Tryphtazine is a less powerful antipsychotic agent than aminezine, which has a selective effect . Powerless Adrenolytic . Antihistamine ,

It has spasmolytic and anti-inflammatory effects. When taking Triftazine, movement stiffness, general weakness, and numbness do not develop, on the contrary, the patients' interest in the environment, their attitude to cocktails, and their activity increase, because it has a moderate stimulating effect. Aminazine has fewer side effects.

Fluorphenazine - Strong neuroleptic. Strongly matures dopamine receptors in MNS, compared to adrenoreceptors. Strong antipsychotic effect combined with moderate activating effect. Sedative effect occurs only in large doses. It is less effective than Triftazin. It often causes extrapyramidal changes. Trishish can also be.

Unpleasant effects of phenothiazine products: general weakness, drowsiness, apathy, dry mouth, hypotonia, orthostatic collapse, parkin

sonism, hyperbilirubinemia, leukopenia, agranulocytosis, photosensitization, hypothyroidism, depression with prolonged use.

Chlorprotexin is a potent sedative with antipsychotic effects. Enhances the effect of analgesic and sedative drugs. Strong cholinolytic, moderate

It has an adrenolytic and weak anticonvulsant effect. The neuroleptic effect of chlorprotexin is combined with an antidepressant effect. Rarely, extrapyramidal changes occur. Few side effects. Patients respond well.

Haloperidol is the most powerful neuroleptic of the present time. It has a sedative effect. It increases the effect of hypnotics, narcotics, and analgesics. It blocks alpha-adrenoreceptors and especially dopamine receptors in the MNS. It has a heavy cholinolytic effect. Weak peripheral adrenolytic, does not lower konbosimin. Often, extrapyramidal changes occur. Other neuroleptics also show good results. Unlike Aminazine, it does not cause indifference and restlessness, but has an activating effect. The effect begins quickly and lasts for 3 days. It slowly separates from Or-zm.

Droperidol - Fast and strong , but to the short-term (2-3 s) effect have _ Narcotic analgesics , hypnotic and muscle relaxants effect strengthens _ Karakhtlik , note to come against , α - adrenolytic , central dopamine receptors perfectionist to the property have _ Cholinolytic effect load. It has a hypotensive and antiarrhythmic effect. Has a strong kthaleptogenic effect. Mainly used for neuroleptanalgesia. (Talamonaldroperidol and fentanyl borate preparation)

Sulpiride is a selective inhibitor of D2 - dopamine receptors. Has moderate neuroleptic, antidepressant and antiserotonin effects. Sedative and antispasmodic effect. Analgesics, hypnotics do not increase the effect. Extrapyramid does not cause changes. Mining pressure

moderates. It is applied without MIT. $T_{1/2}$ 5-10 s. Patients accept it well. Sometimes it develops sleep disorders, dyspepsia, galactorrhea, gynecomastia.

Clozapine - Strong neuroleptic, antipsychotic effect combined with sedative and muscle relaxant properties. Extrapyramid rarely causes changes. It enhances the effect of analgesics and hypnotics. It has a strong cholinolytic and peripheral α -adrenolytic effect. Presynaptic

reduces the release of dopamine from the membrane. It has a strong general depressant effect, but it develops unpleasant effects such as drowsiness, blurred vision, muscle weakness, orthostatic hypotension, tachycardia, dry mouth. Seriously complication this agranulocytosis .

Instructions for taking neuroleptics:

- Psychoses, especially strong aggression. in mental illnesses with hallucinations, delusions and hallucinations.
- In the treatment of drug addiction (morphinism, alcoholism)
- Returning and listening to the conversation
- In anesthesiology , artificial hibernation, narcotics, analgesic effect enhancement

Anxiolytics - The main properties of anxiolytics are to eliminate excitement, fear, restlessness, aggression, quick anger. Under their influence, calmness, calmness, indifference, low activity develop. They are ineffective in psychosis . Benzodiazepine products anxiolytic as are used the most .

Anxiolytics –

1. Benzodiazepine receptor agonists

- short-acting ($T_{1/2}$ < 6 h) *midozalam*
- moderately effective ($T_{1/2}$ < 6-24 h) *nosepam , lorazepam ,* alprazolam
- lasting effect ($T_{1/2}$ < 24-48 c) *phenazepamdiazepam , clozepide*

2. Buspirone, an agonist of serotonin receptors

Amizil , meprotan , trioxazine are drugs of different structure

XLOZEPID is the first used tranquilizer among elenium, librium, napton-benzodiazepine products. Enhances the effect of hypnotics and analgesics. Moderate sleep. In neurotic conditions, it reduces depression, excitement, restlessness, and tension. It does not have an antipsychotic effect. Reduces psychomotor agitation in large doses. Pushes faster than MIT. T.1\2=8-10 hours. The placental bar is removed, and the kidneys are separated. ***Application:*** neurotic states, insomnia, migraine, climacteric changes, preparing patients for surgery, movement disorders, myositis, arthritis, bursitis and similar diseases with muscle tension, eczema and shrinking dermatitis, seizures, abstinence syndrome (drug addiction, alcoholism). Titrazepam, sibazone and fenozepam are not used in cases where it is not possible to wash.

NOZEPAM . Its chemical structure and pharmacological properties are similar to clozepine and sibazon, but it has a milder effect, its toxicity is lower, its muscle relaxant and antispasmodic effect is weaker. Compared to clozepine and sibazon, patients accept it well. It is used like other benzodiazepines, with the same precautions. ***MEZAPAM*** . The sedative effect of this drug is combined with some activating properties. Enhances the effect of narcotics, analgesics and hypnotics. Due to weak muscle relaxant and hypnotic properties, it can be used in debilitated patients, caries and children. ***Unpleasant effects*** : dizziness, constipation, accommodation disorder, tachycardia, in some cases drowsiness is observed. Caution should be exercised when used by transport drivers and operators. ***AMIZIL*** . diphenylmethane derivative. It belongs to the group of central M-cholinolytics. Cup has a pharmacological effect: moderate spasmolytic, against histamine and serotonin , has local anesthetic properties . Amizil's to MNS effect tyxolinesterase of substances and of cholinomimetics poisonous and strive caller features in reduction sedatives and analgesics effect in strengthening manifestation will be Cough laughs _ Lost the nerve will be completed . (look expands , tachycardia, smoothness muscles it will be ...).

Anxiolytic characterized by asthenic and neurotic reactions patients in treatment laughs _ In Parkinsonism effective _ from MIT good is pushed , one how many hour effect is enough Kidney orca separated . Unpleasant effects atropine property with dependence _ In glaucoma to use possible not _ ***TRIOXAZINE*** .Minor tranquilizer. A mild sedative effect combined with an activating property is accompanied by an expectation (improvement) of the patient's mood. Drowsiness and intellectual laziness do not develop. Muscle spasms are not observed. Ambulatory laughter is possible.

MEPROTAN is a cardamine ester of propanediol and is considered the first of the minor tranquilizers (anxiolytics). Central myorelaxant, enhances the effect of MNS sedatives, hypnotics and decongestants. Removes irritation. It does not affect the autonomic nervous system, the cardiovascular system, the respiratory system and the muscular system. Reduces body temperature.

SEDATIVE MEDICINES.

These agents have a calming effect on the activity of the higher nervous system and reduce some symptoms of neurosis (reduce anxiety, improve mood, stabilize sleep), because they harmonize the relationship between inhibition and excitation processes in the brain.

this regard, sedatives are weaker than tranquilizers and do not have a selective effect on sedation. Sedatives include bromine salts, preparations of valerian and lion's tail plants. ***SODIUM BROMIDE*** (potassium bromide) Bromine preparations embody and strengthen the inhibition process in the cerebral cortex (especially in the organ of MNS sensitivity). The effect of these drugs is especially noticeable in neuroses. The strength of anticonvulsant effects is much lower than the strength of drugs used in epilepsy. ***use*** : neurasthenia, neuroses, hysteria, initial period of insomnia, epilepsy, chorea. To prevent bromism, mouthwashes, mouthwashes, frequent washing of mouthwashes. The burden of significant unpleasant effects of bromides, the good acceptance of patients, makes it possible to use them widely even in daily medical ambulatory conditions, especially in the elderly and elderly.

Addiction to bromine salts , addiction, mental and physical dependence (camelism) does not develop.

VALERIAN PREPARATIONS.

of the valerian plant . Contains isovalerian and there are valerian acids , borneol. Valerian preparations to MNS soothing effect sleeper _ _ of drugs effect strengthens , internal of members smooth muscles relaxes - spasmolytic effect increases . MNS monitoring strengthens _ Nervous disturbances (serjakhil , depression) , cardiovascular _ system in neuroses , insomnia , MIT in spasms used in many places another soothing and to the heart effect doer drugs with together is used . Carvalol , valocardin .

PREPARATIONS OF LION TAIL VENUM .

contains essential oils, saponins, astringents, alkaloids. MNS has a calming effect. its properties are similar to valerian drug.

LITHIUM SALTS.

mania-obsession, mania, maniacal and paranoid manifestations, stage of manic-depressive psychosis.
Antipsychotics and lithium salts may be used to treat mania . But when taking antipsychotic drugs, general laziness, indifference, drowsiness appear.

Lithium salts have a specific and selective effect by moderating the mental state, so they do not cause general lethargy and have a slight sedative effect. Lithium salts are mainly used to prevent or treat mania.
mechanism of action : they reduce the release of NA from the presympathetic membrane, increase intracellular oxidation and increase neuronal firing. As a result, the amount of NA that binds to the receptors in the synapse and especially the postsynaptic membrane is sharply reduced.

Lithium salts from MIT are absorbed well, absorbed slowly from GEB, so their amount in cerebrospinal fluid is twice as low as compared to mineral serum. It is excreted by the kidneys, 80% is reabsorbed. T1/2=24 hours. If the amount of NaCl in the oven is increased, the separation of lithium salts is accelerated.
Unpleasant effects : Dyspepsia, muscle weakness, tremor, polyuria, bukok. It is not possible to use ash in the case of impaired excretory function of the kidneys, dysfunction of the thyroid gland, and ulcer disease of the stomach and duodenum.
acute poisoning : nausea, diarrhea, ataxia, dysarthria, convulsions, coma and death may occur.
treatment : osmotic diuretics, hemodialysis.

Midazolam - Fast and short acting anxiolytic . Fast developing and strong sedative , myorelaxant and to trish against to the effect have _ from MIT good it is pushed , decomposes quickly , low sugar . Anterograde amnesia develops when used parenterally. Parenteral resuscitation is not recommended in conditions where resuscitation equipment is not available.

Indications : premedication, crèche and combination. anesthesia Homilador should not be used by nursing mothers, the elderly, chronic pain, kidney and liver failure.

Adverse effects : hypotension, tachycardia, apnea, dyspnea. Abstinence syndrome develops with prolonged use.

Buspirone has a high affinity for 5-NT $_{1A}$ serotonin receptors in the brain . Shock sharply reduces the synthesis and release of serotonin in nuclear neurons, binds to dopamine receptors, does not affect GAMK receptors. It has a sufficient, but slowly (1-2 weeks) developing anxiolytic effect. Sedative, myorelaxant, has an anti-twitch effect. It is well pushed from MIT, the cystic part breaks down in the liver. $T_{1/2}$ =4-8 s.

Unpleasant effects : dyspepsia, headache, paraesthesia, nervous breakdown

Final conclusion on the topic of the report (appendix #1)

It is necessary to take into account the individual characteristics and condition of the organism when taking drugs, because the sensitivity to drugs changes depending on the patient's age, gender, and genetic factors. The effect of drugs depends more on the state of the organism, in particular, on the pathology to which they are given, accordingly, their anticipated effects also change.

Thus, the general practitioner should analyze their pharmacodynamic and pharmacokinetic properties and their influencing factors when using neuroleptic and tranquilizer drugs.

Lecture

Topic 6: Means affecting the activity of the respiratory system.

Time: 80 minutes	***Number of students: 50-70***
Report plan	*1. Introduction* *2. General characteristics of respiratory drugs substances* *3. Mechanism of action of drugs affecting the respiratory system* *4. Use of drugs affecting the respiratory system* *5. Side effects of drugs affecting the respiratory system* *6. Importance of drugs affecting the respiratory system.*
The purpose of the report:	***Consolidation and deepening of students' knowledge about drugs affecting the respiratory system.***

Pedagogical tasks: -understanding of drugs affecting the respiratory system, sources of their acquisition. - use of drugs affecting the respiratory system. - the use of drugs affecting the respiratory system and their contraindications. - side effects of drugs affecting the respiratory system. - the use of drugs affecting the respiratory system in pediatrics.	***Results of educational activities:*** ***The applicant should know:*** - *They tell the classification of drugs affecting the respiratory system* - *They reveal the main features of drugs affecting the respiratory system* - *Instructions for the use of drugs affecting the respiratory system are given* - *They explain the side effects of drugs affecting the respiratory system* - *They explained the importance of drugs affecting the respiratory system in pediatrics.*
Educational methods	***Lecture, problem method, brainstorming, discussion, rapid inquiry***
Form of education	***Teamwork, working in groups***
Educational tools	***Lecture text, computer, multimedia, slides, visual materials, marker,***
Educational conditions	*A room designed and equipped for lectures at TTA.*
Monitoring and evaluation	***Oral survey : rapid survey , written survey***

Technological map of the thematic report

Work step - larval time 80 minutes	***Activity***	
	Educationer	**Learners**
1st stage . Enter 5 min	***1.1. It conveys the topic's name, purpose, and expected results. Topic Basics: Introduces the keywords and topic outline for the topic. Gives a list of references.***	***They listen and record.***
2 stages Activity activation 10 minutes	***2.1. Asks stimulating questions to engage students in brainstorming:*** ***- When are drugs affecting the respiratory system used?*** ***- What are types of bronchodilators?*** ***- What are the side effects of drugs affecting the respiratory system?*** ***2.2. Answers will be heard and a blitz survey will be conducted with the students.*** ***2.3. Giving students an idea about the plan of lectures and intermediate, final controls, rating control in the department of private pharmacology.***	

Stage 3. Basic information section 60 minutes	3.1. According to the plan of the report, using multimedia slides, the scheme will convey the topic of the report to the students in a certain order and address certain questions. 3.2 Emphasis is placed on the necessary and necessary questions on the topic and students are invited to write them down: 1. What are the special features of Codeine? 2. What are bronchodilators? 3. What are the pharmacokinetics and pharmacodynamics of Euphyllin? 4. When are respiratory system drugs not used?	They listen to the report, see diagrams, tables and visual materials, discuss and ask clarifying questions. they ask and ask questions where they don't understand. They write down the necessary and basic information.
4th stage. Completer 5 minutes	4.1. Makes a final conclusion on the topic. How does requiring students to focus on the core of the subject affect their higher performance? 4.2. Invites students to ask questions and answers them.	4.1. They listen and record. 4.2. Clarifies, asks questions.

RESPIRATION STIMULANTS

According to the direction of their action, respiratory stimulants are subdivided into the following groups:

- *Drugs affecting the respiratory center directly*
v Bemegride
v Caffeine

v Aethimizolum

- *Reflex respiratory stimulants*
v Cytiton
v Lobeline

- *Drugs of the mixed type of action*

v Nikethamide (cordiaminum)

v Carbon dioxide

Respiratory stimulants are used to treat mild intoxication with the opioid analgesics and carbon oxide as well as asphyxia of newborns. They are also used to improve the essential levels of lung ventilation in the postanesthetic period. In general, respiratory stimulants are used very rarely. Hypoxia is usually treated with assisted or artificial respiration.

ANTITUSSIVE DRUGS

There are two groups of antitussive drugs.

- Centrally acting antitussives
  - *Opioid (narcotic) drugs*

  v Codeine

  v Ethylmorphine
  - Non-opioid (non-narcotic) drugs
  v Glaucine

  v Oxeladin (tusuprex)

- Peripherally acting antitussives

v Phenoxdiazine (libexinum)

Centrally acting drugs that suppress the medullary cough center, are widely used in practical medicine.

Phenoxdiazine (libexinum) belongs to the group of peripherally acting antitussives. It has an anesthetic effect on the mucosa of the upper respiratory tract and also possesses broncholytic properties. It does not affect the CNS. Drug dependence to phenoxdiazine does not develop. Phenoxdiazine is a non-opioid (non-narcotic) antitussive drug.

EXPECTORANTS

The use of this group of drugs is indicated to facilitate the expectoration of mucus produced by the bronchial glands. There are two types of expectorants: *1) reflex acting drugs*, 2) *directly acting drugs.*

Reflex acting drugs include ipecacuanha and thermopsis (extracts and infusions). When these drugs are taken orally, alkaloids contained in these preparations (in thermopsis also saponines) cause irritation of the stomach receptors. This is followed by a reflex increase in the bronchial glands' secretion, increased activity of the ciliary epithelium and intensified contraction of the bronchial muscles. Sputum becomes more abundant, less viscous and expectorates more easily with cough.

When used in high doses, these drugs cause reflex vomiting, but this effect does not have a therapeutic use.

Directly acting drugs are those that can dilute the secretions *(mucolytics).*

DRUGS USED FOR THE TREATMENT OF BRONCHOSPASM

All drugs used for the treatment of bronchial asthma and other bronchospastic states can be classified into the following groups.

I • Bronchodilators (broncholytics).

β_2-Adrenoceptor stimulators v Salbutamol v Fenoterol v Terbutaline

v Isoprenaline (isadrinum) v Orciprenaline v Epinephrine

M-cholinoceptor blockers v Atropine

v Metocinium (methacinum) v Ipratropium

Spasmolytics that have a myotropic effect v Theophylline v Aminophylline (euphylline)

II • Drugs producing anti-inflammatory and broncholytic effect.

Steroid anti-inflammatory drugs v Hydrocortisone v Dexamethasone v Triamcinolone v Beclometasone

Anti-allergic drugs v Cromoline v Ketotifen

Drugs affecting leukotriene system

- Inhibitors of the leukotrienes synthesis (5-lypooxygenase inhibitors) v Zileuton

- Blockers of leukotriene receptors v Zafirlukast v Montelukast

DRUGS USED IN ACUTE RESPIRATORY FAILURE

Pulmonary edema is one of the major causes of acute respiratory failure. It can develop in diseases of the cardiovascular system, in chemical lung injury, in some infectious diseases, kidney and liver pathology and in cases of brain edema.

Opioid analgesics such as morphine, fentanyl and talamonal are widely used for the treatment of pulmonary edema.

If pulmonary edema is caused by high arterial blood pressure, the main task is to lower it. *Ganglioblockers* (trepirium, azamethonium, benzohexonium), *vasodilators of myotropic action* (sodium nitroprusside) and α-*adrenoblockers* (for example, phentolamine, low doses of chlorpromazine, promethazine) are used for this purpose.

Another way to reduce pulmonary edema is by decreasing the circulating blood volume with the help of some efficacious and quick-acting diuretics (furosemide, ethacrynic acid) that also possess a hypotensive effect.

Alveolar edema and the formation of foam in the alveolar lumen leads to the development of a marked hypoxia that requires urgent medical assistance. Apart from the already mentioned drugs, the so called *anti-foaming agents* may be helpful. One of them is ethanol, which, when inhaled, decreases the surface tension of foam bubbles and transforms them into a fluid that takes up less volume (thus freeing up respiratory alveolar surface).

The most frequently used treatments of pulmonary edema are glucocorticoids, which have an anti-inflammatory and immunosuppressive effects.

Oxygen therapy is the universal method of treatment for all cases of pulmonary edema. Another treatment of pulmonary edema (in case of cardiac failure) are cardiac glycosides.

One of the manifestations of acute respiratory failure is acute respiratory distress syndrome (ARDS)— a disease of newborn infants. Usually in the lungs the special alveolar cells produce surface-active substances — *surfactants* (phosphatidylcholines, sphingomyelins), which decrease fluid surface tension and play an important role in maintaining the alveolar tissue elasticity. In newborn infants, an insufficiency of pulmonary surfactants may be the cause of respiratory distress syndrome. It manifests as the interstitial pulmonary edema and multiple atelectases. This

syndrome is treated with drugs that substitute for the endogenous surfactant as well as controlled pulmonary ventilation. One of the drugs from the group of medicinal surfactants is colfosceril (exosurf pediatric).

Practical training

Topic 1: The importance of the recipe in the preparation of GP. Doses. Recipe and its structure. Hard and soft drug forms and rules for prescribing them.

1. 1. A place of carrying out of study, equipment.

- Pharmacology department.;
- The complete set of medicine, the State Pharmacopoeia, samples of prescription forms, slides.

2. Duration of studying of a theme

Quantity of hours - 4

3. The employment purpose

- To develop general idea about the State Pharmacopoeia, doses, weights;
- To acquaint students with prescription structure;
- To yield classification of medicinal forms;
- To yield classification of liquid medicinal forms;
- to develop general idea about solutions;
- To yield concept about means of a discharging of the liquid medicinal forms dosed inside by spoons.

Tasks

The student should know:

- The basic partitions of the State Pharmacopoeia;
- Kinds of doses and a weight;
- Prescription structure;
- Classification of medicinal forms;
- Classification of liquid medicinal forms;
- The characteristic of solutions;
- Means of a discharging of the liquid medicinal forms dosed inside by spoons;
- ***Formulas for calculation of therapeutic doses for adults, children and elderly patients.***

The student should be able:

To execute practical skills - to carry out of the task under the formula (to write out prescriptions on the liquid medicinal forms dosed inside by spoons).

4. Motivation

The doctor of any speciality should be able write out correctly the liquid medicinal forms dosed inside by spoons, to be able to calculate therapeutic doses for adults, children and elderly patients, to define solution strength. Therefore the knowledge of this theme is necessary for all doctors, especially general practitioners, pediatrists.

5. Intersubject and intrasubject communications

Teaching of the yielded theme bases on knowledge students of bases of chemistry, Latin. The knowledge received during employment will be used at transit of clinical disciplines by all of them, and also at the further studying of partitions of private pharmacology by all of them.

6. The content of study

6.1. A theoretical part

Dose calculation

Td = maxd / 2; 3

Td child = td adult* age of a child / 24

Td> 60 age = td adult/ 2

The solutions dosed by spoons

Example of a discharging of the solutions dosed by spoons

To write out sodium bromidum (td-0,3) in solution table spoons for 4 days and to prescribe on 1 table spoon 3 times a day.

1. Rp.: Natrii bromidi 3,6 (0,3*12)

   Aquae destillatae 180 ml (15*12)

   M.f. solutio

   D.S. By 1 table spoon 3 times a day

2.

Rp.: Sol. Natrii bromidi ex 3,6-180 ml

D.S. By1 table spoon 3 times a day

3.

Rp.: Sol. Natrii bromidi 2 %-180 ml

D.S. By1 table spoon 3 times a day

The PROBLEM to Define how many вromidum sodium contains in 1 table spoon of this solution?

100 - 2

15 – x x = 15*2/100=0,3

Mixture

Example of a discharging of mixture

To write out the mixture consisting of caffeine-sodium benzoatum (Td 0,1) and amidopyrinum (Td 0,25). To prescribe table spoons.

Calculation - 0,1*12 = 1,2 caffeine-sodium benzoatum

0,25*12=3,0 Amidopyrinum

15*12=180 water ml

Rp.: Coffeini natrio-benzoatis 1,2

Amydopyrini 3,0

Aquae destillatae ad 180 ml

M.D.S. By 1 table spoon 3 times a day

Korrigens

EXAMPLE to write out chlorali hydras solution (Td 1,0) on 4 receptions by table spoons with slime addition.

Calculation: 1*4 = 4,0

15*4 = 60

Mucilages - 60/3 = 20

Rp.: Chlorali hydrati 4,0

Mucilaginis Amyli 20 ml

Aquae destillatae ad 60 ml

M.D.S. By1 table spoon for the night

Suspensions (cloud)

EXAMPLE to write out 10 ml of the aqueous slurry keeping 0,5 % of Hydrocortisoni acetas. To prescribe on 2 drops in an eye 4 times a day.

Rp.: Suspensionis Hydrocortisoni acetatis 0,5 %-10 ml

D.S. By 2 drops in an eye 4 times a day.

Before the use to shake

EXAMPLE to write out 100 ml of suspension of Griseofulvinum and to prescribe on 1 dessert spoon 3 times a day.

Rp.: Susp. Griseofulvini 100 ml

D.S. By 1 dessert spoon 3 times a day, shake before the use

Soft medicinal forms

Ointment

EXAMPLE to Write out 20,0 ointments on Vaselinum with the maintenance of 10 % of zinc oxide

Calculation: 100 - 10

20 - x x=20*10/100=2

Rp.: Zinci oxydi 2,0

Vaselini ad 20,0

M.f. unguentum

D.S. For greasing of the damaged field of a skin

EXAMPLE: Rp.: Unguenti Zinci oxydi 10% - 20,0

D.S. For greasing of the damaged field of a skin

EXAMPLE Write out 10,0 officinal Unguentums Zinci.

Rp.: Unguenti Zinci 10,0

D.S. For greasing of the damaged field of a skin

Pasta

EXAMPLE Write out 50,0 Pastas, keeping 5 % of Anaesthesinum and 25 % of Zinci oxydum.

Calculation: 100 - 5

50 - x x= 50*5/100=2.5 Anaesthesinum

100 – 25

50 - x x=50*25/100=12,5 Zinci oxydum

Rp.: Anaesthesini 2,5

Zinci oxydi 12,5

Vaselini ad 50,0

M.f. pasta

D.S. For greasing of the damaged field of a skin

EXAMPLE

Write out 40,0 officinal Pastas zinc.

Rp.: Pastae Zinci 40,0

D.S. For greasing of the damaged field of a skin

Linimentum

EXAMPLE to Write out 75 ml of Linimentum with the maintenance of turpentine of 5 % and 15 % Methylii salicylatis

Calculation: 100 – 5

75 - x x=75*5/100=3,75 turpentine

100 – 15

75 - x x=75*15/100=11,25 Methylii salicylatis

Rp.: Olei Terebinthinae 3,75

Methylii salicylatis 11,25

Olei Gossypii ad 75 ml

M.f. linimentum

D.S. For grinding

EXAMPLE: Write out 25 ml officinal 5 % of Linimentum Synthomycini

Rp.: Linimenti Synthomycini 5% - 25 ml

D.S. Put on a wound

Suppositories

EXAMPLE to Write out 10 rectal suppositories, containing on 0,3 Anaesthesinums. To prescribe on 1 suppository in the morning and in the evening.

Rp.: Anaesthezini 0,3

Olei Cacao 3,0

M.f. suppositorium rectale

D.t.d.N. 10 in charta cerata

S. By 1 suppositories 2 times a day in a rectum

Rp.: Suppositorium cum Anaesthezino 0,3

D.t.d. N. 10 in charta cerata

S. . By 1 suppositories in the morning and in the evening

EXAMPLE. To write out 10 suppositories of "Betiol" (the commercial name) and to prescribe on 1 suppository 2 times a day.

Rp.: Suppositoria “Bethiolum” N. 10

D.S. By 1 suppositories 2 times a day in a rectum

6.3. Practical part

Calculation of doses.

1. To calculate a therapeutic dose of analginum for the adult, the child of 8 years, the 70-year-old patient if the maximum dose is peer 1,0.

2. To calculate a therapeutic dose for the child of 3 years of caffeine pure (maxd 3 dg) and Amidopyrinum (maxd 5 dg).

3. To define a therapeutic dose for the child of 8 years of streptocide (td 5 sg).

4. To define a therapeutic dose of Sulfadimezinum for the child of 4 years, if maxd 2

Performance of tasks under the formula.

1. To write out Calcii chloridum maxd 1,0 in mixture table spoons.

2. To write out Amidopyrinum maxd 0,5 in solution tea spoons all means.

3. To write out caffeine Natrium benzoicum td 5 sg in solution dessert spoons.

4. To write out Kalii bromidum td 2 dg in solution table spoons.

5. To write out ammonium Sodium chloridum td 3 dr in solution table spoons.

6. To write out potassium Iodidum td 5 sg in solution teaspoons.

1. DISCHARGING OF PRESCRIPTIONS ON SOLUTIONS FOR INTRINSIC APPLICATION

Purpose: the Discharging of prescriptions on solutions for intrinsic application.

Carried out stages (steps):

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	List of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	Indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	Indicating to the pharmacist about quantity of a given drugs	0	10
5.	Indicating to the patient about a drug intake mean	0	30
	Total	0	100

Practical training

Topic 2: Liquid dosage forms and writing prescriptions for them.

1. 1. A place of carrying out of study, equipment.

- Pharmacology department.;

- The complete set of medicine, the State Pharmacopoeia, samples of prescription forms, slides.

2. Duration of studying of a theme

Quantity of hours - 4

3. The employment purpose

- To develop general idea about infusions, decoctions and emulsions;
- To acquaint students with features of preparation of infusions, decoctions and emulsions;
- To yield concept about medicinal collectings;
- To develop general idea about features of appointment of the solutions dosed by drops;
- To yield the characteristic of infusions, liquid extracts, neogalenical drugs;
- To yield concept about means of a discharging of infusions and decoctions, and also the liquid medicinal forms dosed inside by drops;
- To develop general idea about solutions for outside application and means of their discharging;
- To yield concept about ophthalmic, aural drops, drops for a nose;
- To acquaint students with features of a discharging of ophthalmic, aural drops, drops for a nose;
- To develop general idea about medicinal clysters and means of their discharging.

The student should know:

- The characteristic of infusions, decoctions and emulsions;
- Differences in preparation of infusions, decoctions and emulsions;
- Kinds of medicinal collectings;
- Features of appointment of the solutions dosed by drops;
- The characteristic of infusions, liquid extracts, neogalenical drugs;
- The characteristic of solutions;
- Means of a discharging of infusions, decoctions and emulsions, and also the liquid medicinal forms dosed inside by drops;
- Kinds of solutions for outside application;
- Means of a discharging of solutions for outside application;
- The characteristic of ophthalmic, aural drops, drops for a nose;
- Features of a discharging of ophthalmic, aural drops, drops for a nose;
- The characteristic of medicinal clysters;
- Features of a discharging of medicinal clysters;
- Formulas for calculation of therapeutic doses for adults, children and elderly patients.

The student should be able:

- To execute practical skills - to carry out of the task under the formula (to write out prescriptions on infusions, decoctions and emulsions, and also the liquid medicinal forms dosed inside by drops, on solutions for outside application, ophthalmic, aural drops, drops for a nose, medicinal clysters).

4. Motivation

The doctor of any speciality should be able write out correctly prescriptions on infusions, decoctions, emulsions, the liquid medicinal forms dosed inside by drops, solutions for outside application, to be able to calculate therapeutic doses for adults, children and elderly patients, to define solution strength. Therefore the knowledge of this theme is necessary for all doctors, especially general practitioners, otorhinolaryngologists, to ophthalmologists, pediatrists.

5. Intersubject and intrasubject communications

Teaching of the yielded theme bases on knowledge students of bases of chemistry, Latin. The knowledge received during employment will be used at transit of clinical disciplines by all of them, and also at the further studying of partitions of private pharmacology by all of them.

6. The content of study

6.1. A theoretical part

Infusions, decoctions, emulsions

EXAMPLE:

1) Write out grass infusion Thermopsis in concentration 1:400 in number of 200 ml

Rp.: Inf. herbae Thermopsidis ex 0,5 - 200 ml

D.S. By 1 table spoon 3 times a day

2) Write out 180 ml of decoction of sheet of a bearberry (1:10)

Rp.: Dec. folii Uvae Ursi ex 18,0-180 ml

D.S. By 1 table spoon 3 times a day

3) Write out 200 ml of an emulsion from seeds of sweet almonds.

Rp.: Emulsi semenis Amygdali dulcis ex 20,0 - 200 ml

D.S. By 1 table spoon in each hour

4) Write out 180 ml of an emulsion from a castor oil.

Rp.: Emuls. Olei Ricini ex 18,0 - 180 ml

D.S. By 1 table spoon in each hour

Medicinal collectings

EXAMPLE to Write out 10 doses collecting, containing on 2 g of a grass of an adonis and 1,5 g of a root of Valeriana. A collecting dose to weld up in a beaker of boiled water and to insist within 30 minutes, to take over on 1 table spoon 3 times a day.

Rp.: Herbae Adonidis Vernalis 2,0

Radicis Valerianae 1,5

M.F. species

D.t.d. N. 10

S. Collecting dose to weld up a beaker of boiled water and to insist within 30 minutes. To take over on 1 table spoon 3 times a day

The solutions dosed by drops

EXAMPLE

Write out Atropini sulfas (Td 0,0005) in drops and to prescribe on 10 drops inside.

Calculation: a dose 0,0005 0,0005*20 = 0,01

Amount receptions 20 10 drops = 0,5*20 = 10мл

1) Rp.: Atropini sulfatis 0,01

Aquae destillatae 10 ml

M.f. solutio

D.S. By 10 drops 3 times a day

2) Rp.: Sol. Atropini sulfatis 0,01 - 10 ml

D.S. By 10 drops 3 times a day

3) Calculation: It is known that in 10 ml contains 0,01 Atropini sulfases. To compound a proportion

10 - 0,1

100 - x h=0,01*100/10 = 0.1 %

Rp.: Sol. Atropini sulfatis 0,1 % - 10 ml

D.S. By 10 drops 3 times a day.

Prescription calculation - How many Atropini sulfas contains in 10 drops of 0,1 % of solution?

We compound a proportion:

10 drops - 0,5

100 - 0,1 x = 0,5*0,1/100 = 0,0005

0,5 - x

EXAMPLE

1) Write out Solution Nitroglycerini spirituous (maxd = 5 drops)

Rp.: Solutionis Nitroglycerini spirituosae 2 ml

D.S. By 2 drops on Saccharum scrap under tongue

2) Write out 10 ml of Cordiaminum and to prescribe on 10 drops in 3 times a day.

Rp.: Cordiamini 10 ml

D.S. By10 drops 3 times a day

Tinctures and liquid extracts

EXAMPLE Write out Tinctura of Valerianae (Td = 20 drops)

Rp.: T-rae Valerianae 20 ml

D.S. By 20 drops 3 times a day

EXAMPLE

Rp.: T-rae Valerianae 20 ml

T-rae Convallariae 10 ml

M.D.S. By 30 drops on reception

EXAMPLE

Rp.: Extracti Frangulae fluidi 30 ml

D.S. By 30 drops 2 times a day

Neogalenical drugs

EXAMPLE Write out 15 ml of Adonisidum. To prescribe on 15 drops 3 times a day.

Rp.: Adonisidi 15 ml

D.S. By 15 drops 3 times a day

Solutions for outside application

EXAMPLES

1. Write out 0,02 % solution of potassium of permanganate on 10 gargles. To one gargle to prescribe 200 ml.

Let's define how many it is necessary permanganate potassium on one gargle:

100 - 0,02

200 - x x = 200*0,02 / 100 = 0,04

It is possible to write out a concentrated solution, having dissolved each dose in a table spoon of water

Calculation: 0,04*10 = 0,4

Rp.: Kalii permanganatis 0,4

Aquae destillatae 150 ml (15*10 = 150)

M.f. solutio

D.S. By 1 table. To a spoon on 200 ml water for Gargles

Ophthalmic drops

EXAMPLE to Write out Pilocarpinum hydrochloride in ophthalmic drops (md-0,01).

Calculation: maxd = 0.01 0.005*20=0.1

Etc. = 0.005

Rp.: Pilocarpini hydrochloridi 0.1

Aquae destillatae 5 ml

M.f.solutio

D.S. By 2-3 drops in each eye

Rp.:Sol. Pilocarpini hydrochloridi ex 0,1 - 5 ml

D.S. By 2-3 drops in each eye

Calculation: 5 = 0,1

100=x x=100*0,1/5=2 %

Rp.:Sol. Pilocarpini hydrochloridi 2 % - 5 ml

D.S. By 2-3 drops in each eye

EXAMPLES

1) Write out 10 ml of solution of ephedrine of a hydrochloride of 2 % - drops in a nose and to prescribe on 3-4 drops in each nostril.

Rp.: Sol. Ephedrini hydrochloridi 2 %-10ml

D.S. By 3-4 drops in a nose

2) Write out 20 ml of hydrogen dioxide. To prescribe on 2-3 drops in an ear.

Rp.: Sol. Hydrogenii peroxydi diluti 20ml

D.S. By 2-3 drops in an ear

Medicinal clysters

EXAMPLE Write out Chlorali hydras on 1 clyster (Td=1,0)

Rp.: Chlorali hydrati 1,0

Mucilaginis Amyli

Aquae destillatae aa 25 ml

M.D.S. Sluggishly to introduce into a straight line intestine 20 minutes prior to a sleep

6.3. A practical part

Performance of tasks under the formula - to write out prescriptions:

1. Infusion from leaves of a digitalis in number of 200 ml;

2. Decoction from a cortex of an oak in number of 200 ml;

3. Tincture Strophanthus, maxd 10 drops and infusion of a lily of the valley maxd 30 drops together in the vial;

4. 200 ml of an emulsion from a castor oil;

5. 20 ml of an extract of a buckthorn of the liquid;

6. Tincture deadlies maxd 20 drops;

7. 200 ml of infusion from a grass Thermopsis;

8. Infusion from a root marsh-mallow in concentration 1:30 with Ethylmorphinum a hydrochloride Td 1 sg;

9. Tincture opium simple maxd 22 drops;

10. Liquid Viburnum extract Td 20 drops;

11. Liquid an extract of water pepper Td 30 drops;

12. Infusion from a grass of an adonis with Themisalum Td 5 dg;

13. Atropine sulphate maxd 1 mg of a drop inside;

14. Potassium permanganate in concentration 1:1000 for syringing;

15. Chloral hydrate td 1 g on 3 clysters;

16. Proserin maxd 1 sg in ophthalmic drops;

17. Silver nitrate in ophthalmic drops;

18. Naphthizin 0,1 percentage solution in drops for a nose;

19.10 ml 0,02 percentage solution of Phosphacolum in ophthalmic drops;

20. Pilocarpine hydrochloride Td 5 mg in ophthalmic drops;

21. 200 ml of solution of furacilinum for a lavage of wounds;

22. hydrogen peroxide for a gargle;

23. Eserini Salicylas maxd 1 mg in ophthalmic drops.

Make a calculation:

1. How many Atropini sulfas contains in 2 drops of 1 percentage solution?

2. How many Calcii chloridum contains in 1 table spoon 10 percentage solutions?

3. How many it is necessary to take atropine to prepare 5 ml 0,2 percentage solutions?

4. In 5 ml 5 mg of atropine are dissolved. What percentage solution?

5. In 2 drops 1 mg of material contains. What percentage solution?

1. THE DISCHARGING OF PRESCRIPTIONS ON SOLUTIONS FOR INTRINSIC AND OUTSIDE APPLICATION

Purpose: Discharging of prescriptions on solutions for intrinsic and outside application.

Carried out stages (steps):

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	List of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	Indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	Indicating to the pharmacist about quantity of a given drugs	0	10
5.	Indicating to the patient about a drug intake mean	0	30
	Total	0	100

7. Forms of controlling of knowledge, skills and abilities

- The verbal;
- The written;
- Demonstration of the mastered practical skills.

8. Control questions

1. What is the infusion?
2. What is the decoction?
3. How prepare infusions and decoctions?
4. In what difference between infusion and decoction?
5. In what concentration prepare infusions and decoctions?
6. What plants fall into with the toxicant?
7. What plants fall into with the strong?
8. In what form write out infusions and decoctions in prescriptions?
9. What is the emulsion?

10. What distinguish kinds of emulsions?

11. In what concentration prepare emulsions?

12. In what form write out emulsions in the prescription?

13. What disadvantages of a method of dosage by drops?

14. What means write out the solutions dosed by drops?

15. What is the infusion?

16. What mean write out infusion in the prescription?

17. What is the liquid extract?

18. What mean the liquid extract in the prescription leaves?

19. What is the neogalenicals drugs?

20. How neogalenicals drugs in the prescription leave?

21. How prescribe solutions for outside application?

22. How write out solution for a gargle?

23. How write out solution for syringing?

24. What is the ophthalmic drops?

25. What demands are shown to ophthalmic drops?

26. What means ophthalmic drops in prescriptions leave?

27. What means aural drops and drops for instillations in a nose in the prescription leave?

28. What is the medicinal clyster?

29. How write out a medicinal clyster in the prescription?

Performance of tasks under the formula - to write out prescriptions:

1. Infusion from leaves of a digitalis in number of 200 ml;

2. Decoction from a cortex of an oak in number of 200 ml;

3. Tincture Strophanthus, maxd 10 drops and infusion of a lily of the valley maxd 30 drops together in the vial;

4. 200 ml of an emulsion from a castor oil;

5. 20 ml of an extract of a buckthorn of the liquid;

6. Tincture deadlies maxd 20 drops;

7. 200 ml of infusion from a grass Thermopsis;

8. Infusion from a root marsh-mallow in concentration 1:30 with Ethylmorphinum a hydrochloride Td 1 sg;

9. Tincture opium simple maxd 22 drops;

10. Liquid Viburnum extract Td 20 drops;

11. Liquid an extract of water pepper Td 30 drops;

12. Infusion from a grass of an adonis with Themisalum Td 5 dg;

13. Atropine sulphate maxd 1 mg of a drop inside;

14. Potassium permanganate in concentration 1:1000 for syringing;

15. Chloral hydrate td 1 g on 3 clysters;

16. Proserin maxd 1 sg in ophthalmic drops;

17. Silver nitrate in ophthalmic drops;

18. Naphthizin 0,1 percentage solution in drops for a nose;

19.10 ml 0,02 percentage solution of Phosphacolum in ophthalmic drops;

20. Pilocarpine hydrochloride Td 5 mg in ophthalmic drops;

21. 200 ml of solution of furacilinum for a lavage of wounds;

22. hydrogen peroxide for a gargle;

23. Eserini Salicylas maxd 1 mg in ophthalmic drops.

Make a calculation:

1. How many Atropini sulfas contains in 2 drops of 1 percentage solution?

2. How many Calcii chloridum contains in 1 table spoon 10 percentage solutions?

3. How many it is necessary to take atropine to prepare 5 ml 0,2 percentage solutions?

4. In 5 ml 5 mg of atropine are dissolved. What percentage solution?

5. In 2 drops 1 mg of material contains. What percentage solution?

Practical training

Topic 3: Liquid drug forms and rules for prescribing them (II).

1. 1. A place of carrying out of study, equipment.

- Pharmacology department.;

- The complete set of medicine, the State Pharmacopoeia, samples of prescription forms, slides.

2. Duration of studying of a theme

Quantity of hours - 4

3. The employment purpose

- To develop general idea about features of prescribing of liquid medicinal forms for parenteral application, advantages of injections;
- To give concept about ways of introduction of various injections;
- To develop knowledge of the demands shown to intentional liquids;
- To acquaint students with features of prescription of aqueous solutions for injections,
- Solutions for intravenous introduction, Solutio oleosa and suspensions, officinal drugs
- Solutions and neogalenical preparations for injections;
- To develop general idea about soft medicinal forms;
- To give concept about ointments, Pastas, Linimentums, suppositories;
- To develop knowledge of differences of Linimentums, Pastas from ointments.
- To acquaint students with features of a prescribing of ointments, Pastas, Linimentums, suppositories.

Tasks

The student should know:

- Features of prescribing of liquid medicinal forms for parenteral application, advantage of injections;
- Ways of introduction of various injections;
- The demands shown to injectable liquids;
- Features of prescribing of aqueous solutions for injections, solutions for intravenous introduction, Solutio oleosa and suspensions, officinal solutions and neogalenical preparations for injections;
- Classification of soft medicinal forms;
- The characteristic of ointments, Pastas, Linimentums, Suppositories;
- Features and ways of prescribing of soft medicinal forms;
- Formulas for calculation of concentration and therapeutic doses for adults, children and elderly patients.

The student should be able:

- To execute practical skills - to carry out of the task on a compounding (to write out prescriptions on aqueous solutions for injections, solutions for intravenous introduction, Solutio oleosa and suspensions, officinal solutions and neogalenical drugs for injections, ointments, Pastas, Linimentums, Suppositories).

4. Motivation

The doctor of any speciality should be able write out correctly prescriptions on aqueous solutions for injections, solutions for intravenous introduction, Solutio oleosa and suspensions, officinal solutions and neogalenicals drugs for injections, soft medicinal forms, to be able to calculate therapeutic doses for adults, children and elderly patients, to define solution strength. Therefore the knowledge of this theme is necessary for all doctors, especially general practitioners, pediatrists, neuropathologists, cardiologists, gynecologists, dermatoviderologists, to ophthalmologists, surgeons.

5. Intersubject and intrasubject communications

Teaching of the yielded theme bases on knowledge students of bases of chemistry, Latin. The knowledge received during employment will be used at transit of clinical disciplines by all of them, and also at the further studying of partitions of private pharmacology by all of them.

6. The content of study

6.1. A theoretical part

The solutions which are prescribing for an injection

EXAMPLE:

To write out Atropini sulfas (Td=0,001) in not parted and parted kind all means hypodermic on 10 injections.

Calculation: we write out on 10 injections on 1 ml on an injection

Single dose=0,001

NOT PARTED MEAN

1. Rp.: Atropini sulfatis 0,01 (0,001 * 10)
   Aquae pro injectionibus 10 ml (1 ml * 10 ml)
   M.f. solutio
   Sterilis!
   D.S. By 1 ml subcutaneously

2. Rp.: Sol. Atropini sulfatis ex 0,01 – 10 ml
   Sterilis!
   D.S. By 1 ml subcutaneously

3. Rp.: Sol. Atropini sulfatis 0,1% – 10 ml 100 - x
   Sterilis! 10- 0,01
   D.S. By 1 ml subcutaneously x= 100*0,01/10=0,1

THE PARTED MEAN

1. Rp.: Atropini sulfatis 0,001
   Aquae pro injectionibus 1 ml
   D.t.d. N. 10 in ampullis
   S. By 1 ml subcutaneously

2. Rp.: Sol. Atropini sulfatis ex 0,001 - 1 ml
   D.t.d. N. 10 in ampullis
   S. By 1 ml subcutaneously

3. Rp.: Sol. Atropini sulfatis 0,1% - 1 ml
   D.t.d. N. 10 in ampullis
   S. By 1 ml subcutaneously

1 - 0,001
100 – x
x = 100*0,001/1=0,1

EXAMPLES

1. To write out 10 % Calcii chloridum solution on 10 ml in ampulas on 10 intravenous injections

Rp.: Sol. Calcii chloridi 10% - 10 ml
D.t.d. N. 10 in ampullis
S. By 10 ml i.v.

2. To write out 200 ml of 0,9 % of an isoosmotic solution of Sodium chloridum for i.v. introduction

Rp.: Sol. Natrii chloridi 0,9% - 200 ml
Sterilis!
D.S. For intravenous introduction

EXAMPLE Write out Solutio oleosa of camphor for hypodermic introduction (Td=0,2)

Rp.: Sol. Camphorae oleosae ex 0,2 – 1 ml
D.t.d. N. 10 in ampullis
S. By 1 ml hypodermic

Rp.: Sol. Camphorae oleosae 20% – 1 ml
D.t.d. N. 10 in ampullis
S. By 1 ml hypodermic

1 - 0,2
100- x
x=100*0,2/1=20

EXAMPLES

Write out 6 ampulas of Hexenalum on 1,0 and to prescribe on 1,0 for intravenous introduction, preliminarily having dissolved ampula contents in 10 ml of water for injections

Rp.: Hexenali 1,0
D.t.d. N.6 in ampullis

S. Dissolve ampula contents in 10 ml of water for

Injections and sluggishly inject into a vein before a narcosis

Rp.: Aquae pro injectionibus 10 ml

D.t.d. N. 6 in ampullis

S. For preparation of solution of Hexenalum

2. Write out 10 vials Benzylpenicillini-sodium on 500000 ED and prescribe i.m. 4 times a day.

Rp.: Benzylpenicillini-natrii 500000 ED

D.t.d. N. 10

S. Vial contents dissolve in 5 ml 0,25% sol.

Novocainum and inject i.m. 4 times a day

Rp.: Sol. Novocaini 0,25% - 5 ml

D.t.d. N. 10 in ampullis

S. For dissolution benzylpenicillini

EXAMPLE Write out 100 ml Biiochinolum and prescribe on 3 ml i.m. 1 time in

3 days. Shake before useing

Rp.: Biiochinoli 100 ml

D.S. By 3 ml i.m. 1 time in 3 days. Shake before using

EXAMPLE 1. Write out 10 ampulas of Cordiaminum on 1 ml and prescribe on 1 ml subcutaneously once a day

Rp.: Cordiamini 1 ml

D.t.d. N. 10 in ampullis

S. By 1 ml subcutaneously once a day

2. Write out 10 ampulas digalen-neo by 1 ml and prescribe by 1 ml subcutaneously once a day

Rp.: Digalen-neo 1ml

D.t.d. N. 10 in ampullis

S. By 1 ml subcutaneously once a day

3. Write out 10 ampulas containing 1 ml (5 ED) Pituitrinum. Prescribe by 1 ml hypodermic.

Rp.: Pituitrini 1 ml

D.t.d. N. 10 in ampullis

S. By 1 ml hypodermic

Ophthalmic drops

EXAMPLE to Write out Pilocarpinum hydrochloride in ophthalmic drops (md-0,01).

Calculation: maxd = 0.01 0.005*20=0.1

Etc. = 0.005

Rp.: Pilocarpini hydrochloridi 0.1

Aquae destillatae 5 ml

M.f.solutio

D.S. By 2-3 drops in each eye

Rp.:Sol. Pilocarpini hydrochloridi ex 0,1 - 5 ml

D.S. By 2-3 drops in each eye

Calculation: 5 = 0,1

100=x x=100*0,1/5=2 %

Rp.:Sol. Pilocarpini hydrochloridi 2 % - 5 ml

D.S. By 2-3 drops in each eye

EXAMPLES

1) Write out 10 ml of solution of ephedrine of a hydrochloride of 2 % - drops in a nose and to prescribe on 3-4 drops in each nostril.

Rp.: Sol. Ephedrini hydrochloridi 2 %-10ml

D.S. By 3-4 drops in a nose

2) Write out 20 ml of hydrogen dioxide. To prescribe on 2-3 drops in an ear.

Rp.: Sol. Hydrogenii peroxydi diluti 20ml

D.S. By 2-3 drops in an ear

Medicinal clysters

EXAMPLE Write out Chlorali hydras on 1 clyster (Td=1,0)

Rp.: Chlorali hydrati 1,0

Mucilaginis Amyli

Aquae destillatae aa 25 ml

M.D.S. Sluggishly to introduce into a straight line intestine 20 minutes prior to a sleep

6.3. Practical part

Performance of tasks under the formula - write out prescriptions:

1. Kofein-Sodium benzoatum Td 1 dg subcutaneously for 5 injections;

2. Glucose intravenously 40 percentage solution on 20 ml in ampulas on 10 injections.

3. Atropine sulphatis Md 1 mg subcutaneously.

4. Aminazine Md 5 sg in ampulas.

5. Camphor Td 2 dg Solutio oleosa in ampulas.

6. Aceclidinum Td 2 mg on 10 injections.

7. Ephedrine hydrochloride Td 5 sg subcutaneously.

8. Analginum Td 5 dg for 10 injections.

9. Dibazolum by 2 ml in ampulas 0,5 percentage solutions.

10. 10 ampulas of Cordiaminum on 1 ml.

11. 30 g of the ointment keeping 2,5 percent of Hydrocortisoni acetas.

12. 50 ml of Linimentum keeping 5 percent of a synthomycin.

13. Anesthesin Td 25 sg in rectal suppository.

14. Ichthyol Td 3 dg in vaginal suppository.

1. THE DISCHARGING OF PRESCRIPTIONS ON SOLUTIONS FOR INJECTIONS

Purpose: Discharging of prescriptions on solutions for injections.

Carried out stages (steps):

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	List of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	Indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	Indicating to the pharmacist about quantity of a given drugs	0	10
5.	Indicating to the patient about a drug intake mean	0	30
	Total	0	100

2. THE DISCHARGING OF PRESCRIPTIONS ON SOFT MEDICINAL FORMS

Purpose: the Discharging of prescriptions on soft medicinal forms.

Carried out stages (steps):

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10

2.	List of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	Indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	Indicating to the pharmacist about quantity of a given drugs	0	10
5.	Indicating to the patient about a drug intake mean	0	30
	Total	0	100

7. Forms of controlling of knowledge, skills and abilities

- The verbal;
- The written;
- Demonstration of the mastered practical skills.

8. Control questions

1. What falls into to medicinal forms for injections?
2. What use as dissolvents for injections?
3. What advantages of injections?
4. What disadvantages of injections?
5. What demands are shown to solutions for injections?
6. What means write out solutions for injections in prescriptions?
7. How write out solutions for intravenous injections?
8. What means write out Solutio oleosa for injections?
9. How powdery medicinal materials leave in ampulas and vials?
10. How oil suspensions in vials leave?
11. How neogalenical drugs and officinal solutions in ampulas leave?
12. What medicinal forms refer to the soft?
13. What is the ointment?
14. What Ointment bases use for preparation of ointments?
15. How ointments in prescriptions leave?

16. What is Pasta?

17. What bases use for Pasta preparation?

18. How Pastas in prescriptions leave?

19. What is Linimentum?

20. What bases are used for preparation of Linimentums?

21. How Linimentums leave?

22. What is suppository?

23. What distinguish kinds of suppository?

24. How write out suppository in prescriptions?

Performance of tasks under the formula - write out prescriptions:

1. Kofein-Sodium benzoatum Td 1 dg subcutaneously for 5 injections;

2. Glucose intravenously 40 percentage solution on 20 ml in ampulas on 10 injections.

3. Atropine sulphatis Md 1 mg subcutaneously.

4. Aminazine Md 5 sg in ampulas.

5. Camphor Td 2 dg Solutio oleosa in ampulas.

6. Aceclidinum Td 2 mg on 10 injections.

7. Ephedrine hydrochloride Td 5 sg subcutaneously.

8. Analginum Td 5 dg for 10 injections.

9. Dibazolum by 2 ml in ampulas 0,5 percentage solutions.

10. 10 ampulas of Cordiaminum on 1 ml.

11. 30 g of the ointment keeping 2,5 percent of Hydrocortisoni acetas.

12. 50 ml of Linimentum keeping 5 percent of a synthomycin.

13. Anesthesin Td 25 sg in rectal suppository.

14. Ichthyol Td 3 dg in vaginal suppository.

Practical training

Topic 4: GENERAL PHARMACOLOGY. PHARMACOKINETICS AND PHARMACODINAMICS OF DRUGS

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector

2. The duration of the study of themes

Hours –4

3. Purposes

- learning a general idea of antituberculosis and antisperochetal drugs to their destination;
- give a classification of antituberculosis and antisperochetal antituberculosis and antisperochetal drugs;
- give a notion of effects of the antituberculosis and antisperochetal drugs;
- give a notion of mechanisms of action of the antituberculosis and antisperochetal drugs;
- give a notion of side effects of the antituberculosis and antisperochetal drugs;
- give a notion about indications and contraindication of the antituberculosis and antisperochetal drugs.

Tasks

Student should know:

- route of administration and excretion of drugs;

- the interaction of drugs;

- The types of action of drugs;

- side effects and complications caused by medicinal substances.

Student should be able to:

Perform practical skills - perform tasks for the recipe (prescription to furatsilin (solution for outdoor applications), diotsid (bottle.), brilliant green (bottle), chloramine B (bottle), alcohol-iodine solution (bottle), peroxide hydrogen (bottle), boric acid (bottle, ointment).

4. Motivation

In general of Pharmacology provides general pattern of pharmacokinetics and pharmacodynamics of drugs. Effects of drugs are the result of their interaction with the organism, in this context covers not only the basic properties of substances, but also the dependence of the effect on the application of these substances and the state of the body, discusses the most important

types of pharmacotherapy, general rules of side and toxic effects of drugs. Therefore, knowledge of this topic is necessary for physicians of all specialties, especially the general practitioner.

5. Intersubject and intrasubject connections

Teaching this topic is based on the knowledge bases of students of biochemistry, microbiology. Acquired during the course of knowledge will be used by students during the passage of therapy, surgery, obstetrics and other clinical disciplines, as well as further study of private pharmacy.

6. The content of lessons

6.1. Theoretical part

Pharmacology - the science of the interaction of chemical compounds from living organisms. In general pharmacology studies drugs used to treat and prevent various diseases and pathological conditions. One of the major problems of pharmacology is to find new drugs.

The search for new drugs developed in the following areas.

I. The chemical synthesis of drugs

II. Receipt of drugs from medicinal plants and the selection of individual substances:

1) animal origin;

2) vegetable origin;

3) mineral.

III. Isolation of drugs, which are products of vital activity of fungi and microorganisms.

General pharmacology is the study of the common patterns of drugs pharmacokinetics and pharmacodynamics. Pharmacokinetics (from the Greek. pharmacon - medicine, kineo - move) - this section pharmacology of absorption, distribution in the body, depositing, metabolism and excretion of substances. The main content of the pharmacodynamics (from the Greek. pharmacon - medicine, dynamis - force) - the biological effects of substances, as well as localization and mechanism of action.

Drug administration routes. Existing ways of bringing in is usually divided into enteral (through the digestive tract) and parenteral (bypassing the digestive tract).

For enteral routes include introduction through the mouth under the tongue, buccally, the duodenum, rectum (rectal).

For parenteral introduction of routes include subcutaneous, intramuscular, intravenous, intra-arterial, intrasternalny, intraperitoneal, inhalation, subarachnoid, sub occipital and some other.

Ways of removing drugs from the body. Drugs, their metabolites and conjugates are primarily excreted in the urine and bile. Gaseous and many volatile substances (such as tools for

inhalation anesthesia) are displayed in the main light. Certain drugs are allocated salivary gland (iodide), sweat (protivoleproznoe means ditofal), gastric glands (quinine, nicotine) and intestine (weak organic acids), lacrimal gland (rifampicin).

Local and resorptive effect of drugs. Directly and reflectory action. Reversible and irreversible action. Selective effect. The action of a substance that occurs at the point of application, called local. The action of substance partitioning after its intake, the income the bloodstream and then into the tissue, called resorptive. At the local and resorptive effect drugs have either direct or reflex effect. The first is implemented on the ground in direct contact with the tissue substance. When the reflex effects of substances affect Exter or interoceptors and effect is a change in the state of the nerve centers, or executive. Depending on the strength of the "substance-receptor distinguish reversible effect (characteristic of most substances) and irreversible (as a rule, in the case of covalent bonding). If the matter only interacts with certain receptors functionally unambiguous localization and does not affect other receptors, the effect of such substances are considered selective.

The dependence of the pharmacotherapeutic effect on the properties of medicines and conditions of use

a) chemical structure, physico-chemical and physical properties of drugs

b) the dose and concentration

c) The repeated use of drugs

d) The interaction of drugs

Repeated use of drugs their action may change in the direction of both the growth and reduce the effect.

The increase in effect a number of substances due to their ability to cumulation. Cumulation of material under the mean accumulation in the body of pharmacological substances.

And the so-called functional cumulation, in which "builds up" effect rather than substance.

Reduce the effectiveness of substances in their re-application - addictive (tolerance) - observed by using a variety of drugs (analgesics, antihypertensives, laxatives, etc.).

Special kind of addiction is tachyphylaxis - addictive, appearing very quickly, sometimes after 1 injection of the substance.

For some substances (usually neurotropic) in their re-introduction of developing drug dependence. It appears irresistible desire to receive the material, usually in order to enhance mood, improve well-being, eliminate unpleasant feelings and sensations, including those arising from the abolition of substances that cause drug dependence. Distinguish between mental and physical drug

dependence. In the case of mental drug addiction cessation of drugs is only an emotional discomfort. When taking certain substances is developing a physical drug dependency.

d) The interaction of drugs

Interaction of drugs can be classified as follows.

I. Pharmacological interaction:

1) based on the change in the pharmacokinetics of drugs;

2) based on changes in the pharmacodynamics of drugs;

3) based on chemical and physico-chemical interaction of drugs in the environment of the body.

II. Pharmaceutical interactions.

The main and side effects. Medicines prescribed for a specific pharmacotherapeutic effect: to reduce pain, antihypertensives to lower blood pressure, etc. All this - the manifestation of the main action of drugs for which they are applied in practical medicine. However, along with the desired effects of virtually all substances have an adverse effect, which includes the negative side-effects of non-allergic nature, allergic reactions, toxic and other effects.

Used in this lesson, new teaching technologies, "Web".

USING "WEB"
The method provides for active participation in the occupation of each student, the teacher works with the entire group.
Steps:
1. Previously students are given time to prepare questions on the passed occupation (pharmacokinetics, pharmacodynamics of drugs).
2. Participants sit in a circle.
3. One of the participants is given skein of thread, and he sets his prepared question (for which he must know the full answer), hold the end of the filament coil and transferring to any student.
4. A student who receives skein, answers the question (in this party, who asked him, commented on a response) and passes the baton on the issue. Participants continue to ask questions and answer them until everything will be in the web.
5. Once students have completed all the questions, a student holding a roll, returning his party, from whom he received the issue, while asking his question, and so on, until the "unwinding" of the coil.
Note: To prevent the students, which should be attentive to each answer, because they do not know who to throw skein.

The teacher, if necessary, corrects the issue, commented on the correct answer of each student.

This methodology promotes student speech, the ability to make sense of mastery of the material and highlight the key points form the foundations of critical thinking as In this case, the student learns to assert his view, analyze responses classmates.

6.3. Practical part

Perform practical skills - perform tasks for the recipe (prescription to furatsilin (solution for outdoor applications), diotsid (bottle.), brilliant green (bottle), chloramine B (bottle), alcohol-iodine solution (bottle), peroxide hydrogen (bottle), boric acid (bottle, ointment).

1. Prescribing FOR SOLUTION FOR EXTERNAL USE

Purpose: Prescribing FOR SOLUTION FOR EXTERNAL USE.
Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

2. Prescribing on soft medicinal forms (ointments)

Purpose: Prescribing on soft medicinal forms (ointments).

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30

	In total	0	100

7. Forms of control knowledge, skills and abilities

- oral;
- writing;
- experience the practical skills.

8. Control questions

1. What is studying pharmacy?
2. Give an idea of the pharmacokinetics and pharmacodynamics of drugs.
3. Indicate the route of administration of drugs into the body.
4. What is characteristic for enteral route of administration of drugs?
5. Which is typical for parenteral route of administration of drugs?
6. Give an idea about the absorption and distribution of drugs in the body.
7. Specify the path elimination of drugs from the body.
8. Specify the types of drugs.
9. Give an idea of the therapeutic breadth.
10. What could be the body's response to the action of drugs in their re-introduction. guide?

Practical training

Topic 5. Medicines affecting the afferent nervous system.

Local anesthetics.

Local anesthetics cause loss of feeling. First of all, they eliminate the feeling of pain, in connection with which they are used chapters ¬ manner for local anesthesia (anesthesia). With the deepening of anesthesia ¬ sion off temperature and other types of sensitivity, in the last instance - reception to touch and pressure. Acting on the end of the sensory nerves and nerve fibers, anesthetics inhibit the generation and conduction of excitation. The mechanism of action of anesthetics is associated mainly with the block of voltage-gated sodium channels ¬ fishing. This prevents the occurrence of the action potential as well as its Provence ¬ Denia. It is believed that the hydrophobic (non-ionized) compounds pass through the membrane and inhibit axonal sodium channels on the inner side. Hydrophilic compounds have some blocking effect, entering through open sodium channels. Therefore anesthetic activity, that are weak bases, depending on the pH, determining the ratio of ionized and unionized drug portions. In par ¬ STI, in the case of inflammation at a low pH (acidic) anesthetics are less effective because it reduces the concentration of ionized compounds.

The structure of most anesthetic comprises 3 basic moiety, an aromatic structure, an intermediate chain amino group. Aromatic structure is lipophilic, hydrophilic amino group. Avg moiety typically represented ¬ an aliphatic chain, built according to the type of esters or amides. Judging from the structure of the anesthetic, it is conceivable that in their interaction with the membrane of nerve fibers involved in both polar (amino group) and non-polar lipophilic (apo ¬ matic) grouping.

By anesthetics make certain demands. First of all, they should have a high selectivity without exerting negative influence ¬ ative (irritant, etc.) or on the nerve elements or the surrounding tissue. The short latency, high performance for different types of local anesthesia, a certain duration (comfortable for a variety of manipulations) - qualities that have more dominant anesthetics. It is desirable that they have narrowed blood vessels (or at least do not increase them). This is an important point, since the narrowing of blood vessels increases ¬ anesthesia, reduces bleeding from the tissue and reduces the possibility of toxic effects, delaying the absorption of the anesthetic. The opposite effect is observed during the expansion of blood vessels. If the anesthetic does not affect the blood vessels or expanding them, it is advisable to mix it cosudosuzhivayushimi substances from the group of agonists. The important characteristics include low toxicity and minimal side effects. In this case, consider the possibility resorptive action anesthetics since they can be absorbed from the site of administration. Preparations should be well soluble in water and does not deteriorate during storage and sterilization.

Anesthetics are used for various types of anesthesia.

The main ones are the following:

• surface or terminal, anesthesia - anesthetic is applied to a mucosal surface where it blocks the closure of the sensory nerves in addition, the anesthetic may be applied to the wound, ulcer surface;

• infiltration anesthesia - anesthetic solution consistently pro ¬ impregnated skin and deeper tissues, which will be operational by the cut, with this anesthetic blocks nerve fibers, as well as the end of sensi ¬ tivity of the nerves;

• wires, or regional (provincial), anesthesia - anesthetic is administered by the nerve, blocks the conduction of excitation along the nerve fibers, which is accompanied by loss of sensation in the area innervated by them.
Species are spinal block anesthesia anesthetic ¬ teziya at which the anesthetic is administered subarachnoid and epidural (epidural) anesthesia - anesthetic is injected into the space above the hard shell spinal cord. In these embodiments, the anesthetic effect on the front and back ¬ roots of the spinal cord.
From the point of view of practical application of anesthetics are divided into following ¬ lowing group.
1. Means, used for surface anesthesia
Cocaine Dikain Anestezin Piromekain
2. Means, used mainly for irrigated and wire ¬ greenhouse anesthesia
Novocaine Trimekain
3. Medicines used for all types of anesthesia
Lidocaine

The use of several drugs for surface anesthesia because they are quite toxic (cocaine, dicain) or poorly soluble in water (ane ¬ stezin).
The first anesthetic used in methylene ¬ ditsinskoy practice was cocaine - an alkaloid plants Erytroxylon pump (native to South American). Hydrochloride is difficult ¬ ester of benzoic acid and metilekgonina. It has a high anesthetic activity, surpassing in this respect novocaine.
Cocaine use is limited by its high toxicity. Even for surface anesthesia cocaine ¬ tion should be applied cautiously OS as it is absorbed from mucus membranes ¬ grained and may cause adverse and toxic effects. Most cocaine use in ophthalmic practice, burying it in a cavity solutions conjunctiva. Along with you ¬ expression of surface anesthesia continued ¬ yuscheysya about 1 hour, cocaine constricts blood vessels sclera, the pupil expands. Intraocular pressure is usually reduced. However, a number of persons arises ¬ a sharp rise in intraocular pressure (obviously violated the outflow of aqueous humor). Cocaine, especially with prolonged use, a negative effect on the epithelium of the cornea, causing desquamation and ulceration. When resorptive effect cocaine has a predominantly stimulating effect on the central nervous ¬ yanie. Effects occur in the descending order. First, change the functional state of the cerebral cortex. There are euphoria, anxiety, agitation, decreased sensation of fatigue, hunger, may gal lyutsinatsii. Cocaine stimulates and centers of the medulla oblongata (respiratory, vasomotor, vomiting center), possible convulsions. If the dose is high enough cocaine, CNS stimulation is replaced by its oppression. Death occurs from the oppression of the vital centers of the medulla oblongata (mainly the center of breath).
Peculiar effect of cocaine on adrenergic innervation. It enhances the effects of her excitement, and also potentiated the effect of a number Adrenomimeticalkie funds. ¬ but linked this to the fact that cocaine inhibits the neuronal uptake of catecholamines varicose bulges adrenergic fibers. This explains the ability of cocaine to narrow blood vessels and raise blood pressure (along with the stimulating effect ¬ it on vasomotor center) cause tachycardia and mydriasis (pupil dilation).
In acute cocaine poisoning should be, above all, to reduce its absorption from the injection site. If this is the digestive tract, then carry out gastric lavage (0.05 - 0.1% solution of potassium permanganate), appoint absorbent material and salt weak ¬ bitelnye. When applied to the mucous membrane of cocaine wash it with isotonic sodium chloride solution. If the drug was

introduced into the tissue, limiting its suc ¬ tion is achieved by imposing bundle proximal to the site of injection. In addition, immedi ¬ ately on the site of injection of cocaine put an ice pack. In severe intok ¬ sikatsii must be prepared to conduct ventilatory support, as well as a tracheotomy and artificial respiration. For relief of excitation ¬ DYT intravenously administered diazepam.
With chronic use of cocaine (sniffing, chewing coca leaves, sometimes intravenously) developed drug dependence (cocainism). When ¬ cause of it, apparently, is occurring under the influence of cocaine euphoria: the improvement ¬ tion of mood, eliminate unpleasant emotions and sensations. Abrupt discontinuation in ¬ EMA cocaine causes a painful mental state, but a severe withdrawal symptoms, what is observed in drug dependence of the opioid analgesics (morphine and heroin), with cocainism arise. This is because the development of cocaine Vaeth ¬ mental, not physical dependence. Getting used to it does not occur or is expressed to a small extent.
The drugs used mainly for surface anesthesia, ¬ ratio also relates dicain (tetracaine hydrochloride). Chemically it is a derivative of parabens. By active it is about 10 times greater than cocaine, but 2-5 times more toxic it. When using tetracaine for anesthesia of the mucous membrane of the eye on the intraocular pressure and akkomoda-tion are not affected. Pupils are not expanding. Possible irritation of the cornea is about ¬ shell. Dicain vessels expands, so when anesthesia of mucous membranes it is advisable to combine with adrenaline or other agonists. In some cases dicain used for epidural anesthesia. When used for surface tetracaine and epidural anesthesia have to be very careful with the dosage. Dikain readily absorbed through mucous membranes, and a slight excess of higher therapeutic doses may cause severe toxic effects, and in some cases death.
For surface anesthesia is also used piromekain, similar in structure to trimekain.
Unlike these drugs derivative parabens oxygen ¬ items benzocaine poorly soluble in water (it is easily soluble in alcohol, fatty oils). In this regard, it is used externally in the form of powders, pastes, ointments (the affected surface of the skin) as well as for effects on enterally ¬ fifth mucous membrane of the digestive tract (for example, pain in the stomach) in the on ¬ Roshko, tablets, suspensions. In addition, benzocaine administered in suppository ¬ tions for rectal fissures, hemorrhoids. In all cases, benzocaine causes surface anesthesia.
Primarily for infiltration and block anesthesia used novocaine and trimekain.
Novocaine (procaine hydrochloride) - ester diethylaminoethanol and parabens. In medical practice used in the form of the hydrochloride. It has a fairly pronounced anesthetic activity, but inferior in this respect to other drugs. The duration of infiltration anesthesia is 30 minutes-1 hour novocaine big advantage is its low toxicity. This is true of its metabolites. Mucosal procaine passes poorly, for surface anesthesia was applied slowly (sometimes these purposes it is used in otorhinolaryngology in high concentrations - 10% solution). Novocaine unlike cocaine is not big vessels. Their tone does not change or decreases slightly, so often in the solution of novocaine added agonists (eg, epinephrine). Narrowing the vessels and slowing the absorption of novocaine, agonists enhance and prolong its anesthetic effect and reduce its toxicity.
When resorptive effect novocaine has predominantly inhibitory effect on the nervous system. It has a mild analgesic activity. Eliminates the descending inhibitory effect of the reticular formation of the brain stem. Inhibits the visceral and somatic reflexes polysynaptic spinal reflexes. In high doses can cause convulsions. Has ganglioblokiruyushee effect, reducing the release of acetylcholine from the preganglionic fibers. In large doses, violates the neuromuscular transmission by reducing the release of acetylcholine from the endings of motor fibers.
Effect of novocaine on the cardiovascular system manifested hypotensive effect (the result of the depressing effects of the drug on the central nervous system and sympathetic ganglia), as well as

short-term antiarrhythmic effect (increasing the effective refractory period and at the time of the conduction system of the heart, decreased excitability, and automaticity).
In the novocaine quickly hydrolyzed by plasma and tissue esterases. Its main metabolites are dietilaminoetanol and P-aminobenzoic acid. It should be borne in mind that the latter is a competitive antagonist of antibacterial agents from the group of sulfonamides. Reaction products of novocaine excreted by the kidneys.
For infiltration and block anesthesia is also used trimekain - a compound similar in structure to lidocaine. Preparation 2-3 times more active novocaine, but slightly toxic.
Operates more lasting than procaine (2-4 h). Tissue is not annoying. Often used with adrenaline. For surface anesthesia is less effective (higher concentrations are needed - 2-5% solution).
Trimekain has a depressing effect on the cerebral cortex and the ascending reticular formation of the brain stem. Sedative, hypnotic and anticonvulsant effects.
When using trimekaina for infiltration and wires anetezii significant changes in the cardiovascular system, respiration is not marked.
Of the side effects sometimes seen burning sensation in the area of the injection, nausea, vomiting, intoxication - clonic seizures.
In the systemic action has antiarrhythmic activity. In this case, it is administered intravenously.
For all types of anesthesia is effective lidocaine (lidocaine, Xylocaine). He ¬ cauldron for the surface, infiltration, conduction, epidural, subarachnoid and other types of anesthesia.
By anesthetic procaine activity exceeds 2.5 times and 2 times the current is longer. Thus, in combination with agonists procaine causes anesthesia lasting about 1.5-2 hours, lidocaine - 2-4 h (0.5% solution). Lidocaine toxicity depending on concentration corresponds to that of procaine, or slightly exceeds it.
Irritating to the tissues lidocaine has not. With instillation into the cavity of the conjunctiva on the value of the pupil and does not affect vascular tone.
Lidocaine is advisable to apply in conjunction with epinephrine (¬ Xia reduces toxicity and increases the duration of anesthesia).
When lidocaine toxicity observed drowsiness, blurred vision, nausea, tremors, convulsions. In severe cases occur cardiovascular disorders, respiratory depression.
In general anesthetic lidocaine proved to be valuable universal application. Lidocaine and its metabolites do not enter into a competitive relationship with sulfonamides. Particularly demonstrates the use of lidocaine (or trimekaina) in case of intolerance of novocaine and other derivatives of para-aminobenzoic acid ¬ you. Of considerable interest is lidocaine as an effective antiarrhythmic agents.
According to the chemical structure and pharmacological properties to lidocaine prox ¬ portation bupivacaine hydrochloride. Is a highly active and long-term action ¬ applicable local anesthetic. Used for wires and infiltration of the diet ¬ anesthesia. The effect is within 5-10 minutes. When epidural anesthesia is maintained for 3-4 hr, the blockade of the intercostal nerves - 7-14 hours, in some cases, it takes 24 hours or more.
Against the backdrop of action for narcosis, hypnotic-type drugs, anti ¬ tipsihoticheskih drugs and opioid analgesics effects of anesthetic agents is enhanced, and when combined with CNS stimulants (analeptic) weakened.

1. DISCHARGING OF PRESCRIPTIONS ON SOLUTIONS FOR INTRINSIC APPLICATION

Purpose: the Discharging of prescriptions on solutions for intrinsic application.

Carried out stages (steps):

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	List of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	Indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	Indicating to the pharmacist about quantity of a given drugs	0	10
5.	Indicating to the patient about a drug intake mean	0	30
	Total	0	100

7. Forms of controlling of knowledge, skills and abilities

- The verbal;

- The written;

- Demonstration of the mastered practical skills.

Practical training

Topic 6: Means that affect M- and N-cholinergic receptors.

Means that affect- M cholinergic receptors.

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector

2. The duration of the study of themes

Hours – 4

3. Purposes

- To form overview of the parasympathetic and sympathetic nervous systems;

- To give the concept of localization and muscarine-sensitive and nicotine-sensitive cholinoceptors;

- Give an idea of the mechanisms of action, effects caused by M, N-cholinomimetics and M, N-cholinoblockers;

- To give knowledge about the mechanism of action, effects caused by anticholinesterase drugs, M- cholinomimetics and M- cholinoblockers;

- To generate knowledge of indications and contraindications to the use of M, N-cholinomimetics, M, N-cholinoblockers, anticholinesterase drugs, M- cholinomimetics and M- cholinoblockers;

- Create the ability to analyze the action, the appointment of separate funds, based on the overall pharmacodynamics of M, N-cholinomimetics, M, N-cholinoblockers, anticholinesterase drugs, M- cholinomimetics and M- cholinoblockers;

- To give knowledge of the elements of pharmacotherapy with examples from the private formula.

Tasks

Student should know:
- Localization of M-and N-cholinoceptors;

- The impact of M, N-cholinomimetics, M, N-cholinoblockers, anticholinesterase drugs, M-cholinomimetics and M- cholinoblockers on the body;

- Mechanisms of action of the M, N-cholinomimetics, M, N-cholinoblockers, anticholinesterase drugs, M- cholinomimetics and M- cholinoblockers;

- Indications for the use of the M, N-cholinomimetics, M, N-cholinoblockers, anticholinesterase drugs, M- cholinomimetics and M- cholinoblockers;

- Side effects and complications caused by the M, N-cholinomimetics, M, N-cholinoblockers, anticholinesterase drugs, M- cholinomimetics and M- cholinoblockers.

Student should be able to:

Perform practical skills - perform tasks for the recipe (prescription to neostigmine (proserinum) (tab., amp.), galantamine (val.), pilocarpine (eye drop.), atropine (eye drops, amp.), platyphilline (amp.) with the release form, dosage, quantity, and the indications for use).

4. Motivation

Preparations of M, N-cholinomimetics, M, N-cholinoblockers, anticholinesterase drugs, M-cholinomimetics and M- cholinoblockers; are widely applied in many fields of clinical medicine. They are used in surgery for atony of the gastrointestinal tract, ophthalmology, glaucoma, myasthenia Neurology, paresis, after effects of poliomyelitis, Parkinson's disease in the clinic of internal medicine for gastritis with decreased secretory function and a violation of secretion glands. However, the identified side effects and complications arising from the application of these funds. Therefore, knowledge of the action, indications and contraindications to the use of these drugs, the ability to dispense them properly prescribe them to a general practitioner. Knowledge of this topic will help students in further study of private pharmacy (eg, topics such as money, affecting the function of the gastrointestinal tract used in the treatment of glaucoma, agents used in Parkinson's disease, myasthenia gravis), as well as the passage of therapy, surgery and other clinical disciplines.

5. Intersubject and intrasubject connections

Teaching this topic is based on the knowledge bases of students of biochemistry, anatomy, histology, normal and pathological physiology of the nervous system, gastro-intestinal tract. Acquired during the course knowledge will be used during the passage of medicine, surgery, neurology, ophthalmology and other clinical disciplines, as well as further exploration of the themes of private pharmacy, as a means of influencing the function of the gastrointestinal tract used in the treatment of glaucoma, etc.)

6. The content of lessons

6.1. Theoretical part

M, N-cholinomimetics. M, N-cholinoblockers

This group of substances contains acetylcholine and its analogues. Acetylcholine has a direct stimulating action on M- and N-cholinoceptors. In the systemic action of acetylcholine its M-cholinomimetic effects predominate: bradycardia, dilatation of blood vessels, increased muscle activity in the bronchi and gastrointestinal tract, an increase in the secretion of bronchial and digestive tract glands, etc. These effects are analogous to those observed with the stimulation of the cholinergic (parasympathetic) nerves. Acetylcholine-induced stimulation of N-cholinoceptors of the autonomic ganglia (sympathetic and parasympathetic) is masked by its M-cholinomimetic action. N-cholinomimetic effect can be easily seen when M-cholinoceptors are blocked (for example, with M-cholinoblocker atropine). Due to this, high doses of acetylcholine, instead of reducing blood pressure, cause a pressor effect due to the stimulation of N-cholinoceptors of the autonomic ganglia and adrenal medulla.

Acetylcholine has a stimulating effect on N-cholinoceptors of the skeletal muscles. The CNS also has cholinoceptors sensitive to acetylcholine.

In clinical practice acetylcholine analogue carbachol is used occasionally for the treatment of glaucoma. Carbachol differs from acetylcholine by its stability. It is not hydrolyzed by acetylcholinesterase and because of this it acts for a longer term (1—1.5 h). It is believed that carbachol not only causes a direct cholinomimetic effect but also stimulates the release of acetylcholine from the presynaptic endings. The range of pharmacological action of carbacholine is the same as that of acetylcholine. It is determined by its effect on M-cholinoceptors.

M, N-cholinoblockers - trihexyphenidyl (Cyclodolum).

M-cholinomimetics, or muscarinomimetics

M-cholinomimetics have a direct stimulatory effect on M-cholinoceptors. The main representative of these drugs is a muscarine alkaloid, which has a selective effect on M-cholinoceptors. Muscarine, contained in fly agarics, can be the cause of acute poisoning. It is not used as a drug.

In clinical practice pilocarpine is administered locally in the form of eye drops to treat glaucoma. It is not used for systemic action.

Aceclidinum is used for local and systemic action. Aceclidinum is administered in glaucoma (but can cause some irritation of the conjunctiva) as well as in atony of the gastrointestinal tract, bladder and uterus.

With the overdose of aceclidinum and other M-cholinomimetics, M-cholinoblock- ers are used as physiologic antagonists (atropine and atropine-like drugs).

M-cholinoblockers, or atropine-like drugs

M-cholinoblockers are drugs that block M-cholinoceptors. The typical and well-studied representative of this group is atropine. The main effects of M-cholinoblockers occur due to the block of the peripheral M-cholinoceptors of the effector cell membranes (on the terminals of postganglionic and cholinergic fibers). Moreover, they block M-cholinoceptors in the CNS (if they pass through the blood-brain barrier).

The principle of action of M-cholinoblockers is that, while blocking M-cholinoceptors, they prevent their interaction with acetylcholine. M-cholinoblockers reduce and eliminate activation of the cholinergic (parasympathetic) nerves and decrease the effect of the drugs that have M-cholinomimetic activity (acetylcholine and its analogues, anticholinesterase drugs as well as muscarinomimetic drugs).

Atropine is administered as a spasmolytic in spasms of smooth muscle organs: digestive tract and biliary ducts. Spasmodic pain (colic) is reduced or disappears after atropine intake.

The ability of atropine to reduce glandular secretion is used in the treatment of stomach and duodenal ulcers and acute pancreatitis, to eliminate hypersalivation (in Parkinsonism and poisoning with heavy metals salts).

Wide use of atropine for so-called premedication before surgical interventions is also linked to its ability to inhibit secretion of salivary, nasopharyngeal and tracheobronchial glands. Moreover, blocking M-cholinoceptors of the heart (vagolytic action), atropine prevents negative effects on the heart, including the possibility of its reflectory arrest (for example, in administration of inhalation anesthetics that irritate the upper respiratory tract).

M-cholinoblocking action on the heart is favorable for atrioventricular block of vagal origin, as well as in some cases of angina pectoris.

In ophthalmologic practice the mydriatic effect of atropine is used for diagnostic purposes (to examine retina, prescribe glasses, so on) and in the treatment of a number of diseases of the eyes (iridocyclitis, etc.).

Atropine is indicated for the management of poisoning with M-cholinomimetics and anticholinesterase drugs.

Used in this lesson, new teaching technologies, "Web."

USING "WEB"

The method provides for active participation in the occupation of each student, the teacher works with the entire group.

Steps:

1. Previously students are given time to prepare questions on the passed occupation (pharmacokinetics, pharmacodynamics of drugs).

2. Participants sit in a circle.

3. One of the participants is given skein of thread, and he sets his prepared question (for which he must know the full answer), hold the end of the filament coil and transferring to any student.

4. A student who receives skein, answers the question (in this party, who asked him, commented on a response) and passes the baton on the issue. Participants continue to ask questions and answer them until everything will be in the web.

5. Once students have completed all the questions, a student holding a roll, returning his party, from whom he received the issue, while asking his question, and so on, until the "unwinding" of the coil.

Note: To prevent the students, which should be attentive to each answer, because they do not know who to throw skein.

The teacher, if necessary, corrects the issue, commented on the correct answer of each student.

This methodology promotes student speech, the ability to make sense of mastery of the material and highlight the key points form the foundations of critical thinking as In this case, the student learns to assert his view, analyze responses classmates.

6.2.Analitical part

Situational problem:

1. The patient after surgery for gall bladder developed intestinal. All used measures, including the appointment of laxatives, have not led to the restoration of his motor skills. Given this, your doctor has prescribed the drug to the patient by injection, after which the intestines became operational. Which drug was introduced to the patient? To explain its mechanism of action.

Response. Patients with postoperative intestinal atony was introduced Neostigmine (anticholinesterase drugs), which increases the tone of smooth muscles, including the intestine.

2. Patient with motor disorders after suffering encephalitis was appointed oksazil (anticholinesterase drugs). Within 1.5 hours after dosing the patient noted an improvement in motor activity, Wanting to fix the result, it took another pill, but after 2 hours - and a third. After that there were severe abdominal pain, difficulty breathing, increased sweating. What is the cause of the overdose? Response. Oksazil - strong anticholinesterase agent, whose action develops quickly (over 0.5 - 1.5 hours) and lasts a long time (5-10 hours). If the drug is used more than 4 hours, accumulation may occur, resulting in an overdose.

3. Glaucoma patients for a long time applied pilocarpine in the form of eye drops. Intraocular pressure had returned to normal, but over time, irritation conjunctivitis, redness, tearing. Given that pilocarpine does not have local irritating action, the doctor believes that the patient appeared to him the increased sensitivity, and decided to replace it with another vehicle. What drug can be replaced by pilocarpine?

Response. Pilocarpine can be replaced atseklidinom, neostigmine, physostigmine, phosphacol who, having the M-cholinomimetic action, cause a reduction in intraocular pressure.

4. Emergency Physician patient complaints filed strong abdominal cramps, nausea, uncontrollable vomiting, frequent "choleriform" s drugs 20-25 times a day. On examination, the doctor noticed that the patient has sharply narrowed pupils, clammy skin and a rare heart rate. The vomit was like "coffee grounds" and in the stool - a fresh blood. Survey of physician found that the night before the patient was eating fried mushrooms. Was diagnosed with poisoning poisonous mushrooms. Which ones give the described picture of intoxication? Assistance measures.

Response. The appearance of vomit like "coffee grounds" and blood in the feces typically for poisoning a pale toadstool. All other symptoms are characteristic for the excitation of the M-holinoergicheskih systems, so is the antidote atropine spretsificheskim. Along with atropine give activated charcoal 20,0-30,0 in suspension, washed stomach (10-12 liters of water), forced diuresis (furosemide, Lasix), hemosorbtion, spend hepatoprotective therapy (intravenous glucose, vitamins, C, E, prednisolone).

5. During anesthesia ftorotanovogo patient developed severe bradycardia to the threat of cardiac arrest. Anesthesiologist brought the patient out of this state drug administration, increased heart rate. That brought a doctor? Can I prevent this complication in the process of preparing the patient for surgery?

Response. The doctor kept atropine. For the prevention of vagal cardiac arrest during inhalation anesthesia atropine should be administered prior to surgery as a means of sedation.

6. Emergency doctor diagnosed the patient's severe attack of asthma. In the medicine cabinet he brought in three spazmolitika: atropine, and metacin platifillin. What will choose a doctor? Why the drug of choice will be more effective than other in this situation?

Response. To assist the patient with a severe attack of asthma in terms of three antispasmodics doctor chooses metacin because of bronchodilatory effect it is superior to atropine and platifillin and has more pronounced antisecretory effect.

7. A child during the game swallowed seeds of unknown plants. After a while, the child appeared excitement, disorientation, nonsensical phrases, playing with imaginary toys. OBJECTIVE: hyperemia of face, "a gaping pupil" tachycardia., Blood pressure increased, fever, swollen stomach, but painless. How the plant and how the substance contained in this plant was poisoning? What symptoms can be confirmed by additional prospective diagnosis? Assistance measures.

Response. Poisoning associated with use of the herb seeds containing atropine. To confirm the diagnosis is necessary to pay attention to the nature of breath (dyspnea), condition of skin and mucous membranes, especially dry mouth, impaired vision in the vicinity (paralysis of accommodation). Measures of assistance: activated charcoal, gastric lavage, mucus inside, diuretics, laxatives, saline, I / O - isotonic glucose or sodium chloride functional antagonist - antiholinesteraznve funds; antispasmodic therapy as sedatives, anticonvulsants, hypnotics.

6.3. Practical part

Write prescriptions for these drugs: neostigmine (proserinum) (tab., amp.), galantamine (val.), pilocarpine (eye drop.), atropine (eye drops, amp.), platyphilline (amp.).

1. Prescriptions TO SOLID DOSAGE FORMS

Purpose: Prescriptions TO SOLID DOSAGE FORMS

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

2. Prescribing FOR SOLUTION INJECTION

Purpose: Prescribing FOR SOLUTION FOR INJECTION.

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20

4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

7. Forms of control knowledge, skills and abilities

- oral;

- writing;

- experience the practical skills.

8. Control questions

1. What is the localization of M-cholinoceptors?
2. What is the localization of N-cholinoceptors?
3. What effects do occur under the influence of acetylcholine?
4. Action and indications for use of M-and H-cholinomimetics?
5. Which properties are characteristic for cyclodolum?
6. What is the mechanism of action of anticholinesterase drugs?
7. What is the classification of anticholinesterase drugs?
8. What effects observed in the application of anticholinesterase drugs?
9. What are the indications for the use of anticholinesterase drugs?
10. What is the difference between neostigmine and galantamine?
11. Side effects of anticholinesterase drugs?
12. Basic principles of treatment of organophosphate poisoning?
13. What drugs are M-cholinomimetics?
14. How effects are observed under the action of pilocarpine in the eye?
15. What mechanism of action of the M-cholinomimetics?
16. How main effects of M-cholinomimetics?
17. How indications for the use of M-cholinomimetics?
18. What is the difference between the pilocarpine and aceclidinum?
19. What side effect of M-cholinomimetics?
20. What toxic effects of muscarine poisoning help with this substance?

21. How substances belong to the M-cholinoblokers?

22. What mechanism of action of M-cholinoblokers?

23. How main effects are influenced by M-cholinoblokers?

24. Reading to use M-cholinoblokers?

25. What side effects of M-cholinoblokers?

26. What characteristics of scopolamine, platyphilline, methacinum?

27. How atropine affects the central nervous system?

28. What symptoms of poisoning with atropine and supportive measures?

29. Write down the recipes: neostigmine (proserinum) (tab., amp.), galantamine (val.), pilocarpine (eye drop.), atropine (eye drops, amp.), platyphilline (amp.).

Practical training

Topic 7: Anticholinesterase agents. Medicines affecting N-cholinerceptors.

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector.

2. The duration of the study of themes

Hours –4

3. Purposes

- To form a general idea of N – cholinomimetics, N - cholinoblockers, to their destination;

- To give an idea about the main effects of N – cholinomimetics, N - cholinoblockers;

- Give an idea of the mechanisms of action of N – cholinomimetics, N - cholinoblockers;

- To give knowledge of side effects of N – cholinomimetics, N - cholinoblockers;

- To generate knowledge of indications and contraindications to the use of N – cholinomimetics, N - cholinoblockers;

- Create the ability to analyze the action, the appointment of separate funds, based on the overall pharmacodynamics of N – cholinomimetics, N - cholinoblockers;

- To give knowledge of the elements of pharmacotherapy with examples from the private formula.

Tasks.

Student should know:

- Localization of N-cholinoceptors;

- Classification of N - cholinoblockers;

- The impact of N-cholinomimetics, ganglion blocking and neuromuscular blocking agents on the body;

- Mechanisms of action of N-cholinomimetics, ganglion blocking and muscle relaxants;

- Indications for the use of N-cholinomimetics, ganglion blocking and muscle relaxants;

- Side effects and complications caused by the N – cholinomimetics, N - cholinoblockers.

Student should be able to:

Perform practical skills - perform tasks for the recipe (prescription to pirilen (tab.), benzohexonium (val.) with the release form, dosage, quantity, and the indications for use).

4. Motivation

Preparations H cholinomimetics widely used in many fields of clinical medicine. They are used in the clinic of internal diseases as drugs used in the inhibition of the respiratory center in case of poisoning by carbon monoxide, morphine in obstetrics - newborn asphyxia. N-cholinoblockers, in particular ganglioplegic, used in obliterating endarteritis, Raynaud's disease, with hypertension and hypertensive crisis in the complex treatment of gastric ulcers and duodenal ulcers, muscle relaxants are used to relax skeletal muscles during operations, bronchoscopy, reduction of dislocations. However, the identified side effects and complications arising from the application of these funds. Therefore, knowledge of the action, indications and contraindications to the use of these drugs, the ability to dispense them properly prescribe them to a general practitioner. Knowledge of this topic will help students in further study of private pharmacy (eg, topics such as money, affecting the respiratory function, antihypertensive drugs, money, affecting the function of the gastrointestinal tract, the means used in violation of the peripheral circulation) as well as the passage of medicine, surgery and other clinical disciplines.

5. Intersubject and intrasubject connections

Teaching this topic is based on the knowledge bases of students of biochemistry, anatomy, histology, normal and pathological physiology of the cardiovascular system, respiratory system and digestive system. Acquired during the course knowledge will be used during the passage of medicine, surgery, anesthesiology, obstetrics and other clinical disciplines, as well as further exploration of the themes of private pharmacy, as a means of influencing the function of the respiratory, antihypertensive drugs, money, affecting the function gastro-intestinal tract, the means used in violation of the peripheral circulation), as well as the passage of medicine, surgery and other clinical disciplines.

6. The content of lessons

6.1. Theoretical part

Nicotinic cholinoceptors (N-cholinoceptors) have various localizations. They take part in the transmission of efferent impulses in the autonomic ganglia, adrenal medulla, and neuromuscular synapses, in chemoreception and generation of afferent impulses in the carotid body, as well as in interneuronal transmission in the CNS.

Anticholinesterase drugs

Anticholinesterase drugs's effects result from their capacity to block acetylcholinesterase and, therefore, prevent the hydrolysis of acetylcholine. This leads to more notable and prolonged action on the cholinoceptors. These drugs act similarly to M-, N-cholinimimetics, but the effect of anticholinesterase drugs is mediated by acetylcholine. Certain drugs (for example, neostigmine) also have some direct cholinomimetic effect.

Based on the stability of interaction of anticholinesterase drugs with acetylcholinesterase they can be subdivided into two groups:

• *Drugs of reversible action*

v Physostigmine

v Neostigmine (Proserinum)

v Galantamine

• *Drugs of irreversible action*

v Arminum

Preventing hydrolysis of acetylcholine, anticholinesterase drugs intensify and prolong its muscarinic and nicotinic effects. M-cholinomimetic action leads to an increase in the tone and contractile activity of a number of smooth muscles (iris, sphincter muscles, ciliary muscles of the eye, muscles of the bronchi, gastrointestinal tract and biliary tracts, etc.). In therapeutic doses anticholinesterase drugs usually cause bradycardia, heart contractility decreases and cardiac conduction becomes slower down. Arterial pressure decreases. When high doses are used, tachycardia can occur (effect on the heart contraction rate is not only associated with excitation of its M-cholinoceptors, but also with the stimulation of cholinoceptors in the sympathetic ganglia, adrenal medulla and centers of the medulla oblongata).

Anticholinesterase drugs intensify the secretion from glands (bronchial, digestive, sweat, other) that have cholinergic innervation.

Nicotinic effects are manifested in neuromuscular transmission and autonomic ganglia. In low doses anticholinesterase drugs facilitate transmission of excitation to the skeletal muscles and in autonomic ganglia; in high doses they have an inhibitory action.

In low doses anticholinesterase drugs stimulate the CNS (desynchronization of the electroencephalogram, latent period of certain reflex reactions is shortened). In high and especially in toxic doses these drugs inhibit the CNS.

The ability of anticholinesterase drugs to decrease intraocular pressure is used for the treatment of glaucoma.

Anticholinesterase drugs have a stimulatory effect on the motility of the gastrointestinal tract that is mediated by M- and N-cholinoceptors of cholinergic innervation and the myenteric (Auerbach's) plexus. Tone and contractile activity of the bladder muscles are also increased. These effects are used to treat the atony of the intestine or the bladder.

Due to facilitation of neuromuscular transmission anticholinesterase drugs are effective in myasthenia and as antagonists of neuromuscular relaxants of antidepolarizing (competitive) types of action.

N-cholinomimetics

This group includes such alkaloids as nicotine, lobeline and cytisine. They have a two-phase action on N-cholinoceptors (excitatory stage is alternated with inhibitory effect).

Nicotine is an alkaloid of tobacco leaves. It does not have any therapeutic value. It is used in experimental pharmacology.

Nicotine affects both peripheral and central N-cholinoceptors. N-cholinoceptors of the autonomic ganglia, on which nicotine has a two-phase effect, are especially sensitive to it. The first phase (excitation) is characterized by a depolarization of the ganglionic neuronal membranes, the second one (inhibition), are provided by competitive antagonism with acetylcholine. Nicotine does not affect the release and hydrolysis of acetylcholine.

N-cholinomimetics such as lobeline and cytisine are sometimes used in clinical practice as respiratory stimulants of reflex action.

Both drugs are sometimes administered to stimulate respiration (if reflex excitation of the respiratory center is preserved). It is injected intravenously. Their action is very short-term. Moreover, both alkaloids are used as basic components of a number of drugs, used to aid 'quitting' smoking (cytisine is contained in «Tabex» tablets, lobeline — in «Lobesilum» tablets).

N-cholinoblockers

This group includes ganglionic blockers, blockers of neuromuscular synapses and some central cholinoblockers.

Ganglionic blockers

Ganglionic blockers block sympathetic and parasympathetic ganglia, as well as N-cholinoceptors of the adrenal medulla and carotid body.

Chemically ganglionic blockers can be divided into the following.

- *Bis-quaternary ammonium compounds*
 v Benzohexonium
v Azamethonium (Pentaminum)
v Trepirium (Hygronium)
- *Tertiary amines*
 v Pempidine
 v Pachycarpinum

There are two groups of drugs. Some of them are intended for *long-term administration.* The main requirements for such drugs are as follows. They have to have high activity after different routes of administration, long duration of action, low toxicity and absence of any serious side effects. It is important that addiction to these drugs would develop as slowly as possible or not develop at all.

Ganglionic blockers are used for the treatment of obliterating endarteritis, pulmonary edema, and arterial embolism but seldom for hypertension (mainly in hypertensive emergencies).

Ganglionic blockers of short-term action are used for controlled hypotension.

Besides, administration of ganglionic blockers prevents the development of negative reflexes on the heart, vessels and other visceral organs, which can take place during surgical interventions.

Peripheral muscle relaxants

The main effect of this group of pharmacological drugs is the relaxation of skeletal muscles as a result of blocking effect on the neuromuscular transmission. Initially such properties were found in curare, and that is why the drugs of this group are often called curare-like drugs.

Neuromuscular relaxants inhibit neuromuscular transmission on the level of postsynaptic membrane, interacting with N-cholinoceptors of the endplates. However, neuromuscular block, caused by different neuromuscular relaxants, may have different genesis. I Classification of neuromuscular relaxants is based on this. According to the action mechanism, these agents can be divided into the following basic groups.

1. *Antidepolarizing (nondepolarizing) drugs*
 v Tubocurarine
 v Pancuronium
 v Pipecuronium
2. *Depolarizing drugs*
v Suxamethonium (dithylinum, succinylcholine)

Neuromuscular relaxants are widely used in anaesthesiology when performing different surgical interventions. By causing relaxation of the skeletal muscles, they significantly facilitate the performance of most operations on the organs of the thoracic and abdominal cavities, as well as on the upper and lower limbs. They are administered in tracheal intubation, bronchoscopy, reduction and reposition of bone fracture fragments. Besides, these drugs are sometimes used for the treatment of tetanus and in electroconvulsive therapy.

It has to be remembered, that these drugs inhibit or totally stop respiration. This is why they can be used in medical practice only when antagonists and the necessary equipment for artificial ventilation are available.

Used in this lesson, new teaching technologies, **"Black Box".**

USE OF THE 'BLACK BOX'

The method provides for joint activities and active participation in the classroom each student, the teacher works with the entire group.

Each student gets from the "black box" unknown drug, a brief abstract of which is written on the cards. (Options annotations are included.) Students are required to determine this drug in detail justifying answer.

To think about each answer the student is given 3 minutes. Then discuss the answers, given in addition pharmacodynamics, pharmacokinetics. At the end of the method of teacher comments on answer is correct, its validity, the activity level of students.

This methodology promotes student speech, forming the foundations of critical thinking as In this case, the student learns to assert his view, analyze responses band members - participants of the contest.

Options abstracts:

1. Define a group of substances: Reduces A/P, improves blood circulation in the legs, inhibits N-cholinoceptors has no effect on M- cholinoceptors. It is used to reduce the A/P, with endarteritis, gastric and duodenal ulcers. Side effects: inhibition of motility of gastrointestinal tract, orthostatic hypotension, disturbance of accommodation (ganglionic blockers).

2. Determine the substance: It is used to relax the skeletal muscles. Blocks neuromuscular transmission, rapidly causes apnea, duration 20-40 minutes. Side-effects: it reduces the A/P, bronchospasm. Antagonist is the anticholinesterase agents (tubocurarine).

3. Determine the drug: It is used to relax the striated muscle during surgery. Violates the neuromuscular transmission. Duration of action 5-10 minutes. Anticholinesterase funds reinforce its action. Side effects include pain in muscles, after the anesthesia period, the violation of heart rate (ditilin).

4. Identify a group of substances: Blocks neuromuscular transmission. Ether increases the effects of these substances, Neostigmine - weakens (muscle relaxants antidepolyarizuyuschih action).

6.2.Analitical part

Situational problem:

1. Patient with hypertensive crisis has been introduced antihypertensive medication. After 20 minutes he felt better and got up abruptly. In this case there was severe dizziness and fainting

occurred. The patient lost consciousness and fell. What is this phenomenon? The drug is a group introduced to the patient? Measures for the prevention of this complication.

Response. The patient developed ortostatic collapse associated with the sharp weakening of the tone of arterial and venous vessels. This complication is characteristic of ganglion blocking drugs from the group, which have hypotensive action. For the prevention of this complication is necessary after the introduction of the ganglionic blockers be in the supine position 2-2.5 hours.

2. To facilitate the reposition of dislocation of the shoulder joint to relax the skeletal muscles the patient entered a muscle relaxant. At the same time has come "Apnoea", after 10 minutes breathing was restored. The patient entered Neostigmine, but breathing is not restored. Only after the transfusion of fresh citrate blood the patient started to breathe. What is a muscle relaxant was used? Why the introduction of neostigmine did not contribute to the restoration of breathing?

Response. The patient was put depolarizing muscle relaxant action - ditilin. If it does not have an overdose of Neostigmine antagonistic effect, since it contributes to the accumulation of acetylcholine, which aggravates the condition of the depolarization of the postsynaptic membrane at neuromuscular synapses, which further enhances and prolongs the action ditilin. Fresh citrated blood contains an enzyme pseudocholinesterase, which destroys the accumulated acetylcholine in the synapses and ditilin and restores neuromuscular transmission, including the respiratory muscles.

6.3. Practical part

Write prescriptions for these drugs: pirilen (tab.), benzohexonium (val.)

1. *Prescriptions TO SOLID DOSAGE FORMS*

Purpose: Prescriptions TO SOLID DOSAGE FORMS

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10

5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

2. Prescribing FOR SOLUTION INJECTION

Purpose: Prescribing FOR SOLUTION FOR INJECTION.

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

7. Forms of control knowledge, skills and abilities

- oral;
- writing;
- experience the practical skills.

8. Control questions

1. Where are the N-cholinoceptors?
2. What substances are N-cholinomimetics?
3. The mechanism of action of N-cholinomimetics.?
4. Main effects of N-cholinomimetics?
5. What are the indications for use and side effects of N-cholinomimetics?
6. In what appears toxic effects of nicotine?

7. Classification of N-cholinoblockers?

8. Classification of ganglionic blockers?

9. What is the location and mechanism of action of ganglionic blockers?

10. What effects observed in the application of ganglionic blockers?

11. What are the indications for use of ganglionic blockers?

12. Side effects of ganglionic blockers?

13. Classification of muscle relaxants?

14. The mechanism of action of various groups of muscle relaxants?

15. The use of muscle relaxants?

16. What are the side effects cause muscle relaxants?

17. What help with an overdose of the various groups of muscle relaxants?

18. Write down recipes: pirilen (tab.), benzohexonium (val.).

Practical training

Topic 8: Medicines that stimulate adrenoreceptors. Adrenoreceptor blockers.

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector

2. The duration of the study of themes

Hours – 4

3. Purposes

- To form a general idea of adrenoceptors;

- To form a general idea of adrenomimetics, to their destination;

- To classify adrenomimetics;

- To give an idea about the main effects of adrenomimetics;

- To give an idea about the mechanism of action of adrenomimetics;

- To give knowledge of side effects of adrenomimetics;

- To generate knowledge of indications and contraindications to the use of adrenomimetics;

- Create the ability to analyze the action, the appointment of separate funds, based on the overall pharmacodynamic of adrenomimetics;

- To give knowledge of the elements of pharmacotherapy with examples from the private formula.

Tasks:

Student should know:
- Classification of adrenergic drugs;

- Classification of adrenomimetics;

- The influence of adrenomimetics on the body;

- Mechanisms of action of adrenomimetics;

- Indications for use of adrenomimetics;

- Side effects and complications caused by adrenomimetics.

Classification of adrenoblockers;

- The impact of adrenoblockers and sympatholytics on the body;

- Mechanisms of action of adrenoblockers and sympatholytics;

- Indications for use of adrenoblockers and sympatholytics;

- Side effects and complications caused by the adrenoblockers and sympatholytics.

Student should be able to:

Perform practical skills - to perform the task according to a recipe (to write prescriptions for adrenaline hydrochloride (amp., flac.), mezatonum (amp.), izadrinum (amp., flac.), ephedrine hydrochloride (amp., flac., tab.) indicating the release form, dosage, quantity, and the indications for use).

4. Motivation

Drugs adrenomimetic funds widely used in many fields of clinical medicine. They are used in the clinic of internal medicine as hypertensive funds and to stimulate heart activity in the atrio-ventricular blockade, bronchial asthma, and their use in surgery, obstetrics, otolaryngology. However, the identified side effects and complications arising from the application of these funds. Therefore, knowledge of the action, indications and contraindications to the use of these drugs, the ability to dispense them properly prescribe them to a general practitioner. Knowledge of this topic will help students in further study of private pharmacy (eg, topics such as hypertensive funds

antiarrhythmic means, bronchodilators), and the passage of medicine, surgery and other clinical disciplines.

5. Intersubject and intrasubject connections

Teaching this topic is based on the knowledge bases of students of biochemistry, anatomy, histology, normal and pathological physiology of the cardiovascular system. Acquired during the course knowledge will be used during the passage of medicine, surgery, hematology, ophthalmology and other clinical disciplines, as well as further exploration of the themes of private pharmacy, as the means used by hypotonic conditions, asthma, antiarrhythmic drugs and others) .

6. The content of lessons

6.1. Theoretical part

Depending on the predominant localization of effect the drugs that affect transmission in the adrenergic synapses, are subdivided into the following groups.

Drugs, acting directly on adrenoceptors

- Adrenomimetics of the direct action:

v Norepinephrine,

v Epinephrine,

v Isoprenaline (isadrinum),

Drugs of presynaptic action, affecting release and (or) storage of norepinephrine

- Sympathomimetics or adrenomimetics of indirect action:

v Tyramine

v Ephedrine.

Depending on the receptor affinity of adrenomimetics to α- and β-adrenoceptors, they can be systematized in the following way.

Adrenomimetics

- Stimulating α- and β-adrenoceptors

v Epinephrine (β1 β2 α1 α2)

v Norepinephrine (α1, α2 β1)

- Stimulating mostly a-adrenoceptors

v Phenylephrine (mezatonum) (α1)

vNaphazoline (naphthizinum) (α2)

vXylometazoline (halazolinum) (α2)

- Stimulating mostly β-adrenoceptors

v Isoprenaline (isadrinum) (β1 β2)

v Salbutamol (β2)

v Fenoterol (β2)

v Terbutaline (β2)

v Dobutamine (β1,)

α-, β-adrenomimetics

The most typical representative of this group is epinephrine (adrenaline). Epinephrine has a direct stimulating effect on α- and β-adrenoceptors.

Epinephrine is administered for anaphylactic shock and other allergic reactions of mediate type. It is effective as a bronchial spasmolytic for the treatment of acute bronchial asthma attacks. It is used for hypoglycaemic coma, caused by antidiabetic (insulin, etc.). Sometimes it is administered as a pressor drug (although norepinephrine and phenylephrine are used more often for this purpose). Epinephrine is added al anesthetic solutions. Vasoconstriction at the site of epinephrine injection intensifies local anesthesia and reduces resorptive and, possibly, the toxic of anesthetics. Epinephrine can be used to eliminate atrioventricular block, as well treat cardiac arrest (intracardial administration). It is used in ophthalmology to the pupil and in the open-angle glaucoma.

Epinephrine can lead to cardiac rhythm disorders. Most marked arrhythmias (especially, ventricular extrasystoles) occur after the administration of epinephrine along with that sensitize the myocardium to it (for example, on the background of action of halothane).

α-adrenomimetics

Phenylephrine (mezatonum) has a predominant effect on α1-adrenoceptors. Phenylephrine is used as a pressor drug. Besides, it is administered locally in rhinitis. The combination with local anesthetics is possible. Phenylephrine is also indicated for the treatment of open-angle glaucoma.

α2-adrenomimetic naphazoline (naphthizinum, sanorinum), when compared with norepinephrine and phenylephrine, causes longer-term vasoconstrictive effect. It has an inhibitory effect on the CNS. It is used locally in rhinitis.

β-adrenomimetics

Isoprenaline (isadrinum, isuprel has a direct influence on β-adrenoceptors. Isoprenaline stimulates β1-, β2- and β3-adrenoceptors. Its main effects are directed at the heart and smooth muscles. Isoprenaline is administered to relieve bronchial spasm (it is mainly introduced by inhalation in the form of spray), as well as for the treatment of atrioventricular block (sublingual administration).

Adverse effects include tachycardia, cardiac arrhythmias, and headache.

Since these side effects (especially tachyarrhythmia), which occur with isoprenaline use for bronchial asthma, are associated with β1-adrenomimetic action, drugs with predominant effects on β2-adrenoceptors have been synthesized. They are salbutamol, terbutaline (bricanyl), fenoterol (berotec N, partusisten), etc. They differ from isoprenaline (isadrinum) in that they have a less marked effect on the β1-adrenoceptors of the heart. Besides, they are effective after oral administration and they have a more long-term effect than isoprenaline (especially terbutaline). The above mentioned drugs are administered as broncholytic drugs (by inhalation, orally, parenterally), as well as to reduce contractile activity of the myometrium.

Sympathomimetics (adrenomimetics of indirect action)

Ephedrine is contained in different species of the Ephedra plant. It is a sympathomimetic (adrenomimetic of indirect action), indirectly stimulating α- and β-adrenoceptors.

Ephedrine has the following effect. Firstly, it has a presynaptic effect on the varicosities of the adrenergic fibres, promoting mediator release (norepinephrine). Secondly, it has a weaker stimulating effect directly on the adrenoceptors.

Ephedrine is similar to epinephrine in its main effects. It stimulates heart function, increases arterial pressure, causes a broncholytic effect, inhibits intestinal peristalsis, dilates the pupil (not affecting accommodation or intraocular pressure), increases the skeletal muscle tone and induces hyperglycaemia.

It differs from epinephrine in that its effect develops gradually and lasts longer.

Ephedrine is significantly inferior to epinephrine in its vasopressor activity.

After repeated frequent (after 10—30 min) administration of ephedrine its pressor action rapidly subsides, and tachyphylaxis occurs. It is caused by a progressive reduction in norepinephrine storage in the varicosities (since ephedrine intensifies norepinephrine release from them).

Ephedrine has a marked effect on the CNS. In this regard it surpasses epinephrine, but is inferior to amphetamine.

A substantial difference of ephedrine from other drugs of this group is its efficiency after oral administration. It is resistant to MAO action. It is partially deaminated in the liver (due to other enzymes). The kidneys eliminate a substantial part of ephedrine (approximately 40%) in an unchanged form.

Ephedrine is used as a broncholytic and sometimes to increase arterial pressure. It is effective for treating rhinitis (local vasoconstriction lowers secretion of the nasal mucous membrane). It can be administered to treat atrioventricular block; it is also used in ophthalmology to dilate the pupil. The stimulating effect of ephedrine on the CNS is sometimes used in narcolepsy.

Adrenoblockers block adrenoceptors, preventing the effect of the mediator (norepinephrine), as well as catecholamines that circulate in the blood and other adrenomimetics. Adrenoblockers do not inhibit norepinephrine synthesis.

Depending on the receptor affinity of adrenoblockers to α- and β-adrenoceptors, they can be systematized in the following way.

Adrenoblockers

- Blocking α-adrenoceptors

v Phentolamine (α1, α2)

vTropodifene (tropaphenum) (α1, α2)

v Dihydroergotoxin (α1, α2)

v Prazosin (α1)

- Blocking β-adrenoceptors

v Propranolol (anaprilinum) (β1 β2)

v Oxprenolol (β1 β2)

v Metoprolol (β1)

v Talinolol (β1)

v Atenolol (β1)

- Blocking α- and β-adrenoceptors

vLabetalol (β1 β2 α1)

α-ADRENOBLOCKERS

α-Adrenoblockers reduce the pressor effect of epinephrine or alter it. α-Adrenoblockers in high doses convert a pressor effect of epinephrine to depressor one (so called epinephrine reversal). This occurs due to the fact that when α-adrenoceptors are blocked, the stimulating effect of epinephrine on the vascular β-adrenoceptors leads to their dilation (the smooth muscle tone is decreased).

The most important effect of α-adrenoblockers is the dilation of the peripheral vessels. This is why they are mainly used to treat various disorders of peripheral blood circulation (endarteritis, Raynaud's disease, other), including shock (hemorrhagic, cardiogenic), with spasm of arterioles. The administration of α-adrenoblockers for pheochromocytoma is quite common. Sometimes, α-adrenoblockers are used in hypertensive crises.

β-adrenoblockers

Propranolol (anaprilinum, inderal, obsidan) is a widely used β-adrenoblocker. It blocks β1- and β2-adrenoceptors (of the heart, vessels, bronchi, gastrointestinal tract, etc.).

Propranolol is administered for the treatment of angina pectoris (block of β-adrenoceptors leads to a reduction in cardiac work, thus lowering its oxygen consumption), hypertension (prolonged administration of the drug is associated with gradual and stable decrease of the arterial pressure). Propranolol is indicated to treat supraventricular arrhythmias, for example, atrial

fibrillation (propranolol reduces automatism and slows conduction from the atria to the ventricles). Propranolol is used to eliminate tachycardia of various etiologies (in mitral stenosis, thyrotoxicosis), as well as in arrhythmia, caused by adrenomimetics or cardiac glycosides.

Possible side affects are: cardiac failure, cardiac block, increase in peripheral vessel tone and bronchospasm. Propranolol is administered carefully to patients with diabetes mellitus, since it prolongs hypoglycaemia caused by the drugs.

B1- and β2-Adrenoceptor blockers also include oxprenolol (trasicor) and a number of other drugs.

There are compounds that mainly block β1-adrenoceptors. One of them is metoprolol (egilok). It has an insignificant effect on the β2-adrenoceptors of the bronchi and vessels.

It is administered orally in arterial hypertension, cardiac arrhythmia, and angina pectoris. Possible side effects are headache, fatigue and sleep disturbance. In bronchial asthma metoprolol can somewhat increase bronchial tone.

α-, β-adrenoblockers

Labetalol (trandate) blocks both types of adrenoceptors β1, β2 α1. It lowers peripheral vascular resistance The drug works for 8—10 h. Labetalol is used as an antihypertensive drug.

Carvedilol (dilatrend) is an adrenoblocker of a mixed type of action. It is an antagonist of β- and α1-adrenoceptors. Its blocking effect on β-adrenoceptors is 10-100 times higher than on α1-adrenoceptors (for labetalol - 1.5-3 times). Besides, this drug has a marked antioxidant activity.

The vasodilating affect of carvedilol is associated with a decrease in peripheral vascular resistance. It inhibits the production of renin. Pre- and afterload on the heart is decreased. The drug also prevents hypertrophy of the left ventricle.

Carvedilol is useful in the treatment of arterial hypertension, coronary heart disease and chronic heart failure. Possible side effects include dizziness, headache, bronchospasm, fatigue, skin reactions, etc.

Sympatholytics

Sympatholytics impair transmission on the level of the varicosities of the adrenergic fibres, i.e. they act presynaptically. They do not affect adrenoceptors. Under the action of these drugs direct adrenomimetic effect does not decrease but even increases. Thus, sympatholytics and adrenoblockers have a blocking effect on different stages of the adrenergic transmission of nerve impulses.

Guanethidine (octadinum), reserpine, bretilium (ornidum) belong to the group of sympatholytics. Affecting the varicosities of the adrenergic fibres, these drugs reduce the amount of norepinephrine, released in response to nerve impulses. The drugs of this group weaken the effects of adrenomimetics of indirect action (tyramine, ephedrine, amphetamine).

Guanethidine and reserpine were used mainly for the treatment of hypertension. Guanethidine is more effective than reserpine as a hypotensive drug. Sometimes guanethidine is

administered for glaucoma. Tolerance to guanethidine and reserpine develops very slowly, which is an advantage of these drugs, since they are usually administered for a long period.

Bretilium is not used as a hypotensive drug, since it is poorly absorbed from the digestive tract and tolerance develops quickly. In some cases it is administered for cardiac arrhythmias treatment.

Used in this lesson, new educational technologies: The "black box".

USE OF THE "BLACK BOX"

The method provides for joint activities and active participation in the classroom each student, the teacher works with the entire group.

Each student takes out a "black box" unknown drug, a brief abstract of which is written on the cards. (Options annotations are included.) Students are required to determine this drug in detail justifying answer.

To think about each answer the student is given 3 minutes. Then discuss the answers, given in addition pharmacodynamics, pharmacokinetics. At the end of the method of teacher comments on answer is correct, its validity, the activity level of students.

This methodology promotes student speech, forming the foundations of critical thinking as In this case, the student learns to assert his view, analyze responses band members - participants of the contest.

Options abstracts:

1. Identify the ingredient: narrows blood vessels, increasing the A/P. The tone of the bronchial muscle has virtually no effect. Pressor effect is not distorted digidroergotoksinom. It is used for hypotension, collapse (noradrenaline).

2. Determine the substance: It relaxes muscles, bronchial tubes, increase strength and heart rate to slow motility gastrointestinal tract. Do not have cholinergic properties. It is used in bronchial asthma (izadrinum).

3. Specify drug: drug narrows blood vessels, increases the A/P, strengthens the heart, lowers the tone of the bronchial muscles. Increases metabolism, blood sugar levels. It is used in allergiticheskih reactions, shock, collapse, for the relief of acute attacks of bronchial asthma, cardiac arrest (epinephrine).

4. Determine the drug: A synthetic drug that causes constriction of peripheral blood vessels, gradually increasing the A/P, has a longer effect in comparison with the mediator substances such action, enhances pupils. It is used in the collapse, hypotension, for the treatment of rhinitis (mezatonum).

6.2. Analitical part

Situational problem:

1. In the clinic the patient brought in a state of shock. A|P - 80/40.mm. Hg. Art. Immediately started intravenous drip infusion, which caused a stable increase in blood pressure. In this part of the heart

was observed bradycardia. What drug was the patient? Why is the aetiology and how can it be reduced?

Response. The patient performed an intravenous drip of α-adrenoceptor agonists noradrenaline. Emerged against the background of its action is a reflex bradycardia and associated with the excitation of baroreceptors rising pressure vessels. It can reduce atropine, which increases heart rate and blood pressure increases at the same time.

2. The patient in the dentist's reception after the injection of novocaine solution developed anaphylactic shock with typical symptoms: facial flushing, difficulty breathing, drop in blood pressure and loss of consciousness, the dentist brought the patient out of this state by s / c injection of a group of agonists. Which drug adrenomimetic action is the drug of choice for first aid in anaphylactic shock?

Response. The drug of choice in anaphylactic shock from a group of agonists epinephrine, which has a direct α-and β-adrenomimetic action.

3. The patient sought medical advice on what to remove asthma attacks he uses izadrinum, the reception is accompanied by palpitations, and sometimes arrhythmia. The doctor recommended to cancel and appointed izadrinum more effective bronchodilators drug does not cause tachycardia. Why izadrinum tachycardia? Which drug prescribed by a doctor instead izadrinum?

Response. Izadrinum is a β1 and β2,-agonists. Its effect of bronchodilators is associated with β2-adrenoceptor stimulation and excitement β1-adrenergic receptors, located in the heart, strengthens the heart, increases the rate and speed up his rhythm. To avoid this complication, your doctor has prescribed the drug with selective action of selective excitatory effect on β2-adrenergic receptors of the bronchi: salbutamol, fenoterol (berotek), terbutaline.

4. The patient with acute rhinitis designated agent in the form of droplets, which he used every 20-30 minutes. The first instillation caused a lasting effect, and starting with 8-10 burrowing effect decreased significantly in the future absent. Which drug a patient was assigned to the treatment of rhinitis? As is noted by the phenomenon? With what it involves?

Response. The patient with acute rhinitis by local administration (nasal drops) was appointed Naphazoline (naphthizinum, sanorinum) or halazolinum. The weakening of their effect in frequent use is called tachyphylaxis, which is associated with depletion of norepinephrine and the weakening of α2-adrenoceptor excitation presinaptic membranes.

6.3. Practical part

Write prescriptions for these drugs: adrenaline hydrochloride (amp., flac.), mezatonum (amp.), izadrinum (amp., flac.), ephedrine hydrochloride (amp., flac., tab.)

1. Prescriptions TO SOLID DOSAGE FORMS

Purpose: Prescriptions TO SOLID DOSAGE FORMS

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

2. Prescribing FOR SOLUTION INJECTION

Purpose: Prescribing FOR SOLUTION FOR INJECTION.

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10

5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

7. Forms of control knowledge, skills and abilities

- oral;

- writing;

- experience the practical skills.

8. Control questions

1. Classification of adrenoceptors?
2 Classification of adrenomimetics?
3. What are the indications for the use of alpha and beta- adrenomimetics?
4. Side effects of alpha and beta- adrenomimetics?
5. The main effect of alpha- adrenomimetics?
6. What are the indications for the use of alpha- adrenomimetics?
7. Side effects of alpha- adrenomimetics?
8. The main effect of beta- adrenomimetics?
9. What are the indications for use of beta- adrenomimetics?
10. Side effects of beta- adrenomimetics?
11. The mechanism of action of ephedrine hydrochloride?
12. Indications and side effects of ephedrine hydrochloride?
13. Write down the recipes: adrenaline hydrochloride (amp., flac.), mezatonum (amp.), izadrinum (amp., flac.), ephedrine hydrochloride (amp., flac., tab.)

Practical training

Topic 9: Narcotics. Ethyl alcohol. Sleep aids.

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector

2. The duration of the study of themes

Hours – 4

3. Purposes

- To form a general idea of ethyl alcohol and sleeping pills, to their destination;

- Give a classification of sleeping pills;

- To give an idea about the main effects of ethanol and snotovornyh funds;

- Give an idea of the mechanisms of action of ethyl alcohol and sleeping pills;

- To give knowledge of side effects of hypnotic drugs and toxic effects of ethanol;

- To generate knowledge of indications and contraindications to the use of ethyl alcohol and sleeping pills;

- Create the ability to analyze the action, the appointment of separate funds, based on the overall pharmacodynamic data hypnotics;

- To give knowledge of the elements of pharmacotherapy with examples from the private formula.

Tasks

Student should know:

- Classification of sleeping pills;
- The impact of individual hypnotic drugs on the body;
- The basic mechanisms of action of hypnotics and ethanol;
- Indications for use of hypnotics and ethanol;
- Side effects and complications of hypnotics and ethanol.

Student should be able to:

Perform practical skills - perform tasks for the recipe (prescription to: phenobarbital (table), diazepam (Valium), phenazepam (table), ethyl alcohol).

4. Motivation

Ethyl alcohol and sleeping pills are widely used in many fields of clinical medicine (surgery, neurology, psychiatry, obstetrics, gynecology, etc.), so knowledge of ethyl alcohol and sleeping pills, their values for the body, as well as applications to students in further exploration of private pharmacy and GP.

5. Intersubject and intrasubject connections

Teaching this topic is based on the knowledge bases of students of biochemistry, anatomy, histology, normal and pathological physiology of the nervous system. Acquired during the course knowledge will be used during the passage of surgery, gynecology, psychiatry, neurology and other clinical disciplines, as well as for further study by a private pharmacy.

6. The content of lessons

6.1. Theoretical part

ETHYL ALCOHOL

Ethyl alcohol is a typical drug possessing a general (nonselective) depressant effect on the CNS. Besides, it has a marked antiseptic action.

Ethyl alcohol is of limited interest for medical practice. It is mainly used as an antiseptic. It is much more interesting from a social point of view, since alcohol consumption is often associated with acute and chronic poisoning.

The systemic action of ethyl alcohol is mainly directed at the CNS. It has inhibitory CNS action that is proportionate to the increase of ethyl alcohol concentration in the blood and in the brain. CNS inhibition has three main stages 1) excitatory stage; 2) anesthetic stage; 3) medullary depression stage.

The excitatory stage is the result of suppression of the inhibitory mechanisms in the brain. Usually it is prominent and prolonged. Euphoria occurs, mood is improved, and the individual becomes excessively communicative and talkative. At the same time psychomotor reactions, the individual's behavior, self-control, adequate evaluation of the surrounding situation and working capacity are impaired.

HYPNOTICS (Sleep aids)

Hypnotics - non-selective CNS depressants.

Hypnotics facilitate falling asleep and provide necessary sleep duration.

Drugs of different pharmacological groups are used as hypnotics. The traditional hypnotics (barbiturates, some aliphatic compounds) that have been used for a long time, are drugs of a non-selective depressant action on the CNS. In low doses they have a sedative1 effect, in medium doses — hypnotic effect, and in high doses — an anesthetic one. They are not used for general anesthesia due to their narrow margin of safety and long-term action that make it impossible to control the depth of the general anesthesia.

Currently, the most frequently used hypnotics are anxiolytics (tranquillizers) of the benzodiazepine series, which belong to the class of psychotropic drugs.

Hypnotic drugs have an inhibitory action on the interneuronal (synaptic) transmission in various structures of the CNS (for example, in the cerebral cortex, afferent pathways, limbic system).

Hypnotic drugs are classified according to the principle of their action and chemical structure.

1. Hypnotic drugs — agonists of benzodiazepine receptors

- *A. Benzodiazepine derivatives* Nitrazepam Lorazepam Nozepam Temazepam Diazepam Phenazepamum Flurazepam

- *B. Drugs of different chemical structure («nonbenzodiazepine» compounds)* Zolpidem Zopiclone

2. Hypnotic drugs — non-selective CNS depressants

- ***A. Heterocyclic compounds - Derivatives of barbituric acid (barbiturates)*** Pentobarbital (ethaminal, nembutal)
- ***B. Aliphatic compounds*** Chloral hydrate

Other drugs that have a hypnotic action are also used to normalize sleep: blockers of histamine H1receptors (diphenhydramine), general anesthetics effective after oral administration (sodium hydroxybutyrate). Drugs containing epiphysial hormone melatonin are recommended to treat sleep disorders, associated with long distance air flights.

Used in this lesson, new educational technologies:

USE OF THE 'BLACK BOX'

The method provides for joint activities and active participation in the classroom of each student, the teacher works with the entire group.

Each student takes out a "black box" unknown medication and brief annotations function which is written on the cards. (Options annotations are included.) Students are required to determine this drug in detail justifying answer.

To think about each answer the student is given 3 minutes. Then discuss the answers, given in addition pharmacodynamics, pharmacokinetics. At the end of the method of teacher comments answer is correct, its validity, the activity level of students.

This methodology promotes student speech, forming the foundations of the critical thinking, as In this case, the student learns to assert his view, analyze responses band members - participants of the contest.

Options abstracts:

1. Specify drug: Refers to the barbituric acid derivatives. Causes long sleep (6-8 hours). Possesses antiepileptic properties. With prolonged use cumulative effect is possible. (Phenobarbital).

2. Determine the drug: Appointed by mouth or rectally (in enemas) as a soporific, sedative or anticonvulsant. Possesses strong irritant properties. (Chloral hydrate).

3. Determine the drug: It has sedative, anxiolytic, sedative, anticonvulsant and miorelaksantnym activity. Induces sleep duration 6-8 hours. The half-life - 24 hours. Used only as a soporific. (Nitrazepam).

4. Determine the drug: an agonist of benzodiazepine receptors. Effective with the sleep disturbance associated with anxiety, emotional stress. In addition, used for status epilepticus, tetanus. (Diazepam).

6.2.Analitical part

Situational problem:

1. The patient complained of sleep disturbance of sleeping pills prescribed after admission, which is a patient process of falling asleep to normal. However, waking up, the patient did not feel the courage and marked decrease in performance.

Appointment of any sleeping pills could cause a similar effect?

The use of any drugs would avoid the effect of substance?

Response. The patient was assigned a long-acting barbiturate, probably phenobarbital. He was more appropriate to normalize the sleep process to appoint a short-acting barbiturates.

2. The patient for the normalization of sleep has been appointed group of hypnotic barbiturates. Initially, the drug prescribed by a doctor at a dose of normal sleep, but over time to achieve the hypnotic effect of the patient was forced to increase the dose.

What is the cause of weakening of the therapeutic effect of the initial dose of sleeping pills? Was the patient?

Response. The reason for the weakening effect of hypnotic barbiturates with their long-term use - they cause the activation of microsomal enzymes, leading to an increase in their metabolism. The patient was admitted improperly. In order to prevent reducing the effect of barbiturates should alternate their reception with hypnotics different chemical structure.

3. Patients with impaired sleep due to constant pain in the stomach was appointed sleeping pills, under whose influence he fell asleep after 60 minutes. And slept for 8 hours after awakening and felt a heaviness in the head, weakness, drowsiness.

Which drug a patient was assigned?

Justify the need to replace it and recommend more effective means in this case.

Response. The patient was assigned a long-acting barbiturate, probably phenobarbital. He was more appropriate to appoint a group of sedative anxiolytic - nitrazepam, which has advantages over the barbiturates.

4. After suffering a nervous shock patients within a few days does not sleep. In this complaint the doctor decided to appoint her a sleeping pill.

Which group of hypnotic drugs should be preferred for the treatment of insomnia, which arose in connection with the patient's emotional arousal?

Response. In this case it is advisable to appoint a group of sedative anxiolytics (nitrazepam, sibazon, etc.), which also have sedative and anxiolytic effects.

6.3. Practical part

1. Prescribing FOR SOLUTION FOR EXTERNAL USE

Purpose: Prescribing FOR SOLUTION FOR EXTERNAL USE.

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

2. Prescribing on soft medicinal forms (ointments)

Purpose: Prescribing on soft medicinal forms (ointments).

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

7. Forms of control knowledge, skills and abilities

- oral;
- writing;
- experience the practical skills.

8. Control questions

1. What are the features of the influence of ethyl alcohol on the central nervous system?

2. What impact does ethanol on the secretory and motor activity of the stomach in a concentration dependent?

3. How does ethanol on thermoregulation?

4. What are the effects of ethanol are used in medicine?

5. What are the indications for the use of ethanol?

6. What is the clinical picture and aid in acute poisoning with ethyl alcohol?

7. What is the mechanism of action of teturam?

8. What is the classification of sleeping pills?

9. What are the requirements to sleeping pills?

10. When applying any of barbiturates are often observed phenomenon of aftereffect?

11. What is the mechanism of action of hypnotics?

12. What is the clinical picture and help in acute poisoning with soporific?

13. Quest for the recipe (prescription to: phenobarbital (table), diazepam (Valium), phenazepam (table), ethyl alcohol).

Practical training

Topic 10: ANALGESICS

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector

2. The duration of the study of themes

Hours – 3

3. Purposes

- creat overview of narcotic and non-narcotic analgesics,

to their destination;

- to give a classification of narcotic and non-narcotic analgesics;

- to give an idea about the main effects of narcotic and non-narcotic analgesics;

- give an idea of the mechanisms of action of narcotic and non-narcotic analgesics;

- to give knowledge of the adverse effects of narcotic and non-narcotic analgesics;

- To generate knowledge of the indications and contraindications to the use of narcotic and non-narcotic analgesics;

- create the ability to analyze the action, the appointment of the individual funds based on the total pharmacodynamic data of narcotic and non-narcotic analgesics;

- to give knowledge of the elements of pharmacotherapy with examples of private recipe..

Tasks:

Student should know:

- classification of narcotic and non-narcotic analgesics;
- the effect of individual drugs and non-narcotic analgesics on the body;
- mechanisms of action of major drugs and non-narcotic analgesics;
- indications for use of narcotic and non-narcotic analgesics;
- side effects and complications caused by drug and non-narcotic analgesics.

Student should be able to:

Perform practical skills - to perform the task according to a recipe (to write prescriptions for these drugs: acetylsalicylic acid (tab), paracetamol (tab), analginum (tab, amp), morphine hydrochloride (amp), promedolum (amp)).

4. Motivation

Given the very high prevalence of pathological processes accompanied by pain that can persist for months and years, the importance of pain management is difficult to overestimate. Narcotic and narcotic analgesics are widely used in many fields of clinical medicine (surgery, internal medicine, obstetrics, gynecology, anesthesiology, etc.), so knowledge of narcotic and non-narcotic analgesics, and their values for the body to use as students with further study of private pharmacy, so and GP.

5. **Intersubject and intrasubject connections**

Teaching this topic is based on the knowledge bases of students of biochemistry, anatomy, histology, normal and pathological physiology of the nervous system. Acquired during the course of knowledge will be used during the passage of surgery, anesthesiology and intensive care, therapy and other clinical disciplines, as well as further study of those private Pharmacology.

6. The content of lessons

6.1. Theoretical part

Both organic and psychogenic disorders can cause acute and chronic pain. Pain may be also caused by a dysfunction of the nervous system itself. Analgesics are drugs that selectively inhibit pain sensitivity. They do not affect consciousness and do not inhibit other types of sensitivity.

According to the pharmacodynamics of the appropriate drugs, they are subdivided into following groups.

I. Drugs of mainly central action

Opioid (narcotic) analgesics

- Agonists – Morphine Trimeperidine (promedolum)
  Fentanyl Sufentanil

- Agonists-antagonists and partial agonists –
  Pentazocine Nalbuphine

  Butorphanol Buprenorphine

Non-opioid analgesics

- Non-opioid (non-narcotic) analgesics (paraaminophenol derivatives)
- Drugs from different pharmacological groups with analgesic component of action

II. Drugs of mainly peripheral action

Non-opioid (non-narcotic) analgesics (derivatives of salicylic acid, pyrazolone, other)

Most opioid analgesics belong to the first group of drugs. However, agonists-antagonists can also be used as analgesics if they predominantly have agonist properties (pentazocine); partial agonists can be used as well. Since these analgesics interact with opioid receptors, they are referred to as opioids.

Opioid analgesics produce marked inhibitory effect on the CNS. These include analgesia, drowsiness and antitussive action. In addition, most of them change mood (euphoria) and cause drug dependence (psychological and physical).

Some of drugs that belong to the opioid analgesics group are derived from plant raw material and some are synthesized.

Morphine alkaloid is most commonly used in clinical practice. It is derived from opium, which is a dried juice from the incised unripe seed capsules of the poppy plant — Papaver somniferum.

The main effect of morphine is pain-relief. Morphine has a rather selective pain-relieving action. It does not depress other types of sensitivity (touch, temperature, hearing, sight) in therapeutic doses.

The mechanism of its analgesic action is not absolutely clear. However, there is evidence that suggests that its effect is the result of the combination of the following components: 1) inhibition of neurotransmission of pain stimuli in the central part of the afferent pathway and 2) impairment of subjective emotional perception of pain, pain assessment and reaction to it.

In therapeutic doses morphine causes drowsiness and in favorable conditions promotes sleep development. Sleep caused by morphine is usually superficial and easily interrupted by external stimuli.

One of the manifestations of the central effect of morphine is the decrease in body temperature, associated with inhibition of the thermoregulation center, located in the hypothalamus. However, a distinct hypothermia is observed only after administration of high doses of morphine. At the

same time morphine can have a stimulating effect on certain centers of the hypothalamus. It leads to an increase in the production of the antidiuretic hormone vasopressin and a reduction of diuresis.

Contraction of the pupils (miosis) observed with the administration of morphine (especially in toxic doses) also has a central genesis and is associated with the excitation of the oculomotor center.

The effect of morphine on the medulla oblongata and, primarily, on the respiratory center is essential in its pharmacodynamics. Morphine (starting with therapeutic doses) inhibits the respiratory center, decreasing its excitation in response to carbon dioxide and reflex reactions. First, the respiratory rate slows down, and this is compensated by an increase in amplitude. With higher a dose (up to the subtoxic doses), respiratory rhythm decreases even more, the amplitude and minute volume decrease as well. Frequently, irregular respiratory rhythm occurs; periodic respiration is possible (Cheyne-Stokes, in toxic doses). In morphine poisoning, lethal outcome occurs as a result of respiratory center paralysis.

Morphine inhibits the central link of the cough reflex and has a marked antitussive activity.

Morphine usually has an inhibitory effect on the vomiting center. However, in some cases it can cause nausea and vomiting. It is associated with the stimulating effect of morphine on the chemoceptors of the trigger zone located at the bottom of the IVth ventricle that leads to the activation of the vomiting center . Morphine stimulates the vagal center, especially in high doses, leading to bradycardia. It has almost no effect on the vasomotor center. Spinal reflexes usually remain unchanged after the administration of therapeutic doses of morphine, after high doses they are depressed. Morphine has a marked effect on most smooth muscle organs that have opioid receptors. Unlike opium alkaloids of the isoquinoline series (for example, papaverine), morphine stimulates the smooth muscles, increasing their tone.

In the gastrointestinal tract there is also an increase in the tone of the intestinal sphincters, a decrease of intestinal peristalsis, which normally promotes propulsion I of its contents and an increase in their segmentation. Besides, there is a decrease in pancreatic and bile secretion. All this leads to a slowing down of the movement of the intestinal contents along the intestines. In addition, an increase in water absorption from the intestine leads to hardening of its masses and the development of constipation.

Morphine can significantly increase the tone of Oddi's sphincter and bile ducts, and this impairs the bile flow towards the intestine. Pancreatic secretion is also reduced.

Morphine increases the tone and contractility of the ureters. It also increases the tone of the urinary bladder sphincter, hampering urination.

Morphine increases the tone of bronchial muscles. This can be associated both with its effect on the opioid receptors of the muscles and with histamine release.

It has almost no direct effect on the vessels.

Non-opioid analgesics are interesting mainly because of the need for effective analgesics that do not cause drug dependence. This section discusses two groups of drugs. The first one includes non-opioid drugs, which are mainly used as analgesics (non-opioid analgesics of central action).

The second group contains various drugs, which, along with their main effect (psychotropic, hypotensive, antiallergic, other), also have essential analgesic activity.

Used in this lesson, new teaching technologies: **"Black Box".**

USING THE "BLACK BOX"

The method provides for joint activities and active participation in the classroom of each student, the teacher works with the entire group.

Each student takes out a "black box" unknown medication and brief annotations function which is written on the cards. (Options annotations are included.) Students are required to determine this drug in detail justifying answer.

To think about each answer the student is given 3 minutes. Then discuss the answers, given in addition pharmacodynamics, pharmacokinetics. At the end of the method of teacher comments answer is correct, its validity, the activity level of students.

This methodology promotes student speech, forming the foundations of the critical thinking, as In this case, the student learns to assert his view, analyze responses band members - participants of the contest.

Options abstracts:

1. Define a group of substances: Have analgesic, antipyretic properties. Used in neuralgia, joint and muscle pain. In traumatic pain are not effective. (Non-narcotic analgesics).

2. Determine the drug: A substance has a strong analgesic, anti-inflammatory, antipyretic properties. Refers to a derivative of salicylic acid. It is used for headaches, scoliosis, radiculitis, feverish conditions. (Acetylsalicylic acid).

3. Define a group of substances: Have analgesic properties. In large doses cause sleep. Of addictive substances and drug addiction. Apply for traumatic pain. (Narcotic analgesics).

4. Determine the drug: It has analgesic properties. On the analgesic activity of morphine is inferior. Excitability of the respiratory center decreases less than morphine. Synthetic derivative piperedina. By developing a substance addiction and drug dependence. (Promedol).

5. Determine the matter: It has a mild analgesic properties. Eliminates the inhibitory effects of narcotic analgesics at the center of respiration, without restoring the respiratory depression during poisoning means for anesthesia and hypnotics. (Nalorfin).

6. Determine the matter: It has analgesic properties. Respiratory depression. Suppresses the cough reflex. Causes constipation. Apply for traumatic pain, pain associated with myocardial infarction, for sedation. Alkaloid of opium. (Morphine).

7. Determine the drug: A synthetic substitute for morphine, but much stronger, although has a short analgesic effect. Can be used alone and in combination with droperidolom for neyroleptanalgezii. (Fentanyl).

6.2.Analitical part

Situational problems:

1. In the hospital received a patient in the pre state of shock with a penetrating wound to the chest and persistent cough accompanied by hemoptysis.

Purpose of medication will simultaneously antishock and antitussive actions necessary for the success of follow-up to stop pulmonary hemorrhage?

Answer: Morphine, as it has both a strong analgesic and antitussive effects.

2. Patient with inoperable lung cancer on humanitarian grounds, was appointed to the morphine injection. Against this background arose the phenomenon of acute intestinal obstruction, urinary retention.

What is the cause of the signs of bowel obstruction?

Possible preventive measures.

Answer: The symptoms of intestinal obstruction occurred due to spasmogenic action of morphine. To prevent these complications, you must assign morphine in combination with atropine or replace morphine promedolom.

3. In the hospital brought the patient in a coma. An objective examination the doctor noted cyanosis of the skin and mucous membranes, pale face, cold extremities, sharply narrowed pupils, not reacting to light, such as breathing Cheyne-Stokes heart sounds are muffled, pulse 50 beats / min, BP 100/40 mm Hg. Art., patellar tendon reflexes were preserved.

That served the cause of a coma?

What are the measures of first aid?

Answer: The cause of this condition was an overdose of morphine. Stomach should be washed with a solution of potassium permanganate, to adsorb the means and saline laxatives, to introduce the antagonists naloxone or nalorfin, kordiamin.

4. In the surgical ward admitted patients with extensive "ripe" abscess on the buttocks. After consultation with the surgeon, anesthesiologist decided to open the abscess under short general anesthesia without the use of funds for anesthesia.

What do you call this type of general anesthesia?

Which drug from a group of narcotic analgesics used for this purpose?

Answer: the variety of general obezebolivaniya is neyroleptanalgeziya, which is achieved by the combined use of narcotic analgesic (fentanyl) and neuroleptic (droperidol).

5. In a patient with extensive myocardial infarction condition continued to be aggravated. Against this background, there was marked bradycardia.

What should introduce the patient to prevent shock?

Answer: The patient should be entered as a means of antishock morphine, but in this case necessarily with atropine.

6. A patient with arthritis to reduce joint pain for a long time took the medicine, after which he drew attention to the swelling of the face and on this occasion asked the doctor. After the examination, he discovered a protein in urine, erythrocytes, and cylinders.

Which drug a patient received?

What is the cause of complications?

Answer: The patient received non-narcotic analgesic pyrazolone series. Complications are a consequence of autoimmune nephritis.

7. Patients after myocardial infarction, prescribed acetylsalicylic acid. However, some time later the patient appeared epigastric pain, tarry stools.

For what purpose the patient was appointed acetylsalicylic acid?

Cause of complications?

Answer: The patient was appointed acetylsalicylic acid for the prevention of thrombotic events. Encountered complications are a consequence of ulcerogenic effect of aspirin.

6.3. Practical part

Write prescriptions for these drugs: acetylsalicylic acid (tab), paracetamol (tab), analginum (tab, amp), morphine hydrochloride (amp), promedolum(amp)).

2. Prescriptions TO SOLID DOSAGE FORMS

Purpose: Prescriptions TO SOLID DOSAGE FORMS

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10

5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

2. Prescribing FOR SOLUTION INJECTION

Purpose: Prescribing FOR SOLUTION FOR INJECTION.

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

7. Forms of control knowledge, skills and abilities

- oral;
- writing;
- experience the practical skills.

8. Control questions

1. Explain the mechanism of pain.
2. What are the nociceptors?
3. Give a complete classification of analgesics.

4. What are the basic steps characteristic for phenanthrene derivatives?

5. Explain the mechanism of analgesic action of morphine.

6. What is the effect of morphine on the respiratory center?

7. What is the effect of morphine on the digestive system?

8. What drugs are agonist-antagonist opioid receptors?

9. What farmokadinamika tramadol?

10. What is the pharmacodynamics of clonidine?

11. What side effects are opioid analgesics?

12. What do you know the antagonists of opioid analgesics?

13. Than explained by the emergence of drug addiction to opioid analgesics?

14. What is an analgesic used to neyroleptanalgezii?

15. What properties are characteristic of fentanyl?

16. What are the symptoms of acute poisoning with morphine?

17. What are the main events in acute morphine poisoning?

18. What is the difference between narcotic and non-narcotic analgesics?

19. What is the classification of non-narcotic analgesics?

20. What is the mechanism of analgesic action of non-narcotic analgesics?

21. What are the indications for use of non-narcotic analgesics?

22. What are the effects of peculiar musk?

23. What are the side effects of salicylates?

24. What are the side effects of pyrazolone derivatives?

Practical training

Topic 11: Neuroleptics. Anxiolytics. Psychostimulants. Antidepressants.

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector

2. The duration of the study of themes

Hours – 4

3. Purposes

- give an idea of neuroleptics and tranquilizers, to their destination;
- give a classification of neuroleptics and tranquilizers;
- explain the differences between antipsychotics and tranquilizers;
- give an idea about the main effects of neuroleptics and tranquilizers;
- give an idea of the mechanisms of action of neuroleptics and tranquilizers;
- conduct a comparative evaluation between individual antipsychotics and tranquilizers;
- to give knowledge of side effects of neuroleptics and tranquilizers;
- build knowledge of the indications and contraindications to the use of neuroleptics and tranquilizers;
- create the ability to analyze the action, the appointment of the individual funds based on the total pharmacodynamics of neuroleptics and tranquilizers;
- provide knowledge of the elements of pharmacotherapy with examples of private recipe.

Tasks

Student should know:

- classification of neuroleptics and tranquilizers;

- know the difference between neuroleptics and tranquilizers;

- the main effects of neuroleptics and tranquilizers;

- mechanisms of action of neuroleptics and tranquilizers;

- indications for use of neuroleptics and tranquilizers;

- side effects and complications caused by neuroleptics and tranquilizers;

- features some of neuroleptics and tranquilizers.

Student should be able to:
Perform practical skills - to perform the task according to a recipe (to write prescriptions for haloperidol (tab, amp), chlorpromazine (aminazine) (Bean, amp), trifluoperazine (triftazinum) (tab, amp), diazepam (tab, amp), phenazepamum (table)).

4. Motivation

Antipsychotics and tranquilizers are widely applied in many fields of clinical medicine (neurology, internal medicine, anesthesiology, psychiatry, etc.), so knowledge of neuroleptics and tranquilizers, and their values for the body, as well as their use, side effects must be like for students with further study of private pharmacy and GP.

5. Intersubject and intrasubject connections

Teaching this topic is based on the knowledge bases of students of biochemistry, anatomy, histology, normal and pathological physiology of the nervous system. Acquired during the course of knowledge will be used during the passage of Neurology, Anesthesiology and Intensive Therapy, therapy, psychiatry and other clinical disciplines, as well as for further study by a private pharmacy.

6. The content of lessons

6.1. Theoretical part

ANTIPSYCHOTIC DRUGS (NEUROLEPTIC DRUGS)

The drugs of this group have antipsychotic and, to some extent, marked sedative (calming) action. Antipsychotic effect reduces the so-called productive symptoms of psychoses (delusions, hallucinations) and delays further progression of the disease. Psychosedative action is characterized by general sedation — elimination of affective reactions, reduction in anxiety, nervousness, as well as a decrease in motor activity.

The mechanism of antipsychotic action is not clear enough. It is suggested that for most drugs of this group, the effect is associated with the block of postsynaptic dopamine D2-receptors in the limbic system. The dopamine receptor-blocking effect leads to the antagonism with dopamine and dopaminomimetics (apomorphine, amphetamine) that becomes apparent in the behavioural reactions and on a level of separate neurons.

The ability of antipsychotic drugs to cause specific side effect, such as extrapyramidal disorders, is explained by the effect on the dopaminergic system. The changes occur in the neostriatum, where a significant number of receptors, blocked by the antipsychotic drugs, are localized.

The antagonism between antipsychotic drugs and dopamine was confirmed, in particular, by the experiments with ionophoretic injection of dopamine into the area of the caudate nucleus. Prior introduction of an antipsychotic drug chlorpromazine (aminazine) eliminates the inhibitory effect of

dopamine on the caudate nucleus neurons. The inhibition of the nigrostriatal transmission and reduction of the suppression of the striatum by the substantia nigra lead to a change of the effect of the striatum on motor activity control. This results in the enhancement of the activity of the spinal cord α—motoneurons, increase in muscular tone and development of drug-induced parkinsonism (hypokinesia, rigidity and tremor). It is thought that the change in the functional state of the neostriatum is a valuable part of the antipsychotic effect.

The block of dopamine receptors is also associated with a number of other effects of antipsychotic drugs:

Dopamine receptors localization	Main effects
Mesolimbic and mesocortical systems	Antipsychotic effect.
	Emotional indifference. Depression
Hypothalamus—hypophysis	Decrease in body temperature.
	Galactorrhea (increase in prolactin release)
Extrapyramidal system	Parkinsonism symptoms; delayed dyskinesia
Trigger zone of the vomiting center	Antiemetic effect

Sedative action of antipsychotic drugs is partially associated with their effect on the ascending reticular formation of the brainstem. Antipsychotic drugs eliminate the EEG activation due to the external stimuli and mildly affect the neuronal excitation in the reticular formation after their direct electrical stimulation. It has been shown that iontophoretic application of a number of antipsychotic drugs on the brainstem reticular formation neurons leads to a decrease in or loss of their sensitivity to the excitatory effect of norepinephrine. By blocking adrenoceptors antipsychotic drugs inhibit transmission of nerve impulses from the collaterals of the afferent pathways to the reticular formation neurons. Effect on the limbic system and hypothalamus may also explain the sedative effect of these drugs.

For some antipsychotic drugs (for example, phenothiazine derivatives), psychotropic effects are linked to the blockade of the serotonin receptors and M-cholinoceptors of the brain.

It is customary to divide antipsychotic drugs into so-called «typical» and «atypical». The main difference is that «typical» drugs lead to the development of such side effect as extrapyramidal dysfunction (parkinsonism and other motor disorders). With «atypical» antipsychotic drugs, this highly negative effect is very rarely observed and is mild. These differences occur due to binding to different receptors, particularly various subtypes of dopamine receptors.

The drugs are classified as follows.

I. «Typical» antipsychotic drugs

- Phenothiazine derivatives: *Chlorpromazine (aminazine) Trifluoperazine (triftazinum) Fluphenazine (phthorphenazinum)*

- Thioxanthene derivatives: *Chlorprothixene*

- Butyrophenone derivatives: *Haloperidol*

II. «Atypical» antipsychotic drugs

- Benzamides: *Sulpiride*

- Benzodiazepine derivatives: *Clozapine (azaleptinum)*

ANXIOLYTICS (TRANQUILIZERS)

The main effect of these drugs is the anxiolytic (tranquilizing) one. It results in a decrease of internal tension, elimination of nervousness, anxiety and fear. Besides, most anxiolytics have a sedative action. Anxiolytics are mainly used in neurotic and pseudo- neurotic (reactive) conditions. Most drugs (except benactyzine) do not affect the autonomic innervation; anxiolytics do not induce extrapyramidal disorders.

Anxiolytics are divided into the following groups:

- Agonists of benzodiazepine receptors *(diazepam, phenazepamum, etc.)*

- Agonists of serotonin receptors *(buspirone)*

- Drugs of different action types *(benactyzine, etc.).*

The first group is the most widely used. By chemical structure these drugs are benzodiazepine derivatives.

Benzodiazepine anxiolytics are classified according to their duration of effect. Effect duration of both the basic drug and its active metabolites has to be considered. The following are groups of benzodiazepine anxiolytics:

- Long-term action (t|/2 = 24—48 h)

Phenazepamum Diazepam (sibazonum, seduxen, Valium) Chlordiazepoxide (chlozepidum, elenium)

- Medium-term action (t|/2 = 6—24 h)

Nozepam (oxazepam, tazepam) Lorazepam Alprazolam

- Short-term action (t <6 h)

Midazolam (dormicum)

The following effects are typical for benzodiazepine drugs:

- anxiolytic,

- sedative,

- hypnotic,

- muscle-relaxant,

- anticonvulsive,

- amnestic.

Benzodiazepines have marked anxiolytic and sedative properties. By reducing emotional strain, they also promote the onset of sleep. The psychotropic action of these drugs is mainly associated with their effect on the limbic system. Thus, benzodiazepines are shown to reduce spontaneous activity of the hippocampal neurons to a greater degree than hypothalamic neurons or brainstem reticular formation. They inhibit impulse after-effect in the limbic system as well as in the hypothalamus. Inhibitory effect on the activating reticular formation of the brainstem may also be somewhat significant, since benzodiazepines depress EEG activation, appearing in response to the stimulation of the reticular formation.

Benzodiazepines act as agonists of benzodiazepine receptors, which are closely connected with GABAA-receptors. Stimulation of the benzodiazepine receptors leads to the allosteric activation of GABAA-receptors. That is why benzodiazepines, interacting with their receptors, induce GABA-mimetic effect. At the same time the channel opening rate for $Cl^-$is increased, intensifying the inward current of CI . Hyperpolarization of the membrane and inhibition of neuronal activity takes place.

PSYCHOSTIMULANT DRUGS

Psychostimulants improve mood, the ability to percieve external stimuli and psychomotor activity. They minimize sensation of weakness, intensify mental and physical efficiency (especially in fatigue) and temporarily reduce sleep requirements.

According to their chemical structure, psychostimulants are classified into the following groups.

- *Phenylakylamines*

Amphetamine (phenaminum)

- *Piperidine derivatives*

Pipradol (piridrolum) v Methylphenidate (meridilum)

- *Sydnonimin derivatives*

Mesocarb (sydnocarbum)

- *Methylxanthines*

Caffeine

Amphetamine (phenaminum) is a prototype psychostimulant. It is a phenylalkylamine, i.e. according to its structure it is similar to epinephrine and norepinephrine. Amphetamine possesses

all the characteristics of the psychostimulant group of drugs. The stimulating mechanism of amphetamine is provided by its ability to release norepinephrine and dopamine from the presynaptic terminals. Released catecholamines stimulate the corresponding receptors located in the CNS. Besides, amphetamine seems to somewhat reduce norepinephrine and dopamine uptake.

The psychostimulating effect of amphetamine is mainly associated with its stimulating effect on the ascending activating reticular formation of the brainstem. It results in desynchronization of the bioelectrical activity on the EEG. However, amphetamine may also directly excite the neurons of the cerebral cortex. Besides, it stimulates some parts of the limbic system and inhibits the neostriatum.

Low doses of amphetamine have a favorable effect on the production and performance of the conditional reflexes, but in high doses it inhibits them. At the same time, this depends on the type of the nervous system.

It is a characteristic of amphetamine to affect the food center located in the hypothalamus, which leads to the inhibition of hunger .

Amphetamine has a direct stimulating effect on the respiratory center, which is manifested mainly on the background of its inhibition. In this case amphetamine plays the role of analeptic .

Amphetamine affects not only the CNS but also the peripheral innervation. It has a stimulating effect on a- and P-adrenoceptors. As it has been noted, amphetamine is a sympathomimetic (causes norepinephrine release from the varicosities of the adrenergic fibers). It also has a direct effect on the adrenoceptors, but this is of secondary significance. Sympatho- and adrenomimetic properties of amphetamine usually result in an arterial pressure increase. The pressor effect of amphetamine is 100—150 times weaker when compared with epinephrine, however it is significantly longer lasting. The effect on other smooth muscles is similar to that of epinephrine but weaker.

ANTIDEPRESSANTS

Antidepressants are drugs administered for the treatment of depression.

They can be divided into the following groups .

I. DRUGS BLOCKING NEURONAL UPTAKE OF MONOAMINES

- Drugs possessing nonselective action, blocking neuronal uptake of serotonin and norepinephrine

Imipramine (imizinum)

Amitriptyline

- *Drugs possessing selective action*

A. Blocking neuronal uptake of serotonin

Fluoxetine

B. Blocking neuronal uptake of norepinephrine

Maprotiline

II. **MONOAMINE OXIDASE INHIBITORS (MAO)**

- *Non-selective action (MAO-A and MAO-B inhibitors)*

Nialamide

Transamine

- *Selective action (MAO-A inhibitors)*

Moclobemide

Drugs from the first group are called tricyclic antidepressants and are widely used in medical practice. They belong to the group of antidepressants of nonselective action, blocking neuronal reuptake of serotonin and norepinephrine.

One of the representatives of this group is imipramine (imizin). It has marked antidepressant properties, which are combined with a weak sedative effect. At the same time in certain conditions a psychostimulating component can also be noted (sometimes excitation, euphoria and sleeplessness maybe observed.

When imipramine is used for the treatment of depression, the therapeutic effect sets in after 2-3 weeks. Side effects are most commonly associated with atropine-like properties of imipramine (dry mouth, accommodation disorder, tachycardia, constipation, difficulty in urination). Cardiovascular problems can also occur. Therapeutic doses of imipramine can decrease the arterial pressure; orthostatic hypotension can sometimes develop. In high doses it can cause tachycardia and arrhythmias. Undesirable psychiatric effects may also occur. They manifest as either excessive sedation or, conversely, hallucinations and sleeplessness. Imipramine treatment can lead to

headaches, tremor, allergic skin reactions, jaundice and more rarely leukopenia and agranulocytosis. The drug also promotes weight gain.

Imipramine is contraindicated in glaucoma and difficulty in urination, associated with hypertrophy of the prostate gland.

It is not to be combined with non-selective MAO inhibitors due to the risk of toxic effects. If two types of antidepressants are administered one after another, the interval between MAO inhibitor discontinuation should not be less than 1.5—2 weeks.

Antidepressants from the group of MAO inhibitors are subdivided into the drugs of non-selective and selective action.

Non-selective MAO inhibitors (affect MAO-A and MAO-B) are used relatively rarely due to their rather high toxicity. When choosing antidepressants, the preference is given to the drugs that affect neuronal uptake of monoamines. Though in some cases MAO inhibitors can also be useful.

In recent years the drugs, reversibly inhibiting mainly MAO-A have attracted a lot of attention. They include moclobemide (aurorix), pirazidolum, etc. Their effect is more short-term than the effect of irreversible MAO inhibitors. Also, they are associated with lower risks of development of hypertensive crisis if taken with sympathomimetic substances in the food (for example, with tyramine), compared with the non-selective MAO inhibitors. Moclobemide is a benzamide derivative.

Pirazidolum is a tricyclic compound. According to its chemical structure it is a derivative of indole. Antidepressant effect of pirazidolum can occur together with sedative (on the background of anxiety, nervousness) or stimulating (on the background of depression) effects, depending on the patient's condition. The mechanism of its antidepressant effect is linked to the reversible inhibition of MAO-A and neuronal uptake of norepinephrine. Pirazidolum does not have M-cholinoceptor blocking activity. The drug is well tolerated. Side effects occur rarely. Pirazidolum is taken orally.

Used in this lesson, new teaching technologies: "Black Box".

USING THE “BLACK BOX”

The method provides for joint activities and active participation in the classroom of each student, the teacher works with the entire group.

Each student takes out a "black box" unknown medication and brief annotations function which is written on the cards. (Options annotations are included.) Students are required to determine this drug in detail justifying answer.

To think about each answer the student is given 3 minutes. Then discuss the answers, given in addition pharmacodynamics, pharmacokinetics. At the end of the method of teacher comments answer is correct, its validity, the activity level of students.

This methodology promotes student speech, forming the foundations of the critical thinking, as In this case, the student learns to assert his view, analyze responses band members - participants of the contest.

Options abstracts:

1. Determine the matter: It has tranquilizing and antipsychotic effect. Reduces the content of catecholamines and serotinina in the CNS. Side effects: increase in gastrointestinal motility, bradycardia, and depression. Is used to treat hypertension and as an antipsychotic drug. (Reserpine).

2. Define a group of substances: It has tranquilizing and antipsychotic properties. Used to treat psychosis. Side effects: extrapyramidal disorder, and depression. (Neuroleptics).

3. Determine the matter: They have a tranquilizing and antipsychotic properties. Potentiate the action of drugs, hypnotics, analgesics. Have a marked antiemetic effect. Have alpha-adrenoblokiruyuschee properties. Is used to treat psychosis. (Neuroleptics).

4. Define a group of substances: Has the tranquilizing effect, eliminate the fear and stress did not eliminate the delusions and hallucinations. Reduce locomotor activity. (Tranquilizers).

5. Determine the drug: It has an antipsychotic, antiemetic, protivoallergiticheskoe effect, reduces the A / D and body temperature. Enhances the action of narcotics, hypnotics and analgesics. Can be used as part of lytic mixtures. (Aminazine).

6. Determine the drug: Reduces anxiety, tension, anxiety, reduces muscle tone and motor activity, does not eliminate the delusions and hallucinations. It is used for nervousness, sleep disturbances. Not recommended before or during those whose work involves the need for a quick response. (Phenazepamum).

6.2.Analitical part

Situational problems:

1. Single parenteral administration of the drug for acute psychosis caused a patient threatening hypotension.

Which group psihosedativnyh funds was introduced drug?

What was the cause of hypotension?

Measures to fix it.

Answer: You enter a neuroleptic of the phenothiazine group. Obviously, chlorpromazine, central

and peripheral effects of which sometimes provokes dangerous hypotension. To normalize the blood pressure must be assigned or norepinephrine mezaton.

2. The patient suffering from mental illness after prolonged use as a therapeutic agent triftazina appeared stiff neck and hand tremor.

What side effects characteristic of many neuroleptics appeared in a patient?

With what it involves?

Purpose of medication will reduce these side effects.

Response. The patient developed symptoms of Parkinson's medication related to the mechanism of antipsychotic action of neuroleptics (dopamine receptor blockade). In this case, to reduce the symptoms of Parkinson's advisable to appoint tsiklodol.

3. People who suffer from vascular dystonia and working on the assembly line, you must assign a tranquilizer.

Which drug should be preferred and why?

Response. This is expedient to appoint Medazepam referring to the "daily tranquilizers, and has minimal sedative-hypnotic effect.

4. To remove the emotion, the feelings of fear of impending tooth extraction dentist for 30 minutes before surgical vmeschatelstva appointed patient a drug that in combination with non-narcotic analgesics not only provides a calming effect, but also enhances their analgesic effect.

He appointed a doctor?

Response. The patient was appointed agent of a group of tranquilizers.

5. Patient with psychomotor agitation and high blood pressure was introduced by intramuscular drug, which docked arousal, and lowered blood pressure.

Which drug was assigned to the patient?

Response. Chlorpromazine, in a complex mechanism of action which has both alpha-adrenoblokiruyuschee effect, stimulated blood pressure reduction.

6. Patient before surgery to achieve the status neyroleptanalgezii in combination with fentanyl was appointed neuroleptic.

Which antipsychotics in this case, preference, and why?

Response. Droperidol, as it has rapidly manifested and strong protivoshokovym action, causes muscle relaxation and has antiemetic effects.

6.3. Practical part

Perform practical skills - to perform the task according to a recipe (to write prescriptions for haloperidol (tab, amp), chlorpromazine (aminazine) (Bean, amp), trifluoperazine (triftazinum) (tab, amp), diazepam (tab, amp), phenazepamum (table)).

3. Prescriptions TO SOLID DOSAGE FORMS

Purpose: Prescriptions TO SOLID DOSAGE FORMS

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

2. Prescribing FOR SOLUTION INJECTION

Purpose: Prescribing FOR SOLUTION FOR INJECTION.

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20

4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

7. Forms of control knowledge, skills and abilities

- oral;

- writing;

- experience the practical skills.

8. Control questions

1. What is the classification of neuroleptics?
2. What is the mechanism of action of antipsychotics?
3. What effects are characteristic of chlorpromazine?
4. What are the side effects of chlorpromazine?
5. What are the indications for use of antipsychotics?
6. What a neuroleptic used for neyroleptanalgezii?
7. What is the difference of antipsychotics tranquilizer?
8. What drugs are tranquilizers?
9. What are the main effects of tranquilizers?
10. What tranquilizers are "day"?
11. What is the mechanism of action of tranquilizers?
12. With what tone of the striated muscles decrease under the influence of tranquilizers?
13. What a tranquilizer has central and peripheral anticholinergic effects?
14. Perform practical skills - to perform the task according to a recipe (to write prescriptions for haloperidol (tab, amp), chlorpromazine (aminazine) (Bean, amp), trifluoperazine (triftazinum) (tab, amp), diazepam (tab, amp), phenazepamum (table)).
15. What is the classification of antidepressants?
16. What are the pharmacological properties of imipramine?
17. What is the mechanism of action of amitriptyline?
18. Which antidepressants are tricyclic?
19. In what appears toxic effects of antidepressants - MAO inhibitors?
20. What drugs are psychoactive?
21. What types of amphetamine?
22. What are the side effects of amphetamine?
23. How does caffeine on the higher nervous activity of man?
24. What effects on the cardiovascular system are observed under the action of caffeine?
25. What are the indications for the use of stimulants?
26. Prescription for amitriptyline (table, Valium), caffeine sodium benzoate (table, amp)).

Practical training

Theme 12: MEDICINES AFFECTING THE ACTIVITY OF RESPIRATORY ORGANS.

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector

2. The duration of the study of themes

Hours – 3

3. Purposes

- To form a general idea about the means of influencing the function of respiratory organs, to their destination;

- Give a classification of drugs which affect the function of respiratory system;

- To give an idea about the basic effects of drugs which affect the function of respiratory system;

- Give an idea of the mechanisms of action of drugs which affect the function of respiratory system;

- To give knowledge of side effects affecting the respiratory function;

- Build knowledge of indications and contraindications to the use of drugs which affect the function of respiratory system;

- Ability to analyze the effect of shape, the appointment of certain drugs based on the total pharmacodynamics of affecting the function of organs of respiration;

- To give knowledge of the elements of pharmacotherapy with examples from the private formula.

Tasks

Student should know:

- Classification of drugs which affect the function of respiratory system;

- Effect of certain drugs which affect the function of respiratory organs, the body;

- Mechanisms of action of plant and equipment that affect the respiratory function;

- Indications for use of drugs which affect the function of respiratory system;

- Side effects and complications caused by the means of influencing the function of the respiratory system.

Student should be able to:

Perform practical skills - perform tasks for the recipe (prescription to caffeine-sodium benzoate (tab, amp), nikethamide (cordiaminum) (amp, flac), phenoxdiazine (libexinum) (tab), codeine phosphate (powd), the infusion of herb Thermopsis, bromhexine (tab), aminophylline (euphylline) (tab, amp), atropine sulfate (amp), adrenaline hydrochloride (amp), ephedrine hydrochloride (amp), isoprenaline (isadrinum) (flac)).

4. Motivation

Drugs affecting the function of respiratory system, widely used in many fields of clinical medicine (therapy, pediatrics, critical care, allergy, etc.), so knowledge of that impact on respiratory function, the values for the body to use as students in further study of private pharmacy and GP.

5. Intersubject and intrasubject connections

Teaching this topic is based on the knowledge bases of students of biochemistry, anatomy, histology, normal and pathological physiology of the respiratory system. Acquired during the course knowledge will be used during the passage of therapy, pediatrics, critical care, allergy, obstetrics and other clinical disciplines, as well as for further study by a private pharmacy.

6. The content of lessons

6.1. Theoretical part

RESPIRATION STIMULANTS

According to the direction of their action, respiratory stimulants are subdivided into the following groups:

- *Drugs affecting the respiratory center directly*
v Bemegride
v Caffeine

v Aethimizolum

- *Reflex respiratory stimulants*
v Cytiton
v Lobeline

- *Drugs of the mixed type of action*

v Nikethamide (cordiaminum)

v Carbon dioxide

Respiratory stimulants are used to treat mild intoxication with the opioid analgesics and carbon oxide as well as asphyxia of newborns. They are also used to improve the essential levels of lung ventilation in the postanesthetic period. In general, respiratory stimulants are used very rarely. Hypoxia is usually treated with assisted or artificial respiration.

ANTITUSSIVE DRUGS

There are two groups of antitussive drugs.

- Centrally acting antitussives
  - *Opioid (narcotic) drugs*

  v Codeine

  v Ethylmorphine
  - Non-opioid (non-narcotic) drugs
  v Glaucine

  v Oxeladin (tusuprex)

- Peripherally acting antitussives

v Phenoxdiazine (libexinum)

Centrally acting drugs that suppress the medullary cough center, are widely used in practical medicine.

Phenoxdiazine (libexinum) belongs to the group of peripherally acting antitussives. It has an anesthetic effect on the mucosa of the upper respiratory tract and also possesses broncholytic properties. It does not affect the CNS. Drug dependence to phenoxdiazine does not develop. Phenoxdiazine is a non-opioid (non-narcotic) antitussive drug.

EXPECTORANTS

The use of this group of drugs is indicated to facilitate the expectoration of mucus produced by the bronchial glands. There are two types of expectorants: *1) reflex acting drugs,* 2) *directly acting drugs.*

Reflex acting drugs include ipecacuanha and thermopsis (extracts and infusions). When these drugs are taken orally, alkaloids contained in these preparations (in thermopsis also saponines) cause irritation of the stomach receptors. This is followed by a reflex increase in the bronchial glands' secretion, increased activity of the ciliary epithelium and intensified contraction of the bronchial muscles. Sputum becomes more abundant, less viscous and expectorates more easily with cough.

When used in high doses, these drugs cause reflex vomiting, but this effect does not have a therapeutic use.

Directly acting drugs are those that can dilute the secretions *(mucolytics).*

DRUGS USED FOR THE TREATMENT OF BRONCHOSPASM

All drugs used for the treatment of bronchial asthma and other bronchospastic states can be classified into the following groups.

I • Bronchodilators (broncholytics).

β_2-Adrenoceptor stimulators v Salbutamol v Fenoterol v Terbutaline

v Isoprenaline (isadrinum) v Orciprenaline v Epinephrine

M-cholinoceptor blockers v Atropine

v Metocinium (methacinum) v Ipratropium

Spasmolytics that have a myotropic effect v Theophylline v Aminophylline (euphylline)

II • Drugs producing anti-inflammatory and broncholytic effect.

Steroid anti-inflammatory drugs v Hydrocortisone v Dexamethasone v Triamcinolone v Beclometasone

Anti-allergic drugs v Cromoline v Ketotifen

Drugs affecting leukotriene system

- Inhibitors of the leukotrienes synthesis (5-lypooxygenase inhibitors) v Zileuton

- Blockers of leukotriene receptors v Zafirlukast v Montelukast

DRUGS USED IN ACUTE RESPIRATORY FAILURE

Pulmonary edema is one of the major causes of acute respiratory failure. It can develop in diseases of the cardiovascular system, in chemical lung injury, in some infectious diseases, kidney and liver pathology and in cases of brain edema.

Opioid analgesics such as morphine, fentanyl and talamonal are widely used for the treatment of pulmonary edema.

If pulmonary edema is caused by high arterial blood pressure, the main task is to lower it. *Ganglioblockers* (trepirium, azamethonium, benzohexonium), *vasodilators of myotropic action* (sodium nitroprusside) and α-*adrenoblockers* (for example, phentolamine, low doses of chlorpromazine, promethazine) are used for this purpose.

Another way to reduce pulmonary edema is by decreasing the circulating blood volume with the help of some efficacious and quick-acting diuretics (furosemide, ethacrynic acid) that also possess a hypotensive effect.

Alveolar edema and the formation of foam in the alveolar lumen leads to the development of a marked hypoxia that requires urgent medical assistance. Apart from the already mentioned drugs, the so called *anti-foaming agents* may be helpful. One of them is ethanol, which, when inhaled, decreases the surface tension of foam bubbles and transforms them into a fluid that takes up less volume (thus freeing up respiratory alveolar surface).

The most frequently used treatments of pulmonary edema are glucocorticoids, which have an anti-inflammatory and immunosuppressive effects.

Oxygen therapy is the universal method of treatment for all cases of pulmonary edema. Another treatment of pulmonary edema (in case of cardiac failure) are cardiac glycosides.

One of the manifestations of acute respiratory failure is acute respiratory distress syndrome (ARDS)— a disease of newborn infants. Usually in the lungs the special alveolar cells produce surface-active substances — *surfactants* (phosphatidylcholines, sphingomyelins), which decrease fluid surface tension and play an important role in maintaining the alveolar tissue elasticity. In newborn infants, an insufficiency of pulmonary surfactants may be the cause of respiratory distress syndrome. It manifests as the interstitial pulmonary edema and multiple atelectases. This syndrome is treated with drugs that substitute for the endogenous surfactant as well as controlled pulmonary ventilation. One of the drugs from the group of medicinal surfactants is colfosceril (exosurf pediatric).

Used in this lesson, new teaching technologies: interactive game **"DAISY"**

Method involves active participation in the lesson each student, teacher works with the entire group.
Purpose: Consolidation and repetition of material.

STEPS:

1. Advance on a large piece written pattern with groups of drugs, according to the classification of anti-TB drugs.
2. Pre-drawn on thick paper and individually cut "petals". On their reverse side are written the names of drugs. "Petals" are attached to a wall or a board with adhesive tape in the shape of daisies before classes.
3. Each student will "tear off" tab and attach it to the appropriate item on the template.
4. The game is repeated until, until all the petals will not be "derailed".
5. Students together with the teacher evaluate the correctness of the job.
6. Summing up the results of the teacher.

RESPIRATION STIMULANTS		
Drugs affecting the respiratory center directly	*Reflex respiratory stimulants*	*Drugs of the mixed type of action*
Bemegride Caffeine Aethimizolum	Cytiton Lobeline	Nikethamide (cordiaminum) Carbon dioxide

6.2.Analitical part

Situational problem:

1. When you stop breathing in deep anesthesia of surgical patients was introduced cytiton. However, breathing is not restored. Was the doctor wrong?
Response. The doctor did wrong. Cytiton tonic reflex respiratory center. The reflex excitability

under anesthetics suppressed, hence the use of cytiton useless in this situation. Should be introduced analeptic, better - Aethimizolum.

2. In connection with a debilitating cough patient was scheduled antitussive tablets that the patient was taking pre-chewed. Some time later, the cough has decreased considerably, but the patient began to experience increasing "numbness" in the mouth.

Which drug a patient was assigned?

What kind of features of route of administration should warn patients to avoid side effects of this drug?

With what it involves?

Response. The patient was appointed Phenoxdiazine (libexinum) having local anesthetic effect. The patient should warn him to swallow pills, not chewing.

3. Prolonged use of extraordinary means in a patient with a prolonged chronic bronchitis appeared the following effects: runny nose, watery eyes and drooling, to reduce that he was appointed into the solution of calcium chloride, after which these symptoms became less pronounced.

What drug was used?

What is the mechanism of the observed side effects of medication?

Why after administration of calcium chloride to reduce the side effects of the drug used?

Response. The patient was appointed iodides, with continued designation of which may phenomenon hypersecretion of mucous glands, in which iodine is released and the time allocation of annoying them. Calcium chloride is assigned to the patient as a substance, sealing the cell membrane (due to calcium ions) and reducing the concentration of anions of iodine, chlorine anion superseded.

4. Patients with chronic gastritis hyperacid a treatment of acute catarrh of the upper airway difficult to separate sputum. As an expectorant herb infusion was appointed Thermopsis, causing aggravation of gastritis.

How can we explain this?

What is appropriate to appoint an expectorant in this case?

Response. Symptoms of gastritis in patients has increased due to local irritating action cytiton contained in the grass Thermopsis. In this case it is advisable to appoint expectorants direct action. (Trypsin, acetyl, etc.).

5. In order to restore respiratory function the patient was injected intravenously lobeline. Breathing quickened somewhat. To enhance the effect, lobeline entered again. After repeated injections the patient started vomiting, convulsions appeared, there was a danger of cardiac arrest.

Why have developed these side effects?

Response. An overdose of lobeline, which showed in its direct action on CNS arousal centers of the medulla oblongata (the gag, the center of the vagus nerves) and N-cholinergic neurons of the

spinal cord.

6. Patient transported to hospital with a severe attack of asthma. From the introduction of atropine and isoprenaline (isadrinum) declined due to an after receiving tachycardia.

Why atropine and isoprenaline (isadrinum), along with a bronchodilator effect causes tachycardia? What should replace the drugs?

Response. Tachycardia after administration of atropine due to the fact that it reduces the effect of cholinergic vagus nerve on the heart, against this background that dominates the tone of the sympathetic innervation, and isoprenaline (isadrinum) beta1-adrenergic receptors stimulates the heart and causes rapid heart rate. In this situation, you can assign agents to stimulate beta1-adrenergic receptors (salbutamol, fenoterol, terbutaline, etc.) or glucocorticoids.

7. In a patient with heart failure, pulmonary edema there was a threat. At the same time blood pressure dropped to 80/60 mm Hg. Art ..

Can I apply this to the patient or others ganglioblockers?

What types of medications can be used to assist in this situation.

Response. In this case, or other ganglioblockers funds do not apply, since they only aggravate it developed hypotension. In this situation, you can use the cardiac glycosides, corticosteroids, use defoamers, oxygen therapy.

6.3. Practical part

Perform practical skills - perform tasks for the recipe (prescription to caffeine-sodium benzoate (tab, amp), nikethamide (cordiaminum) (amp, flac), phenoxdiazine (libexinum) (tab), codeine phosphate (powd), the infusion of herb Thermopsis, bromhexine (tab), aminophylline (euphylline) (tab, amp), atropine sulfate (amp), adrenaline hydrochloride (amp), ephedrine hydrochloride (amp), isoprenaline (isadrinum) (flac)).

1. Prescribing FOR SOLID DOSAGE FORMS

Purpose: Prescribing FOR SOLID DOSAGE FORMS

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30

3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

2. Prescribing FOR SOLUTION INJECTION
Purpose: Prescribing FOR SOLUTION INJECTION

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

3. Prescribing FOR SOLUTION FOR INTERNAL USE

Purpose: Prescribing FOR SOLUTION FOR INTERNAL USE.

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10

2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

7. Forms of control knowledge, skills and abilities

- oral;

- writing;

- experience the practical skills.

8. Control questions

1. What is the classification of stimulants of respiration?

2. What is the mechanism of action and indications for use of stimulants, breathing in each group?

3. What is the classification and mechanisms of action of antitussives?

4. What are the negative features of codeine?

5. What is the classification and the use of expectorants?

6. What determines the effectiveness of expectorants reflex action?

7. What is the mechanism of action of trypsin expectorant?

8. What is the classification of bronchodilators?

9. What is the reason bronchodilatory effect isoprenaline (isadrinum)?

10. What is the mechanism of action of atropine bronchodilator?

11. The mechanism of action of some bronchodilators is associated with stimulation of beta-blockers?

12. What is the mechanism of the bronchodilator aminophylline (euphylline)?

13. What chemicals are used to relieve asthma attacks?

14. What are the characteristics and application of cromoline sodium?

15. What principles should be followed by pharmacotherapy of pulmonary edema?

"APPROVED"
Dean of the Faculty of
Pharmacy, Management,
Medical Biology, Engineering
and HEN
_____ S.U.Aliyev
"_____"_____2024.

CALENDAR-THEMATIC PLAN

2024-2025 academic year

Department: Pharmacology
Science: Pharmacology
Faculty: General Medicine - No.1, General Medicine - No.2, International faculty
Course: 3 **Semester:** 6
Hours allocated to the semester: lectures - 12 practical training - 33

Lectures

№	Date	Lecture topics	Hours
1.		Cardiotonic and antianginal agents.	2
2.		Hypotensive and hypertensive agents.	2
3.		Medicines affecting gastrointestinal and liver function.	2
4.		Medicines affecting the blood system.	2
5.		Medicines affecting metabolism. Glucocorticoids. Anti-inflammatory drugs.	2
6.		Antibiotics.	2
		Total	**12**

Practical training

№	Date	Topics of practical training	Hours
1.		Cardiotonics. Antiarrhythmic agents. Antianginal agents.	4
2.		Hypotensive agents. Hypertensive agents.	4
3.		Medicines affecting the digestive system. Means affecting liver function. Hepatoprotectors.	4
4.		Diuretics. Means affecting the muscles of the uterus.	4
5.		Medicines affecting the blood system.	4
6.		Hormonal drugs with protein and polypeptide structure. Hormonal preparations with a steroid structure. Anti-inflammatory agents. Anti-allergic agents.	4
7.		Antiseptic and disinfectants. Basic criteria and requirements of chemotherapy. Antibiotics Part I	3
8.		Antibiotics Part II. Sulfanilamide preparations.	3
9.		Anti-tuberculosis drugs. Antiviral and anti-fungal agents.	3
		Total	**33**

Head of the department, professor M.J.Allayeva

Lecture

Topic 1: CARDIOTONIC AND ANTIANGINAL AGENTS.

A report on the subject of pharmacology is a model of educational technology

Time: 80 minutes	***Number of students: 50-70***
Report plan	*1.* Introduction 2. General characteristics of cardiac glycosides 3. Mechanism of action and main effects of cardiac glycosides. 4. Use of cardiac glycosides. 5. Cardiac glycoside poisoning. 6. Use of cardiac glycosides in children's practice. 7. *Ischemic heart.* *8. Classification of tools used in coronary insufficiency.* *9. Pharmacodynamics and pharmacokinetics of antianginal agents. 10. Basic principles of treatment of myocardial infarction. 11. New antianginal agents*
The purpose of the lecture:	***Consolidation and deepening of students' knowledge about cardiac glycosides.***
Pedagogical tasks: - understanding of cardiac glycosides, their sources. - to explain the mechanism of action of cardiac glycosides. - use of cardiac glycosides and contraindications. - poisoning with cardiac glycosides. - use of cardiac glycosides in pediatrics.	***Results of educational activities:*** **The student should know:** - They tell the classification of cardiotonic drugs, their main properties, mechanism of action, instructions for use, side effects and complications. - First aid for acute poisoning with cardiac glycosides is explained. - They reveal the importance of cardiac glycosides in pediatrics. - Cardiac glycosides with a non-glycoside structure are described.
Educational methods	***Lecture, problem method, brainstorming, discussion, rapid inquiry***
Form of education	***Teamwork, working in groups***
Educational tools	***Lecture text, computer, multimedia, slides, visual materials, marker,***
Educational conditions	*A room designed and equipped for lectures at TTA.*
Monitoring and evaluation	***Verbal survey: quick- survey***

Technological map of the thematic report

WORK step - lari time 90 minutes	Activity	
	T is a teacher	T students
1st stage . Enter 5 min	1.1. It conveys the topic's name, purpose, and expected results. Topic Basics: Introduces the keywords and topic outline for the topic. Gives a list of references.	They listen and record.
2 stages Activity activation 10 minutes	2.1. Asks stimulating questions to engage students in brainstorming: - When are cardiac glycosides used? - Cardiac glycosides are obtained from which plants? - How many parts do cardiac glycosides consist of? 2.2. Answers will be heard and a survey will be conducted with the students . 2.3. Giving students an idea about the plan of lectures and intermediate, final controls, rating control in the department of private pharmacology.	
Stage 3. Basic information section 75 minutes	3.1. According to the plan of the lecture, using multimedia slides (slides No. 1.2, etc.), the topic of the lecture will be conveyed to the students in a certain order, and specific questions will be addressed. 3.2 Emphasis is placed on the necessary, necessary questions on the topic and students are invited to write them down: 1. What is the positive inotropic effect of cardiac glycosides on the heart? 2. What is the negative inotropic effect of cardiac glycosides? 3. What is the mechanism of action of cardiac glycosides? 4. What drugs are used in acute heart failure? 5. What are the longest acting cardiac glycosides?	They listen to the report, see diagrams, tables and visual materials, discuss and ask clarifying questions. they ask and ask questions where they don't understand. They write down the necessary and basic information.
4th stage. Completer 5 minutes	4.1. Makes the final conclusion on the topic. What will be the effect of requiring students to pay attention to the main part of the subject? 4.2. Invites students to ask questions and answers them.	4.1. They listen and record. 4.2. Clarifies, asks questions.

CARDIAC GLYCOSIDES

Cardiac glycosides are mainly used in heart failure. There are 3 types of heart failure: 1. Energodynamic - decrease in energy generation, violation of its consumption. 2. Hemodynamic - as a result of the mechanical work of the heart. 3. The mixture is caused by the influence of energodynamic and hemodynamic factors.

In addition to proteins, the muscle fibers of the heart contain actin and myosin, the proteins that make up the contractile system of the myocardium. These proteins are located separately in the heart and their fusion is prevented by potassium ions in the cell. During excitation, potassium ions leave the cell, sodium ions enter the cell, and the proteins combine to form actimyosin.

Under the action of actiomyosin, ATF is broken down in the presence of calcium ions, as a result of which the energy generated is spent on the contraction of the heart muscle - a strong systole occurs. A strong systole is followed by a diastole, during which the energy spent on contraction of the heart is recovered.

Cardiac glycosides are substances obtained from plant medicinal raw materials, have a cardiotonic effect, and are used in the treatment of heart failure caused by dystrophic changes in the heart. They increase the working capacity of the heart. It ensures the efficient functioning of the heart.

Cardiac glycosides consist of 2 parts: non-sugar (aglycon) and sugar (glycon) parts. The basis of the aglycon part is a steroid structure connected to an unsaturated lactone ring from most glycosides.

And the glycon part consists of various carbon atoms.
It consists of D-digydoxose, D-glucose, D-rhamnose and others. The cardiotonic effect is related to the aglucon part, and the sugar part ensures the solubility of glycosides and their transfer to tissues. Cardiac glycosides are easily broken down. Plants themselves have been found to contain enzymes that break them down.

The following preparations of cardiac glycosides obtained from plants are used in medical practice.

1. Digitoxin from the red anghizvona flower.
2. Tukli angishvona - digoxin, celanide, lanatoside, isolanide.
3. Strophanthus kombe - strophanthin K
4. Marvarid - korglucon, convalatoxin.

1. β_1 - adrenergic receptors : ***Dopamine, Dobutamine***

2. Phosphodiesterase inhibitors : ***Amrinone, Milrinone***

Cardiac glycosides are substances isolated from plants, which have a selective effect on the heart, break down into ***glycone*** and ***aglycone when hydrolyzed*** , and increase the ability of the myocardium to contract economically. Contact with those affected:

- positive inotrope (systole rapidly shortens)

-negative chronotropic (bradycardia)

- negative dromotropic (impulse transmission slows down)

- positive bathmotropic (increases myocardial contractility)

Cardiac glycosides differ sharply in their effectiveness. Their effectiveness is determined by a biological method. 1 BTB contains the lowest amount of bug glycosides that inhibits heart failure in most frogs.

He's so cute

50-66 BTB in 1 g digitalis leaf

120 BTB per 1 g of pearl flower

2000 BTB in 1 g of strophant seed

I n d i v i d u a l g l i c o z i d l a r

8000-10000 BTB per 1 g of digitoxin

1 g of celandine contains 14000-16000 BTB

1 g of lily of the valley toxin 63,000-80,000 BTB

1 g of strophantic - K 44000-56000 BTB

The mechanism of cardiotonic effect of cardiac glycosides: by reducing the activity of K^+ and Na^+ ATF-ases, the amount of Na^+ **inside the cell** increases, and K^+ decreases. The exchange of sodium ions for extracellular calcium increases, the release of calcium from the sarcoplasmic reticulum increases. Free Sa^{++} binds to the tropin complex and eliminates its inhibitory effect on reducing oxygen. Actin and myosin join together, resulting in the formation of actinomyosin protein. Then the myocardium contracts quickly and strongly (positive inotropic).

The increase in heart activity occurs against the background of thinning of the heart rhythm and lengthening of diastole. This is called the negative chronotropic effect. As a result, the heart starts working more efficiently. Intensification of systole leads to a sharp increase in pressure in the ventricles, expansion of their walls. As a result, the sensitivity of mechano- and baroreceptors of the mycardium is increased. The impulse goes to the lost nerve center through the afferent pathways. Efferent impulses lead to bradycardia. In the ECG, there is a prolongation of the R-R interval. In addition, cardiac glycosides increase the tone of the vagus nerve, have a direct depressant effect on the conduction system of the heart, and prevent the propagation of excitation in the heart. This is called the negative dromotropic effect. In the ECG, there is a prolongation of the R- Q interval.

Cardiac glycosides increase cardiac automatism in high doses. This leads to the occurrence of excitations in ectopic foci that do not obey the sinus node in the heart. Various arrhythmias occur.

Cardiac glycosides increase myocardial excitability in small doses. This is called a positive bathmotropic effect.

The left side of the heart increases its pumping activity, causing a decrease in pressure in the small blood circulation. As a result, the activity of the right ventricle eases and the work of the heart in general eases, venous blood stagnation is eliminated. This effect is the main effect of cardiac glycosides on blood circulation in cardiac decompensation. Elimination of venous blood stagnation reflexively leads to rapid heart rate - tachycardia. Arterial blood pressure does not change. The blood and oxygen supply to the tissues improves as the resistance of the peripheral blood vessels decreases.

The damaged functions of internal organs are restored. The supply of blood and oxygen to the heart is improved due to the positive effect of cardiac glycosides on general hemodynamics. Due to the normalization of blood circulation, kidney function also improves. Diuresis and

filtration also increase. Cardiac glycosides reduce the reabsorption of sodium in the renal tubules. As a result, diuresis increases. Increased diuresis leads to reduction of excess fluid in the body and improvement of hemodynamics.

Cardiac glycosides differ from each other in terms of latent period, potency and duration. Strafantin and corglucon begin to act after 5-10 minutes when administered intravenously. The effect of tselanid is after 5-30 minutes. Digoxin starts working after 30 minutes, while digitoxin works after about 2 hours. According to the onset of the cardiotropic effect of cardiac glycosides can be described as follows:

Strophanthin Corglucon Tselanide Digoxin Digitoxin

The duration of action of cardiac glycosides depends on their inactivation in the body. One of the most important properties of cardiac glycosides is their cumulative property. Cardiac glycosides are absorbed differently from the gastrointestinal tract. Lipophilic substances, namely digitoxin and digoxin, are very well absorbed. Tselanid is slower 20-40%, Strophantin is poorly absorbed 3%. Biotransformation of cardiac glycosides takes place mainly in the liver. Their metabolites leave the body through the kidneys and bile.

The drug Strophantin K (ubain) is poorly absorbed in the gastrointestinal tract, it breaks down quickly in the intestines, so it is only administered intravenously. The effect begins after 5-7 minutes and reaches its maximum after 40-60 minutes. It has a strong positive inotropic effect. Unlike other glycosides, the negative effect on atrioventricular conduction is weaker, it does not cause bradycardia. This feature limits the use of the drug in heart failure with tachysystole and sinus tachycardia. And in the treatment of heart failure against the background of bradyarrhythmia, ash is used.

Corglucon is the sum of the glycosides obtained from the pearl flower. The positive irotropic effect is weaker than that of strophantin, but its other properties are similar to it. The difference from other glycosides is that the arrhythmogenic effect is weaker.

Isolanid (tselanide lonatazid) causes less accumulation than other glycosides due to the presence of an acetyl radical. Isolanid does not cause poisoning like digitalis preparations. Therefore, isolanid can be used in cases where digitalis preparations cannot be used.

Digoxin is a glycoside of hairy angus flower. Because it is absorbed very well in the gastrointestinal tract, it is widely used not only in our country, but also abroad. The effect begins after 40-50 minutes and the maximum effect after 2-3 hours. 60-80% of the delivered digoxin is absorbed in the small intestine, and 20-30% is combined with plasma proteins. When administered intravenously, it starts quickly.

Digitoxin is the drug with the most effective and longest effect. It is issued in the form of tablets and suppositories. Stomach - almost 100% absorbed from the intestine. Has a strong cumulative property and often causes digitalis poisoning. Therefore, when giving this drug, it is necessary to pay attention to these symptoms.

Cardiac glycosides are mainly used in acute and congestive heart failure. In acute heart failure, fast-acting drugs are used. In addition, glycosides are used in cardiac arrhythmias.

Cardiac glycosides are not used in the following cases:

- In incomplete atrioventricular block.

- In bradycardia

- In acute infectious myocarditis

Poisoning with cardiac glycosides causes cardiac and extracardiac disorders.

Cardiac disorders : arrhythmias, complete and incomplete atriovennventricular block. The most common fatal complication is ventricular fibrillation.

Extracardiac disorders : decreased vision, lethargy, dyspeptic disorders, headache, skin rashes, mental changes.

Cordiatonic agents that do not have a glycoside structure.

They include adreno mimetics, dopamine, methylxanthines and glucogonal agents.

They are classified according to the mechanism of action:

1. Beta-adrenoceptor stimulants: dopamine, dobutamine.

2. Phosphadiesterase enzyme inhibitors: amrinone, milrinone.

Antianginal drugs- means used when the blood supply to the heart muscle is disturbed.

Ischemic heart disease includes angina pectoris and myocardial infarction.

Two types of methods are more commonly used in the effective treatment of angina pectoris. It should slow down the work of the heart and thereby reduce the heart's need for oxygen and improve blood supply to the heart. Reducing the work of the heart and thereby reducing its need for oxygen can be achieved in various ways. For example, by lowering arterial and venous pressure, the work (load) of the heart can be reduced. As a result, the tension of the myocardial wall decreases and the oxygen demand of the myocardium decreases. Oxygen demand of the myocardium can be achieved by blocking the adrenergic innervation and inhibiting the entry of calcium ions into the myocardial cells. Improving blood supply to the heart can be achieved by dilating coronary blood vessels. This is often caused by the direct effect of the means on the smooth muscles of the blood vessels. Myotropic spasmolytics - dipyridamole, nitroglycerin, and antagonists of calcium ions have this effect. At the same time, there are known agents that eliminate spasm of coronary vessels through a reflex arc (validol). Based on the above principles, it is possible to classify antianginal drugs according to:

the oxygen demand of the myocardium
and improve its blood supply.

1.
Organic nitrates .
–
–
– – –
– – –
–
–

Heart depressants

Beta-blockers

Propranolol	Metoprolol
Oxyprenolol	Talinolol
Pindolol	Atenolol
Nadolol	

Oxygenation of the heart boosters

Myotropic spasmolytics	V-adenomimetics	Means with a reflective effect
Dipyridamol Carbochromene Papaverine No-shpa	**Nonolazine Oxypheridine**	**Validol**

Ischemic heart disease (IHD) has 2 different clinical manifestations, as mentioned above, i.e. acute (angina and myocardial infarction) and chronic (coronarocardiosclerosis). Such diseases apparently (95%-98%) lead to a lack of blood in the heart muscles, insufficient supply of oxygen (hypoxia) as a result of coronary atherosclerosis. It is also observed during strong physical activity, mental stress, and excitement. In this case, the myocardium needs oxygen to work properly, and the coronary arteries cannot fulfill this task. Hypoxia can sometimes occur with coronary artery spasm or thrombosis. One of the diseases caused by myocardial compression is angina pectoris. It is characterized by a sharp pain in the left chest, over the chest, which radiates to the left arm and shoulder, pain over the heart, and a feeling of suffocation. It won't last long. There is a difference between heart attack stress, that is, as a result of physical activity ("stenocardia napryagenia") and in a peaceful state of sleep ("stenocardia pokoya"). Myocardial infarction is accompanied by the intensity of pain, as if hitting the heart with a dagger, fear, excitement, panic and worsening of the patient's condition. It is the treatment of 2 different diseases in 2 different ways: the first one is the treatment of heart attack and the second one is prevention. To stop a heart attack, nitroglycerin, validol, and for preventive purposes, organic nitrates are used - sustak, nitron, nitrolong, erinite, papaverine, no-shpa, carbocremen, anaprilin, amylnitrite, etc.

Nitrates have a spasmolytic (myotropic) effect and reduce venous blood flow to the heart. They save oxygen and energy consumption. Nitroglycerin increases the release of prostacyclin from the vascular wall by affecting the prostaglandin system, and reduces the release of thromboxane. The expansion of peripheral blood vessels, in turn, reduces the return of venous blood to the heart, and as a result, the diastolic pressure of the left ventricle decreases, the tension of the walls of the ventricle decreases.

The following side effects may occur when nitrates are used: reflex tachycardia, dizziness, tinnitus, headache, decreased arterial blood pressure, and collapse; they can become habituated with long-term use. Means that reduce the oxygen demand of the myocardium and improve its blood supply. They consist of organic nitrates, calcium antagonists and various other drugs.

Organic nitrates: nitroglycerin-nitric acid ester and glycerol. In medicine, a tablet, a sheath, a solution of ointment in oil and alcohol is used drop by drop (1-2 drops) in sugar. It is quickly pushed and eliminates the heart attack in 2-3 minutes. The effect lasts for 30 minutes.

It should be noted that nitroglycerin eliminates the central reflex that leads to contraction of coronary arteries. Recently, a number of different preparations of nitroglycerin with prolonged effect have been found, their importance is very great. One of such drugs is the silent pill, which is released in microgulphs. It is taken orally, the effect lasts for 4 hours. When 2% nitroglycerin ointment is applied externally, the effect appears in 15-30 minutes and lasts for 5 hours.

Trinitrolong is in the form of a polymer plate and is placed on the property.

Nitrogen has a longer effect. The effect lasts up to 7-8 hours. It is taken orally.

Erinite and nitrosorbites - have a long-term effect, but less activity. When taken orally, the effect starts in 30 minutes and lasts 1-4 hours. They bind to blood plasma oxygen. The body accepts well. Effects are lower than nitroglycerin.

Calcium antagonists . Phenigidine, verapamil and other drugs are used as calcium antagonists in heart attacks. They reduce myocardial oxygen demand and improve its delivery to the myocardium. In addition, they also affect subendocardial and collateral blood circulation. Phenigidine has a negative inotropic effect on the heart. Arterpal reduces diastolic blood pressure. Therefore, it is used in angina and hypertension. It cannot be used together with *β - adrenoblockers, during pregnancy and breastfeeding.* It is well absorbed when given orally. The effect appears in 15-20 minutes, the maximum effect is observed in 1-2 hours, and the effect lasts for 6 hours. When the blood plasma is 90% with oxygen, the kidneys are removed. Used orally and sublingually. Headache, reflex tachycardia, sometimes rashes on the skin, fever may occur. Verapamil (Isoptin) is mainly recommended as an antiarrhythmic drug. Increases potassium ions in the myocardium. Antianginal effect is weak. Pharmacological properties and side effects are similar to phenidine.

Various medicines. Amiodarone (Cordarone) is used as an antianginal and antiarrhythmic drug. It blocks some peripheral and *bg'* adrenoreceptors and reduces their effect on the sympathetic nervous system.

Means that reduce the oxygen demand of the myocardium. This group includes anaprilin and metoprolol from *β- adrenoblockers.* These preparations block *β1-* adrenoceptors in the heart and produce an antianginal effect. As a result, the work of the heart and the oxygen demand of the myocardium decreases. The central sedative effect of *β- adrenoblockers is considered to be somewhat beneficial.* In the treatment of angina pectoris, anvprilin (*β1* and *β2* adrenoblockers) is used as a non-selective agent, while metoprolol is a cardioselective (*β1-* adrenoblocker) agent.

Anaprilin blocks *β1-β2-adrenoceptors* in the heart, blood vessels, bronchi, gastrointestinal tract and others . Reduces atrioventicular conduction, reduces automaticity. The hypotensive effect caused by anaprilin is mainly due to a decrease in heart rate and renin secretion. Anaprilin can block *β2-* adrenoreceptors in the bronchi, increase the tension of the bronchi, and cause bronchospasm. Anaprilin is considered an adrenaline antagonist due to its hyperglycemic and lipolytic effects.

Adverse effects : heart failure, heart block, increased tension of peripheral vessels, bronchospasm, diabetes should be used with caution, as it can prolong hyperglycemia caused by other drugs.

Metoprolol is a cardioselective synthetic drug that mainly blocks *β1- adrenoreceptors in the heart.* Blockade of adrenoceptors in the bronchi and veins is much slower. Metoprolol good metabolites leave the intestines. Its maximum effect appears in 1.5 hours, and its effect lasts for 5-6 hours.

Side effects : headache, fatigue, sleep disturbance, increased bronchial tension in bronchial asthma.

Means that improve oxygen delivery to the myocardium. Myotropic coronary vasodilators.

Dipyridamol- (curantyl)- pyrimidine product is calculated. The main effect of dipyridamole is to supply a lot of oxygen to the myocardium, it is considered to reduce the

resistance of the coronary vessels and to increase the blood circulation in the veins. The mechanism of action of dipyridamole consists in reducing the absorption of adenosine by the heart and erythrocytes, improving the synthesis of adenosine and prostacyclins, and reducing the activity of the adenosine deaminase enzyme. This, in turn, prevents the formation of thrombosis. Adenosine has the property of dilating coronary arteries and is released during myocardial hypoxia.

In addition, it inhibits platelet aggregation and improves microcirculation in the myocardium. Dipyridamol cannot be used in coronary atherosclerosis and angina pectoris. Because in the place of occlusion, the small veins are maximally expanded. This is considered a compensatory state in hypoxia. And dipyridamole expands arterioles and collaterals in a healthy place, and promotes the arrival of blood and oxygen in the place of ischemia (the "throwing symptom" occurs). In general, dipyridamole is considered an active antianginal drug. It is given orally. Side effects: dyspeptic condition, dizziness, hypotension.

Carbochromene (intencordin, intensain) - relieves an attack of angina pectoris. It expands the coronary vessels for a long time. Improves collaterals when used long term. It has a negative effect on the heart, does not reduce arterial pressure. It is given orally and parenterol is administered. The additive effect is similar to carbomal.

Papaverine is one of the opium alkaloids of the isoquinoline class. Dilates the coronary arteries a little. Arterial deposit lowers pressure. Antianginal effect is weak. Adverse effects: can cause heart failure, ventricular fibrillation, and constipation.

No-shpa is similar to papaverine in its chemical structure and mechanism of action. Myotropic has an antispasmodic effect, but has a long-term effect.

Means with *β- adrenomimetic effect* . Nonachlazin is a phenothiazine product. It stimulates adrenoreceptors in the heart and coronary vessels and improves blood flow in the coronary arteries. The mechanism of action has not been fully studied.

Nonachlazin is used in various heart attacks.

It is given orally, the effect occurs in 2-5 days.

Side effects: itching, rashes on the skin.

It cannot be used with

β- adrenoblockers. **Oxyephedrine** - stimulates *β*- adrenoceptors and dilates coronary arteries similar to nonachlasin.

Increases heart rate with less force due to stimulation of *β- adrenoreceptors.* It also has a general peripheral antiarrhythmic effect. It is recommended to take internally in angina pectoris. It has moderate therapeutic activity.

Those who relieve coronary spasm by having a reflex effect. Validol. It is considered to be 20-30% menthol in isovaleric acid methyl ester. Validol is used to relieve angina attacks. A few drops of sugar are given or a pill or capsule is kept under the tongue until it dissolves.

If the effect does not appear within 2-3 minutes, it is replaced with nitroglycerin. Cardiac glycosides, antiarrhythmic agents, tranquilizers, anti-stenosis agents, and anticoagulants are also used in angina pectoris.

Drugs used in myocardial infarction. These are several groups of drugs that are used depending on the patient's condition. In the first place, the ogre slayers are given.

Final conclusion on the topic of the report (appendix #1)

It is necessary to take into account the individual characteristics and condition of the organism when taking drugs, because the sensitivity to drugs changes depending on the patient's age, gender, and genetic factors. The effect of drugs depends more on the state of the organism, in particular, on the pathology to which they are given, accordingly, their anticipated effects also change.

Thus, the general practitioner should analyze their pharmacodynamic and pharmacokinetic properties and their influencing factors when using cardiotonic drugs.

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Thus, the general practitioner should analyze their pharmacodynamic and pharmacokinetic properties and their influencing factors when using antiarrhythmic drugs.

Lecture

Topic 2: HYPOTENSIVE AGENTS. HYPERTENSIVE AGENTS.

Lecture educational technology model of pharmacology

Time: 80 minutes	*Number of students: 50-70*
Lecture plan	*1. 1. Introduction.* *2. 2. Classification of hypotensive agents.* *3. 3. Pharmacokinetics and pharmacodynamics of hypotensive agents.* *4. 4. Side effects of hypotensive substances.* *5. 5. Information about new modern antihypertensive agents.* *6. 6. Summary*
The purpose of the lecture:	*- To give students an understanding of the pathogenesis of hypertension, its causes. Information about new antihypertensive agents on their pharmacokinetics and pharmacodynamics. Explain the principles of treatment of hypertensive crises.*

Pedagogical tasks: **-to provide an understanding of hypotensive agents.** **- classification of hypotensive agents;** **- to provide complete knowledge about the mechanism of action of hypotensive agents;** **- to deepen knowledge about the main effect of hypotensive agents;** **- expanding and deepening knowledge about side effects of hypotensive drugs.** **- interest in broadening the scope of knowledge about the use of hypotensive agents and inadmissible cases and acquisition of practical skills;.**	**Results of educational activities:** **The student should know:** *They have an understanding of hypotensive agents;* *Hypotensive agents are clearly classified.* *They are well aware of the side effects of hypotensive drugs;* *They know when to use hypotensive drugs.* *Students know how to use first aid measures in case of acute and chronic poisoning with hypotensive agents.*
Educational methods	*Маъруза, муаммоли усул, ақлий хужум, мунозора, тезкор сўров*
Form of education	*Teamwork, working in groups*
Educational tools	*Lecture text, computer, multimedia, slides, visual materials, marker,*
Educational conditions	*A room designed and equipped for lectures at TTA*
Monitoring and evaluation	*Verbal inquiry: rapid inquiry, written inquiry*

Technological map of the thematic lecture

Work stage- and time 80 minutes	Activity	
	educator	learners
Stage 1. Enter 5 minutes	1.1. It conveys the topic's name, purpose, and expected results. Topic Basics: Introduces the keywords and topic outline for the topic. Gives a list of references.	They listen and record.
Stages 2. Activity activation 10 minutes	2.1. Asks stimulating questions to engage students in brainstorming: - Pharmacological composition of Clofelin? - Mechanism of action of methyldopa? - Which drugs are neurotropics?	

	- What are the side effects of minoxidil? 2.2. Answers will be heard and a blitz survey will be conducted with the students. 2.3. Giving students an idea about the plan of lectures and intermediate, final controls, rating control in the department of private pharmacology.	
Stage 3. Basic information section 55 minutes	3.1. Using multimedia slides according to the plan of the lecture, the subject of the lecture will be conveyed to the students and specific questions will be addressed. Classification of hypotensive drugs according to question 1. According to question 2, the effect of hypotensive drugs on the body. According to question 3, the mechanism of action of hypotensive drugs. According to question 4, the use of hypotensive drugs. Question 5 Side effects of hypotensive drugs. 3.2 Emphasis is placed on the necessary, necessary questions on the topic and students are invited to write them down:	They listen to the lecture, see schemes, tables and visual materials, discuss and ask clarifying questions. they ask and ask questions where they don't understand. They record the necessary and basic information.
Step 4. Finisher 10 minutes	By asking short questions on the topic, it is determined how the students mastered the topic. - What is the mechanism of action of methyldopa on the body? - Which drugs have a myotropic spasmolytic effect? - What are the main properties of neurotropic agents? - What means are included in the group of myotropic means? Final conclusions on the topic are made.	Answers questions.

HYPOTENSIVE MEDICINES

Blood pressure depends on many factors: the work of the heart, the tone of peripheral vessels and their elasticity, the total volume of blood, the composition of electrolytes, and its viscosity. All of the above are controlled by neurohumoral mechanisms.

Hypotensive agents are substances that lower blood pressure. Pharmacological effects of hypotensive agents can be on many joints (links) involved in the physiological control of blood pressure.

HYPOTENSIVE MEDICINES

I. I. Means that reduce the stimulating effect of adrenergic nerves on the cardiovascular system (neurotropic means).

1. Means that reduce the activity of vasomotor (controlling the movement of blood vessels) centers, clofelin, methyldopa;

2. Ganglioblockers hygronium, pentamine, benzohexonium;

3. Sympatholytics octadine, reserpine;

4. Adrenoblockers; α-adrenoblockers phentolamine, tropafen, prozazin, β-adrenoblockers anaprilin, metaprolol, talinol, α and β adrenoblockers lobetalol.

II. Myotropic agents that directly eliminate the spasm of the smooth muscles of the vessels;

1. Activators of potassium channels are apressin, diazoxide, minoxidil

2. Nitric oxide donors sodium nitroprusside;

3. Means that block calcium channels (calcium antagonists) - phenigidine, diltiazem;

4. Various drugs, dibazol, magnesium sulfate, papaverine, no-spa.

III. Agents affecting the renin-angiotensin system;

1. Angiotensin II synthesis inhibitor captopril, enalapril;

2. Saralazine, which blocks angiotensin receptors.

IV. Agents affecting water-salt exchange (diuretics): dichlothiazide, spironolactone, furasemid.

Sedative, anxiolytic, hypnotic agents, along with a calming effect, have a more or less depressant effect on the center of blood vessels and dilate vessels, lowering blood pressure.

CLOFELIN is a central hypotensive agent. The drug stimulates α2-adrenoreceptors located in the solitary tract, as a result, it weakens the neurons involved in the control of vascular tone located in the medulla and possibly the hypothalamus (when α2adrenoreceptors are stimulated, the release of noradrenaline decreases and the sympathetic nerve effect decreases). Due to this, spontaneous impulses coming to the preganglionic part of sympathetic nerve fibers are reduced, and stable, strong hypotension, bradycardia, a decrease in the total resistance of peripheral blood vessels, and a decrease in heart rate are observed. But at the beginning of the effect of Clofelin, short-term hypertension (due to stimulation of peripheral α-adrenoreceptors) appears.

Clofelin lowers body temperature, has a sedative and hypnotic effect (depressant effect on MNS), increases appetite, reduces secretory and motor activity of MIT (constipation), increases Na+ ions and water retention in the body. The hypotensive effect of Clofelin begins after 2-4 hours and lasts for 6-12 hours. T½about 12 hours. Well absorbed from MIT.

Application: GB (sadness) and its attacks (crisis). Stopping the use of the drug is carried out gradually, as the withdrawal syndrome develops (insomnia, hypertensive crisis).

METHYLDOFA is transformed into α-methylnoradrenaline in the body, which, like clofeline, stimulates α-adrenoreceptors in the MNS and reduces the activity of neurons involved in blood pressure control. Methyldopa has a calming effect on the MNS and induces sleep. When drinking from MIT, up to 50% of the drug is absorbed. Hypotensive effect begins after 4-5 hours and lasts up to a day. In severe cases, methyldopa can be administered intravenously. Usually methyldopa is well tolerated by patients, but sometimes side effects such as depression, parkinsonism, dyspepsia, dry mouth may develop. In rare cases, agranulocytosis, thrombocytopenia, hemolytic anemia occur.

APRESSIN - similar to diazoxide and minoxidil, is mainly included in agents that expand resistant vessels (arterioles) and small arteries. The drug reduces the total resistance of peripheral vessels and blood pressure. The drug causes reflex tachycardia. Well absorbed from MIT. The effect is the highest after 1 hour. 80-90% of absorbed apressin is bound to proteins. It is acetylated in the body.

Adverse effects: changes such as dyspepsia, rheumatoid arthritis and lupus erythematosus.

DIAZOXIDE - the drug lowers the tone of arterioles. It slows down the work of the heart. After intravenous injection, it quickly and strongly lowers blood pressure. The effect lasts 12-18 hours. It is used to relieve an attack of anxiety.

Adverse effects: It slows down the excretion of Na+ ions and water from the body. Develops hyperglycemia, hyperuricemia.

MINOXIDIL is an agonist of vascular smooth muscle potassium channels, similar to diazoxide. Has little effect on veins. Reduces total resistance of peripheral vessels, increases tachycardia and cardiac output. It is well absorbed from MIT (90%), most of it (90%) is broken down in the liver, forming pharmacologically active metabolites. The effect begins after 30 minutes. Metabolites are mainly (97%) excreted in urine (24-48 sometimes 75 hours). It passes through the placenta.

Adverse effects: similar to diazoxide.

DIBAZOL is a benzimidazole derivative. Repels spasm of smooth muscles of internal organs and vessels. It lowers blood pressure by dilating blood vessels and reducing the volume of blood pumped by the heart. The hypotensive effect is moderate and not persistent. It is often used in combination with other hypotensive agents. It is injected into a vein in cases of heart attack. Patients take it well. Side effects are rare.

PAPAVERINE – an alkaloid- isoquinoline product in Karadori, a myotropic spasmolytic. Moderately expands the coronary vessels of the heart, increases the oxygen demand of the myocardium. Expands large vessels and arterioles. In large doses, conduction in the atrioventricular node is disturbed.

The structure and mechanism of action of NO-ShPA are similar to kidney papaverine, but its antispasmodic effect is stronger and longer.

MAGNESIUM SULFATE - has myotropic spasmolytic properties, significantly lowers blood pressure. Reduces the release of AX in vegetative ganglia (ganglioblockatory property). In large doses, it weakens the center of blood circulation. Sedative, anticonvulsant, has a narcotic

effect in large doses. The width of the therapeutic effect is small, therefore, if the dose is exceeded, it paralyzes the respiratory center, develops miorolactation. CaSl2-antagonist is introduced for elimination. SODIUM NITROPRUSSIDE is a myotropic agent. Has a short effect (1-2min). Resistive (arterioles, small arteries) dilates vessels. It does not change the systolic volume of the heart, because it reduces the volume of blood returning to the heart with veins. Tachycardia develops. The mechanism of action is similar to nitroglycerin: that is, it increases the activity of the enzyme guanylate cyclase and increases the amount of tsGMF, due to which the smooth muscles of the vessels relax. Sodium nitroprusside drops are used in anxiety attacks, controlled hypotension, and heart failure.

CAPTOPRIL - angiotensin II plays an important role in controlling vascular tone. The liver secretes α2globulin (renin substrate) or angiotensinogen. When it is affected by renin (proteolytic enzyme) produced by the supraglomerular apparatus of the kidney, angiotensin I is formed. Renin, angiotensinogen, angiotensin I have no vasoactive effect. Angiotensin I is converted to angiotensin II in many peripheral tissues (kidneys, lungs) and vascular endothelium under the action of kinase II (peptidylpeptide hydroxylase-angiotensin-converting enzyme). It is 50 times stronger than noradrenaline. Under the influence of angiotensin II, the release and synthesis of NA increases, the release of aldosterone from the adrenal gland increases. Na+ and water are retained in the body. Blood pressure rises. Captopril has a high affinity for angiotensin-converting enzyme and blocks it. As a result, the formation of angiotensin II decreases, the stimulation of angiotensin receptors of vessels and the adrenal gland decreases. As a result, the release of aldosterone decreases, the vessels relax, and blood pressure decreases. At the same time, the secretion of prostacyclin and PGE2 increases. Blood vessels expand and their total resistance decreases. Heart volume and heart rate do not change. Captopril from MIT is well absorbed. The effect begins after 30-60 minutes and lasts more than 8 hours. Captopril is broken down in the liver, its metabolites are excreted in the urine. It does not pass to the MNS, nor does it pass through the placenta. Can be used together with other hypotensive agents. Patients take it well.

Adverse effects: allergic reactions, taste disturbances, tachycardia.

SARALAZIN is an analogue of angiotensin II. It is also a competitive antagonist of its receptors. It eliminates the hypertensive effect of angiotensin II. The effect is short, 6-8 minutes, because it is quickly broken down under the action of peptidases. The drug is administered intravenously, as it breaks down quickly in the gastrointestinal tract. But because Saralazine has agonist properties, it can increase blood pressure. Therefore, it is not an ideal drug as a hypotensive agent.

Final conclusion on the topic of the lecture (appendix #1)

It is necessary to take into account the individual characteristics and condition of the organism when taking drugs, because the sensitivity to drugs changes depending on the patient's age, gender, and genetic factors. The effect of drugs depends more on the condition of the organism, in particular, on the pathology to which they are given, accordingly, their expected effects also change.

Thus, the general practitioner should analyze their pharmacodynamic and pharmacokinetic properties and factors affecting them when using hypotensive drugs.

Lecture

Topic 3: MEDICINES AFFECTING GASTROINTESTINAL AND LIVER FUNCTION.

Lecture educational technology model of pharmacology

Time: 80 minutes	***Number of students: 50-70***
Lecture plan	1. Introduction. 2. Digestive process. 3. Use of means affecting the activity of digestive organs 4. Pharmacodynamics and pharmacokinetics of agents affecting digestive organs 5. The main principles of using the means affecting the activity of the digestive organs.
The purpose of the lecture:	*Formation of knowledge about the means affecting the activity of digestive organs.*
Pedagogical tasks: ***- to give an understanding of the means affecting the activity of the digestive organs.*** ***- classification of agents affecting the activity of digestive organs;*** ***- to provide complete knowledge about the mechanism of action of the agents affecting the activity of the digestive organs;*** ***- to deepen the knowledge about the main effect of the means affecting the activity of the digestive organs;*** ***- to expand and deepen knowledge about the side effects of the means affecting the activity of the digestive organs.*** ***- - interest in expanding the range of knowledge about the use and inadmissibility of the means affecting the activity of the digestive organs and acquisition of practical skills;***	*Results of educational activities:* *The student must perform* *- express their understanding of the means affecting the activity of the digestive organs;* *- clearly classify the means affecting the activity of the digestive organs.* *- tell the side effects of the means affecting the activity of the digestive organs;* *- they tell when to use the means that affect the activity of the digestive organs.* *- to know the side effects caused by the use of agents that affect the activity of the digestive organs and to reveal the necessary measures in such a case.*
Educational methods	*Report, problem solving method, brainstorming, discussion, rapid inquiry*

Form of education	*Teamwork, working in groups*
Educational tools	*Lecture text, computer, multimedia, slides, visual materials, marker,*
Educational conditions	A room designed and equipped for lectures at TMA.
Monitoring and evaluation	*Verbal inquiry: rapid inquiry, written inquiry*

Technological map of the thematic lecture

Work stage- and time	***Activity***	
	Educator	***Learners***
Stage 1. Enter (5 minutes)	*1.1. It conveys the topic's name, purpose, and expected results. Topic Basics: Introduces the keywords and topic outline for the topic. Gives a list of references.*	*1.1 They listen*
2 stages Activity activation (5 minutes)	*2.1. Asks stimulating questions to engage students in brainstorming:* *- How are the agents affecting the digestive organs classified?* *- What are the requirements for the means affecting the activity of the digestive organs?* *- What drugs are included in the means affecting the activity of digestive organs?* *- The mechanism of action of agents affecting the activity of digestive organs?*	*2.1 They answer the questions.*
Stage 3. Basic information section (75 minutes)	3.1. In accordance with the plan and structure of the lecture, he describes the order of actions for the organization of the educational process and analyzes its content by showing the slides with this information. Emphasizes the keywords of the topic. 3.2. Blitz - conducts a survey and uses a system of thematic questions: 1. Classification of agents affecting the activity of digestive organs 2. The use of means affecting the activity of digestive organs 3. Side effects of the means affecting the activity of digestive organs	3.1. They analyze the scheme, the content of the slides. They write down the necessary information in the lecture notebook. 3.2. They answer questions.
Step 4. Finisher (5 minutes)	4.1. By asking short questions on the topic, it is determined how the students mastered the topic. 4.2. Invites students to ask questions and answers these questions	4.1. They listen and record 4.2. They clarify and ask questions.

MEDICINES AFFECTING THE MEANS OF DIGESTION.

In many pathological cases, there is a change in the activity of the organs of the gastrointestinal tract. This situation undoubtedly has a negative impact on the course and outcome of the disease, because the gastrointestinal tract is important for digestion and absorption of nutrients into the blood. Many drugs are used to eliminate dysfunction of the organs of the gastrointestinal tract. They affect the secretion and excretory functions of the stomach and intestines.

Appetite suppressants.

Appetite largely depends on the functional state of the cerebral cortex and the limbic system, as it is controlled by the hunger center located in the lateral nucleus of the hypothalamus and the satiety center located in the ventromedial nucleus of the hypothalamus. Appetite control is mainly related to the noradrenergic dopamine and serotonergic systems. Appetite changes are of 2 types (increased and decreased), and accordingly, the means to eliminate it are divided into the following groups:

1. Appetite-increasing agents (bitters, insulin, psychotropic, neurotropic agents, anabolics, etc.):

2. Appetite suppressants (anorexic agents):

1) Agents affecting the catecholaminergic system (stimulators of the CNS):

• phenamine derivatives and analogs fepranon, dezopimon.

• isoindole products mazindol

2) Means affecting the serotoninergic system (depressants of MNS): fenfluramine.

Bitters are glycosides isolated from plants with a bitter taste. They stimulate receptors in the oral cavity and tongue, increase the secretion of gastric juice in a reflex way, increase appetite and improve food digestion. Bitters are used in hypoacid and chronic atrophic gastritis, anorexia caused by nervous diseases, and in the period after operations.

Bitter Armenian Tincture - contains absinthe alkaloid and absintheol - essential oil. The reflector increases the excitability of the hunger (opening) center. After that, it enhances the complex reflex phase of gastric secretion to the food received. But bitters themselves do not increase the secretion of gastric juice. This group also includes erbakho (gorichavka), zubturum (podorjnik), buznoch (bessmertnik), garimdori, apilak, appetite tea and others.

INSULIN - reduces the amount of glucose in the blood and increases the feeling of hunger, because there are special "glucoreceptors" in the center, which are sensitive to the difference in the amount of glucose in arterial and venous blood. Due to this, glucagon reduces appetite at the expense of hyperglycemia, sweet tea also has this property, some psychotropic drugs (aminazine, amitriptyline, lithium carbonate), neurotropic hypotensive drugs (hemiton - clofelin) also increase appetite. Anabolic hormones also increase appetite.

ANOREXIGENOUS AGENTS.
(an - elimination, orexis - appetite).

The means of this group are mainly used in alimentary obesity. Obesity has a negative effect on the course of many diseases and pathologies, as it disrupts metabolism and the cardiovascular system. The most effective way to eliminate obesity is to limit food intake. But the

feeling of hunger will prevent you from doing it. Anorexigenic drugs are used to eliminate that severe feeling of hunger.

PHENAMIN - having central and peripheral adrenomimetic properties, suppresses the feeling of hunger by stimulating the satiety center. But phenamine is a strong psychostimulant, it causes insomnia, restlessness, tachycardia and increases blood pressure. At the same time, addiction to it develops, because euphoria is called. For this reason, this drug cannot be used as an anorexic agent. But the products of phenamine are synthesized and have more selective anorexigenic effect.

FEPRANON has a weaker effect (stimulates) on the CNS than Phenamine. Less affects peripheral adrenergic structures.

Application: alimentary obesity, adeposogenital dystrophy, hypothyroidism and other types of obesity. Treatment with fepranon is carried out in combination with fasting and fasting days with low potency. Fepranon is well tolerated by patients. Treatment lasts 1.5-2 months.

Contraindications: high-grade heart disease (GB), severe cerebral and coronary blood circulation disorders, myocardial infarction, thyrotoxicosis, glaucoma, malignant tumors of the pituitary gland and adrenal gland, diabetes, psychoses, seizures, sleep disorders. Fepranone can not be used together with MAO inhibitors nialamide.

DEZOPIMONE is similar to fepranon. Anorexigenic effect occurs without strongly stimulating the MNS, weakly increases blood pressure.

Indications: Similar to fepranon.

MAZINDOL – stimulates the CNS like phenamine. 5-10 times stronger than him.

Mechanism of action: increases the release of adrenaline and noradrenaline from the presynaptic membrane, reduces their re-neuronal absorption. MIT reduces the absorption of triglycerides, slows down their synthesis, reduces the amount of cholesterol in the blood, has a moderate antidepressant effect. Low power makes dieting easier.

Side effects: sleep disturbance, dry mouth, nausea, constipation, allergic reactions, nervousness.

FENFLURAMIN is characterized by a sedative effect on the CNS. Does not change blood pressure.

Mechanism of action: reduces the amount of serotonin in the brain, as it increases its release, reduces re-neuronal absorption and increases its metabolism. In addition, fenfluramine suppresses dopamine receptors. The drug increases the absorption of glucose in peripheral tissues, reduces the absorption of triglycerides from MIT and their synthesis. Enhances lipolysis.

Adverse effects: drug dependence, drowsiness, depression, inflammation of the MIT. It gives pleasure in large doses. Sometimes drug addiction develops.

MEDICINES AFFECTING THE ACTIVITY OF THE SALIVARY GLANDS.

AMPLIFIERS: pilocarpine, carcholine, anticholinesterase agents-proserin;

ATTENUANTS: atropine.

Mainly used in hypersalivation (in case of worm infestation, parkinsonism, poisoning with heavy metal salts)

MEDICINES USED IN DISORDER OF STOMACH FUNCTIONS.

The secretory and motor functions of the stomach are controlled by the vagus nerve and MIT hormones. M-n: gastrin, histamine. Stimulation of the vagus nerve increases gastric secretion. Many substances produced in the body (secretin, cholecystokinin-pancreozymin, prostaglandin E2, peptide VIP, which activates intestinal vessels, and peptide GIP, which suppresses gastric secretion) on the contrary, reduce gastric secretion. (VIP-Vasoactiveintestinalpeptide), (GIP-Gastricinhibitorypeptide) In order to properly ensure the digestive properties of gastric juice, it should have a pharmacological effect on the gastric glands. When the activity of these glands decreases, strengthening agents or replacement agents should be used. In case of hyperfunction, on the contrary, inhibitors are used. Gastrin, histamine and extractive substances are mainly used for the purpose of diagnosis. If the decrease in gastric secretion is due to functional changes, these agents will increase the secretion of gastric juice, but not if it is due to organic injury. The best tool for diagnosis is gastrin. It is formed in the antral part of the stomach after eating, is absorbed into the blood, and has an effect on the glands in the fundal part of the stomach, increasing the secretion process in them. Gastrin is much stronger than histamine in terms of its effect and has a selective effect. Gastrin, like histamine, stimulates the release of Nsl and pepsinogen, intrinsic factor of Castle, and pancreatic secretion and bile production. Synthetic gastrin-pentagastrin is used in medical practice. It consists of 2 polypeptides, each consisting of 5 amino acids, while the gastrin molecule consists of 17 amino acids.

HISTAMINE – by stimulating N2 receptors, strongly increases gastric juice and its acidity. Histamine has a wide range of effects. It lowers blood pressure, increases capillary permeability, causes bronchospasm, causes intestinal spasm. Therefore, before the introduction of histamine, patients are given antihistamines, because they eliminate other changes from the effect of histamine on gastric juice. Mineral waters carbonated with SO2 gas also increase gastric secretions and are used medicinally. If the production of gastric juice is sharply reduced or completely stopped, natural gastric juice (Succusgastricusnaturalis), pepsin (Pepsin - 0.2-0.5 g), diluted hydrochloric acid (Acidumhydrochloridumdilutum) can be used instead. TabulettaAcidum-pepsin (consists of 1 part of pepsin and 4 parts of acidin-betaine hydrochloride, which is hydrolyzed in the stomach and free HCl is formed). In medicine, gastric juice, acedin-pepsin tablets and pepsin are mainly used in cases of hypoacidity.

MEDICINES THAT REDUCE THE SECRETION OF GASTRIC GLANDS.

The drugs of this group reduce the amount of gastric juice and are mainly used in hyperacidic conditions, gastric and duodenal ulcers. Such tools are divided into the following groups:

1. Cholinergic blockers:

a) non-selective M-cholinoblockers, atropine sulfate

b) pirenzepine, which mainly block M-cholinergic receptors of the stomach

c) ganglioblockers pyrylene, benzohexonium.

2. N2-receptor blocking means ranitidine, cimetidine, famotidine, nizatidine, roxatidine.

3. Proton pump inhibitors, omeprazole.

4. Prostaglandins and their synthetic derivatives misoprostol.

PIRENZEPIN (gastrozepine) - mainly blocks the M-cholinergic receptors of the stomach. All effects are due to the effect on the peripheral nervous system, because it does not pass through the GEB. Blocks M-cholinoreceptors of parasympathetic synapses of parietal and gastrin-producing cells located in the gastric mucosa. Therefore, it reduces basal and stimulated HsI acid and pepsinogen secretion, as well as gastrin release. Pirenzepine, although less, simultaneously reduces the secretion of salivary glands.

Half of the drug is absorbed from the gastrointestinal tract. The T½ period is approximately 8-20 hours. The drug does not pass through GEB and placenta.

Currently, famotidine, ranitidine, nizatidine, and cimetidine are used as N2-receptor blockers with strong activity. These drugs are histamine derivatives in terms of their chemical structure. (the imidazole part of the molecule is preserved).

Classification of N2-blockers:

first generation-cimetidine

second generation-ranitidine

third generation-famotidine

fourth generation-nizatidine

fifth generation-roxatidine

Mechanism of action: related to the activity of adenylate cyclase enzyme, because when N2-receptors are stimulated, the activity of adenylate cyclase increases and the amount of intracellular tsAMF increases. As a result, the secretory activity of parietal cells in the gastric mucosa increases. Under the influence of histamine, the amount of tsAMF increases in other tissues (fat cells, T-lymphocytes, myocardial cells, fat cells and some parts of the MNS). N2-receptor blockers are competitive antagonists of histamine. Their main effect is related to the secretion of the mucous membrane of the stomach: it consists in sharply reducing the secretion of NCl in the parietal cells; in which the basal secretion of HCl is also reduced. To a lesser extent, the secretion of pepsinogen and Kasl's intrinsic factor is reduced. In general, the volume of gastric juice decreases. In addition to reducing the synthesis of HCl and pepsin, N2-receptor blockers increase the blood circulation in the gastric mucosa and increase mucus production. They increase the synthesis of PG (prostoglandins). It also increases the proliferation of gastric epithelium. That is, N2-blockers not only reduce the aggressiveness of gastric juice, but also increase the trophism of the gastric mucosa and strengthen its defense ability.

Most N2-receptors pass poorly into the MNS, because those with low lipophilicity are excreted unchanged in the urine. Part of it enters the intestine in the bile and is excreted in the feces. N2-blockers are mainly used in gastric and duodenal ulcers, hypergasternemia, esophagitis, peptic esophagitis, erosive gastritis and duodenitis.

RANITIDINE– (zontak) has high N2-blocking effect, selective effect, low toxicity, well absorbed from MIT (bioavailability 50%). Unlike cimetidine, there is no antiandrogenic effect at all. Almost does not affect MOS enzymes. 55% of unchanged drug is excreted in urine, 45% in feces. It passes through the placental barrier well, after drinking, it passes into the cerebrospinal fluid, and is excreted in milk. Duration of effect is 8-12 hours (T½=2.7 hours). Ranitidine has no serious side effects. Some patients experience headaches, weakness, dyspepsia (constipation or diarrhea), allergies. In rare cases: drowsiness, mental changes, granulotidopenia, thrombocytopenia, gynecomastia may occur.

RANITIDINE VISMUTTTSITRATE (piloride) is a drug with bactericidal activity against Helicobacter pylori and N2-blocking effect. It has strong healing properties in stomach and duodenal ulcers.

Famotidine (quamatel) is an N2-blocker 3-4 times stronger than ranitidine. It has a more lasting effect on him. No antiandrogenic effect. It does not negatively affect MOS activity (T½=3-8 hours), does not increase prolactin levels, does not cause gynecomastia.

Indications: gastric and duodenal ulcers, symptomatic erosive ulcers of MIT (burn patients, brain injuries, myocardial infarction, after operations, caused by endocrine diseases (Zollinger-Ellison syndrome, hyperparathyroidism), under the influence of anti-inflammatory drugs and steroid hormones advanced gastrointestinal ulcers In preventing and stopping gastrointestinal bleeding Famotidine (Quamatel) parenteral form Pentoprozole, lansoprozole also have a similar effect to omeprozole.

mizoprostol - a synthetic product of pge, reduces the secretion of hsl in the stomach, increases the secretion of bicarbonates and mucus. increases the regeneration of gastric mucosa cells, improves microcirculation in it. in general, it strengthens the ability of the mucous membrane to resist the aggressive effects of gastric juice and other factors. it is also effective when drinking. the treatment of acutely developed ulcers in the mucous membranes of the stomach is weak compared to n2-blockers. often causes diarrhea.

application: in chronic ulcer diseases of the stomach and duodenum, to prevent the occurrence of gastric ulcer by nonsteroidal anti-inflammatory drug.

side effects: diarrhea, mild nausea, headache, abdominal pain, nausea, drop in blood pressure.

contraindications: in case of increased sensitivity to prostaglandins, lactating women, pregnancy, intestinal inflammation, blood circulation disorders in the brain and coronary arteries.

ANTACID MEDICINES.

(anti-against, acidus-ore, sour).

Most of the agents of this group have a basic property and neutralize it by reacting with NCl acid in gastric juice.

SODIUM HYDROCARBONATE – antacid action is fast-onset but short-lived. It produces SO2 gas, which expands the volume of the stomach and secondarily increases its secretion.

The antacid effect of MAGNESIUM OXIDE and MAGNESIUM TRISILICATE develops slowly, but is 3-4 times stronger than that of sodium bicarbonate.

ALUMINUM HYDROXIDE - has antacid and adsorbing properties, can cause constipation.

CALCIUM CARBONATE. The effect starts quickly. Produces SO2, can cause constipation. Less absorbed than MIT, due to which the systemic effect is less. But in large doses it develops hypercalcemia and alkalosis.

GASTROPROTECTORS (CYTOPROTECTORS)

The drugs of this group have a direct effect on the gastric mucosa and increase its resistance to external damaging effects (physical, chemical...). It is mainly used in stomach and intestinal diseases to maintain the structure and functions of the gastric mucosa. They are mainly divided into two groups.

I. Means that create mechanical protection of the mucous membrane: sucralfate, tripotassium dicitrate of bismuth.

II. Means that increase the protective function of the mucous membrane barrier and its resistance to damaging factors: carbenoxolone, misoprostol.

SUCRALPHATE (antepsin) is a white-yellow gel consisting of sulfated sucrose sugar and polyaluminum oxide. In an acidic environment, when it is less than RH4, it is polymerized, forming a very viscous (serous) substance, which especially covers the surface of wounds. This property of the drug is also preserved in the duodenum. But a small amount adheres to the uninjured mucous membrane. It stays on the surface of the wounds for about 6 hours. Substances with PG and SH groups also play a role in the manifestation of sucralfate's gastroprotective properties. The drug is taken after meals and before bedtime. However, it is not necessary to use sucralfate together with antacids and N2-blockers, because an acidic environment is necessary for the effect of the drug to appear. Sucralfate is not absorbed from MIT, that is, the drug has no resorptive effect.

Adverse effects: sometimes constipation, dry mouth are observed.

DENOL (bismuth tripotassium dicitrate) is a colloidal suspension that forms a white precipitate under the action of gastric acid. This deposit forms a strong coating with glycoproteins in the gastric mucosa and especially on the wound surface. As a result, a protective layer consisting of a polymerglycoprotein complex is formed on the surface of the wound. The drug has no side effects.

Currently, according to some scientists, one of the factors that cause chronic gastritis and peptic ulcer disease is the positive spiral bacteria Helycobacterpylori. Denol is used in its treatment along with metronidazole, tetracycline and amoxicillin.

КАРБЕНОКСОЛОН (biogastron) is a cyclic triterpene, isolated from the root of sweet brain. Its effect increases the production of mucus from the mucous membrane of the stomach. Its viscosity is high and forms a strong protective layer. In addition, under the influence of the drug, the activity of the enzyme that decomposes PG decreases. 90% of the absorbed drug binds to blood serum proteins, it is separated in the bile and reabsorbed from the intestine into the blood (intestinal-hepatic recirculation). It is mainly excreted in feces, only 1% is excreted in urine. It is more effective in gastric ulcer compared to duodenal ulcer. Carbenoxolone, having a steroid structure, has mineralocorticoid activity and therefore has unpleasant effects: accumulation of water, Na+ ions in the body, swelling, hypertension, hypokalemia. Spironolactone eliminates these

changes, but the therapeutic effect of the drug also disappears. Diuretics from the thiazide group do not weaken the gastroprotective properties of carbenoxalone and eliminate its unpleasant effects.

In general, gastroprotectors protect gastric and duodenal ulcers from external injury factors and create favorable conditions for their healing. Agents that accelerate wound healing (i.e. enhance reparation) may also be beneficial in gastric and duodenal ulcers. Such drugs include: sodium oxyferriscarbon, salcoseryl, methyluracil, vitamin U, anabolic steroids.

MEDICINES AFFECTING GASTRIC MOTORICS.

This group of tools is divided into two:

1. Prokinetic agents (stimulators of gastric motility) metoclopramide, cisapride, domperidone. They are mainly used when the evacuation of food mass from the stomach slows down and in the gastroesophageal reflex.

2. Antikinetic agents (depressants of gastric motility) cholinoblockers: m-cholinoblockers, ganglioblockers, buscopan, probantin, spasmolytics: papaverine, no - spa

RETURN AND ANTI-RETURN DEVICES.

Vomiting (vomiting) is a complex reflex process, which involves many groups of muscles (stomach, small intestine, diaphragm, abdominal wall, etc.). Vomiting develops because the vomiting center is provoked by various influences. For example: disgusting appearance, smell, taste. In addition, exposure to the vestibular apparatus or stimulation of various interoreceptors also develops vomiting. At the bottom of the fourth ventricle of the brain there is a vomiting center, the stimulation of its chemoreceptors causes vomiting. (triggerzone - starting zone). These chemoreceptors consist of dopamine D2, serotonin - 5NT3 and M1 - cholinergic receptors. Often, emetic substances stimulate these receptors, causing vomiting directly or reflexively.

APOMORPHINE HYDROCHLORIDE – stimulates dopamine receptors in the trigger zone.

According to the mechanism of action, anti-inflammatory agents are divided into two groups:

1. Agents that directly stimulate the vomiting center or the trigger area that activates it are apomorphine hydrochloride.

2. Indirect or reflective means of regurgitation: copper sulfate, zinc sulfate, ipecac root, thermopsis-legendary herbs.

Digitalis flower preparations and antiblastoma agents used in the treatment of malignant tumors (for example: chlorethylamines) also have an effect on vomiting like apomorphine.

Indirect-reflex emetics induce vomiting by stimulating gastric receptors when ingested, but also directly affect the trigger zone when absorbed into the bloodstream. In particular, thermopsis and ipecacuanha preparations have such an effect. But these two drugs are not used as an antiemetic, because after taking them, there is a long period of nausea. But during this period, the secretion of the bronchial glands and the movement of the floating epithelium increases, the volume of sputum increases, its viscosity decreases and its separation becomes easier. Because of this, they are used as an expectorant. Copper sulfate and zinc sulfate have only a peripheral reflector effect. The mechanism of action of veratrum alkaloids on vomiting is unique. They

stimulate the ganglion of a stray nerve (g.nodozum) and develop vomiting. Reversible agents are rarely used. In particular, in cases where gastric lavage is not possible for some reasons, apomorphine is mainly used. This drug is also used to treat alcoholism and create a negative reflex. However, in case of poisoning with strong acids and alkalis (chemical burns of the stomach), gastric and duodenal ulcers, diseases that may bleed from the lungs, and severe heart diseases, emetics cannot be used. Apomorphine does not work when poisoned with drugs that paralyze the vomiting center (for example: anesthetics).

ANTI-RETURN REMEDIES

When using the means of this group, it is necessary to be based on the causes of vomiting. For example, shaking (seasickness) and altitude sickness (airsickness) strongly stimulate the receptors located mainly in the balance apparatus (vestibular), activates the vomiting center through M-choline and N1-histamine receptors in the brain. In such cases, it is appropriate to give scopolamine-containing preparations to people with high excitability of the vestibular apparatus. One of the widely used anti-concussion products is "AERON" tablets. It should be drunk 30-60 minutes earlier (before boarding a plane, ship or car) in order to prevent vomiting. The effect lasts about 6 hours. In such cases, antihistamines are also effective (diprazine, dimedrol) because they have sedative and cholinergic properties. In addition, they must have a direct effect on the return center. But these drugs have unpleasant effects such as drowsiness, dryness of the mouth and disturbance of accommodation.

METOCLOPRAMIDE (Cerucal, Reglan) is an active antiemetic compound. Benzamide inhibits the withdrawal-initiating region because it blocks D2-dopamine and, in large doses, 5-NT3-receptors in the MNS. Metoclopramide is more active than aminazine and has a selective effect on vomiting. Therefore, general mental retardation is not observed under its influence. Metoclopramide is also used in gastric and duodenal ulcer disease, dyskinesia of MIT, flatulence, as it improves gastric and small intestinal peristalsis (

tropisetron (navoban) – blocks 5 nt3-seronine receptors. absorbed quickly from mit. the effect lasts about 1 day. it is mainly used as an antiemetic in chemotherapy of malignant tumors.

adverse effects: headache, dizziness, dyspepsia, hypertension, rarely hallucinations develop.

glucocorticoids (dexamethasone) also have antiemetic properties.

when stopping and preventing vomiting, it is necessary to remember the following: continuous vomiting can cause dehydration (due to excessive water loss), alkalosis, and hypokalemia. to prevent this, along with antiemetics, additional vitamins (v1, v6, v12), insulin, isotonic saline solution, and glucose are administered parenterally.

One of the physiological importance of bile is the fat-emulsifying property of bile acids contained in it. It is known that fats in the emulsion state are absorbed by the enzyme lipase and absorbed from the intestine. Insufficiency of bile can be due to 2 different reasons: violation of bile formation in liver attacks or violation of bile flow into the intestine. Based on this, bile drive agents are divided into two types:

1. Means that increase the production of bile (choleretics, cholesecretics, chole-grass, rheo-flow).

2. Means that increase the excretion of bile (cholagoga or holikinetics-chole-bile, ago-drive).

3. Means that increase the formation of bile (choleretics) are divided into the following.

• Bile acids and their salts dehydrocholic acid, hologone, dehydrocholine.

• Bile preparations - "cholenzym" tablets.

• Preparations made from plants - kholosas.

• Synthetic drugs-oxaphenamide

All of these preparations increase the production of bile, especially its fatty acids.

MEDICINES TO ENHANCE BILE EXCRETION

(to the speaker)

This group includes simple sphincter relaxants. Basically, these are M-cholinoblockers and spasmolytic drugs with a myotropic effect (atropine group, no-shpa, papaverine, etc.).

CHOLECYSTOKININ (pancreozymin) - a hormone of the 12-finger intestine, has a strong effect of increasing the secretion of bile. A peptide of 33 amino acid residues. The duodenum of pigs is obtained from the mucosa. There is also a synthetic octapeptide drug. Both reduce the size of the gallbladder, increase pancreatic secretion, and decrease the secretion of HSl in the stomach. It is injected intravenously as a diagnostic tool, mainly to determine the contractility of the gallbladder and the bodies inside it.

MAGNESIUM SULFATE shrinks the gallbladder when taken, relaxes its normal sphincter, and increases bile secretion. Mechanism of action: the hypertonic solution of magnesium sulfate stimulates intestinal receptors and increases the release of cholecystokinin from the intestinal mucosa. As a result, the gallbladder shrinks, intestinal peristalsis accelerates. Drink 1 tablespoon of a 20-25% solution 2-3 times a day. During duodenal probing, 50 ml of a 25% solution or 100 ml of a 10% solution is introduced into the intestine through a probe, 20% of the drug is absorbed from the intestine and excreted through the kidneys. Application: as a bile driver, in duodenal probe (as surgi). It cannot be used during pregnancy, menstruation, kidney failure, acute gastoenteritis, gastroenterocolitis. Adverse effects: nausea, vomiting, polyuria, increased inflammation in the intestine. SORBITUM (Sorbitum) is a polyatomic alcohol that enhances bile production and excretion. After drinking, it increases the secretion of cholecystokinin hormone from the intestinal mucosa. And it shrinks the gallbladder. By relaxing the normal sphincter, it increases the flow of bile into the duodenum. When drinking, the effect begins after 5-6 minutes. Faster than magnesium sulfate. XYLITE (Xylitum) - the effect of five-atom alcohol is similar to that of sorbitol. However, under the influence of xylitol, not only bile in the gall bladder, but also in the liver increases the secretion of bile, which contains a lot of bilirubin, cholic acid, and lipoprotein complex. In terms of effectiveness, they are not inferior to Pancreozymin. Provides an opportunity to absorb vitamins of group V, resists the development of ketosis. The effect of xylitol is eliminated by atropine, so it is not used in combination with vagolytics.

Indications for use of xylitol and sorbitol: chronic cholecystitis, biliary tract hypokinesia, chronic pancreatitis, chronic colitis. It cannot be used for diarrhea caused by various reasons.

Adverse effects: Both drugs can cause constipation.

The presence of dissolved cholesterol in the bile depends on the amount of bile acid salts in the bile (cholesterol-cholate ratio). An increase in the amount of cholesterol or a decrease in bile acids in the bile leads to the release of cholesterol and the formation of large stones. Xenodeoxycholic acid reduces the synthesis of cholesterol in the liver and its excretion in bile. As a result, cholesterol stones began to dissolve slowly. Drugs with such an effect include derivatives of chenodeoxycholic and ursodeoxycholic acids.

XENOFALK (Chenofalk) - contains 250 mg. xenic acid (3-α,7-α dehydroxy-5-β-cholic acid).

It is mainly used in the treatment of gallstones, which are X-ray negative (not visible on X-ray) stones. In this case, the function of the gallbladder should be well preserved. It is more difficult to dissolve gallstones in obese patients. The drug is taken continuously (from 3 months to 2-3 years) and regularly. After the stones have dissolved, you need to take the drug for another 2-3 months.

Adverse effects: diarrhea, increased activity of ALT, AST enzymes in the blood.

Inflammation of the bile ducts, cases of partial or complete obstruction of the common bile duct, hepatitis, enteritis, enterocolitis, gastritis, high degree of kidney failure, pregnancy cannot be used.

XENOXOL (Chenocholum) - contains xenodezoic acid isolated from cattle bile. Under the influence of the drug, the content of bile acids and lecithin increases. In particular, chenodeoxycholic acid increases, deoxycholic acid decreases, cholic acid almost disappears. In general, the content of bile increases more with bile acids than with lecithin. Xenohol is completely absorbed from the intestine, conjugated with amino acids glycine and taurine in the liver, and then enters the intestine either as Na or K salt through the bile ducts. A small part is excreted in feces, most of it is reabsorbed and enters the liver. Some part of the drug is dehydroxylated into lithocholic acid under the influence of intestinal bacteria and is absorbed into the blood (enterohepatic circulation). A dose of 15-18 mg/kg per day is taken in three divided doses (more at night), the treatment lasts from 6 months to 1-2 years. Indications, contraindications are similar to Xenofalk.

URSOFALK (Ursofalk). - contains ursodeoxycholic acid. It has the same effect as xenohol.

HEPATOPROTECTIVE AGENTS.

This group includes drugs that strengthen the membrane of hepatocytes and ensure their regeneration in pathology. It is known that the functional state of membranes and the activity of enzyme systems located in them largely depend on the composition and amount of phospholipids. Under the influence of hepatoprotectors, the ability of liver cells to resist various types of toxic substances and factors increases. At the same time, reparative regeneration, protein synthesis, bile production, absorption and separation processes in the liver increase, dystrophy and cytolysis processes decrease. The mechanism of action of many hepatoprotectors is related to the reduction of free radical formation, increase in the amount of enzymes (superoxide dismutase, catalase), glutathione and other compounds that are part of the antioxidant system, and increase in protein synthesis due to the increase in the activity of DNA-dependent RNA polymerase.

ESSENTIALE (Essentiale) - contains phospholipids, unsaturated fatty acids (linoleic-70%, linolenic, oleic acids), pyridoxine NCl, cyanocobalamin, nicotinamide, riboflavin, tocopherol, thiamin, and other nutrients. Improves the participation of the liver in detoxification, carbohydrate and fat metabolism. The biosynthesis of RNA and DNA is regulated, preventing injury of hepatopets under the influence of various factors. It reduces the activity of transaminases and the amount of bilirubin in the blood. It slows the infiltration of hepatocytes with fats, because the liver introduces parenchymatous factor (PXF) into the lipid layer of the cell membrane. It is used parenterally (drip into a vein) and enterally. Treatment lasts from 14 days to 6 months based on the scheme.

Indications: acute and chronic hepatitis, dystrophies, liver cirrhosis, to improve liver function in diabetes, alcoholism, radiation sickness, etc.

Side effects: sometimes dyspepsia (when drinking), increased SOE.

LEGALON (carsil) is a flavonoid substance isolated from plants. It contains three isomeric compounds: slibin, silydianin, silichristin. The common name of all three is called "silymarin". Has a hepatoprotective effect. 80% of the drug is bound with glucuronide and sulfuric acid and is excreted in the bile. About 20% is reabsorbed from the intestine and forms a circulation in the hepato-intestinal circle. A large amount of the drug accumulates in the liver and kidneys (to an extent that is not present in other organs), about 6% of the drug is excreted in the urine during 24 hours. After drinking, the maximum concentration of the drug in the blood occurs after 0.5 hours. T½about 6 hours. It is excreted in bile in maximum concentration after 2 hours. About 40% of the drug is quickly resorbed from the intestine. The mechanism of action of Legalon is related to its membrane stabilizing property.

Directions: Similar to essentialen.

Adverse effects: allergic reactions.

SILIBOR is a mixture of plant-derived flavanoids. A drug similar to legalon.

LIV-52 is a mixture of dry substances isolated from the juice and decoction of several plants. Improves liver functions, enhances metabolism in hepatocytes, increases their regeneration, prevents fatty infiltration of the liver, regulates protein synthesis in the liver, improves appetite and digestion. Improves intestinal evacuator function and eliminates flatulence. The drug is taken in tablet form.

Indications: as essential, as well as anorexia, weight loss, diabetes.

Adverse effects: Lyella syndrome.

VITOGEPAT is a preparation made from beef liver.

SIREPAR is a protein-free hydrolyzate of the liver.

VIGERATIN is a preparation consisting of lyophilized liver extract and pancreatin. The last three drugs also have hepatoprotective properties.

MEDICINES AFFECTING INTESTINAL MOTION ACTIVITY.

This group of tools is divided into 2:

1. Means that increase intestinal motility.

2. Means that weaken intestinal motility.

The drugs of the second group reduce bowel movement and tone. Including: M-cholinoblockers, ganglioblockers, spasmolytics with myotropic effect (papaverine, no-shpa, dibazol). Adrenomemetics also have a similar effect. These drugs are used in acute and chronic diarrhea (diarrhea).

Loperamide (imodium) is structurally similar to narcotic analgesics, but the analgesic effect is weak. The drug stimulates m-opioid receptors in the intestine and reduces the peristalsis of MIT organs. (similar to black drug preparations) that is, it weakens longitudinal and circular muscle activity. As a result, stool movement stops, absorption of liquid in it increases, and the internal pressure of the intestine decreases, and the impression that moves the intestine decreases. At the

same time, intestinal secretion decreases, anal sphincter tone increases, diarrhea stops. The drug is poorly absorbed by the CNS. The drug does not cause mental dependence. It is poorly absorbed from MIT (50%). 97% of the absorbed drug is bound to serum proteins. Within a day, 40% of the drug is excreted through the intestines, 10% in the urine. T½ is about 11 hours.

Application: acute and chronic diarrhea

Classification of surgi means.

I. Excipients consisting of inorganic substances - salts, magnesium sulfate, sodium sulfate, natural and artificial carlovar salt.

II. Organic compounds

1. Extracts from plants:

a) vegetable oil - (castor oil) sesame oil

b) preparations containing anthraglycosides: extracts of Togjumrud bark, rhubarb root, sano leaves.

2. Synthetic agents: phenophthalin, isafenin.

MAGNESIUM SULFATE, SODIUM SULFATE (natural and artificial carlovar salt). These drugs are strong and have a much faster effect and induce constipation. Usually drugs are drunk with 1-2 glasses of water, the effect appears after about 3-6 hours.

Mechanism of action: the drug is poorly absorbed from MIT (about 20%) increases the osmotic pressure in the intestine and prevents the reabsorption of the liquid part of feces and intestinal juice in the intestine. As a result, the liquid in the intestinal cavity (water, intestinal juice) increases the volume of feces without being absorbed. In this case, the intestinal wall becomes tense, the mechanoreceptors in it are stimulated, and the intestinal peristalsis increases reflexively (6 g of magnesium sulfate salt retains 100 ml of water). At the same time, the tension of the intestinal wall increases the secretion of cholecystokinin in its mucous membranes, which not only increases intestinal peristalsis, but also increases the speed of blood circulation from the MIT, the secretion of glands, the contraction of the gallbladder, relaxes the normal sphincter, and increases the flow of bile. Salt suppositories affect all parts of the intestine, not a specific one.

Uses: choleretic, as an expectorant, to clean the intestine before examination, in the use of anthelmintics, in acute poisoning, in probing the duodenum.

Side effects: nausea, vomiting, polyuria, increased intestinal inflammation. Magnesium sulfate weakens MNS activity, reduces AD, promotes muscle relaxation. It is not possible to use during menstruation, kidney dysfunction, pregnancy, acute gastroenterocolitis. Pulses, fruits, cabbage, turnips, beets, carrots, truffles, pumpkins, apricots, plums, melons, watermelons, and greens (dill, cilantro, green onions) can also work well for constipation. Because they, like salts, reduce the absorption of water from the intestine, increase the volume of feces and increase peristalsis. Hydrophilic methylcellulose, agar-agar, flaxseed, sea cabbage also have laxative properties. But the effect of these preparations is much weaker than that of salts.

SESAME OIL (Oleum Ricini) – this preparation consists of pure oil extracted from sesame seeds. When ingested, it is broken down into glycerol and ricinoleic acid by lipase in the duodenum. And ricinoleic acid slows down the absorption of water and electrolytes from the intestine. Stool volume increases. In addition, ricinoleic acid stimulates the receptors in the

intestinal mucosa and increases peristalsis. Undegraded oil and the resulting glycerin reduce the friction of feces on the inner wall of the intestine and facilitate its movement. The effect of the drug begins 2-6 hours after drinking and lasts for about 6 hours.

Uses: constipation, bowel cleansing before X-ray examination. Do not use in case of poisoning with oil-soluble substances (kerosene, gasoline, benzene, male fern...)

Adverse effects: vomiting, abdominal pain, reflex contraction of the uterus, hypokalemia. With continuous use, it disrupts the absorption of nutrients and digestion.

CLARIFIED VASELINE OIL – envelops stool in the intestine, making it easier to rub and move. MIT is not being asked. Therefore, dissolved poisons are not absorbed. It is used in chronic constipation, poisoning with fat-soluble substances. Drink 1-2 tablespoons (as an emulsion).

REMEDIES USED IN DISORDER OF THE EXCRETORY FUNCTION OF THE PANCREAS

Enzymes secreted by the pancreas (proteolytic-trypsin, chymotrypsin, collagenose; amylolytic, alpha and gamma-amylase; lipolytic lipase) are of great importance in the breakdown and digestion of food products in the intestine. Therefore, in acute and chronic diseases of the pancreas, it is necessary to control the activity of this gland. Currently, the agents affecting the pancreas can be divided into the following groups:

1. Enhancer of pancreatic activity: secretin, cholecystokinin

2. Decreasing pancreatic enzymes: pantripin, gordox, ingitril (contrical), traskolan

3. Means used instead of pancreatic products: Pancreatin, Panzinorm, Festal, Mezim, Oraza, Nigadaza, etc.

SECRETIN (peptide consisting of 27 amino acids), to a lesser extent cholecystokinin, are intestinal hormones that enhance the secretion of pancreatic activity. Both drugs are isolated from the 12-intestinal layer of a slaughtered pig. Also obtained synthetically. It is mainly used for diagnostic purposes. Entered parenterally.

Agents that reduce the activity of pancreatic enzymes include anti-enzymatic drugs. They mainly reduce the activity of proteolytic enzymes, stop the release of biologically active polypeptides (M-n: kinins, kalidin, bradykinin), and prevent the development of edema by reducing capillary permeability. As a result, they eliminate pain, development of necrosis, poisoning, inflammation and reduce morbidity and mortality. They are mainly used in acute and chronic pancreatitis, bleeding caused by hyperfibrinolysis.

PANTRIPIN (Pantrypinum) and GORDOKS (Gordox) preparations are also extracts of the pancreas of slaughtered cattle, they eliminate the activity of proteolytic enzymes consisting of polypeptide chains: trypsin, chymotrypsin, kallikrein, plasmin, etc., thus stopping the autolysis process, reducing pain and inflammation, and prevents the development of complications such as necrosis, abscesses and peritonitis of acute pancreatitis.

Indications for use: acute and recurrent pancreatitis, non-specific acute parotitis after surgery, various malaises, extensive and deep tissue injuries, coagulopathy and primary hyperfibrinolytic bleeding. to prevent pancreatitis that develops after abdominal operations (especially around the pancreas).

Adverse effects: allergic reactions, dyspepsia, individual inability to absorb.

Contraindications: Allergy, thrombophlebitis, anaphylactic shock.

KONTRIKAL (Contrykal) and INGITRILIN (Ingitilum) Both of these drugs are polypeptides extracted from the lungs of slaughtered cattle.

Effects, instructions for use, side effects are similar to pantripin, that is, it reduces the activity of proteolytic enzymes.

TRASCOLAN (Trascolanum) is a protease inhibitor similar to the above-mentioned drugs. Instead of pancreatic products, the following drugs are used to improve digestion in cases where the activity of this gland has decreased sharply.

PANCREATIN (Pancreatinum) is obtained from the pancreas of slaughtered cattle. Contains trypsin and amylase enzymes. In the alkaline conditions of the intestine, they break down starch and proteins. It is drunk before meals. Treatment lasts 1-2 months.

Indications: chronic gastroduodenitis, pancreatitis, hepatocholecystitis and other indigestion.

Adverse effects: allergies.

FESTAL (Festal) - contains pancreatic enzymes and bile components: (lipase and amylase, protease, hemicellulose, bile components). It decomposes proteins and carbohydrates in the alkaline conditions of the intestine and ensures their absorption.

Indications: pancreatic exocrine insufficiency, chronic pancreatitis, gastroenteritis, indigestion in the elderly, colitis after infections, sprue, in indigestion developing after surgery and antibiotics (sulfanilamide).

There are no side effects, but it cannot be used if there is an allergy to the components of the drug.

ORAZA (Orazum) - granules are taken before or with meals. It consists of a complex of proteolytic and amylolytic enzymes resistant to gastric acid (amylase, maltase, protease, lipase). It is obtained from the culture of the fungus Aspergiltusoryzae. Does not break down in the stomach, dissolves in the alkaline environment of the intestine. Improves digestion in the intestine. Reduces intestinal muscle tone, has spasmolytic properties. 4-5 days after the start of treatment, dyspepsia, pain and diarrhea will disappear.

Instructions: Same as Festal.

Adverse effects: Diarrhea may sometimes increase in patients with diarrhoea. Treatment lasts 2-4 weeks.

PANZINORM FORTE (Panzyronum forte) - composition consists of gastric mucosa extract, dry extract of cattle bile, pancreatin and hydrochloric acid salts of amino acids. Enzyme activity of 1 tablet is as follows: lipase-6000 ME, Trypsin-450 ME, chymotrypsin-1500 ME, amylase-7500 ME. Panzinorm forte is a highly active, stable polyenzyme drug that enhances digestion in the stomach and intestines. The effect is especially weak in acidic conditions. That is, the drug eliminates digestive disorders that develop due to the lack of enzymes in both the stomach and intestines. The drug contains substances that enhance bile, gastric, pancreatic and intestinal enzymes. Tablets are prepared in such a way that the enzymes in it are gradually released in the places where they need to develop their optimal physiological effects. In

particular, the bile extract contained in the drug contains bile acids, which increase the digestion of fats, increase the release of lipase and protease from the pancreas. This increases the process of food digestion in the 12th intestine. The extract of the gastric mucosa contained in the drug contains pepsin and cathepsin with high proteolytic activity, as well as peptides and amino acids, which stimulate the release of gastrin and gastric glands, and increase the release of HSl acid. The drug contains all essential amino acids, which increase the secretion of gastric, pancreatic and small intestinal juices, as well as the stability of pepsin in the drug. The first layer of the drug dissolves under the influence of gastric juice, pepsin, cathepsin and amino acids are released from it, and in the intestine, the rest of the drug dissolves and pancreatin and bovine bile extract are released. That is, the components of the drug show their effect in the right place. The good thing is that the substances contained in panzinorm not only replace the missing enzymes, but also increase their release.

Indications: used for indigestion (belching, flatulence, flatulence) and pancreatin indications.

No side effects.

MEZIM FORTE (Mezym forte) is a dragee. Contains 140 mg pancreatin, 4200 ED amylase, 3500 ED lipase and 250 ED protease.

The pharmacological effect is similar to Penzinorm and Festal.

NIGEDAZA (Nigedasa) is a lipolytic enzyme drug extracted from the seeds of the Nigelladamascena plant. Hydrolytically decomposes vegetable and animal fats even without bile acids. The shell of the tablets preserves the activity of the enzymes in it not only in a normal, but also in a highly acidic environment.

Indications: age-related decrease in the lipolytic activity of duodenal juice, as well as in all diseases requiring the use of Panzinorm and Festal, steatorrhea.

Adverse effects: chronic colitis can sometimes cause abdominal pain. 1-2 tablets are taken 3 times a day for 3-4 weeks, 10-30 minutes before meals.

SOLIZYM (Solizymum) is a lipolytic enzyme obtained from penicillinum solitum. It is used in the same way as Nigidaza: 2 tab. with or after food. Drink 3 times for 2-4 weeks.

Final conclusion on the topic of the lecture (appendix #1)

It is necessary to take into account the individual characteristics and condition of the organism when taking drugs, because the sensitivity to drugs changes depending on the patient's age, gender, and genetic factors. The effect of drugs depends more on the condition of the organism, in particular, on the pathology to which they are given, accordingly, their expected effects also change.

Thus, the general practitioner should analyze their pharmacodynamic and pharmacokinetic properties and the factors influencing them when using agents that affect the activity of the digestive organs.

Lecture

Topic 4: MEDICINES AFFECTING THE BLOOD SYSTEM.

Lecture educational technology model of pharmacology

Time: 80 minutes	***Number of students: 50-70***
Lecture plan	1. Introduction. 2. Creation of blood. 3. Use of drugs affecting the blood system 4. Pharmacodynamics and pharmacokinetics of agents affecting the blood system 5. Basic principles of the use of agents affecting the blood system.
The purpose of the lecture:	***Formation of knowledge about the means affecting the blood system.***
Pedagogical tasks: ***- to give an understanding of the means affecting the blood system.*** ***- classification of drugs affecting the blood system;*** ***- to provide complete knowledge about the mechanism of action of agents affecting the blood system;*** ***- to deepen the knowledge about the main effect of the means affecting the blood system;*** ***- expanding and deepening knowledge about the side effects of drugs affecting the blood system.*** *- - interest in expanding the range of knowledge about the use of drugs affecting the blood system and inadmissible cases and acquisition of practical skills;*	***Results of educational activities:*** ***The student must perform*** ***- they tell their understanding about the means affecting the blood system;*** ***- clearly classify the agents affecting the blood system.*** ***- tell about the side effects of drugs affecting the blood system;*** ***- they will tell you when to use drugs affecting the blood system.*** *- to know the side effects caused by the use of drugs affecting the blood system and to reveal the necessary measures in such a case.*
Educational methods	***Lecture, problem method, brainstorming, discussion, rapid inquiry***
Form of education	***Teamwork, working in groups***
Educational tools	***Lecture text, computer, multimedia, slides, visual materials, marker,***
Educational conditions	*A room designed and equipped for lectures at TTA.*
Monitoring and evaluation	***Verbal inquiry: rapid inquiry, written inquiry***

Technological map of the thematic lecture

Work stage- and time	***Activity***	
	Educator	***Learners***
Stage 1. Enter (5 minutes)	***1.1. It conveys the topic's name, purpose, and expected results. Topic Basics: Introduces the keywords and topic outline for the topic. Gives a list of references.***	***1.1 They listen***
2 stages Activity activation (5 minutes)	***2.1. Asks stimulating questions to engage students in brainstorming:*** ***- How are drugs affecting the blood system classified?*** ***- What are the requirements for agents affecting the blood system?*** ***- What drugs are included in the agents affecting erythropoiesis?*** ***- For what purposes are the agents affecting erythropoiesis used?*** ***- What drugs are included in the agents affecting leukopoiesis?*** ***- Mechanism of action of agents affecting leukopoiesis?***	***2.1 They answer the questions.***
Stage 3. Basic information section (75 minutes)	3.1. In accordance with the plan and structure of the lecture, he describes the order of actions for the organization of the educational process and analyzes its content by showing the slides with this information. Emphasizes the keywords of the topic. 3.2. Blitz - conducts a survey and uses a system of thematic questions: 1. Classification of agents affecting the blood system 2. Use of drugs affecting the blood system 3. Side effects of drugs affecting the blood system	3.1. They analyze the content of the scheme and slides. They write down the necessary information in the lecture notebook. 3.2. They answer questions.
Step 4. Finisher (5 minutes)	4.1. By asking short questions on the topic, it is determined how the students mastered the topic. 4.2. Invites students to ask questions and answers these questions	4.1. They listen and record 4.2. They clarify and ask questions.

MEDICINES AFFECTING BLOOD FORMATION.

Blood elements (elements) are constantly renewed in the body of mammals. This complex process is controlled by the neuroendocrine system. Organs that produce blood, blood in veins, organs where blood elements are broken down, and the system that controls these processes are called the blood system in general. Dysfunction of any part of this system leads to quantitative or qualitative changes in blood, that is, pathology develops, mostly due to disorders of erythropoiesis, leukopoiesis, and thrombocytopoiesis. Medicines used to control these processes are used in medical practice. They are divided into the following groups.

I. Means affecting erythropoiesis:

1. Means that enhance erythropoiesis:

a) used in hypochromic anemia: iron sulfate, iron lactate, ferumlek, fercoven, coamide

b) used in hyperchromic anemia: cyanocobalamin, folic acid

2. Means that suppress erythropoiesis: sodium phosphate solution with phosphorus 32 isotope.

II. Means affecting leukopause:

1. leukopoiesis enhancing agents: pentoxyl, sodium nucleicate, molgramostim, filgrastim

2. agents that suppress leukopoiesis: novembixin, myelosan, mercaptopurine, dopan, thiophosphamide.

AGENTS AFFECTING ERYTHROPOESIS.

Anemia is a pathological condition characterized by a decrease in the amount of erythrocytes and hemoglobin, as well as changes in the shape, size and life span of erythrocytes. There are many types of anemia, and iron deficiency anemia and pernicious anemia are more amenable to treatment with drugs.

In hypochromic anemias (color index less than 1), iron preparations are mainly used to increase erythropoiesis. There are about 5 grams of iron in the human body, 60% of which is in hemoglobin, 20% in myoglobin and tissue enzymes (cytochrome v, c, a3, r-450, v5), and the rest is in reserve (liver, spleen, marrow). Iron reserves are mainly used for the synthesis of hemoglobin and enzymes in the blood. Women lose a lot of iron during menstruation (10-50mg per day). The same happens in pregnancy (for fetal hemoglobin and enzymes). Men's daily requirement for iron is 5mg, and women's is 15mg. At least 20 mg of iron is taken by a person in a daily meal. That is, the daily requirement is completely covered by food. But when there is chronic blood loss (Fig. Hemorrhage) iron content in food is low, the same happens when mothers are breastfeeding (alimentary anemia). Absorption is mainly an active process, but also occurs (less often) by diffusion. In the mucous membrane of the stomach and intestines there is a transport protein - apoferritin. It binds to iron and turns into ferritin. If free apoferritin is used up, absorption is stopped. In the blood, transport protein (β-globulin) transferrin 2-molecule binds with iron and turns into ferrotransferritin. In this case, the iron is delivered to the reserve spaces. There is apoferritin, which absorbs iron and turns it into ferritin. Absorption of iron is accelerated when the reserve is depleted. A maximum of 50mg of iron per day can be absorbed from MIT. This amount cannot be supplied with food. Therefore, it is necessary to give preparations containing iron elements.

IRON SULFATE and IRON LACTATE. These preparations are taken in the form of capsules or effervescent tablets, because the sulfur in the oral cavity of iron combines with hydrogen (SH) to form black iron sulfide. Teeth darken. Iron preparations develop constipation,

Practical training

Topic 4: MEDICINES AFFECTING THE DIGESTIVE SYSTEM. MEANS AFFECTING LIVER FUNCTION. HEPATOPROTECTORS.

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector

2. The duration of the study of themes

Hours – 4

3. Purposes

- To form a general idea about the means of affecting the digestive organs, to their destination;

- Give a classification of drugs which affect the digestive organs;

- To give an idea about the basic effects of drugs which affect the digestive organs;

- Give an idea of the mechanisms of action of drugs which affect the digestive organs;

- To give knowledge of side effects affecting the digestive organs;

- To generate knowledge of indications and contraindications to the use of drugs which affect the digestive organs;

- Create the ability to analyze the action, the appointment of separate funds, based on the overall pharmacodynamic data of affecting the digestive organs;

- To give knowledge of the elements of pharmacotherapy with examples from the private formula.

Tasks

Student should know:

- Classification of drugs which affect the digestive organs;

- Mechanisms of action of plant and equipment that affect the digestive organs;

- Indications for use of drugs which affect the digestive organs;

- Side effects and complications caused by the means of affecting the digestive organs.

Student should be able to:

Perform practical skills - perform tasks for the recipe (prescription to: magnesium oxide (tab), the natural gastric juice (flack), ranitidine (tab), sodium bicarbonate (tab)).

4. Motivation

Drugs affecting the digestive organs, are widely used in many fields of clinical medicine (gastroenterology, surgery, therapy, etc.), so knowledge of drugs which affect the digestive organs, the values for the body, as well as applications to students in further study of private pharmacology, and general practitioners.

5. Intersubject and intrasubject connections

Teaching this topic is based on the knowledge bases of students of biochemistry, anatomy, histology, normal and pathological physiology of the gastrointestinal tract. Acquired during the course knowledge will be used during the passage of therapy, gastroenterology, and other clinical disciplines, as well as for further study by a private pharmacy.

6. The content of lessons

6.1. Theoretical part

DRUGS THAT AFFECT APPETITE

If the appetite is abnormally low, *appetite stimulants* can be prescribed. These include bitter solutions such as wormwood tincture obtained from common wormwood (*Artemisia absinthium).*

Certain psychotropic agents (chlorpromazine, amitriptyline and lithium carbonate), neurotropic hypotensive agents (clonidine) and anabolic steroids can stimulate appetite.

Another group of agents include *appetite suppressants (anorexigenic agents).* They are used for the treatment of alimentary obesity, a condition that complicates the course of many diseases and leads to metabolic and cardiovascular disturbances.

DRUGS THAT AFFECT SALIVARY GLAND FUNCTION

Excitation of cholinergic receptors is known to cause strong salivation, and so M-cholinomimetics (pilocarpine, carbachol, neostigmine and others) increase salivation. On the

contrary, M-cholinoblockers (atropine group) decrease the secretion of the salivary glands. These drugs are used for the treatment of hypersalivation in parkinsonism, helminth invasions and heavy metals salts intoxications.

DRUGS THAT INCREASE GASTRIC SECRETION. REPLACEMENT THERAPY

These groups of medicines include diagnostic and therapeutic agents.

Gastrin, histamine and some extracts are used for *diagnostic purposes.* If decreased secretion has been caused by functional disorders, then these drugs significantly increase gastric secretion. This does not occur if the damage is structural.

Another treatment that increases gastric juice secretion is carbonic acid mineral water.

Often gastric gland insufficiency is treated by *replacement therapy*. Natural or artificial gastric juice, pepsin and a solution of hydrochloric acid are used to treat this condition.

DRUGS THAT DECREASE GASTRIC SECRETION

These agents are used for the treatment of conditions associated with ulcerations of gastric or duodenal mucosa as a result of a disbalance between the erosive effect of hydrochloric acid and pepsin and the defensive mechanisms of the gastroduodenal mucosa. This is why management of this pathology consists of a reduction in gastric secretion and an increase in cytoprotective mechanisms.

The main agents that suppress hydrochloric acid secretion in the stomach may be divided into the following groups.

I. PROTON PUMP INHIBITORS

Omeprazole

Pantoprazole

II. HISTAMINE H-2-RECEPTOR BLOCKERS

Ranitidine

Famotidine

Cimetidine

III. CHOLINOCEPTOR BLOCKERS

- *Non-selective M-cholinoblockers*

Atropine

- Drugs mostly blocking M-1- cholinoceptors

Pirenzepine

IV. PROSTAGLANDINS AND THEIR SYNTHETIC DERIVATIVES

Mizoprostol

ANTACIDS

Antacids are often used to decrease the excessive acidity of gastric juice. They are bases that interact with the hydrochloric acid of the gastric juice and neutralize it. The agents that are considered being antacids include sodium bicarbonate, magnesium oxide, magnesium trisilicate, aluminum hydroxide and calcium carbonate.

These agents differ from each other by a number of properties: speed of onset, degree of absorption from the intestines, the ability to produce a resorptive effect and the formation of CO2 in the stomach.

GASTROPROTECTORS

Gastroprotectors (cytoprotectors) include the group of drugs that act directly on the mucous membrane of the stomach and, to a certain extent, prevent damage caused by chemical or physical factors (acids, alkali, enzymes, etc.). Gastroprotectors are used to preserve the structure and basic functions of the mucous membrane and its components (especially the endothelium of the microcirculatory vessels of the mucous membrane). Usually such drugs are used to treat gastric and duodenal ulcers. Astringents, mucous and adsorbing drugs have been used to protect the mucous membrane of the stomach for a long time.

Gastroprotective drugs may be divided into two following groups:

I. **DRUGS THAT CREATE MECHANICAL PROTECTION FOR THE MUCOUS MEMBRANE (ULCER SURFACE)**

Sucralfate

Bismuth tripotassium dicitrate

II. **DRUGS THAT INCREASE THE PROTECTIVE FUNCTION OF THE MUCOSAL BARRIER AND THE RESISTANCE OF THE MUCOSA TO DAMAGING FACTORS**

Carbenoxolone

Mizoprostol

DRUGS THAT AFFECT GASTRIC MOTILITY

Drugs that increase gastric motility (the so called *prokinetic drugs)* include meto- clopramide (the antagonist of peripheral and central dopamine D_2-receptors and the agonist of serotonin 5-HT_4-receptors), cizapride (the agonist of serotonin 5-HT_4-receptors that indirectly activates cholinergic neurons of the intramural plexus and increases the release of acetylcholine), domperidon (motilium; it blocks peripheral dopamine D_2-receptors) and other drugs. They are used for the treatment of the delay in gastric emptying (gastroparesis) and also in gastroesophageal reflux.

If the motor activity of the stomach is increased, cholinoblockers (atropine-like and ganglioblocking agents and the drugs combining both types of activity, e.g. buscopan (hyoscine butylbromide) and propantheline (pro-banthine) and spasmolytics of myotropic effect (papaverine, no-spa and others) are used.

Used in this lesson, new teaching technologies, "Web".

USING "WEB"

The method provides for active participation in the occupation of each student, the teacher works with the entire group.

Steps:

1. Previously students are given time to prepare questions on the passed occupation (pharmacokinetics, pharmacodynamics of drugs).

2. Participants sit in a circle.

3. One of the participants is given skein of thread, and he sets his prepared question (for which he must know the full answer), hold the end of the filament coil and transferring to any student.

4. A student who receives skein, answers the question (in this party, who asked him, commented on a response) and passes the baton on the issue. Participants continue to ask questions and answer them until everything will be in the web.

5. Once students have completed all the questions, a student holding a roll, returning his party, from whom he received the issue, while asking his question, and so on, until the "unwinding" of the coil.

Note: To prevent the students, which should be attentive to each answer, because they do not know who to throw skein.

The teacher, if necessary, corrects the issue, commented on the correct answer of each student.

This methodology promotes student speech, the ability to make sense of mastery of the material and highlight the key points form the foundations of critical thinking as In this case, the student learns to assert his view, analyze responses classmates.

6.2.Analitical part

Situational problem:

1. People who suffer from obesity, drug therapy was performed, and therefore the patient's weight decreased. However, he developed insomnia, headaches, pain in the heart. What drug was prescribed to the patient?

Response. The patient was appointed as anorectics (eg, mefolin). Excitatory effect on central nervous system and peripheral adrenomimetic of the result of his closeness in chemical structure to fenilalkilamine and determine its side effects.

2. The patient on the dental admission profuse salivation hampers therapeutic manipulation in the mouth. In this regard, your doctor has prescribed him a drug that the patient received 15 drops orally 3 times daily for 5 days. Salivation decreased, so that he even felt a dry mouth, but there was tachycardia and decreased vision at close range. Which drug a patient was assigned? What is the reason the state has arisen?

Response. The patient was assigned into a solution of atropine drops. Tachycardia and accommodation disturbances arose in connection with an M-anticholinergic mechanism of action of atropine.

3. The patient with gastric gland insufficiency to diagnose substance was introduced subcutaneously, and then was taken by the gastric juice. An increase in gastric secretion. However, after the introduction of the substance in the patient appeared side effects: lowering blood pressure, itching, redness and swelling of the face. What substance was administered to the patient? How can we prevent these side effects.

Response. The patient for diagnostic purposes was introduced by histamine. To prevent its adverse effects should first introduce the H-1 blockers (diphenhydramine, suprastin, etc.).

4. The patient went to a doctor for advice on the fact that after taking the sodium bicarbonate, which he used for heartburn, regurgitation had been air and discomfort in the stomach. In this connection, after taking the sodium bicarbonate may have these effects?

Response. Sodium bicarbonate in the interaction with the hydrochloric acid of gastric juice forms carbonic acid which dissociates to form carbon dioxide, and stretching the stomach causing belching air.

5. A patient suffering from a stomach ulcer, took a long time antacid. In this connection, began to notice nausea and abdominal pain. On examination the patient was found to change the acid-alkaline balance in the direction of blood alkalosis. What substance the patient received?

Response. The patient received sodium bicarbonate, which is in contact with hydrochloric acid of gastric juice forms carbonic acid dissociates to form carbon dioxide, stretching the stomach, which can cause pain. Sodium bicarbonate is easily absorbed and can cause systemic alkalosis.

6. The patient with gastric ulcer drug was appointed, after taking the pain is significantly reduced, but there were dry mouth and palpitations. Which drug a patient was assigned?

Response. The patient was assigned an M-cholinobloker, probably atropine.

EMETIC DRUGS

The chemical substances that cause vomiting influence chemoreceptors of the trigger zone or stimulate the vomiting center via a reflex. Agents that stimulate dopamine receptors of this zone include apomorphine.

The trigger zone can also be activated by digitalis, some antiblastomic agents (chlorethylamines and others) and by morphine. Drugs that cause reflex stimulation of the vomiting center include the preparationes of thermopsis and ipecacuanha, but they are not used in the clinic.

Copper sulphate and zinc sulphate produce only peripheral irritation of the mucous membrane of the stomach.

Veratrum alkaloids have a very specific effect. They cause vomiting due to the stimulation of the *ganglion nodosum* of the afferent fibers of the vagi nerves.

The use of emetic drugs is very limited. Sometimes, in acute intoxications, if gastric lavage is not possible, apomorphine may be used (it is injected subcutaneously). Also, apomorphine is used for the treatment of alcoholism to establish a stable negative reflex reaction to ethanol.

ANTIEMETIC DRUGS

The administration of antiemetic drugs should be done according to the genesis of vomiting. People with vestibular hyperexcitability are recommended to take drugs containing scopolamine as a prophylaxis. One of the most commonly used drugs for the treatment of motion sickness is «Aeron» tablets.

Motion sickness can also be treated with the blockers of H-1-receptors such as promethazine (diprazinum) and diphenhydramine (dimedrolum) that possess both sedative and cholinoblocking properties.

Metoclopramide is an active antiemetic drug that supresses the trigger zone. Metoclopramide is also used for the treatment of gastric and duodenal ulcers, meteorism and for dyskinesia of the gastrointestinal tract.

The derivative of phenothiazine tiethylperazine (torecan) is a drug with high antiemetic activity. There are data proving that along with the blocking of dopamine receptors of the trigger zone, tiethylperazine produces a direct suppressing effect on the vomiting center. This is why this antiemetic drug can be used more universally.

The derivatives of phenothiazines perphenazine (aethaperazinum), trifluoperazine (triphtazinum) and the derivatives of butyrophenone (haloperidol) that block the dopamine receptors of the trigger zone of the vomiting center possess marked antiemetic activity. They are effective for the treatment of vomiting caused by the substances that affect the trigger zone (digitalis glycosides, apomorphine, etc.). These drugs also eliminate postoperative vomiting as well as vomiting occurring due to radiation sickness and toxicosis of pregnancy.

Another antagonist of dopamine D_2-receptors is domperidon (motilium). It is used as an antiemetic and prokinetic drug.

A number of drugs that block serotonin 5-HT_3-receptors (in the CNS and peripherally) belong to the class of active antiemetic agents. One of them is ondansetron (emetron). It is used to prevent or stop vomiting associated with cancer chemotherapy or radiation sickness.

Glucocorticoids (dexamethazone, other) are also known to possess antiemetic activity.

HEPATOPROTECTIVE DRUGS

The agents of this group increase the resistance of the liver to the damaging factors, promote the restoration of its function and increase detoxifying properties. Hepatoprotective effect can be achieved by the normalization of the metabolic processes in hepatic cells, an increase in microsomal enzyme activity and by restoration of cell membrane function. Hepatoprotectors (legalon, silibinin hydrosuccinate sodium, ademethionine (heptral), lipoic acid, essenciale) are used for the treatment of acute and chronic hepatitis, dystrophy and cirrhosis of the liver, and in toxic damage of the liver including that associated with alcoholism.

CHOLAGOGUE DRUGS

The bile contains bile acids, which emulsify fats in the intestine and contribute to their absorption as well as absorption of fat-soluble vitamins. Bile deficit can be associated with the disorder of its formation in hepatic cells or with some difficulties in its passage into the duodenum from the bile ducts. Therefore there are two types of cholagogue drugs.

I. **THE DRUGS THAT STIMULATE THE FORMATION OF BILE (CHOLERETICS OR CHOLE- SECRETICS).**

- *Bile preparationes*

«Cholenzymum» tablets

- *The preparationes of plant origin*

Cholosasum

- *Synthetic drugs*

Osalmide (oxafenamidum)

II. **THE DRUGS THAT STIMULATE BILE EXCRETION (CHOLAGOGUE OR CHOLIKINETICS).**

The drugs that facilitate bile flow (excretion) include drugs that relax the Oddi's sphincter (the sphincter of hepatopancreatic ampulla), i.e. M-cholinoblockers and spasmolytics that possess a myotropic effect.

Cholagogue drugs are used for the treatment of chronic hepatitis, cholangitis and chronic cholecystitis.

DRUGS THAT INDUCE GALLSTONE DISSOLUTION (CHOLELITHIATIC DRUGS)

There are drugs that are able to cause dissolution of small (containing no more than 4% of calcium salt) gallstones in the gallbladder. This is a quality of natural bile acids, such as henodeoxicholic (chenodiol, chenofalk) and ursodeoxicholic (ursodiol, ursofalk). These agents lead to a reduction of cholesterol concentration in the bile.

DRUGS USED FOR THE TREATMENT OF PANCREATIC FAILURE

Treatment of pancreatic failure can be treated with replacement therapy with the help of pancreatin (a powder made of dried pancreatic glands of the cattle). It is an enzyme drug thatmostly contains tripsin and amylase. Pancreatin is used for the treatment of chronic pancreatitis and enterocolitis.

Some conditions are treated with the *drugs that suppress pancreatic secretion* (M-cholinoblockers), for example, acute pancreatitis.

DRUGS THAT AFFECT INTESTINAL MOTILITY

In spastic conditions of the intestine such agents as M-cholinoblockers (atropine and other), ganglioblockers (pempidine, benzohexonium) and spasmolytics of myotropic effect (for example, papaverine, no-spa) are used *to reduce its tone and motility.*

The suppression of the intestinal motility is also seen with the administration of adrenomimetics.

In acute and chronic diarrhoea loperamide (imodium) is often used.

Increase in cholinergic tone leads to an increase in the motility of the intestine. This is why hypotonia and atonia of the intestine are treated with the cholinomimetic drugs (aceclidine, betanecol, neostigmine). The antagonists of serotonin 5-HT_4-receptors (cizapride), agonists of

motilic receptors (erythromycin, oleandomycin) and myotropic drugs (vasopressin) are effective for the treatment of these conditions.

Drugs that increase the motility of the intestines include the groups of laxatives.

LAXATIVES

The classification of the laxative drugs may be presented in the following way.

I. INORGANIC AGENTS

- *Saline laxatives*

Magnesium sulphate

Sodium sulphate

II. **ORGANIC AGENTS**

- *The preparations of plant origin*

A) Plant oils

Castor oil

B) Preparations containing antraglycosides

Cortex Frangulae: liquid or dry extract

Radix Rhei: tablets

Folia Sennae: infusio, dry extract (in tablets)

- *Synthetic drugs*

Phenolphthalein

Bisacodyl

Oxyphenisatine (isapheninum)

Saline laxatives are used for the treatment of acute constipation and also intoxication with chemical substances (saline laxatives retain their absorption).

Castor oil is used for the treatment of acute constipation. It is contraindicated in poisoning with fat-soluble compounds.

Laxatives that mostly affect the large intestine (the drugs containing antraglycosides, phenolphthalein, bisacodyl and oxyphenisatine) are of great practical importance. The main indication for the use of colonic laxatives is chronic constipation.

Used in this lesson, new teaching technologies, "Web".

USING "WEB"

The method provides for active participation in the occupation of each student, the teacher works with the entire group.

Steps:

1. Previously students are given time to prepare questions on the passed occupation (pharmacokinetics, pharmacodynamics of drugs).

2. Participants sit in a circle.

3. One of the participants is given skein of thread, and he sets his prepared question (for which he must know the full answer), hold the end of the filament coil and transferring to any student.

4. A student who receives skein, answers the question (in this party, who asked him, commented on a response) and passes the baton on the issue. Participants continue to ask questions and answer them until everything will be in the web.

5. Once students have completed all the questions, a student holding a roll, returning his party, from whom he received the issue, while asking his question, and so on, until the "unwinding" of the coil.

Note: To prevent the students, which should be attentive to each answer, because they do not know who to throw skein.

The teacher, if necessary, corrects the issue, commented on the correct answer of each student.

This methodology promotes student speech, the ability to make sense of mastery of the material and highlight the key points form the foundations of critical thinking as In this case, the student learns to assert his view, analyze responses classmates.

6.2.Analitical part

Situational problem:

1. The patient during the course of anticancer chemotherapy, there was severe nausea and even vomiting. Which drug of anti-emetics can be used to relieve these symptoms?

Response. In this case, the antiemetic drug is expedient to appoint a neuroleptic, perphenazine (aethaperazinum), blocking dopamine receptors in the starting zone of the vomiting center.

2. The patient with chronic cholecystitis appointed two drugs: one - containing dry bile, the other - an alkaloid of opium, which has miotropnym antispasmodic action. What are the names of these drugs and for what purpose they are assigned to the patient?

Response. The patient was prescribed a means of stimulating the formation of bile, «Cholenzymum» tablets and spasmolytic papaverine to relax the sphincter of Oddi and improve the separation of bile.

3. Patient transported to hospital with severe pains in the abdomen nature of herpes. Blood test for diastasis confirmed the clinical diagnosis of acute pancreatitis. Assign a means of pathogenetic therapy.

Response. The patient should start intravenous contrycal, an inhibitor of proteolytic enzymes.

4. The patient with acute poisoning unknown poison as a laxative was prescribed castor oil, but the signs of intoxication continued to increase despite the implementation of other measures of detoxification. What are the cause of the deterioration of the patient and make adjustments to the appointment of a physician.

Response. The patient had been poisoned by poison lipophilic, castor oil has worsened his condition. In this case, you need to assign saline laxatives (magnesium sulphate powder).

5. A pregnant woman complained of constipation (enterocolitis). She was prescribed a laxative, which after taking the signs of preterm labor. What a laxative taken ill?

Response. The patient was assigned to magnesium sulphate, which is a reflex triggered increased contractile activity of myometrium.

6.3. Practical part

Perform practical skills - perform tasks for the recipe (prescription to: magnesium oxide (tab), the natural gastric juice (flack), ranitidine (tab), sodium bicarbonate (tab)).

1. Prescribing FOR SOLID DOSAGE FORMS

Purpose: Prescribing FOR SOLID DOSAGE FORMS

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

2. Prescribing FOR SOLUTION FOR INTERNAL USE

Purpose: Prescribing FOR SOLUTION FOR INTERNAL USE

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10

5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

7. Forms of control knowledge, skills and abilities

- oral;

- writing;

- experience the practical skills.

8. Control questions

1. What medications are prescribed to increase appetite?

2. For what purpose did appoint bitterness? How do they do?

3. What is the classification of anorectics?

4. Explain the mechanism of action of anorectics.

5. What groups of drugs affect the function of salivary glands and their application?

6. Which group of drugs used to enhance the secretion of gastric glands?

7. Which means that affect the secretion of gastric glands, used for diagnostic purposes?

8. What tools are used in hypoacid gastritis?

9. What is the classification, mechanism of action, side effects and indications for use of resources, reducing the secretion of gastric glands?

10. What tools have gastroprotective activity, their mechanism of action?

11. Give a description of antacids.

12. What distinguishes a group of funds that impact on the motility of the stomach?

13. To write prescriptions for: magnesium oxide (tab), the natural gastric juice (flack), ranitidine (tab), sodium bicarbonate (tab)).

Practical training

Topic 4: DIURETICS. MEANS THAT AFFECT THE FUNCTION OF THE MYOMETRIUM

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector

2. The duration of the study of themes

Hours – 4

3. Purposes

• create a general idea of diuretics and drugs, affecting myometrium;

• to give a classification of diuretics and drugs which affect the myometrium on;

• give an idea about the main effects of diuretics and drugs affecting myometrium;

• give an idea of the mechanisms of action of diuretics and drugs affecting myometrium;

• provide knowledge of the side effects of diuretics and drugs which affect the myometrium on;

• build knowledge of indications and contraindications to the use of diuretics and drugs affecting myometrium;

• build an ability to analyze the action, the appointment of separate funds, based on the overall pharmacodynamic data of diuretics and drugs which affect the myometrium on;

• provide knowledge of the elements of pharmacotherapy with examples from the private formula.

Tasks

Student should know:

• classification of diuretics and drugs which affect the myometrium on;
• the impact of individual diuretics and drugs which affect the myometrium on, on the body;
• the basic mechanisms of action of diuretics and drugs which affect the myometrium on;
• indications for use of diuretics and drugs which affect the myometrium on;
• side effects and complications of diuretics and resources that affect the myometrium on.

Student should be able to:
Perform practical skills - perform tasks for the recipe (prescription to: hydrochlorothiazide (dichlothiazidum) (tab), furosemide (tab, amp), pituitrinum (amp), atropine sulphate (amp).

4. Motivation

Diuretics and resources that affect the myometrium on are widely used in many fields of clinical medicine (surgery, cardiology, obstetrics and gynecology, internal medicine, etc.), so knowledge of diuretics and drugs which affect the myometrium on their values for the body, their use should be as students in further study of a private pharmacy or GP.

5. Intersubject and intrasubject connections

Teaching this topic is based on the knowledge bases of students of biochemistry, anatomy, histology, normal and pathological physiology of the genitourinary and reproductive systems. Acquired during the course knowledge will be used during the passage of surgery, gynecology, cardiology, internal medicine and other clinical disciplines, as well as further study of those private pharmacy.

6. The content of lessons

6.1. Theoretical part

MEDICINES FOR INCREASING URINE EXCRETION

(Diuretics)

This group of substances increases the excretion of urine from the body and reduces fluid in tissues and serous spaces (ascites, hydrothorax, hydropericardium, etc.). Diuretics are mainly used in diseases characterized by accumulation of fluid in the body (chronic circulatory failure, nephrotic syndrome, cirrhosis of the liver), depression, glaucoma, etc. In addition, it is also used to release poison faster in various poisonings. M-n: Acceleration of urinary excretion in combination with controlled blood dilution. This effect of diuretics is related to their influence on the process of urine formation. Urine formation consists of 3 processes: filtration, reabsorption and secretion.

The increase in urine output under the influence of diuretics is due to their selective effect on the kidney and, first of all, to the decrease in the absorption of Na+ and related Cl- and water

from the renal tubules. Reduction of reabsorption can be achieved either by weakening the state of the tubular epithelium, or by increasing the osmotic pressure of the liquid inside the tubules. It is known that the formation of urine is controlled by neurohumoral factors. Hormones (vasopressin-antidiuretic, aldosterone-mineralcorticoids) are especially important (in the heart (("sodium uretic factor")).

I. Depending on the mechanism of action, diuretics are divided into 2:

1. Means that directly affect the function of the kidney to produce urine.

2. Means affecting the hormonal control of urine production.

Modern diuretics are divided into the following groups:

I. Diuretics that directly affect the epithelium of the renal tubules:

1. Substances with a sulfonamide group in the molecule.

a) thiazides, dichlothiazide, cyclomethioside.

b) non-thiazide substances or substances with a different structure: furosemide, clopamide, oxodoline.

II. 2. Dichlorfecos acetic acid derivative is ethacrynic acid

3. Xanthines are temisal, euphyllin.

4. Pteridine derivatives aritriamterene.

5. Pyrazinoylguanidine derivative amiloride.

II. Aldosterone antagonists spironolactone.

. Osmotically active diuretics mannitol, urea.

IV. Acid forming agents are ammonium chloride.

Depending on the site of action, diuretics are divided into the following groups:

1. Dichlothiazide, cyclomethazid, clopomid, oxodoline, which mainly affect the distal part of the renal tubules.

2. Furosemide, ethacrynic acid, which affect the large joint in the ascending part of the genitourinary gland.

3. Means affecting the end of the distal part of the renal tubules and the collecting tubules. Triampterene, amiloride, spironolactone.

4. Agents affecting the proximal part of the renal tubules are eufilin.

5. Means that affect all parts of the kidney tubes - mannitol.

It should be noted that increasing the filtration process does not significantly increase urine output, since 99% of the primary urine is reabsorbed. For example: if the filtration process increases by 10%, the urine will increase by only 0.1%. If the reabsorption process is reduced to that, urine output will increase strongly by 100%!

Diuretics that directly affect the epithelium of the renal tubules.

DICHLOTIAZIDE– a strong diuretic agent, a derivative of benzothiazidin according to its chemical structure, containing a sulfanilamide group. The mechanism of action is associated with

a decrease in the reabsorption of Na+ and related chlorine ions in the proximal and distal parts of the convoluted tubules of the nephron. It reduces carbonic anhydrase activity less than diacarb. Under the influence of dichlothiazide, the reabsorption of K+ and bicarbonate ions is less than that of Na+ and Cl- ions. Diclothiazide is therefore known as an active saluretic agent. Na+ and chlorine ions are separated in equal or equivalent amounts. The drug also shows its effectiveness in acidosis. Even with continuous use, the diuretic effect does not decrease. In case of diabetes, the drug reduces polyuria, reduces the feeling of thirst, and the osmotic pressure of the blood strongly decreases (the mechanism is unknown). In part, it is assumed that this effect is due to the increase in the ability of the kidney to concentrate and the decrease in the activity of the thirst center. In cases of high blood pressure, the drug lowers it. Dichlorothiazide from MIT is rapidly absorbed. The effect starts very quickly (after 30-60 minutes) and lasts 10-12 hours. Learning (accustoming) to the drug does not develop, but dichlothiazide reduces the excretion of uric acid and has a negative effect on the development of hyperuricemia and, therefore, on the progression of gout.

Application: in cases of blood stagnation in the large and small blood circulation (cardiovascular insufficiency), liver cirrhosis, nephritis and nephrosis, nephropathy of pregnant women, edema caused by adrenal gland hormones and ACTG, heart disease (with salt-free diet), glaucoma. Dichlothiazide is well tolerated by patients, but hypokalemia, hypochloremic alkalosis, exacerbation of gout, impotence, dyspepsia may develop with prolonged use. To prevent this, it is necessary to give potassium preparations KCl, asparkam, panangin.

CYCLOMETHIAZIDE– similar in structure and pharmacological properties to dichlorothiazide, but about 50 times stronger than it. The effect begins after 2-4 hours and lasts for 10-12 hours. The amount of urine per day increases 1.5-2.5 times.

CLOPAMIDE AND OXODOLINE – drugs have a long-lasting effect. Clopamide has a strong effect and lasts for 8-18 hours, while oxodoline lasts for about 3 days. The mechanism of action is mainly related to weakening of reabsorption of sodium ions in distal (and partially proximal) tubules. Both drugs are well absorbed from MIT. It is excreted through the kidneys and intestines.

Indications for use and adverse effects are similar to those of dichlothiazide.

FUROSEMIDE – is a very strong fast and short-acting diuretic. The chemical structure is similar to that of diclothiazide. It is also effective when used enterally and parenterally.

The mechanism of action is related to the reduction of reabsorption of sodium and chlorine ions not only in the distal, but also in the proximal parts of the convoluted tubules of the nephrons, as well as in the thick joint of the ascending part of the genitourinary surface. The drug reduces the reabsorption of potassium ions more slowly. It has almost no effect on the activity of the carbonic anhydrase enzyme. It has the same effect on acidosis and alkalosis, and its effectiveness does not decrease even with continuous use. The effect starts quickly. M-n: after intravenous injection, it starts after a few minutes and lasts for 1.5-3 hours. After drinking, it starts after 45-60 minutes and lasts for 4-8 hours. The good thing is that furosemide works well in cases where other diuretics have failed. Furosemide increases blood circulation in the kidney. Causes accumulation of uric acid in the body. It enhances the excretion of calcium ions (from the body), thus it gives a good result in hypercalcemia (hyperparathyroidism). Furosemide moderately lowers blood pressure because it dilates peripheral blood vessels.

9. What drugs are used to stimulate leucopoiesis?

10. To write prescriptions for: iron recovered (tab), ferkovenum (amp)).

Practical training

Topic 6: HORMONAL DRUGS WITH PROTEIN AND POLYPEPTIDE STRUCTURE. HORMONAL PREPARATIONS WITH A STEROID STRUCTURE. ANTI-INFLAMMATORY AGENTS. ANTI-ALLERGIC AGENTS.

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector

2. The duration of the study of themes

Hours – 3

3. Purposes

- To form a general idea of hormonal drugs to their destination;

- To classify hormonal therapy;

- To give an idea about the main effects of hormones;

- Give an idea of the mechanisms of action of hormonal preparations;

- To give knowledge of side effects of hormonal therapy;

- To generate knowledge of indications and contraindications to the use of hormonal drugs;

- Create the ability to analyze the action, the appointment of separate funds, based on the overall pharmacodynamics of the hormonal therapy group;

- To give knowledge of the elements of pharmacotherapy with examples from the private formula.

Tasks:

Student should know:
- Classification of hormones;

- The impact of certain hormones in the body;

- The basic mechanisms of action of hormones;

- Indications for the use of hormones and their synthetic analogs;

- Side effects and complications caused by hormonal therapy.

Student should be able to:

Perform practical skills - perform tasks for the recipe (prescription to pituitrinum (valium), thyroidinum (table), merkazolilum (table), insulin (flak.), butamidum (table), chlorpropamide (table), hydrocortisone (ointment), prednisolone (table, ointment), dexamethasone (table), retabolil (Valium), estradiol dipropionate (Valium), progesterone (Valium), testosterone propionate (Valium) with a release form, dosage, number of and indications for use).

4. Motivation

Hormonal drugs are widely used in many fields of clinical Me-ditsiny (endocrinology, internal medicine, surgery, obstetrics, gynecology, hematology, etc.), so knowledge of hormones, their importance to the organism, the use of hormones as replacement therapy, as well as in pathological states not related to the failure of the endocrine glands, the ability to write prescriptions for hormonal treatments as necessary for students to further explore their private pharmacology (eg, topics such as anti-inflammatory drugs, allergy medications, medications that affect the myometrium, diuretics, etc. .) as well as a general practitioner.

5. Intersubject and intrasubject connections

Teaching this topic is based on knowledge of the foundations of biochemistry students hormone-tion, anatomy, histology, normal and pathological physiology of the endocrine system. Acquired during the course knowledge will be used during the passage of endocrinology, internal medicine, surgery, obstetrics, gynecology, hematology, ophthalmology and other clinical disciplines, as well as further exploration of the themes of private pharmacy, as anti-inflammatory drugs, allergy medications, medications that affect on the myometrium, diuretics, etc.).

6. The content of lessons

6.1. Theoretical part

HORMONAL DRUGS

Hormones are biologically active substances, produced by the endocrine glands and special cell groups in various tissues. They play the most important role in the humoral regulation of various functions of the body. Moreover, some hormones are neuromodulators.

The importance of hormones is particularly evident when there is a hypofunction of the endocrine glands. For example, failure of the pancreatic islet cells leads to the development of diabetes mellitus, parathyroid gland failure which causes hypocalcaemia (associated with convulsions) and insufficiency of the antidiuretic hormone of the posterior pituitary lobe – diabetes insipidus. At the same time there are diseases, associated with increased production of hormones. Thus, hyperfunction of the thyroid gland causes hyperthyroidism (Basedow's disease), excessive production of the somatotropic hormone of the anterior pituitary lobe – gigantism, acromegaly.

Failure of the endocrine glands is usually treated with hormones. In such cases so-called replacement therapy is required; the duration of the administration of replacement hormones is determined by the duration of the endocrine gland hypofunction. Drugs that stimulate hormone production can also be used for the treatment of these conditions.

Hormonal drugs are obtained via synthetic routes as well as from the organs and urine of animals (in the latter case the activity of a number of drugs is evaluated by biologic standardization and measured in action units). Currently, genetic engineering methods are widely used to obtain hormones. In addition, a considerable number of natural hormone derivatives and their synthetic substitutes have been synthesized, and some of them are different from the natural hormones in their structure.

Antagonists of a number of hormones are also available and they block the effect of the hormones on receptors (for example, sex hormones' antagonists).

According to their chemical structure, hormonal drugsbelong to the following groups:

- Agents of protein or peptide origin:
hormonal preparations of the hypothalamus,

pituitary,

parathyroid gland,

pancreas,

calcitonin;

- Aminoacid derivatives:
hormonal preparations of the thyroid gland,

epiphysis;

- Steroid compounds:
hormonal preparations of the adrenal cortex,

sex glands.

Hormone antagonists are used for the treatment of endocrine gland hyperfunction. These

Antagonists block the appropriate receptors or inhibit hormone synthesis.

ANTI-INFLAMMATORY DRUGS

According to their chemical structure, anti-inflammatory drugs are usually subdivided into steroids and nonsteroids.

Glucocorticoids are related to steroid anti-inflammatory drugs. The mechanism of their anti-inflammatory action is linked to their inhibition of phospholipase A2 which is essential for arachidonic acid synthesis. Glucocorticoids themselves do not provide a direct effect on the phospholipase; instead they promote synthesis and release of endogenous protein group – lipocortines which inhibit this enzyme. Considering that the effect of glucocorticoids occurs at the stage of arachidonic acid synthesis, their anti-inflammatory effect is attributed not only to the inhibition of prostanoid synthesis but also to the suppression of the synthesis of oxyacids, leukotrienes and PAF.

Nonsteroidal compounds possessing anti-inflammatory activity are related to the substances that cause inhibition of cyclooxygenase and, thus, reduse biosynthesis of prostanoids (prostaglandins and thromboxane). It has been proven that there exists at least two variants of cyclooxygenases – type 1 and type 2. Cyclooxygenase-1 (COX-1) is produced in the absence of any pathology; it regulates prostanoid formation in the body. COX-2 production is, to a large extent, induced by an inflammatory process. The search for selective inhibitors COX-2 arouses special interest, since they, apart from their anti-inflammatory effect, reduce the risk of the development of many adverse reactions connected with the inhibition of physiologic biosynthesis of prostanoids (which is not the result of inflammation). Therefore, it is reasonable to classify nonsteroidal anti-inflammatory drugs in the following way.

I. Non-selective inhibitors of cyclooxygenase-1 and -2 (COX-1+COX-2)
II. Selective inhibitors of cyclooxygenase-2

The majority of nonsteroidal anti-inflammatory drugs provide anti-inflammatory, analgesic and

antipyretic effect.

ANTIALLERGIC DRUGS

In allergic reaction of the immediate type the following groups of preparations are used:

A). Drugs blocking the release of histamine and other biologically active substances from sensitized mast cells and basophiles

B). Drugs blocking the interaction of the free histamine with the tissue receptors sensitive to it.

C). Drugs eliminating general anaphylactic (shock) manifestations.

D). Drugs decreasing tissue damage.

In hypersensitivity reaction of the delayed type two groups of preparations are commonly used: drugs suppressing immunogenesis and drugs diminishing tissue damage.

DRUGS AFFECTING THE IMMUNE SYSTEM

Drugs stimulating (normalizing) immune reactions are used in the complex therapy of immunodeficiency conditions, chronic infections and malignant tumors. Biogenic substances (preparations of thymus (thymalin, tactivin), interferon, interleukin-2, BCG) and synthetic compounds (for example, levamisole) are available as immunostimulators.

Used in this lesson, new teaching technologies, "Black Box".

USE OF THE 'BLACK BOX'

The method provides for joint activities and active participation in the classroom of each student, the teacher works with the entire group.

Each student takes out a "black box" unknown medication and brief annotations function which is written on the cards. (Options annotations are included.) Students are required to determine this drug in detail justifying answer.

To think about each answer the student is given 3 minutes. Then discuss the answers, given in addition pharmacodynamics, pharmacokinetics. At the end of the method of teacher comments answer is correct, its validity, the activity level of students.

This methodology promotes student speech, forming the foundations of the critical thinking, as In this case, the student learns to assert his view, analyze responses band members - participants of the contest.

Options abstracts: 2

1. Determine the drug: The drug of the anterior pituitary hormone. Dosed in units of. It is used parenterally after prolonged use of glucocorticoids. (Corticotropin).

2. Determine the drug: The drug of the anterior pituitary hormone. Dosed in units of. It is used in thyroid failure, as well as the differential diagnosis of myxedema. (Thyrotropin).

3. Determine the drug: A synthetic analogue of the posterior pituitary hormone. Apply for buccal-Xia induction of labor and lactation. (Dezaminooksitotsin)

4. Determine the drug: The drug posterior pituitary hormone. It is used for non-self-Harney diabetes. Is introduced intranasally. (Adiurecrine).

5. Determine the drug: The drug of hormones of the adenohypophysis. Dosed in units of the action of the Wii. Used for night blindness. (Intermedin).

6. Determine the drug: A synthetic analogue of thyroid hormone. It is used in patients with myxedema coma. Appointed inside. (Triiodothyronine).

7. Determine the drug: It is a preparation of dried thyroid glands of beef cattle. Contains a mixture of thyroid hormones. (Tireoidin).

8. Determine the drug: The drug is used to treat hyperthyroidism. Appointed inside. Side effects: leukopenia, indigestion, "zobogenny" effect. (Merkazolil).

9. Determine the drug: The drug is used to treat hyperthyroidism. The effect is gradually developing Vaeth (after 1-3 months. And more). Appointed inside. Dosed in millicuries. (Radioactive iodine).

10. Determine the drug: The drug is produced from the thyroid glands of pigs. Apply for osteoporosis nephrocalcinosis. (Kaltsitrin).

11. Determine the drug: The drug is prepared from parathyroid glands of cattle slaughter. The action starts in 4 hours and lasts up to 24 hours is dosed in units of. (Parathyroidin).

12. Determine the drug: The drug podzheludochnoyzhelezy hormone. This effect persists up to 24-40 h. The action is slow (3-6 h). It is used for the treatment of diabetes mellitus th. However, for relief of diabetic coma is inappropriate. Introduced only subcutaneously. (Protamine zinc insulin).

13. Determine the drug: Synthetic hypoglycemic agent. It stimulates the beta cells of the pancreas. The effect persists to 12 hours (butamida).

14. Determine the drug: The drug is used in cachexia, after radiotherapy, long-tional use of glucocorticoids, osteoporosis. Effect develops after 2-3 days, stored up to 3 weeks. (Retabolil).

Options abstracts:

1. Define a group of drugs: After prolonged use of anti-inflammatory drug in the patient appeared headache, appetite, impaired digestion, epigastric pain, began to notice the deposition of fat in the face and neck, increased blood pressure. What took ill? (Glucocorticoids).

2. Determine the drug: anti-inflammatory drug used to lower the temperature and muscle, joint pains. In large doses, increases the excretion of uric acid. (Phenylbutazone) .

3. Determine the drug: A patient with gout for a long time taking anti-inflammatory drug, after which he developed swelling, nausea, diarrhea. The patient went to a doctor. After examination of the blood found reduced white blood cells. (Indomethacin).

4. Determine the drug. The patient took the drug for the prevention of coronary heart disease. After some time, began to notice pain in the epigastric region and the blackening of stool. (Acetylsalicylic acid).

5. Identify the product. Is one of the most active NSAIDs. It has a also marked analgesic and antipyretic activity moderate. Is highly toxic. (Indomethacin).

6. When injected to the patient an antibiotic he developed skin rash, itching, edema. What group of drugs should eahnachit? (Antihistamines funds).

7. A patient with allergic rhinitis, conjunctivitis, took antihistamine drug and noted the constant drowsiness. Which drug can cause sleepiness? (Diphenhydramine, suprastin, promethazine).

8. The drug enhances the action for narcosis, narcotic analgesics. In a small reduces body temperature. It has a depressing effect on the CNS. At very high doses causes motor and mental excitement, tremor. (Promethazine).

9. Within 6 days the patient with gastric ulcer received the drug. He noticed that the headache is accompanied by dizziness, appeared muscle pain, diarrhea, depression, and ginekomastiya. Acceptance of the drug caused these effects? (Cimetidine).

10. The drug is taken with hives, hay fever, allergic rhinitis, conjunctivitis, itching dermatoses, duration 4-6 hours. Drug blocks alpha-adrenergic receptors. (Promethazine).

6.2. Analitical part

Situational problem:

1. The patient observed a progressive weight gain, edema, reduced inter-dresses of his surroundings, fatigue, hair loss. Unsuccessfully resorted to diuretics. With these complaints addressed to the doctor. After the examination, the patient was on the means to drug tablets. Systematic medication contribute to raise the general-tree vitality, reduce swelling, increase efficiency.

Which drug a patient was assigned?

What is the reason why failures of diuretics?

Answer: The patient was appointed tireoidin, which helped fill the deficit incretory thyroid function. Diuretics do not have the effect, since any swelling on the basis of hypothyroidism.

2. The patient complained of increased excitability, irritability, Pottle, susceptibility, tachycardia, poor sleep and progressive weight loss. Doctor after the examination has appointed her drug in tablets, which after taking all the signs of Zabo-Levani markedly decreased. However, once the patient noticed an increase in the volume of the neck. Upon further examination of the patient revealed leukopenia.

Which drug a patient was assigned?

What is the reason for the increase in the volume of the neck?

What is the cause of leukopenia?

Answer: The patient was scheduled antithyroid agent - merkazolil. "Zobogen-ny" effect associated with increased production of thyroid-stimulating hormone of the anterior lobe hypo-

fiza (reaction to decrease the concentration of circulating thyroid hormones). To prevent "zobogenny" action merkazolila can use drugs, iodine and diiodotyrosine Tami. Leukopenia occurred due to a side of Dr. I merkazolila.

3. A patient with rheumatoid arthritis was scheduled inside the medicine in tablettis. The phenomena of fever have been cropped. However, because of fear of renewed disease-Bani, the patient continued to take medication. After a while he turned his attention to the puffiness tion face (moon face), a significant increase in weight and appearance often lyayuschiesya pain in the stomach. The patient went to a doctor. In the survey, he found vanii peptic ulcer in the blood - reducing the number of lymphocytes and eosinophils.

Than patient treated?

What is the cause of complications?

What was the tactic of a doctor?

Answer: The patient was treated for drug from the group of glucocorticoids. Long-offs, which led to complications: weight gain due to the stimulation of mineralocorticoid function. Peptic ulcer disease - as a consequence of glucocorticoid suppression of protein synthesis in the body. Complications arose in the blood as a consequence of the oppression of the function of lymphoid tissue. The physician must cancel glucocorticoids, gradually reducing the dose, and assign to corticotropin stimulation of adrenal function.

4. The patient with bronchial asthma for a long time spent hormone therapius. After about six months after starting treatment, the patient began to notice a sleep disturbance, stomach pain, weight gain. Asked the doctor. On examination revealed hyperglycemia, glycosuria, lymphocytopenia, hypoeosinophilia, osteoporosis, hypertension.

Which drug a patient received?

What is the cause of complications?

How should the doctor do?

Answer: The patient appeared steroid diabetes as one of the complications glyukokorti-koidnoy therapy. All other complications are a consequence of the same. Corticosteroids should be discontinued, gradually reducing the dose, and assign to corticotropin stimulation en dokrinnoy adrenal function.

5. The patient with a significant decline of food a day designated to drug injections. One day after the regular injection of the patient felt a sharp weakness, tremors in the limbs, headache, excessive sweating. When questioning the patient succeeded in establish that the injection he had done in the afternoon. In the latter case, the injection was done for 1.5-2 hours until lunch.

What is the cause of symptoms occurred?

What would it take for relief of symptoms occurred?

Answer: The patient was prescribed insulin as a means of non-specific therapy to improve the trophic tissue. The cause of the above symptoms - gipoglike-mission that developed after

injections of regular insulin, but entered for 2 hours before eating. The patient should be allowed to enter the sugar or glucose.

6. A patient with a myocardial infarction that arose with chronic coronary artery not enough, along with specific and antianginal therapy kardiostimuliruyuschey assigned additional medication to 1 tablet. 2 times a day. On the second week since the start of treatment the patient began to notice deepening voice, hair growth on the legs, pain in the liver, jaundice of the skin, some swelling.

Which drug a patient was assigned?

What is the cause of complications?

Is it possible to further use of the drug?

A: A patient education to accelerate the scar in place of necrotic tissue, it was assigned anabolic steroid - methandrostenolone. Complications arose as a consequence of androgen action of the drug. The drug should be discontinued.

6.3. Practical part

Quest for the recipe to pituitrinum (valium), thyroidinum (table), merkazolilum (table), insulin (flak.), butamidum (table), chlorpropamide (table), hydrocortisone (ointment), prednisolone (table, ointment), dexamethasone (table), retabolil (Valium), estradiol dipropionate (Valium), progesterone (Valium), testosterone propionate (Valium) with a release form, dosage, number of and indications for use).

1. Prescriptions TO SOLID DOSAGE FORMS

Purpose: Prescriptions TO SOLID DOSAGE FORMS

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10

5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

2. Prescribing FOR SOLUTION INJECTION

Purpose: Prescribing FOR SOLUTION FOR INJECTION.

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

7. Forms of control knowledge, skills and abilities

- oral;
- writing;
- experience the practical skills.

8. Control questions

1. What is the classification of hormones?
2. What is the effect of anterior pituitary hormones in the body?
3. What drugs are used for diabetes insipidus?
4. What effects are characteristic for the action of vasopressin?
5. What are the indications for the use of oxytocin?
6. What causes metabolic changes thyroxine?

7. What is the classification of anti-thyroid drugs?

8. What are the indications for parathyroid hormone?

9. What medications are effective for patients with diabetes?

10. Way in which insulin is hypoglycemic effect?

11. What are the main effects of glucocorticoids?

12. What are the indications for the use of glucocorticoids?

13. What complications occur with corticosteroids?

14. What effects are typical for mineralocorticoids?

15. What are the indications for mineralocorticoids?

16. What are the indications for the use of estrogen?

17. What are the indications for the use of progestogens?

18. What are the indications for the use of anabolic steroids?

Practical training

Topic 7: ANTISEPTIC AND DISINFECTANTS. BASIC CRITERIA AND REQUIREMENTS OF CHEMOTHERAPY. ANTIBIOTICS PART I

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector

2. The duration of the study of themes

Hours – 3

3. Purposes

-Give basic principles of chemotherapy;

-Give a classification of antibiotics;

-Give an idea about the main effects of antibiotics: penicillins, cephalosporins, carbapenems, monobactams, macrolides, azalides;

-Give an idea about the mechanisms of action of of antibiotics: penicillins, cephalosporins, carbapenems, monobactams, macrolides, azalides;

-Is to give knowledge of the adverse effects of antibiotics: penicillins, cephalosporins, carbapenems, monobactams, macrolides, azalides;

-Form knowledge of indications and contraindications to the use of antibiotics;

-Establish the ability to analyze the action, the appointment of the individual funds based on the total pharmacodynamics of these groups of antibiotics;

-Is to give knowledge of the elements of pharmacotherapy with examples of private recipe.

Tasks:

Student should know:
- basic principles of chemotherapy;
- classification of antibiotics;
- mechanisms of action of antibiotics;
- indications for the use of antibiotics: penicillins, cephalosporins, carbapenems, monobactams, macrolides, azalides;
- side effects and complications caused by antibiotics: penicillins, cephalosporins, carbapenems, monobactams, macrolides, azalides;,

Student should be able to:

Perform practical skills - perform tasks for the recipe (prescription to benzylpenicillin sodium salt (bot.), ampicillin (tab.), cefotaxime (bot.), cephalexin (tab., caps.), erythromycin (tab.).

4. Motivation

Antibiotics are widely used in many fields of clinical medicine for the treatment of infectious diseases caused by microbes, viruses, etc. Therefore, the study of pharmacokinetics and pharmacodynamics of antibiotics and ability write a prescription for them is necessary as the students with further study of those private pharmacy, and general practitioners.

5. Intersubject and intrasubject connections

Teaching this topic is based on the student's knowledge bases of microbiology, biochemistry, and pathophysiology. Acquired during the course of knowledge will be used during the passage of infectious diseases, surgery, obstetrics and other clinical disciplines, as well as for further study by students on selected topics of private pharmacy.

6. The content of lessons

6.1. Theoretical part

ANTIBIOTICS

Two cardinal features characterize antimicrobial chemotherapeutic drugs:

A. The selectivity of their action against certain kinds of microorganisms, i.e. they have a specific spectrum of antimicrobial action;
B. Low toxicity for people and animals.

The clinical application of antibacterial chemotherapeutic drugs has its specificities. Basic principles of chemotherapy are:

1. It is necessary that the causative agent of the disease is identified and its sensitivity to the chemotherapeutic agents that can potentially be used should be evaluated.
2. If the causative agent is already known, the drugs with the appropriate spectrum of antimicrobial action are selected.
3. When the origin of the pathogenic organism is unknown, it is advisable that the drugs with the broadest spectrumof activity be used.
4. It is necessary that the treatment be started as soon as possible.
5. doses of the preparations have to be sufficient to implement bacteriostatic or bactericidal concentrations in biological fluids and tissues.
6. At the beginning of the treatment a large loading dose of the drug exceeding all further ones is sometimes given.
7. Optimal duration of a treatment course is of great importance.
8. With some infectious diseases a repeated course of treatment has to be performed.
9. Selection of a rational route of administration of the drug is especially important.
10. A combine use of antimicrobial agents is especially advisable in case of chronic infections to prevent development of bacterial resistance to these chemotherapeutic drugs.

Antibiotics - are chemical compounds of biological origin, which have selective injurious or destructive effect on microorganisms. Antibiotics are used in medical practice, produced by actinomycetes (luminous mushrooms), fungi and some bacteria.

Antibacterial antibiotics are represented by the following groups:

1. Antibiotics, which have the structure β-lactam ring

Penicillins Cephalosporins Carbapenems Monobactams

2. Macrolides - antibiotics, that contain a macrocyclic lactone ring in their structure (erythromycin, etc.), and asalydes (azithromycin)

3. Tetracyclines – the antibiotics that contain four condensed six-member ring (tetracycline, etc.)

4. Derivatives of dioxyaminophenylpropan (chloramphenicol)

5. Aminoglycosides – the antibiotics that have amino- sugars in their structure (strep tomycin, gentamycin, etc.)

6. Antibiotics of the group of cyclic polypeptides (polymyxins)

7. Lyncosamides (lyncomycin, clindamycin, etc.)

8. Glycopeptides (vancomycin, etc.)

9. Fusidic acid

10. Antibiotics for topical use (Fuzafungine, etc.)

The spectrum of antimicrobial action antibiotics differ quite substantially. Some affect mainly on gram-positive bacteria (biosynthetic penicillins, macrolides), while others - mostly in Gram-negative bacteria (eg, polymyxins, aztreonam). Several antibiotics have broad spectrum (tetracycline, cephalosporins, chloramphenicol, aminoglycosides, etc.), including gram-positive and gram-negative bacteria and other pathogens.

Antibiotics work on bacteria, inhibiting their reproduction (bacteriostatic effect), or causing their death (bactericidal effect).

Known basic mechanisms of antimicrobial action of antibiotics:

1) violation of the synthesis of bacterial cell walls (on this principle are penicillins, cephalosporins);

2) violation of the permeability of the plasma membrane (eg, polymyxin B);

3) violation of intracellular protein synthesis (both are tetracyclines, chloramphenicol, aminoglycosides, etc.);

4) Violation of RNA synthesis (rifampicin).

Penicillins

On differences in the way of receiving penicillins, as well as a number of other signs and reducible based classification.

I. Penicillin preparations obtained via biological synthesis (biosynthetic penicillins)

For parenteral use (destroyed in gastric acid medium)

a) short-term action - Benzylpenicillin sodium salt of benzylpenicillin potassium salt

b) long-term action - benzylpenicillin novocaine salt

Bicillinum-1 Bicillinum-5

For oral use (acid-stable)

Phenoxymethylpenicillin

II. Semisynthetic penicillins

- For both parenteral and oral use (acid-stable)

a) resistant to penicillinase

Oxacillin sodium

Nafcillin

b) Extended spectrum of action (Broad-spectrum)

Ampicillin

Amoxicillin

- For parenteral use (destroyed in gastric acid medium)

a) Extended spectrum of action (Broad spectrum), including Pseudomonas aeruginosa

Carbenicillin disodium salt

Ticarcillin

Azlocillin

b) For oral use (acid-stable)

Carbenicillin indanyl sodium

Carfecillin

Penicillins exert a bactericidal effect. The mechanism of the antibacterial effect is due to violation of the synthesis of cell wall components.

a) Biosynthetic penicillins

Penicillin has a high antibacterial activity, but the range of its validity is limited. The drug belongs to antibiotics acting mainly on gram-positive bacteria. All salts of benzylpenicillin intended for parenteral use, since they are destroyed in the acidic environment of the stomach.

b) Semi-synthetic penicillins

An important step was receiving penicillin resistant to penicillinase. Go to semisynthetic penicillins, has such a property include oxacillin sodium salt, dikloksatsillin and some others.

Side and toxic effects of penicillins

The main side effects include allergic reactions that occur in a substantial number of patients.

In addition, penicillins cause some adverse and toxic effects of non-allergic nature. These include irritant effects of penicillins. When you receive drugs inside, they can cause inflammation of the mucous membrane of tongue (glossitis), mouth (stomatitis), nausea and diarrhea. Intramuscular injection can be accompanied by pain, the development of infiltrates and aseptic necrosis of the muscle, and intravenous - phlebitis and thrombophlebitis.

When used excessively high doses of sodium salt of benzylpenicillin (especially endolyumbalno) possible neurotoxic effects (arachnoiditis, encephalopathy). Toxic effect of penicillin in some cases affects the activity of the heart. In single observations observed inhibitory effect of oxacillin on liver enzymes. Admission acid-penicillins (especially broad-spectrum, such as ampicillin) may be the cause of dysbiosis (bowl candidiasis).

Cephalosporins

Cephalosporins provide a bactericidal effect, which results from their suppressing influence on cell wall formation. Cephalosporins are antibiotics with a broad spectrum of antimicrobial activity. They are resistant to penicillinase of staphylococci, but many cephalosporins are destroyed by β-lactamases produced by certain gram-negative microorganisms.

Cephalosporins are used for the treatment of diseases caused by gram-negative microorganisms as well as gram-positive bacteria, provided that penicillins fail to be effective or are not tolerated. Cephalosporins have a significant percentage of patients cause allergic reactions. From non-allergic complications possible kidney damage. May be a mild leukopenia. Many drugs cause local irritant effect.

Carbapenems

This group includes imipenem - highly active semisynthetic antibiotic with a broad spectrum of action. Inhibits the synthesis of cell wall and thus has a bactericidal effect. Resistant to β-lactamases, but is destroyed degidropeptidazoy-1 proximal renal tubules. Side effects of nausea, vomiting, seizures, allergic reactions.

Meropenem (Meronem) differs from imipenem considerable resistance to digidropeptidaze-1, and therefore does not require its combination with inhibitors of this enzyme. Stable against most β-lactamases. By the mechanism, the nature and range of antimicrobial action is similar to imipenem.

Of the side effects, possible allergic reactions, irritant at the injection site, dyspeptic symptoms, reversible disorders leykopoeza, headache, dysbiosis.

Monobactams

Aztreonam is resistant to β-lactamases produced by a number of gram-negative bacteria. By inhibiting cell wall synthesis aztreonam provides a bactericidal effect. It is used to treat infections of the urinary tract, respiratory system, the skin, etc. The most common side effects are gastrointestinal upset, skin allergic reactions, headache, superinfectionmay also occur while hepatotoxic effect is not common.

Macrolides and azalides

Representatives of the macrolides is erythromycin, oleandomitsina, roksitromitsin, klaritromi-ching, and azalides - azithromycin.

The mechanism of action of erythromycin is the inhibition of protein synthesis by ribosomes of bacteria.The use of erythromycin is limited, since for him to quickly develop resistance of microorganisms. Therefore, it lies within the reserve and antibiotic use in cases where penicillins and other antibiotics are ineffective. Assign inside erythromycin (erythromycin base) and topically.

Clarithromycin (klatsid) are 2-4 times more active against erythromycin of staphylococci and streptococci.

Azalides chemically different from macrolides, but on the basic properties are similar to them. Azithromycin (sumamed), 2-4 times less active on the effect on staphylococci and streptococci than erythromycin. Effective long-term. t1 / 2 = 2-4 days (for erythromycin t1 / 2 = 2-5 h). Of the side effects sometimes observed nausea, diarrhea, and rarely hearing loss. Their cost is higher than erythromycin.

It should be noted that macrolides and azalides effective against obligate intracellular microorganisms - Chlamydia, mycoplasma and legionella, which can be agents of the so-called "atypical" pneumonia.

6.2.Analitical part

Used in this lesson, new teaching technologies, "Web".

USING "WEB"

The method provides for active participation in the occupation of each student, the teacher works with the entire group.

Steps:

1. Previously students are given time to prepare questions on the passed occupation (pharmacokinetics, pharmacodynamics of drugs).

2. Participants sit in a circle.

3. One of the participants is given skein of thread, and he sets his prepared question (for which he must know the full answer), hold the end of the filament coil and transferring to any student.

4. A student who receives skein, answers the question (in this party, who asked him, commented on a response) and passes the baton on the issue. Participants continue to ask questions and answer them until everything will be in the web.

5. Once students have completed all the questions, a student holding a roll, returning his party, from whom he received the issue, while asking his question, and so on, until the "unwinding" of the coil.

Note: To prevent the students, which should be attentive to each answer, because they do not know who to throw skein.

The teacher, if necessary, corrects the issue, commented on the correct answer of each student.

This methodology promotes student speech, the ability to make sense of mastery of the material and highlight the key points form the foundations of critical thinking as In this case, the student learns to assert his view, analyze responses classmates.

Situational problems:

1. Go to the dentist asked his mother with a child 2 years old. The baby teeth erupted on time, but only started to grow up as destroyed. On examination of teeth: incisors are completely destroyed, their margins are saw-tooth shape, tooth enamel yellow, many teeth affected by caries, the necks of the teeth brown rim. Anamnesis revealed that the mother during pregnancy on the disease has taken an antibiotic without consulting your doctor.

Which antibiotic mother took during pregnancy?

Answer: The child's mother took during pregnancy tetracycline. The child - a manifestation of the teratogenic effect of tetracyclines.

2. The patient was treated from bacillary dysentery antibiotic, he turned to the dentist complaining of soreness of the mucous membrane and the presence of whitish-gray plaque in the mouth. The doctor handled the oral cavity and has appointed a patient medication. Soon get better.

What is an antibiotic taken ill?

Which drug your doctor has prescribed to the patient?

That should be taken to prevent such events?

Answer: The patient was treated for tetracyclines. As a result, there was candidiasis. In order to prevent candidiasis useful in conjunction with broad-spectrum antibiotics to take nystatin, which was assigned to the patient.

3. Sick with typhoid fever has taken an antibiotic. There was clinical improvement. However, on day 10 after treatment began sore throat with fever, rash on the mucosa of lips and nose. In the Blood - leukopenia, agranulocytosis.

Than the treated patients?

What is the reason which developed during treatment of complications?

Answer: The patients taking chloramphenicol. The outbreak of angina, agranulocytosis and leukopenia - a consequence of the antibiotic in leukocyte tissue. Rash on the mucosa - the manifestation of candidiasis.

6.3. Practical part

Perform practical skills - perform tasks for the recipe (prescription prescription to benzylpenicillin sodium salt (bot.), ampicillin (tab.), cefotaxime (bot.), cephalexin (tab., caps.), erythromycin (tab.).

4. Prescriptions TO SOLID DOSAGE FORMS

Purpose: Prescriptions TO SOLID DOSAGE FORMS

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

2. Prescribing FOR SOLUTION INJECTION

Purpose: Prescribing FOR SOLUTION FOR INJECTION.

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

7. Forms of control knowledge, skills and abilities

- oral;

- writing;

- experience the practical skills.

8. Control questions

1. What are the basic principles of chemotherapy?
2. What is the classification of antibiotics on chemical structure?
3. What is the classification of antibiotics on antimicrobial spectrum?
4. What are the main mechanisms of action of antibiotics?
5. What is the classification of penicillins?
6. What is the range and mechanism of antimicrobial action of biosynthetic penicillins?
7. What are the advantages and disadvantages of biosynthetic penicillins?
8. What is the classification and spectrum of antimicrobial action of semisynthetic penicillins?
9. What are the indications for the use of penicillin?
10. What complications may occur in the application of penicillin?
11. What is the range and mechanism of antimicrobial action of cephalosporins?
12. What is the classification of cephalosporins?
13. What are the indications for use of cephalosporins?
14. What side effects are possible with the use of cephalosporins?
15. What are the features of the pharmacodynamics and pharmacokinetics of carbapenems and monobactams?
16. What are the indications for use of carbapenems and monobactams?
17. What is the range and mechanism of antimicrobial action of macrolides and azalides?
18. What are the advantages and disadvantages of macrolides?
19. What are the indications for use of macrolides and azalides?

20. Perform practical skills - perform tasks for the recipe (prescription to benzylpenicillin sodium salt (bot.), ampicillin (tab.), cefotaxime (bot.), cephalexin (tab., caps.), erythromycin (tab.).

Practical training

Topic 8: ANTIBIOTICS PART II. SULFANILAMIDE PREPARATIONS.

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector

2. The duration of the study of themes

Hours – 4

3. Purposes

-to give a classification of antibiotics;

-to give knowledge of the pharmacodynamics, pharmacokinetics, side effects of antibiotics: tetracycline, chloramphenicol, aminoglycosides, polymyxins, linkozamides, glycopeptides, fusidic acid, antibiotics for local application;

-create knowledge of indications and contraindications to the use of antibiotics: tetracycline, chloramphenicol, aminoglycosides, polymyxins, linkozamides, glycopeptides, fusidic acid, antibiotics for local application;

-to give a classification of sulfonamides and synthetic antibacterial agents of various chemical structures;

-to give an idea about the mechanisms of action of sulfonamides and synthetic antibacterial agents of various chemical structures;

-to give an idea about the main effects of sulfonamides and synthetic antibacterial agents of various chemical structures;

-create knowledge of indications and contraindications to the use of sulfonamides and synthetic antibacterial agents of various chemical structures;

-to give knowledge of the adverse effects of sulfonamides and synthetic antibacterial agents of various chemical structures;

-establish the ability to analyze the action, the appointment of the individual funds based on the total pharmacodynamics of these groups of antibiotics;

-to give knowledge of the elements of pharmacotherapy with examples of private recipe.

Tasks:

Student should know:
- classification of antibiotics, sulfonamides, synthetic antibacterial agents of various chemical structures;

- mechanisms of action of antibiotics, sulfonamides, synthetic antibacterial agents of various chemical structures;

- indications and contraindications to the use of antibiotics, sulfonamides, synthetic antibacterial agents of various chemical structures;

- side effects and complications caused by antibiotics, sulfonamides, synthetic antibacterial agents of various chemical structures;

Student should be able to:

Perform practical skills - perform tasks for the recipe (prescription to chloramphenicol (tab., caps.), tetracycline (tab.), streptomycin (bot.), etazol (tab.), sulfadimetoksin (tab.), ftalazol (tab.) bactrim (tab.), furazolidone (tab.), nitroksolin (tab.).

4. Motivation

Antibiotics, sulfonamides, and synthetic antimicrobials of different chemical structure are widely used in many fields of clinical medicine for the treatment of infectious diseases caused by microbes, viruses, etc. Therefore, the study of pharmacokinetics and pharmacodynamics of antibiotics, sulfonamides and synthetic antimicrobial agents of different chemical structure and ability write a prescription for them is necessary as the students with further study of those private pharmacy, and general practitioners.

5. Intersubject and intrasubject connections

Teaching this topic is based on the student's knowledge bases of microbiology, biochemistry, and pathophysiology. Acquired during the course of knowledge will be used during the passage of infectious diseases, surgery, obstetrics and other clinical disciplines, as well as for further study by students on selected topics of private pharmacy.

6. The content of lessons

6.1. Theoretical part

ANTIBIOTICS (continuation)

Tetracyclines

Tetracyclines have a broad spectrum of action. Gradually develop resistance to tetracyclines.

The mechanism of their antimicrobial action is associated with inhibition of intracellular protein synthesis by ribosomes of bacteria. Tetracyclines have bacteriostatic effect.

Tetracyclines have several adverse effects. So, they can cause allergic reactions. Side effects of non-allergic nature should first be noted the irritative effect. Tetracyclines have some hepatotoxicity. Precautions need to appoint tetracyclines in the second than half of pregnancies and children. This is due to the fact that tetracyclines are deposited in bone, including the teeth and form chelates with calcium salts. The formation of the skeleton is broken, there are staining and damage to teeth. One of the adverse effects of tetracyclines is their ability to cause photosensitization and related dermatitis. They inhibit protein synthesis (antianabolicheskoe effect), increase the excretion of sodium ions, water, amino acids, some vitamins and other compounds. Greatest concern staphylococcal enterocolitis and pneumonia that can occur is very difficult. Inhibition of saprophytic flora is one of the causes of failure in patients with B-vitamins (saprophytes involved in their synthesis), which aggravates the damage of the mucous membrane of digestive tract caused by irritating to tetracyclines and superinfection.

Chloramphenicol group

Chloramphenicol has a broad spectrum of action.

Mechanism of antimicrobial action is associated with its effect on the ribosome and the inhibition of protein synthesis. Habituation of microorganisms to chloramphenicol develops relatively slowly.

Side effects of non-allergic nature most often occurs irritation (nausea, diarrhea), including anorectal syndrome (with appropriate localization of stimulation); skin rashes, dermatitis), psychomotor disorders, myocardial supression

Aminoglycosides group

The mechanism of action of aminoglycosides is associated with a direct their influence on the ribosome and inhibition of protein synthesis.

Streptomycin has a broad spectrum of antimicrobial action. This antibiotic relatively fast growing addiction. From the gastrointestinal tract of the drug is absorbed poorly.

Negative effects include streptomycin, non-allergic and allergic effects. The most serious is its ototoxic effect. Most often affects the vestibular branch of VIII pairs of cranial nerves, at least - the auditory branch. Streptomycin has a depressant effect on nerve-muscle synapses, which can cause respiratory depression. In addition, it has nephrotoxicity as well as irritating effect, in connection with its painful than injections.

Administration of these drugs streptomycin marked and allergic reactions.

Cyclic polypeptides (Polymyxins)

In polymyxin M sulfate antimicrobial effect expressed mainly on gram-negative bacteria.

The mechanism of antimicrobial action is related to damaging effect of polymyxin M on the plasma membrane.

Resistance to polymyxin M develops slowly, which is an advantage of the drug.

Assign polymyxin M sulfate orally (in the intestine accumulate high concentrations of the drug because of gastrointestinal tract, he sucked bad) and topically. Parenterally, it is not used, since this route of administration it causes severe neuro-and nephrotoxic disorders. Enteral drug use in enterocolitis, as well as for the renovation of the intestine before surgery. Topical polymyxin M sulfate is effective in treating suppurative processes caused by pathogens sensitive to it.

LINCOSAMIDES

Clindamycin is an inhibitor of protein synthesis of bacteria and is usually bacteriostatic effect. Is active mainly against anaerobes, streptococci and staphylococci.
It is used for infections caused by Bacteroides.

The most dangerous side effect - pseudomembranous colitis. Rarely observed allergic reactions, liver damage, leucopenia.

Glycopeptides

Vancomycin impairs bacterial cell wall synthesis and provides a bactericidal effect. Has high activity against gram-positive cocci. Vancomycin is used for the treatment of infections caused by gram-positive cocci, which are resistant to penicillin and of enterocolitis, including pseudomembranous colitis.

The drug is toxic, which limits its application. He has ototoxicity and nephrotoxicity may cause phlebitis. Is rare allergic reactions, neutropenia, thrombocytopenia.

Fusidic acid

It is an antibiotic with a narrow spectrum of action. Mainly influenced by gram-positive bacteria. Inhibits protein synthesis of bacteria. It is used for staphylococcal infections resistant to penicillin, especially osteomyelitis. Side effects: dyspeptic symptoms, skin rash, jaundice.

Topical antibiotics

For local action proposed antibiotic fuzafunzhin, has antimicrobial and anti-inflammatory effects. Produce the drug in aerosol form for inhalation. Recommended for use in infections of nasopharynx and respiratory tract. Of the side effects sometimes observed irritating.

SULFONAMIDES

Sulfonamides were the first chemotherapeutic antibacterial broad-spectrum, which found application in medical practice. Chemically, they are derivatives of sulfanilamide (amide of sulfanilic acid).

In this regard, to the substitution of hydrogen atoms at N4 resort is extremely rare, it is allowed only if the organism is split and the amino radical is released (for example, ftalazol). The introduction of additional radicals in benzene ring reduces the activity of the compounds.

Sulfonamides can be represented by the following groups.

1. Preparations used for their systemic action (readily absorbed from the gastrointestinal tract)

A. With a medium-term action (4-6 h)

Sulfadimidine (sulfadimezinum)

Sulfaethidole (ethazolum)

Sulfadiazin (sulfazinum)

Sulfacarbamide (urosulfanum)

B. With a long-term action (12-24 h)

Sulfamethoxypyridazine (sulfapyridazinum)

Sulfadimethoxine

C. With a very long-term action (-7 days)

Sulfalene

2. Preparations acting in the intestinal lumen (poorly absorbed from the gastrointestinal tract)

Phthalylsulfathiazole (phthalazolum)

3. Preparations for topical use

Sulfacetamide-sodium (sulfacylum-natrium)

Silver sulfadiazine (sulfarginum)

Spectrum of action of sulphonamides is quite wide. It mainly includes the following pathogens:

a) bacteria - pathogenic cocci (Gram-positive and gram), E. coli, causative agents of dysentery (Shigella), Vibrio cholerae, pathogens of gas gangrene (Clostridium), anthrax, diphtheria, catarrhal pneumonia, influenza;

b) Chlamydia - pathogens trachoma, ornithosis, lymphogranuloma inguinal

c) Actinomycetes;

d) the simplest - the agent of toxoplasmosis, malaria plasmodia.

Mechanism of antimicrobial action of sulfonamides is due to their competitive antagonism with para-aminobenzoic acid. The latter is included in the structure digidrofolievoy acid, which synthesize many microorganisms. In human tissue this does not happen, since these tissues are disposed of ready-made digidrofolievuyu acid than, apparently, explains the selectivity of antimicrobial action of sulfonamides.

Due to the chemical similarity to para-aminobenzoic acid, sulfonamides prevent its inclusion in digidrofolic acid. In addition, they competitively inhibit digidropteroatsintetaza. Violation of the synthesis digidrofolic acid reduces the formation of her tetrahydrofolic acid, which is necessary for the synthesis of purine and pyrimidine bases. As a result inhibits the synthesis of nucleic acids, resulting in growth and reproduction of microorganisms are suppressed (bacteriostatic effect).

SYNTHETIC ANTIBACTERIAL AGENTS OF VARIOUS CHEMICAL STRUCTURES

Derivatives of 8-oxyquinoline

Drugs in this series have antibacterial and antiprotozoynoy effects.

Go to Antimicrobial Agents of this group is 5-nitro-8-hydroxyquinoline - nitroksolin (5-LCM). The drug has broad spectrum antibacterial action. In addition, it has a depressing effect on some fungi (yeast, etc.).

Nitroksolin rapidly absorbed from the intestine. Stands unchanged in the urine, which accumulates in bacteriostatic concentrations.

Apply nitroksolin infections of the urinary tract caused by various microorganisms. Assign inside. Of the side effects are possible dyspeptic symptoms. Keep in mind that when receiving nitroksolina urine becomes bright yellow.

Nitrofuran derivatives

This group of compounds includes many of the drugs. Some are used primarily as an antiseptic for external use (for example, furatsilin), others - mainly to treat infections of the intestine and urinary tract infections (furazolidone, furadoninum, furaginum).
Importantly, the nitrofurans are effective against microorganisms resistant to antibiotics and sulfonamides.

Furazolidone used in intestinal infections (bacillary dysentery, paratyphoid fever, poisoning), as well as trichomonas coleitis and giardiasis. Enter his mouth, vaginally, rectally. May cause dyspeptic symptoms, allergic reactions. Effective drug for the treatment of urinary tract infections is furadonin (nitrofurantoin). Assign him inside.

It is rapidly absorbed and excreted in large quantities by the kidneys, which are bacteriostatic and bactericidal its concentration. As with furazolidone, it may interfere with appetite, nausea, vomiting. Some patients have allergic reactions. Furagin used for urinary tract infections, as well as locally.

In order to reduce side effects when taking derivatives of nitrofuran recommended drinking plenty of fluids, blockers of histamine H1-receptor, vitamin B.

6.2.Analitical part

Used in this lesson, new teaching technologies, "Web".

USING "WEB"

The method provides for active participation in the occupation of each student, the teacher works with the entire group.

Steps:

1. Previously students are given time to prepare questions on the passed occupation (pharmacokinetics, pharmacodynamics of drugs).

2. Participants sit in a circle.

3. One of the participants is given skein of thread, and he sets his prepared question (for which he must know the full answer), hold the end of the filament coil and transferring to any student.

4. A student who receives skein, answers the question (in this party, who asked him, commented on a response) and passes the baton on the issue. Participants continue to ask questions and answer them until everything will be in the web.

5. Once students have completed all the questions, a student holding a roll, returning his party, from whom he received the issue, while asking his question, and so on, until the "unwinding" of the coil.

Note: To prevent the students, which should be attentive to each answer, because they do not know who to throw skein.

The teacher, if necessary, corrects the issue, commented on the correct answer of each student.

This methodology promotes student speech, the ability to make sense of mastery of the material and highlight the key points form the foundations of critical thinking as In this case, the student learns to assert his view, analyze responses classmates.

Situational problems:

1. Patients with extensive infected wound in the maxillofacial region was a regular irrigation of the lesion preparation containing the antibiotic. There was improvement, but it was found diminished hearing and impaired renal function.

Which antibiotic can cause side effects mentioned?

Answer: These disorders could be caused by use of the drug containing neomycin.

2. Purulent wound filled streptotsid. Improvements are not forthcoming. Changed the treatment strategy - the wound was treated sintomitsin's liniments, and inside the designated etazol. Surface of the wound was rapidly heal.

Why is the initial treatment option proved to be ineffective?

Why the second treatment option was successful?

Answer: Sulfonamides in the presence of pus is not effective. The second option of treatment topical sintomitsina effectively, since sintomitsin retains its antimicrobial effect in the presence of pus. Appointment etazol increased antimicrobial action sintomitsin.

3. Patient with pneumonia designated chemotherapeutic agent. After a week of treatment, the patient's condition began to improve, but soon the patient began complaining of back pain and

difficulty urinating. In the analysis of urine detected crystalluria, cylindruria, albuminuria and macroscopic hematuria.

Which drug a patient assigned?

Prevention measures.

Answer: The patient was appointed agent of a group of sulfonamides, which are characterized by the described complications, because as a result of acetylation in the body, these drugs lose their solubility and form crystals. To prevent these complications should be combined taking sulfonamides with abundant alkaline drinking.

6.3. Practical part

Perform practical skills - perform tasks for the recipe (chloramphenicol (tab., caps.), tetracycline (tab.), streptomycin (bot.), etazol (tab.), sulfadimetoksin (tab.), ftalazol (tab.) bactrim (tab.), furazolidone (tab.), nitroksolin (tab.).

1. Prescriptions TO SOLID DOSAGE FORMS

Purpose: Prescriptions TO SOLID DOSAGE FORMS

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

2. Prescribing FOR SOLUTION INJECTION

Purpose: Prescribing FOR SOLUTION FOR INJECTION.

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

7. Forms of control knowledge, skills and abilities

- oral;

- writing;

- experience the practical skills.

8. Control questions

1. What antibiotics have a broad spectrum of action?
2. What are the mechanisms of action, indications for use, side effects of tetracycline?
3. What side effects can occur when using chloramphenicol?
4. What are the main indications for the use of chloramphenicol?
5. Which antibiotics are redundant?
6. What side effects can occur when the application of streptomycin?
7. What are the indications for use of streptomycin, neomycin?
8. What are the advantages and disadvantages of aminoglycosides?
9. What are the features of the action, indications for use of polymyxin B?
10. What are the features of the action, indications for use of glycopeptides, fusidic acid, fuzafunzhina?

Practical training

Topic 9: ANTI-TUBERCULOSIS DRUGS. ANTIVIRAL AND ANTI-FUNGAL AGENTS.

1. Location and equipment of the lessons

- department of pharmacology;
- drugs, annotations to the drugs, slides, tables;
- slide projector.
-

2. The duration of the study of themes

Hours – 4

3. Purposes

- learning a general idea of antituberculosis, antisperochetal and antiviral drugs to their destination;
- give a classification of antituberculosis, antisperochetal and antiviral drugs antituberculosis, antisperochetal and antiviral drugs;
- give a notion of effects of the antituberculosis, antisperochetal and antiviral drugs;
- give a notion of mechanisms of action of the antituberculosis, antisperochetal and antiviral drugs;
- give a notion of side effects of the antituberculosis, antisperochetal and antiviral drugs;
- give a notion about indications and contraindication of the antituberculosis, antisperochetal and antiviral drugs.

Tasks

Student should know:

- **classification of antituberculosis, antisperochetal and antiviral drugs drugs;**
- **basis effects of antituberculosis, antisperochetal and antiviral drugs drugs;**
- **mechanisms of action of antituberculosis, antisperochetal and antiviral drugs drugs**
- **indications for use of antituberculosis, antisperochetal and antiviral drugs drugs;**
- **side effects and complications of antituberculosis, antisperochetal and antiviral drugs drugs;**

Student should be able to:

Perform practical skills - perform tasks for the recipe (prescription to isoniazid (tab.), ethambutol (tab.), rifampicin (caps.), biyohinol (vial), rimantadine (tab), oxolin (ointment).

4. Motivation

Tuberculosis, syphilis in recent years are quite common in the practice of a physician. Therefore, the knowledge of antituberculosis and antispirochetal drugs, the ability to write them prescriptions needed for general practice.

5. Intersubject and intrasubject connections

Teaching this themes is based on the student's knowledge bases of microbiology, biochemistry, histology, normal and pathological physiology. Acquired during the course of knowledge will be used when learning them phthisiology, Dermatology and Venereology,

infectious diseases, therapy, pediatrics and other clinical disciplines, as well as for further study by a private pharmacy.

6. The content of lessons

6.1. Theoretical part

ANTITUBERCULOSIS DRUGS

In the complex drug therapy for tuberculosis products is dominated by chemotherapeutic agents. These include drugs:

A. Synthetic agents

1st (main)	2nd (reserve)
Isoniazid	Ethionamide
Ethambutol	Protionamide
	Pyrazinamide
	Thioacetazone
	Aminosalicylate sodium
	Calcium benzamidosalicylate (bepaskum)

B. Antibiotics

1st (main)	2nd (reserve)
Rifampicin	Cycloserine
Streptomycin	Kanamycine
Streptomycin chloride-potassium complex	Viomycin (florimycinum)

Group I — the high efficacy drugs*:* Isoniazid Rifampicin

Group II — medium efficacy drugs*:* Ethambutol Streptomycin Ethionamide Pyrazinamide Kanamycine Cycloserine Viomycin (florimycinum)

Group III — moderate efficacy drugs*:* Aminosalicylate sodium Thioacetazone

Synthetic drugs affects to mycobacterium tuberculosis. They does'n affect to other microorganisms.

The recommended dosage depends on the type of antituberculosis drug and may be different for different patients.

Some antituberculosis drugs must be taken with other drugs. If they are taken alone, they may encourage the bacteria that cause tuberculosis to become resistant to drugs used to treat the disease. When the bacteria become resistant, treating the disease becomes more difficult.

To clear up tuberculosis completely, antituberculosis drugs must be taken for as long as directed. This may mean taking the medicine every day for a year or two or even longer. Symptoms may improve very quickly after treatment with this medicine begins. However, they may come back if the medicine is stopped too quickly. Do not stop taking the medicine just because symptoms improve.

Some people feel drowsy, dizzy, confused, or less alert when using these drugs. Some may also cause vision changes, clumsiness, or unsteadiness.

The search for new anti-TB drugs continue. The challenge is to create high-and low-toxic drugs, deprived of their side effects. It is important that resistance to Mycobacterium tuberculosis has evolved it may slowly. Should take into account the economic side. Such preparations should be made available for widespread use in medical practice, especially because the treatment of very long.

DRUGS FOR THE TREATMENT OF SYPHILIS

The main place in the treatment of syphilis take drugs penicillin. Used for this purpose as a short-range and long-acting drugs. Development of resistance to it pale treponemes were not observed. However, they concede the effectiveness of penicillin drugs. These include biyohinol and bismoverol (suspension of basic bismuth salt monovismutvinnoy acid neutralized peach oil). Unlike antibiotics, spectrum of activity of bismuth drugs is limited to syphilis. The activity they are inferior to benzylpenicillin. Treponemostatic their action is associated with inhibition of enzymes containing sulfonic hydril group. Therapeutic effect of bismuth drugs develops much more slowly than penicillin. From the gastrointestinal tract of bismuth preparations are not absorbed, due to which they are administered intramuscularly.

ANTIFUNGAL DRUGS

Pathogenic and opportunistic fungi cause diseases (mycoses), which have wide circulation. Depending on the agent prescribed drugs with the appropriate Antifungal and antiprotozoal spectrum of activity. In addition, the importance of the choice of drugs have the features of their pharmacokinetics and toxicity.

Antifungal and antiprotozoal agents are divided into:

I. Drugs used for the treatment of diseases caused by pathogenic fungi

1. In systemic or deep mycoses (coccidioidomycosis, paracoccidioidomycosis, histoplasmosis, cryptococcosis, blastomycosis)

Antibiotics - amphotericin B, mycogeptinum

Derivatives of imidazole - myconazole, ketoconazole

Derivatives of triazole - itraconazole, fluconazole

2. In epidermomycoses (dermatomycoses)

Antibiotics - griseofulvin

Derivatives of N - metylnaftalin - terbinafin (lamisil)

Derivatives of nitrophenol - nitrofungin

Preparations of iodine – alcoholic solution of iodine, potassium iodide

II. Drugs used for the treatment of diseases caused by opportunistic fungi (for example, candidiasis)

Antibiotics – nystatin, levorin, amphotericin B

Derivatives of imidazole - myconazole, clotrimazole

Bis-quaternary ammonium salts – dequalinium (dekaminum)

ANTIVIRAL DRUGS

Orientation of antiviral drugs may be different and applies to different stages of interaction of the virus with the cell. So, are known substances that inhibit:

1) attachment to orpenetration into the host cell (enfurviride, γ-globulin);

2) uncoating (deproteinization) of the viral genome (amantadine, rimantadine);

3) synthesis of "early" viral enzymes (guanidine);

4) synthesis of nucleic acids (zidovudine, acyclovir, vidarabine, idoxuridine and other nucleoside analogues);

5) synthesis of "late" viral proteins (saquinavir);

6) assembly of viral coat proteins and viral nucleic acid into new virus particles (metisazone).

Also, getting into the body, the viruses cause the formation of cells of biologically active glycoprotein of interferon and the inclusion of humoral and cellular immunity. Viral proteins, as strong antigens, trigger the formation of antibodies that neutralize the action of viruses. Creating drugs that stimulate the biosynthesis of interferon and antibody production, also promising to fight viral infections.

Antiviral substances, which are used as medicines, may be represented by the following groups:

Synthetic agents

- Analogues of nucleosides - endovudine, acyclovir, vidarabine, ganciclovir, trifluridine,

idoksuridine

- Derivatives of peptides - saquinavir

- Derivatives of adamantane - amantadine, rimantadine

- Derivatives of indolcarbonic acid - arbidolum

- Derivatives of phosphonoformic acid - foscarnet

- Derivatives of tyosemicarbasone - methisazone

Biological substances produced by the cells of the macroorganism - Interferons

A large group of effective antiviral agents represented derivatives of purine and pyrimidine nucleosides. They are antimetabolites that inhibit the synthesis of nucleic acids.

In recent years, particular attention is drawn antiretroviral drugs, which include reverse transcriptase inhibitors and protease inhibitors. The heightened interest in this group of substances associated with their use in the treatment of acquired immunodeficiency syndrome (AIDS). Called it a special retrovirus - human immunodeficiency virus (HIV NIV). Therapy requires the use of anti-AIDS, as well as symptomatic of funds.

Antiretroviral drugs effective for the treatment of the HIV-infection can be divided into the following groups.

1. Inhibitors of viral reverse transcriptase

A. Nucleosides

Zidovudine

Didanosine

Zalcitabine

Stavudine

B. Non-nucleoside compounds

Nevirapine

Delavirdine

Efavirenz

2. Inhibitors of HIV-proteases

Indinavir

Ritonavir

Saquinavir

Used in this lesson, new teaching technologies: interactive game "DAISY"

Method involves active participation in the lesson each student, teacher works with the entire group.
Purpose: Consolidation and repetition of material.

STEPS:

1. Advance on a large piece written pattern with groups of drugs, according to the classification of anti-TBdrugs.
2. Pre-drawn on thick paper and individually cut "petals". On their reverse side are written the names of drugs. "Petals" are attached to a wall or a board with adhesive tape in the shape of daisies before classes.
3. Each student will "tear off" tab and attach it to the appropriate item on the template.
4. The game is repeated until, until all the petals will not be "derailed".
5. Students together with the teacher evaluate the correctness of the job.
6. Summing up the results of the teacher.

Classification of antituberculosis drugs

Antituberculosis drugs			
Synthetic drugs I group	Antibiotics I group	Synthetic drugs II	Antibiotics II
isoniazid ethambutol phtivazid metazid salyuzid INGA-17	streptomycin rifampicin rifamicin	ethionamide protionamide pyrazinamide thioacetazone aminosalicylate sodium (PAS)	cycloserine kanamycine viomycin (florimycinum)

6.2. Analitical part

Situational problems:

1. During pregnancy, women suffering from pulmonary tuberculosis, conducted anti-TB therapy. It was subsequently discovered that the unborn child can not hear.
Which drug a patient was assigned?
Answer: The woman took streptomycin, which causes hearing loss resulting from damage to the eighth pair of cranial nerves.
2. Children suffering from pulmonary tuberculosis received anti-TB drug II series, after which they began to celebrate the visual impairment. After discontinuation of the drug given symptom has disappeared.
Which drug get children?
Answer: The children received ethambutol.
3. During the treatment of pulmonary tuberculosis in a patient with epilepsy after taking the drug

2-nd line, it was noted more frequent seizures
Which drug gets sick?
Answer: The patient received cycloserine.
4. Syphilis patients were assigned to the standard course of treatment. After the first injection a few minutes later developed severe weakness, shortness of breath, choking, fear of death, paleness, cold sweats, and sharply increase swelling.
Which drug gets sick?
Measures elimination of complications.
Further treatment in primary disease.
Answer: The patient appeared allergic reaction is likely to benzylpenicillin. For relief of allergic reaction to the patient must be assigned diphenhydramine, a solution of calcium chloride. Penicillin should be abolished. Treatment continued biyohinolom.
5. Patients with primary syphilis were treated by shock doses of penicillin. By the end of the first days after starting treatment the patient's condition deteriorated over time: new malaise, increased body temperature, increased skin rash.
What are the reasons for the symptoms?
Follow doctor's tactics.
Answer: The reason for the deterioration of the patient in the acute intoxication endotoxins pale spirochetes (Jarisch) due to the massive destruction of the pathogen in the application of penicillin in shock doses. If necessary, the patient should be assigned glucocorticoids, glucose-saline solutions. After the elimination of intoxication continue treatment with the same drug

6.3. Practical part

Perform practical skills - perform tasks for the recipe (prescription to isoniazid (Tab), ethambutol (tab), rifampicin (capsule), biyohinol (vial), rimantadine (Tab), oxolin (ointment).

1. Prescriptions TO SOLID DOSAGE FORMS

Purpose: Prescriptions TO SOLID DOSAGE FORMS

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30

	In total	0	100

2. Prescribing FOR SOLUTION INJECTION

Purpose: Prescribing FOR SOLUTION FOR INJECTION.

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

3. Prescribing ON SOFT FORMS

Purpose: Prescribing ON SOFT FORMS.

Steps:

№	Action	Has not executed	Completely correctly executed
1.	The indicating to the pharmacist (Recipe)	0	10
2.	Transfer of the basic and auxiliary medical products which are a part of the written out medicine, with the dose indicating	0	30
3.	The indicating to the pharmacist about preparation of the medicinal form (M.f)	0	20
4.	The indicating to the pharmacist about amount of a given out drug	0	10
5.	The indicating to the patient about a way of drug intake, the indication to application	0	30
	In total	0	100

7. Forms of control knowledge, skills and abilities

- oral;

- written;

- solution of case problems;

- experience the practical skills.

8. Control questions

1. Classification of antituberculosis, antisperochetal and antiviral drugs drugs;
2. Basis effects of antituberculosis, antisperochetal and antiviral drugs drugs;
3. Mechanisms of action of antituberculosis, antisperochetal and antiviral drugs drugs
4. Indications for use of antituberculosis, antisperochetal and antiviral drugs drugs;
5. Side effects and complications of antituberculosis, antisperochetal and antiviral drugs drugs;
6. What is the classification of antiviral drugs?
7. What are the mechanisms of action of antiviral drugs?
8. What are the indications for use of rimantadine, metisazona, oksolina?
9. What is the biological significance, properties and application of interferons?
10. What medications are used to treat, prevent flu?
11. What is the mechanism of action and indications for use of antiretroviral drugs?
12. Perform practical skills - perform tasks for the recipe (isoniazid (tab.), ethambutol (tab.), rifampicin (caps.), biyohinol (vial), rimantadine (tab), oxolin (ointment).

The recommended literatures

Basic

1. A Trepathy K.D. Essentials of medical pharmacology 2019

1. B Kharkevich D.A. Pharmacology. -M: Medicine, 2010, 2017.

2. Kharkevich D.A. The general recipe. - M: Medicine, 1982.

3. Kharkevich D.A.Management to a practical training on pharmacology. - M: Medicine, 1988.

4. Azizova S.S. Pharmacology. - Tashkent: Ibn-Sino, 2000, 2002, 2006.

Additional

5. Mashkovsky M.D.Drugs. Directory. - M: Medicine, 2001, 2005.

6. A directory of Vidal. - M, 2008, 2009.

7. Makhsumov M. N, Malikov M.M. Pharmacology. - Tashkent: Ibn-Sino, 1997.

8. Kacung B.G.Bazic and clinical pharmacology. - St.-Petersburg - Moscow. 1998.

9. Khakimov Z.Z., Azimov M.M., Zaytseva O.A., Radzhapova Sh.Z. The general recipe Toshkent, 2005.

10. The general medical practice. Clinical references and a pharmacological directory. Under the editorship of I.P.Denisov. Yu.L. Shevchenko. F.G.Nazyrova. - M: GEOTAR-MEDIA, 2005.

11.://www.cibis.ru/catalogue/pharmacology_pharmacy_toxicology/a/sites/52185.html;://medvedev-ma.narod.ru/farmakologia/0.htm;

12. http://max.1gb.ru/farm/;

13. //nmu-student.narod.ru/farmacology;

14. //shop.medicinform.net/showtov.asp?FND=&Cat_id=298696;

15. //www.ronl.ru/formakologiya/; ://www.evrocet.ru/cshop/book-18921;

16. //www.vsma.ac.ru/~pharm/; ://WWW.JEDI.RU/book-189216-115.html.

Independent works for the 5th semester

№	Topics	Hours
1.	Laws and orders of the President of the Republic of Uzbekistan regarding prescription.	4
2.	Regulatory documents used in the control of medicines. State register of medicines.	5
3.	Dopamine and dopaminergic drugs. Serotonin and serotonergic agents. Medicines used to treat Parkinson's disease.	8
4.	Antiepileptic drugs	4
5.	Herbal medicines and their use.	4
6.	Pharmacology of the drug tropicamide.	4
7.	Nicotinism and its complications. The effect of nicotine on the body of adolescents and women.	4
8.	Anaphylactic shock and its treatment.	4
9.	Alcoholism and its complications. The effect of alcohol on pregnant women.	4
10.	Drug addiction and its complications.	4
11.	Lithium salts. Sedatives.	4
12.	Nootropic drugs. Analeptics.	4
	Total	**53**

Independent works for the 6th semester

№	Topics	Hours
1.	Importance of cardiotonic drugs in acute and chronic heart failure.	4
2.	Medicines used in hypertensive crisis.	4
3.	Modern gastroprotectors.	4
4.	Hepatoprotective agents used in the treatment of drug-induced hepatitis.	4
5.	Medicines that increase the tone of the human body. Effects of drugs on the fetus.	4
6.	Pharmacodynamics of the drug torasemide.	4
7.	Vitamins. Comparative analysis of iron-sparing drugs	4
8.	Representatives of the new generation of cephalosporin antibiotics.	4
9.	Medicines affecting leukotriene receptors.	5
10.	Medicines used in the treatment of diabetes insipidus.	5
11.	Hyperthermia syndrome and drugs used in its treatment. Principles of antimalarial drug use.	5
12.	Modern target drugs used in the treatment of malignant tumors. Monoclonal antibodies. Protein kinase inhibitors.	5
	Total	**52**

Glossary

Aa	Ana	from
Ac	Acidum	Acid
Amp	Ampull	Ampulle
Antagonism		When 2 drugs are used together, an anti-inflammatory process occurs in the body.
Aq	Aqua	Water
Aq. Dest	Aqua	Distilled water
But	Butyrum	Castor oil
Cum	Cum	With
Comp	Compositus (a um)	Compound (aya oe)
Caps	Capsula	Capsule
Caps. Amyl.	Capsula Amylum	Starch capsule
Caps. Gelat.	Capsula Gelatinosa	Gelatin capsule
Ch. Cer	Charta Cerata	Wax coconut
Cito	Cito	Quick
Cort	Cortex	Pustlok
D	Da (detur)	Give, let it be given
dil	Dilutes	Melting
D.K		The average treatment concn.
Y U S M		Maximum daily amount
D.M		Average amount of treatment
Dose		A therapeutic amount at a time

Min. dose		The minimum amount at which the pharmacological effect occurs
Dav. Ter. Doza		Rosmona is a healing amount
D.t.d.N	Detur tales dosis numero	From such doses, give no
Decoctum	Decoctum	Do not boil
D.S.	Detur signatur	Let it be given, let it be shown
Dragee	Dragee	Dragee
Empl	Emplastrum	Plaster
Emuls	Emulsum	Emulsion
Elimination		Excretion is the result of the loss of the drug's properties in the tissue and its removal from the body.
Extr.	Extraktum	Extract
Ex	Ex	Dan
Ex tem.	Ex tempore	Come as necessary
F	Fiat	Give
Pharmacokinetics		It studies the delivery of medicinal substances into the body, absorption, distribution, and elimination from the body.
Pharmacodynamics		It studies the effect, power, and mechanism of medicinal substances
Fl	Flos	Flower
Fluid	Fluidum	Liquid
Fol	Folium	Leaf

Gtt	Gutta	Drop
Hb	Herba	Eat, drink
In	In	Yes
In. Ch. Cer	In charta cerrata	On paraffined paper
Inf	Infusum	Drip
Conjugation		Combining the drug or its metabolite with other chemical groups.
Accumulation		When the drug is used repeatedly, it accumulates in the body and increases its effectiveness and duration
M	Misce	Mix it up
M – N cholinomimetics		M-N has a stimulating effect on cholinergic receptors
M – N cholinoblocers		M-N has an inhibitory effect on cholinergic receptors
Metabolic transformation		Substances are mainly hydrolyzed by reductive hydrolysis and oxidation.
mucil	Mukilogo	Slimy
M.D.S.	Misce. Da .Signa	To the nail
ml		Milliliter
Liq	Liquor	Fluid
Mixt	Mixtura	Mix it up
Get used to it. Tolerance		The effect of the drug decreases with repeated use for a long time
Ol	Oleum	Yog
Pil	Pilula	Pilyulia
pulver	pulveratus	Powdery mildew

Pulv	Pulvis	Powder
q.s	Quantum satis	As long as needed
Rad	Radix	Root
Rp.	Recipe	Take it
s.	Signa	Mark and sing
Sensitization		An increase in the sensitivity of the whole body to them when repeated drugs are injected into the body
Sem.	Semen	The seed
Synergism		When used together, one drug increases the effect of 2
Sir	Sirupus	Juice
Sol.	Solutio	Solution
Suppos	Suppositorum	Candle
Ung	Unguentum	Oinment
N	Numero	Amount, number
Steril	Sterillisetur	Let it be sterilized
Susp	Suspensio	Suspension
Tinct	Tinctura	Don't stop nastoyka
Tachyphylaxis		When the drug is used for a short period of time, its effectiveness decreases

MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

MINISTRY OF HEALTHCARE OF THE REPUBLIC OF UZBEKISTAN

TASHKENT MEDICAL ACADEMY

«APPROVED»
Vice-rector of Tashkent medical academy
_____ Sh.A.Boymuradov
_____«____», 2024

MODULE PROGRAM

On Pharmacology

Area of knowledge:	900 000	- Healthcare and social affairs
Field of education:	910 000	- Healthcare
Direction of education:	60910200	- General medicine

Tashkent - 2024

1

Code of module FR15-607	Academic year 2024/2025	Semester 5-6	Credits 7
Module type Mandatory	Language of study English		Number of hours per week 4/3

1.	Module	Auditory lessons (hours)	Independent study (hours)	Total workload (hours)
	Pharmacology	105	105	210

2.

I. Module content

The purpose of teaching the module - in the process of training a family doctor, students are taught the groups of drugs, their mechanisms of action, the selection of therapeutic amounts depending on age, writing prescriptions for drug forms, ways of administration, instructions for use in diseases, side effects is to teach the secrets and cases of impossibility.

The function of the module - is to provide future family doctors with knowledge, skills and qualifications about drugs used in the treatment and prevention of various diseases; in the general prescription section of the module, the forms and preparation of medicinal substances, teaching the rules of prescription writing, in the general pharmacology section, the analysis of pharmacokinetics and pharmacodynamics of medicinal substances, in the special pharmacology section, teaching the nervous system, executive organs, and metabolism formation of skills related to the pharmacology of secretory, antimicrobial and antitumor substances. Knowing how to apply medical aid measures in case of drug poisoning, teaching how to use them in practice, how to change the pharmacokinetics and pharmacodynamics of drugs in children and the elderly under the influence of various factors, with the history of the development of the science of pharmacology in Uzbekistan and the achievements of pharmacologists consists of introduction.

II. The main theoretical part

II.I. The module includes the following topics:

5th and 6th semesters:

Topic 1. General pharmacology. Pharmacokinetics and pharmacodynamics of drugs.

Introduction to the science of pharmacology, its history. Pharmacologists who made a great contribution to the development of the science of pharmacology in Uzbekistan. Basics of creating new drugs. Pharmacokinetic parameters of medicinal substances: ways of administration, distribution, decomposition and excretion. Pharmacodynamics of drugs. The main types of drug effects. Factors affecting the pharmacokinetics and pharmacodynamics of

drugs. Types of doses, width of therapeutic effect. The effect of sex, age and genetic factors on the effects of substances. The dependence of the effectiveness of the pharmacological effect on the pathological state of the organism. Effects of medicinal substances. Changes in the effect of drugs when they are re-introduced into the body. Mixed effects of drugs. Changes observed when drugs are administered together.

Topic 2. Efferent innervation. Medicines affecting cholinergic synapses.

M-, N-cholinomimetic agents. M-, N-cholinoblocking agents. Anticholinesterase agents. M-cholinomimetics. M-cholinoblocking agents. Mechanisms of their action, pharmacological properties, application, side effects, importance in medicine. Acute poisoning by organophosphorus compounds (FOB) and atropine-like substances and the drugs used in it and the measures to be taken.

Topic 3. Drugs that stimulate adrenergic synapses.

α-, β-adrenomimetic agents. Mainly α-adrenoceptor stimulants (α-adrenomimetics). Mainly β-adrenergic stimulating agents (β-adrenomimetics). Mechanisms of their action, pharmacological properties, use, side effects, contraindications.

Topic 4. Painkillers.

Centrally acting painkillers (narcotic analgesics). Opioid receptor agonists. Opioid receptor agonist-antagonists. Centrally acting non-opioid analgesics. Painkillers of different groups. Painkillers with a mixed mechanism of action (opioid + non-opioid). Medicines used in acute and chronic poisoning with morphine and measures to be taken. Their classification, mechanisms of action, pharmacological properties, use, side effects, contraindications, importance in medicine.

Topic 5. Neuroleptics. Anxiolytics.

Neuroleptics. Anxiolytics. Their classification, mechanisms of action, pharmacological properties, use, side effects, contraindications, importance in medicine.

Topic 6. Means affecting the activity of the respiratory system.

Respiratory stimulants. Antitussives. Expectorants. Broncholytic agents. Means used in the treatment of acute respiratory failure. Agents that increase the formation of surfactant. Their classification, mechanisms of action, pharmacological properties, application, side effects, importance in medicine.

Topic 7. Cardiotonic and antianginal agents.

Cardiac glycosides. Cardiotonic agents with non-glycoside structure. Their classification, mechanisms of action, pharmacological properties, application, side effects, importance in medicine. Poisoning from Angishvonagul (digitalis) drugs. Medicines and measures used in it. Medicines used in coronary insufficiency. Antianginal agents. Cardioprotectors. Medicines used in the treatment of myocardial infarction.

Topic 8. Hypotensive and hypertensive agents.

Hypotensive and hypertensive agents. Their classification, mechanisms of action, pharmacological properties, application, side effects, importance in medicine.

Topic 9. Medicines affecting gastrointestinal and liver function.

Medicines used in case of malfunction of the stomach. Antacids. Gastroprotectors. Emetics and antiemetics. Hepatoprotectors: cholekinetic and choleretic agents. Medicines affecting intestinal peristalsis. Purgative drugs. Their classification, mechanisms of action, pharmacological properties, application, side effects, importance in medicine.

Topic 10. Medicines affecting the blood system.

Medicines that stimulate erythropoiesis. Medicines that stimulate leukopoiesis. Medicines affecting platelet aggregation, blood coagulation and fibrinolysis. Medicines used for the treatment and prevention of thrombosis: antiaggregants, direct and indirect anticoagulants, fibrinolytics. Hemostatic agents. Blood clotting agents. Antifibrinolytic drugs. Their classification, mechanisms of action, pharmacological properties, use, side effects, contraindications, importance in medicine.

Topic 11. Medicines affecting metabolism. Glucocorticoids. Anti-inflammatory drugs.

Glucocorticoids. Their classification, mechanisms of action, pharmacological properties, use, side effects, contraindications, importance in medicine. Anti-inflammatory drugs. Their classification, mechanisms of action, pharmacological properties, use, side effects, contraindications.

Topic 12. Antibiotics.

Basic principles of chemotherapy. Antibiotics: penicillins, cephalosporins. Macrolides and azalides. Aminoglycosides. Their classification, mechanisms of action, pharmacological properties, use, side effects, contraindications, importance in medicine.

III. Instructions and recommendations for practical (laboratory) training:

The following topics are recommended for practical training:

5th and 6th semesters:

Topic 1. The importance of the recipe in the preparation of UASh. Doses. Recipe and its structure. Hard and soft drug forms and rules for prescribing them.

Topic 2. Liquid drug forms and rules for prescribing them (I).

Topic 3. Liquid drug forms and rules for prescribing them (II).

Topic 4. General pharmacology. Pharmacokinetics and pharmacodynamics of drugs

Topic 5. Medicines affecting the afferent nervous system.

Topic 6. Medicines affecting M- and N- cholinergic receptors. Anticholinesterase agents. Means affecting M-cholinergic receptors.

Topic 7. Medicines affecting N-cholinerceptors.
Topic 8. Medicines that stimulate adrenoreceptors.
Topic 9. Drugs that paralyze adrenoreceptors.
Topic 10. Narcotics. Ethyl alcohol. Sleep aids.
Topic 11. Analgesics.
Topic 12. Neuroleptics. Anxiolytics
Topic 13. Psychostimulants. Antidepressants.
Topic 14. Medicines that affect the activity of respiratory organs.
Topic 15. Cardiotonics. Antiarrhythmic agents.
Topic 16. Antianginal agents.
Topic 17. Hypotensive agents. Hypertensive agents.
Topic 18. Medicines affecting the digestive system. Medicines affecting liver function. Hepatoprotectors.
Topic 19. Diuretics. Medicines affecting the muscles of the uterus.
Topic 20. Medicines affecting the blood system.
Topic 21. Hormonal drugs with protein and polypeptide structure. Hormonal preparations with a steroid structure.
Topic 22. Anti-inflammatory agents. Anti-allergic agents.
Topic 23. Antiseptic and disinfectants. Basic criteria and requirements of chemotherapy. Antibiotics Part I
Topic 24. Antibiotics Part II. Sulfanilamide drugs.
Topic 25. Anti-tuberculosis remedies.
Topic 26. Antiviral and anti-fungal agents.

General instructions and recommendations for organizing practical training:

Practical training is conducted by one teacher per academic group in an auditorium equipped with multimedia devices.

The following didactic principles are followed during practical training:

- To clearly define the purpose of practical training;

-Arouse students' interest in the possibilities of deepening knowledge on the teacher's innovative pedagogical activity;

- Provide the student with the opportunity to independently obtain the result;

- Theoretical and methodological preparation of the student, etc.

IV. Practical skills:

5th semester:

1. During the module, students learn the basic laws of pharmacology, prescribing drugs for various diseases.

2. Will have the skills to calculate the appropriate doses and write a prescription for them. Pharmacokinetics and pharmacodynamics of drugs, instructions for use,

3. Side effects, drug interactions, precautions for the use of drugs depending on the activity of organs (biochemical indicators of the liver and kidneys), contraindications .

4. Learn the principles of first aid in acute and chronic drug poisoning.

6th semester:

1. To be able to distinguish the drugs used in pathologies of executive organs (respiratory, cardiovascular, gastrointestinal, endocrine, blood system, infectious and non-infectious inflammation);

2. Mechanisms of action of drugs and specific characteristics of their types;

3. Being able to correctly choose the dose of medicines according to the patient's age (pediatric, geriatric indicators), gender, condition, daily life;

4. He should know how to correctly choose the ways of their introduction into the body according to the form of the medicine.

V. Independent education and independent work

Recommended topics for independent education

5th semester:

1. Prescriptive laws and orders of the President of the Republic of Uzbekistan.

2. Regulatory documents used in drug control.

State Register of Medicines.

3. Pharmacology of Tropicamide drug.

4. Nicotinism and its complications. Effects of nicotinism on the body of adolescents and women.

5. Anaphylactic shock and its treatment.

6. Alcoholism and its complications. Effects of alcoholism on the fetus.

7. Drug addiction and its complications.

8. Phytopreparations and their use.

9. Medicines used in the treatment of Parkinson's disease.

10. Anti-epileptic drugs.

11. Lithium salts. Sedatives

12. Nootropics. Analeptics.

13. Dopamine and dopaminergic agents. Serotonin and serotonergic agents.

	6th semester: 1. Medicines used in hypertensive crisis. 2. Means affecting liver function. Hepatoprotectors. Hepatoprotective agents used in the treatment of hepatitis caused by drugs. 3. Medicines that increase the tone of the human body. Agents affecting immunity. 4. Hyperthermia syndrome and drugs used in its treatment. 5. Pharmacodynamics of Torasemide drug. 6. Effects of drugs on the fetus. 7. Synthetic antibacterial agents with different chemical structures. Representatives of the new generation of cephalosporin antibiotics. 8. Medicines affecting the immune system Vitamins. 9. A drug used in the treatment of diabetes insipidus 10. Comparative analysis of iron-sparing drugs 11. Simple insect repellants. Animal repellants for worms. 12. Means against dangerous tumors. 13. Medicines affecting leukotriene receptors.
3.	**VI. Educational results/professional competencies** **The student should know:** **At the end of the 5th semester:** • classification groups of drugs, • names of drugs included in the groups, • mechanism of action, types of action, • to have an idea about special instructions for age, measures and methods of assistance provided in case of drug poisoning; (knowledge) • basic rules of the general recipe, • to be able to write prescriptions for different forms of medicine (liquid, soft, solid and inhaled). • the basics of pharmacokinetics and pharmacodynamics of drugs, • instructions for the use of drugs, • side effects and contraindications for use, • new analogues of drugs, • symptoms of acute poisoning with drugs, • classification of drugs, • to know the characteristics, classification, indications and contraindications of drugs affecting the peripheral nervous system, the rules of prescribing them, • to know the characteristics, classification, indications and contraindications of drugs affecting the central nervous system, the rules of prescribing them,

	• know and be able to use the comparative evaluation of drugs of the pharmacotherapeutic group and measures to prevent side effects; (skill) • the activity of medicinal substances, • their pharmacological properties, • be able to analyze taking into account the mechanism of action, • correctly identify groups of drugs, • dosage of medicines depending on the age of the patient, • to determine ways to introduce drugs, • to be able to determine the correct choice of drugs and their therapeutic effect in situational issues, • mastering the rules of prescription writing, • should have the skills to write prescriptions for different forms of various drugs and prepare them. (qualification) **The student should know:** **At the end of the 6th semester:** • able to analyze the activity of medicinal substances, taking into account their pharmacological properties, mechanism of action, • correctly identify groups of drugs, • dosage of medicines depending on the age of the patient, • to determine ways to introduce drugs, • to be able to determine the correct choice of drugs and their therapeutic effect in situational issues, • to be able to write prescriptions for different forms of various drugs and to have an idea about their preparation; (knowledge) • specific characteristics of drugs affecting executive organs (respiratory, cardiovascular, gastrointestinal, endocrine, blood system, infectious and non-infectious inflammation), • the basics of pharmacokinetics and pharmacodynamics of drugs, • classification of drugs, • instructions for the use of drugs, • side effects and contraindications for use, • new analogues of drugs, • symptoms of acute poisoning with drugs, • to know the rules of writing a prescription and be able to use them; (skill) • to be able to distinguish the drugs used in pathologies of executive organs (respiratory, cardiovascular, gastrointestinal, endocrine, blood system, infectious and non-infectious inflammation) • specific characteristics of the pharmacodynamics of drugs, • to be able to correctly calculate the dose of drugs according to the age and gender of the patient • should have skills such as ways of introducing them into the body according to the form of the drug. (qualification)

4.	**VII. Educational technologies and methods** • Interactive games; • Seminar (logical thinking, quick questions and answers; • Work in groups; • Introduction of presentations; • Individual projects; • Projects for teamwork and advocacy.
5.	**VIII. Requirements for obtaining credits:** Completion of tasks and tasks given in the form of current control, successful submission of written work on the types of intermediate and final control.
6.	**Main literature:** 1. Karen Whalen. Pharmacology. Textbook. «Lippincott illustrated reviews», 6th edition, 2015. 1. Allaeva M.J., Xakimov Z.Z., Ismailov S.R., Aminov S.S., Mustanov B.T. Pharmacology. 2020. (e-book). 2. D.A. Kharkovich. Pharmacology. Textbook. Moscow, 2017. 3. Azizova S.S. Pharmacology. Volume 2006. 4. Maxsumov M.N. Pharmacology. Volume 2006. 5. Sh.Z. Umarova and others. Medical and pharmaceutical partnership. Handbook. 2017. (in Latin script). 6. Kharkovich D.A. Pharmacology. Textbook- 2010, Moscow "Medicine" – 750 pages. 7. Manuchair Ebadi. Pharmacology. Textbook. 3rd edition, Boston New York Toronto London, 1996. 8. Vidal. Medicinal preparations in Uzbekistan. Directory. 2010, Moscow: AstraFarmService. 9. Aliev X.U., M.J. Allaeva. Clinical pharmacy. Textbook. T., 2011. 10. Khakimov Z.Z., Mustanov T.B., Payzieva L.A. Antibacterial agents. Handbook, Tashkent, 2016. 11. Aminov S.D., Ziyaeva Sh.T., Karimova G.A., Mirzaakhmedova K.T., Kaldibaeva A.O. General prescription. Handbook, "Science and Technology" publishing, Tashkent, 2015.

	publishing, Tashkent, 2015. **Websites:** 1. www.evrofarm.uz 2. http://evbmed.fbm.msu.ru/ Moscow Center for Evidence-Based Medicine 3. http://www.fda.gov U.S. Food and Drug Administration (FDA) 4. http://www.pharmgkb.org/ Pharmacogenetics resource. 5. http://www.tga.health.gov.au/adr/aadrb.htm Australian Adverse Drug Reactions Bulletin 6. http://www.mhra.gov.uk/Publications/Safetyguidance/DrugSafetyUpdate/index.htm British Monthly Medicines Safety Bulletin 7. http://www.drugreg.ru Pharmaceutical Information Foundation 8. http://www.rlsnet.ru Russian Encyclopedia of Medicines (REM) 9. http://nmu-student.narod.ru/farmacology
7.	**Developed and approved by the Tashkent Medical Academy.** The curriculum of the module is approved by the order of the Tashkent Medical Academy dated_____"____", 2024 (Annex ____ of the order). Head of the educational and methodological department F.Kh. Azizova
8.	**Responsibles for the module:** **M.J.Allaeva** - head of the "Pharmacology" department, doctor of biological sciences, TMA **G.Yu.Djanaev** – senior teacher of the "Pharmacology" department, PhD, TMA **J.A.Kholmatov** - teacher assistant of the "Pharmacology" department, TMA
9.	**Reviewers:** **Internal reviewer:** **A.X.Rakhmonov** – Researcher of the Biomedical Research Center, doctor of medical sciences, TMA **External reviewer:** **Z.T.Fayziyeva** – Doctor of Medical Sciences, Professor of the Department of Pharmacology and Clinical Pharmacy of Tashkent Pharmaceutical Institute.

MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS
OF THE REPUBLIC OF UZBEKISTAN

MINISTRY OF HEALTH CARE
OF THE REPUBLIC OF UZBEKISTAN

TASHKENT MEDICAL ACADEMY

APPROVED
Vice-Rector of Tashkent
medical academy
Sh.A.Bayxuradov
2024 "__" _____

SYLLABUS
ON THE SCIENCE OF PHARMACOLOGY

Area of knowledge:	900 000	- Healthcare and social affairs
Field of education:	910 000	- Healthcare
Direction of education:	60910200	- General medicine

Tashkent -2024

DEPARTMENT OF PHARMACOLOGY

SYLLABUS
OF THE "PHARMACOLOGY" MODULE
for the 3rd course of General medicine faculty

Subject Name:	**Pharmacology**
Module type:	**Mandatory**
Code of module:	**FR15-607**
Academic year:	**2024/2025**
Semester:	**5-6**
Form of education:	**Daytime**
Form of classes and hours allocated to the semester:	**210**
Lecture	**24**
Practical training	**81**
Laboratory training	**-**
Seminar	**-**
Independent education	**105**
Credit amount:	**7**
Evaluation form:	**FC (Test)**
Science language:	**Uzbek, Russian and English**

Science Objective (SO)	
SO1	- in the process of training a family doctor, students are taught groups of drugs, their mechanisms of action, the selection of therapeutic amounts depending on age, writing prescriptions for drug forms, ways of administration, instructions for use in diseases, side effects and instructions is to teach impossible situations. The module will provide future family doctors with knowledge, skills and qualifications about drugs used in the treatment and prevention of various diseases; in the general prescription section of the module, the forms and preparation of medicinal substances, teaching the rules of prescription writing, in the general pharmacology section, the analysis of pharmacokinetics and pharmacodynamics of medicinal substances, in the special pharmacology section, teaching the nervous system, executive organs, and metabolism formation of skills related to the pharmacology of secretory, antimicrobial and antitumor substances. Knowing how to apply medical aid measures in case of drug poisoning, teaching how to use them in practice, how to change the pharmacokinetics and pharmacodynamics of drugs in children and the elderly under the influence of various factors, consists of

	introduction with the history of the development of the science of pharmacology in Uzbekistan and the achievements of pharmacologists.
Basic knowledge necessary for mastering science	
1.	medical biology
2.	therapy
3.	biochemistry
4.	normal physiology
5.	pathological physiology
6.	anatomy

Learning outcomes (LO)	
	In terms of knowledge:
LO 1	having an idea about the: classification groups of drugs, the names of the drugs included in the groups, the mechanism of action, the types of action, special instructions for age, the measures and methods of assistance provided in case of drug poisoning
LO 2	the basic rules of the general recipe, be able to write prescriptions for different forms of medicine (liquid, soft, solid and inhaled). the basics of pharmacokinetics and pharmacodynamics of drugs, instructions for use of drugs, side effects and contraindications for use,
LO 3	new analogs of drugs, symptoms of acute drug poisoning, classification of drugs, know the characteristics, classification, indications and contraindications of drugs affecting the peripheral nervous system, the rules of prescribing them,
LO 4	to know the characteristics, classification, indications and contraindications of drugs affecting the central nervous system, the rules of prescribing them, should know and be able to use the comparative evaluation of drugs of the pharmacotherapeutic group and measures to prevent side effects
	the basic rules of the general prescription,
	In terms of skills:
LO 5	be able to analyze taking into account the mechanism of action, activity of drugs, their pharmacological properties, correct identification of drug groups;
LO 6	dosage of drugs depending on the age of the patient, determining ways to introduce drugs;
LO 7	to be able to determine the correct choice of drugs and their therapeutic effect in situational matters;
LO 8	mastering the rules of prescription writing, should have the skills to write prescriptions for different forms of various drugs and to prepare them.
Science content	

Form of training: lecture (L)	
5th semester	
L1	General pharmacology. Pharmacokinetics and pharmacodynamics of drugs
L2	Efferent innervation. Drugs affecting cholinergic synapses
L3	Drugs that stimulate adrenergic synapses.
L4	Painkillers
L5	Neuroleptics. Anxiolytics.
L6	Medicines affecting the activity of the respiratory system
	6th semester
L7	Cardiotonic and antianginal agents.
L8	Hypotensive and hypertensive agents.
L9	Medicines affecting gastrointestinal and liver function.
L10	Medicines affecting the blood system.
L11	Medicines affecting metabolism. Glucocorticoids. Anti-inflammatory drugs.
L12	Antibiotics.

Form of training: practical training (Pr)	
5th semester	
P1	The importance of the prescription in the preparation of GP. Doses. Prescription and its structure. Hard and soft drug forms and rules for prescribing them.
P2	Liquid drug forms and rules for prescribing them (I).
P3	Liquid drug forms and rules for prescribing them (II).
P4	General pharmacology. Pharmacokinetics and pharmacodynamics of drugs
P5	Medicines affecting the afferent nervous system.
P6	Medicines affecting M- and N- cholinergic receptors. Anticholinesterase agents. Medicines affecting M-cholinergic receptors.
P7	Medicines affecting N-cholinerceptors.
P8	Drugs that stimulate adrenoreceptors. Adrenoreceptor blockers.
P9	Narcotics. Ethyl alcohol. Sleep aids.
P10	Analgesics.
P11	Neuroleptics. Anxiolytics Psychostimulants. Antidepressants.
P12	Medicines affecting the activity of respiratory organs.
6th semester	
P15	Cardiotonics. Antiarrhythmic agents.
P16	Antianginal agents.
P17	Hypotensive agents. Hypertensive agents.
P18	Medicines affecting the digestive system. Means affecting liver function. Hepatoprotectors.
P19	Diuretics. Medicines affecting the muscles of the uterus.
P20	Medicines affecting the blood system.
P21	Hormonal drugs with protein and polypeptide structure. Hormonal preparations with a steroid structure.
P22	Anti-inflammatory agents. Anti-allergic agents.

P23	Antiseptic and disinfectants. Basic criteria and requirements of chemotherapy. Antibiotics Part I
P24	Antibiotics Part II. Sulfanilamide preparations.
P25	Anti-tuberculosis remedies.
P26	Antiviral and anti-fungal agents

Independent education (IE)		**hours**
5th semester		
1.	Prescriptive laws and orders of the President of the Republic of Uzbekistan.	5
2.	Regulatory documents used in drug control. State Register of Medicines.	5
3.	Pharmacology of the drug Tropicamide.	5
4.	Nicotinism and its complications. Effects of nicotinism on the body of adolescents and women.	5
5.	Anaphylactic shock and its treatment.	5
6.	Alcoholism and its complications. Effects of alcoholism on the fetus.	5
7.	Drug addiction and its complications.	5
8.	Phytopreparations and their use.	5
9.	Drugs used in the treatment of Parkinson's disease.	5
10.	Antiepileptic drugs.	5
11.	Lithium salts. Sedatives	5
12.	Nootropics. Analeptics. Dopamine and dopaminergic agents. Serotonin and serotonergic agents.	5
6th semester		
13.	Medicines used in hypertensive crisis.	3
14.	Means affecting liver function. Hepatoprotectors. Hepatoprotective agents used in the treatment of hepatitis caused by drugs.	3
15.	Medicines that increase the tone of the human body. Agents affecting immunity.	3
16.	Hyperthermia syndrome and drugs used in its treatment.	3
17.	Pharmacodynamics of the drug torasemide. Effects of drugs on the fetus.	3
18.	Synthetic antibacterial agents with different chemical structures. Representatives of the new generation of cephalosporin antibiotics.	3
19.	Medicines affecting the immune system Vitamins.	3
20.	A drug used to treat diabetes insipidus	3
21.	Comparative analysis of iron-sparing drugs	3
22.	Simple insect repellents. Insect repellents for worms.	3
23.	Drugs against malignant tumors.	3
24.	Medicines affecting leukotriene receptors.	2

Main literature

1.	Allaeva M,J., Xakimov Z.Z., Ismailov S.R., Aminov S.S., Mustanov B.T.. Farmakologiya. Darslik, T., 2020. (elektron).
2.	Д.А. Харкевич. Фармакология. Учебник. М.-2017 г.
3.	Azizova S.S. Farmakologiya. Darslik, T., 2006 y..
4.	Maxsumov M.N. Farmakologiya. Darslik, T. 2006 y.
Additional literature	
5.	Харкевич Д.А. Фармакология. Учебник- 2010, Москва «Медицина»– 750 с.
6.	Manuchair Ebadi. Pharmacology. Textbook. 3- edition,Boston New York Toronto London, 1996.
7.	Видаль. Лекарственные препараты в Узбекистане. Справочник. 2010, М.: АстраФармСервис.
8.	Karen Whalen. Pharmacology. Textbook. 6- edition. «Lippincott illustrated reviews». 2015.
9.	Aliev X.U., M.J.Allaeva. Klinik farmatsiya. Darslik. T., 2011.
10.	Xakimov Z.Z., Mustanov T.B.,Payzieva L.A. Antibakterial vositalar. O‘quv qo‘llanma, Toshkent, 2016.

The following criteria are recommended in monitoring the student's mastery of the subject:

Score	ECTS score	Definition of ECTS		Mark	Definition
90-100	A	«excellent»	To have a systematic, full and deep knowledge of all sections of the science program, to be able to justify it with the necessary evidence; can use medical terminology (including scientific, foreign language) clearly and appropriately, can answer questions logically, clearly and succinctly; identify problematic questions, justify their views in scientific and practical language; to know the basic concepts of science and be able to effectively	5	excellent

			apply them in a short time to solve scientific and practical problems; able to demonstrate the ability to solve problems independently and creatively in non-standard situations; able to fully perform practical skills independently (in terms of quality and set quantity) and fully acquire competencies; short, grounded and rational solution of practical issues; demonstrate a very good knowledge of normative and legal documents in practical training, be able to apply this knowledge correctly (always rationally) in new situations, and be able to independently formalize the results of the work performed; complete and in-depth mastering of the main and additional literature recommended in the science program; to understand the essence of theories, concepts and trends in science, give them a critical assessment and be able to apply the scientific achievements of other disciplines; should creatively and independently participate in theoretical and practical training throughout the semester, be active in group discussions, have a high level of culture in performing tasks;		
85-89	B+	«very good»	to have systematic, full and deep knowledge of all sections of the	4	good

			science program, to be able to justify it with the necessary evidence; can use medical terminology (including scientific, foreign language) clearly and correctly, can answer questions logically and accurately; able to independently eliminate the ambiguities that arise when proving one's opinion or explaining other theoretical material; to know the basic concepts of science, to set scientific and professional tasks in a short time and to use them effectively in solving them; able to independently solve problems in standard situations within the curriculum; able to fully perform practical skills independently (in terms of quality and set quantity) and fully acquire competencies; demonstrate good knowledge of normative and legal documents in practical training, be able to apply this knowledge correctly (but not always rationally) in new situations, be able to adequately formalize the results of the work performed; mastering the main literature recommended in the science program; can understand the essence of theories, concepts and trends in the		

			studied science and give them a critical assessment; he should creatively and independently participate in theoretical and practical training throughout the semester, be active in group discussions, have a very good level of culture in performing tasks;	3,5	
71-84	B	«good»	to have systematic, full and deep knowledge of all sections of the science program, to be able to justify it with the necessary evidence, but with some shortcomings; can use medical terminology (including scientific, foreign language) clearly and correctly, can answer questions logically; able to independently eliminate the ambiguities that arise when proving one's opinion or explaining other theoretical material; to know the basic concepts of science, to set scientific and professional tasks in a short time and to use them effectively in solving them; able to independently solve problems in standard situations within the curriculum; able to independently perform practical skills (in terms of quality and set quantity) and acquire competencies, but with some shortcomings; demonstrate good knowledge of normative and legal documents in		

			practical training, be able to apply this knowledge correctly (but not always rationally) in new situations, unable to independently formalize the results of the work performed; mastering the main literature recommended in the science program; to be able to understand the essence of theories, concepts and trends in the studied science; should creatively and independently participate in theoretical and practical training throughout the semester, be active in group discussions, and have a good level of performance in tasks;		
60-70	C	«satisfactory» - poor result, with serious flaws	to have sufficient knowledge within the scope of the science program; use medical terminology, explain answers to questions correctly, but make some mistakes; demonstrate a basic understanding of the subject when struggling to answer or demonstrate some specific skills; able to perform practical skills (in terms of quality and set quantity) independently but completely with mistakes; acquisition of competencies independently, but with errors; to have partial knowledge of the general concepts of science and be able to apply it in solving standard (model) situations;	3	Satisfa-ctory

			being able to solve standard situations with the help of a pedagogue; to understand the essence of the main theories, concepts and trends in the studied science; it is necessary to participate in theoretical and practical training under the guidance of a pedagogue employee, to have a sufficient level of culture in performing tasks;		
0-59	F	«unsatisfied»	if he has only some fragmentary knowledge within the scope of the science program; fails to use medical terms or makes serious and gross logical errors when answering questions or does not answer at all; if he passively participates in theoretical and practical training and has a low level of culture of performing tasks or does not perform them at all; if he does not have practical skills and competencies, if he cannot correct his mistakes even with the help of the recommendations of the pedagogical staff.	2	unsatisfied

Information about the science teacher

Authors:	M.J. Allayeva d.b.s., professor Z.Z. Khakimov d.b.s., professor J.A.Kholmatov, teacher-assistant
E-mail:	jasurbekkholmatov01@gmail.com
Tashkilot:	Department of Pharmacology, TMA
Reviewers:	A.K.Rakhmonov – TTA, researcher of the Biomedical Research Center, doctor of medical sciences Z.T. Fayziyeva – professor of the Department of Pharmacology and Clinical Pharmacy of the Tashkent Pharmaceutical Institute, doctor of medical sciences.

This Syllabus was approved by the minutes of the meeting of the Educational and Methodical Council of TTA dated _____, 20__.

This Syllabus was approved by the minutes of the meeting of the "Pharmacology" department of _____, 20__.

Dean of faculty **S.U. Aliyev**

Head of the department **M.J. Allayeva**

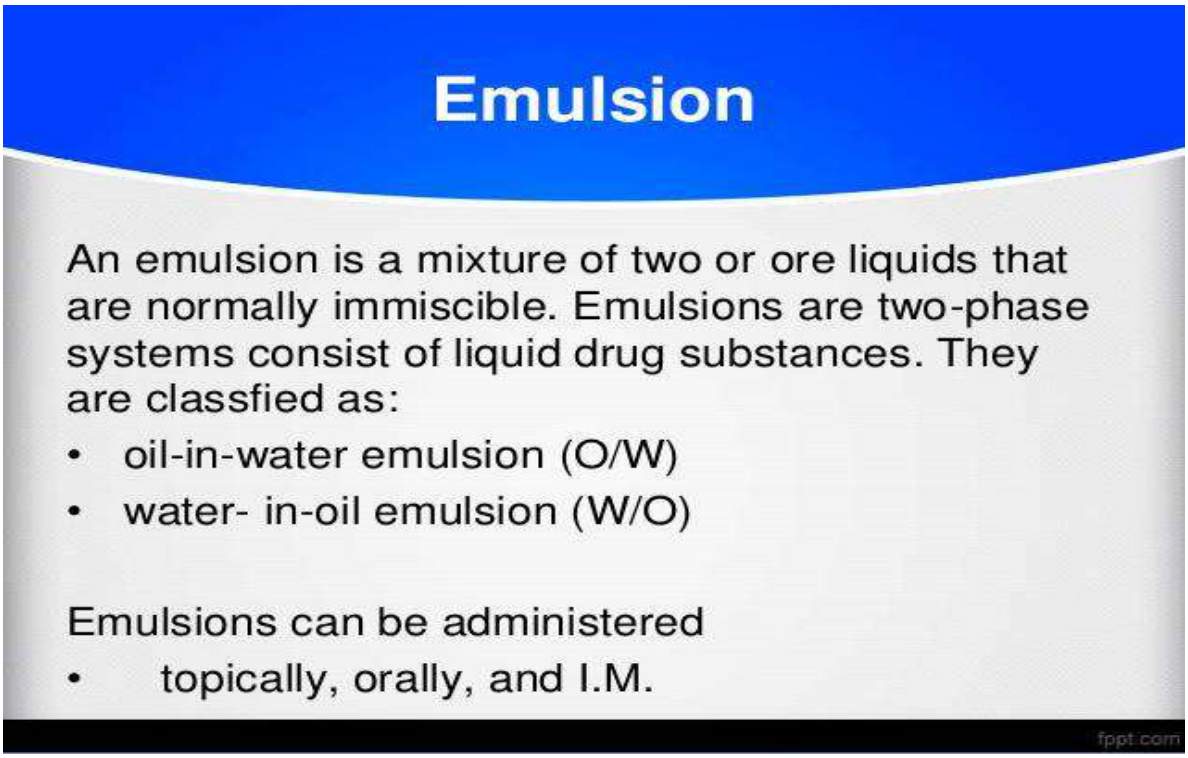
Compilers: **M.J. Allayeva**

Z.Z. Khakimov

J.A.Kholmatov

TEMPERATURE AND DURATION OF THE EXTRACTION PROCESS (KINETICS OF EXTRACTION)

Water extraction	Time of infusion (the water bath temperature)	Time of cooling (the room temperature)
Infusion (less than)	15 min	45 min
More than 1 l	25 min	45 min
Decoction (less than)	30 min	10 min
More than 1 l	40 min	10 min
Infusions and decoctions with the indication "Cito!" in the prescriptions	25 min	artificially



Material	Functional group	% w/w
CB-1 antagonist compound of Formula A (HCl salt)	API	0.27
Cremaphor RH40	Surfactant	15.00
Glycerol formal	Solvent	2.50
Soy grits	Filler	15.13
Corn gluten	Filler	20.00
Fructose	Filler	5.00
Glycerin	Humectant	10.00
Propylene glycol	Humectant	5.00
Sodium starch glycolate	Disintegrant	20.00
Miglyol 812	Lubricant	5.00
Red iron oxide	Color	0.10
Chartor hickory flavor	Flavor	2.00

TABLETS

- solid pharmaceutical dosage form containing drug substance with or without suitable diluents

Characteristics:

- their shapes and dimensions are determined by use of various shaped punches and dies
- tablets are prepared primarily by compression, with limited number prepared by molding
- vary in size, shape, weight, hardness, thickness,disintegration depending upon use & method of manufacturing
- some tablets are **scored, or grooved,** which allows them to be easily broken into 2 or more parts
- for oral tablets – colorants, flavorants and coating of various type

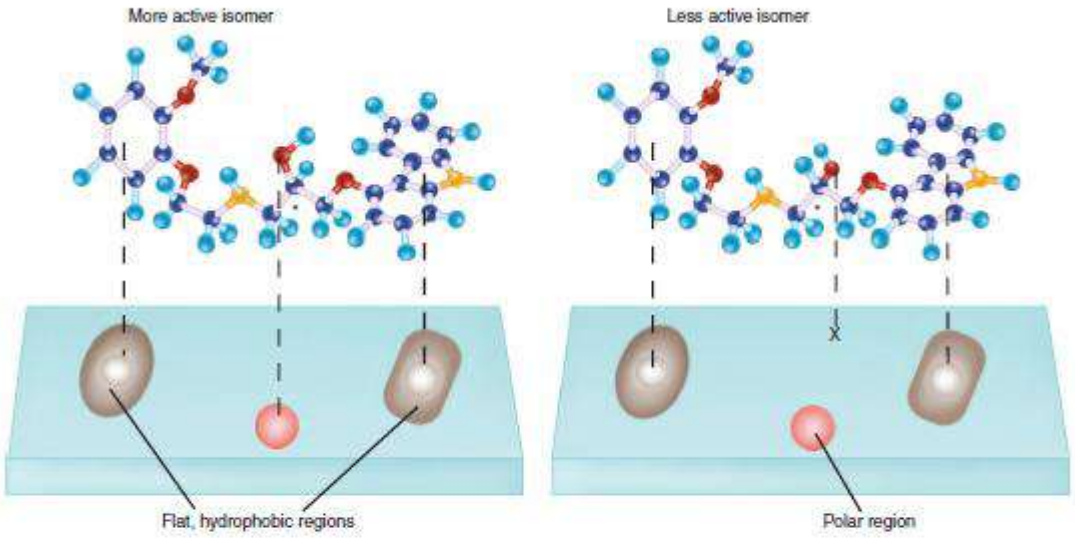


FIGURE 1–2 Cartoon illustrating the nonsuperimposibility of the two stereoisomers of carvedilol on the β receptor. The "receptor surface" has been grossly oversimplified. The chiral center carbon is denoted with an asterisk. One of the two isomers fits the three-dimensional configuration of binding site of the β-adrenoceptor molecule very well (*left*), and three groups, including an important polar moiety (an hydroxyl group, indicated by the central dashed line), bind to key areas of the surface. The less active isomer cannot orient all three binding areas to the receptor surface (*right*). (Molecule generated by means of Jmol, an open-source Java viewer for chemical structures in 3D [http://jmol.sourceforge.net/] with data from DrugBank [http://www.drugbank.ca].)

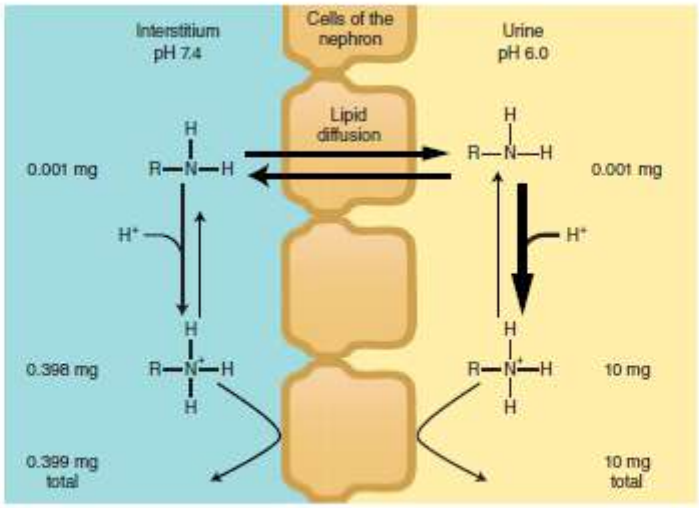


FIGURE 1–6 Trapping of a weak base (methamphetamine) in the urine when the urine is more acidic than the blood. In the hypothetical case illustrated, the diffusible uncharged form of the drug has equilibrated across the membrane, but the total concentration (charged plus uncharged) in the urine (more than 10 mg) is 25 times higher than in the blood (0.4 mg).

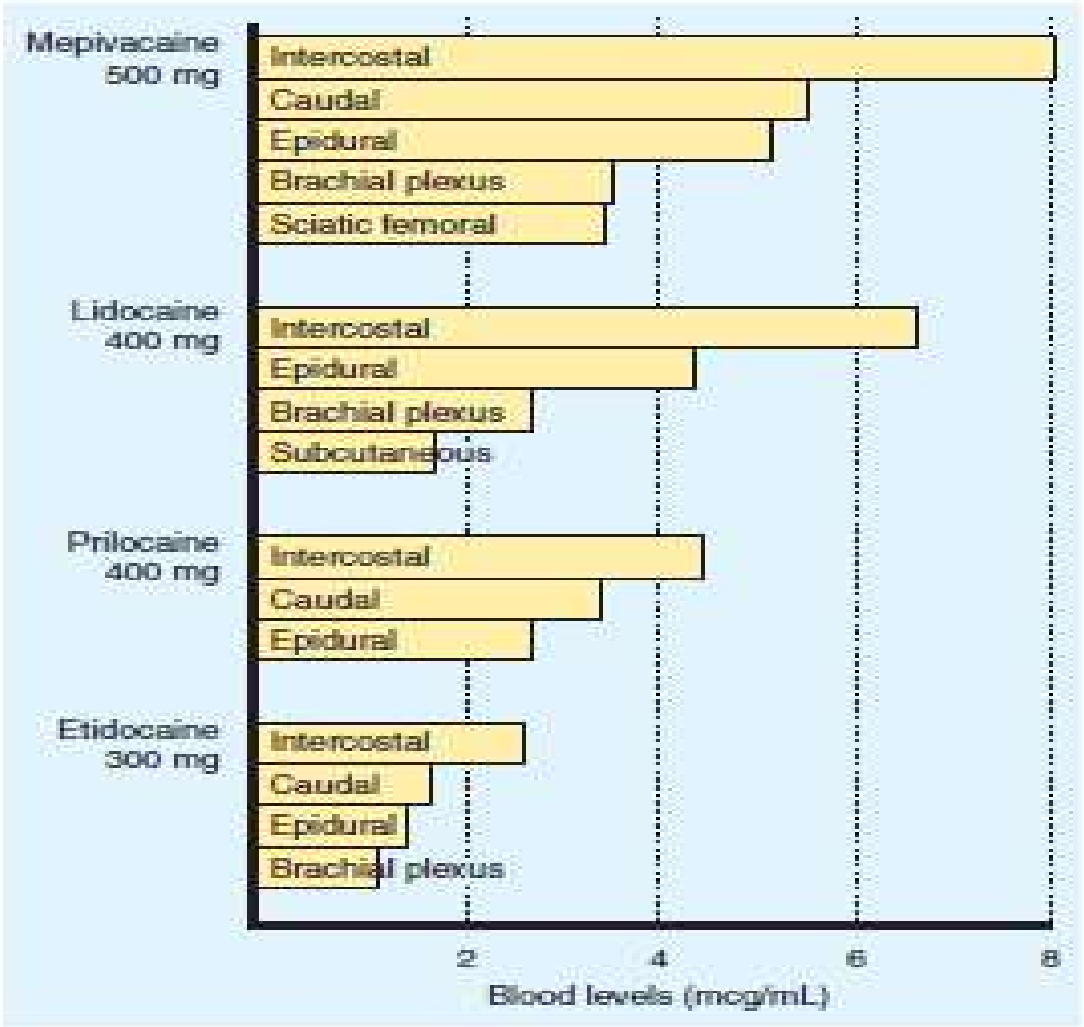


FIGURE 26–2 Comparative peak blood levels of several local anesthetic agents following administration into various anatomic sites. (Modified, with permission, from Covino BD, Vassals HG: *Local Anesthetics: Mechanism of Action in Clinical Use*. Grune & Stratton, 1976.)

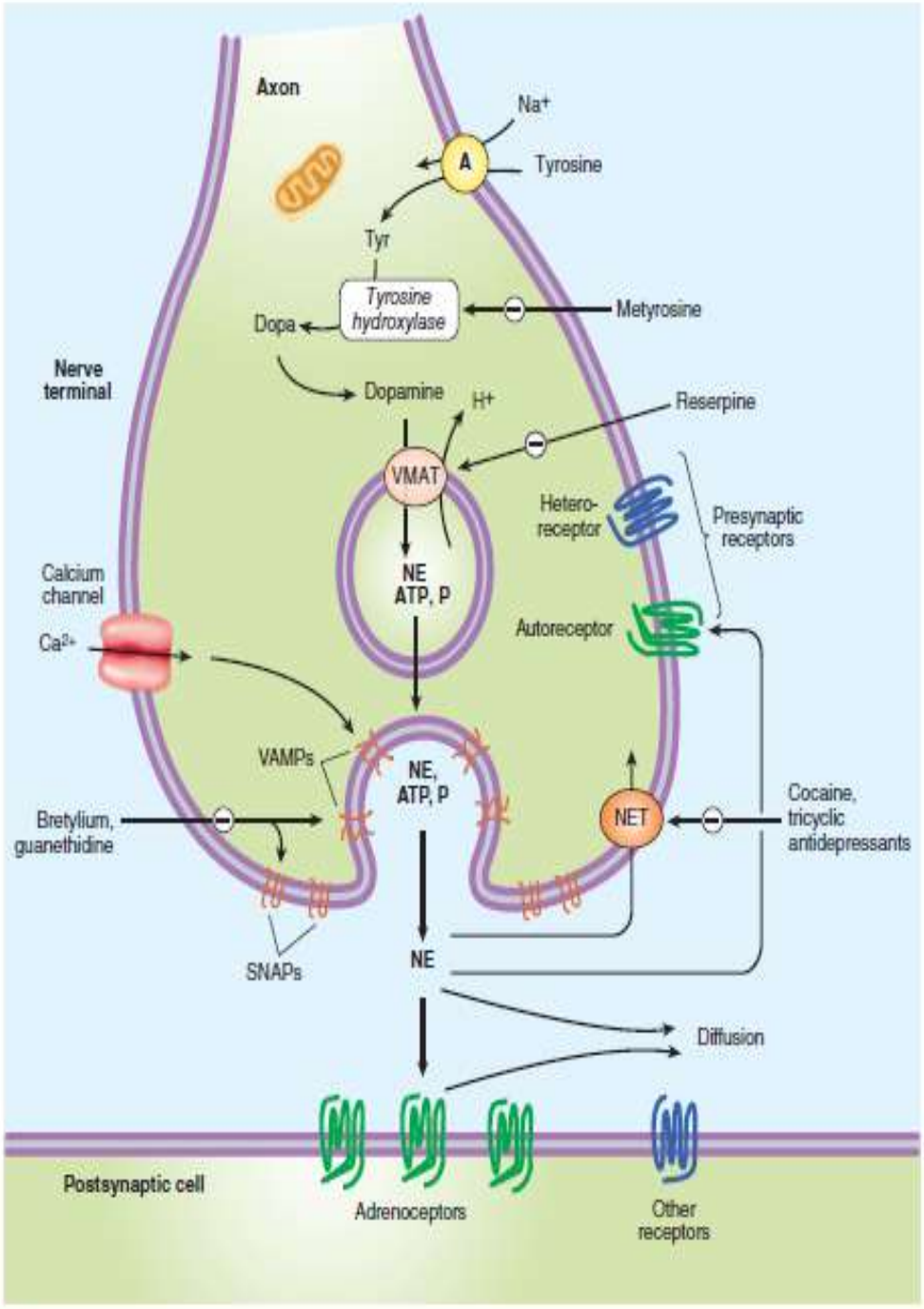
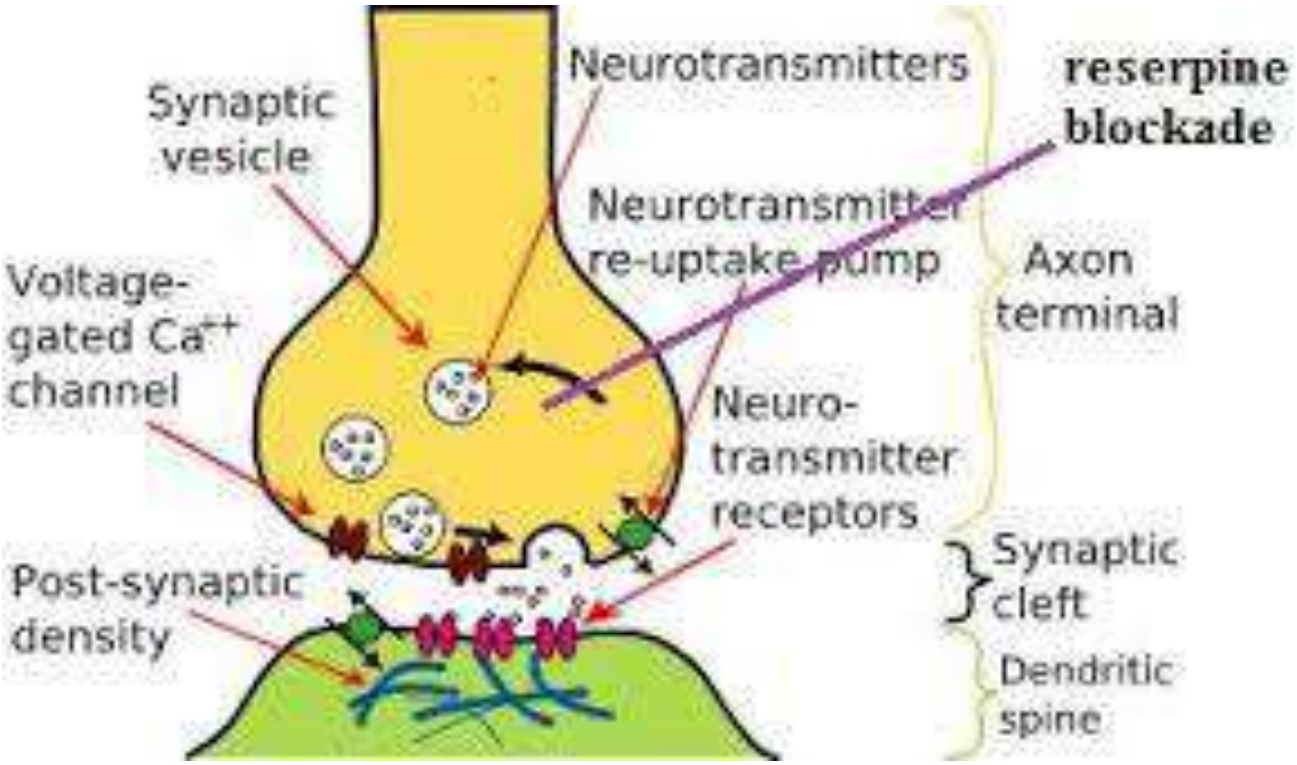


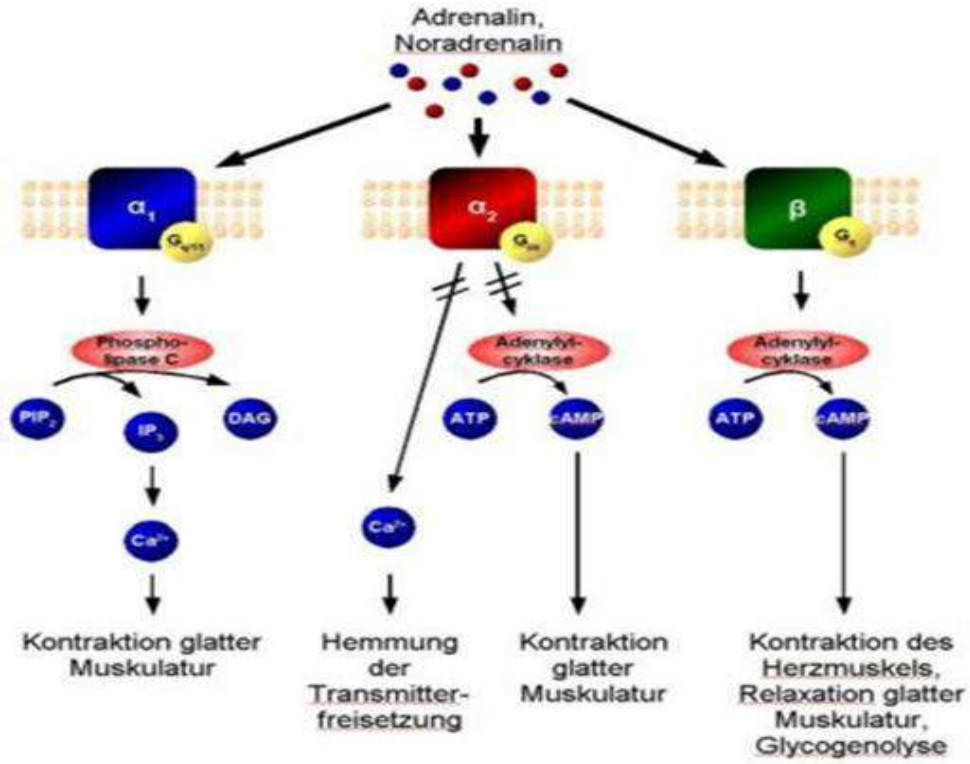
FIGURE 6–4 Schematic diagram of a generalized noradrenergic junction (not to scale). Tyrosine is transported into the noradrenergic ending or varicosity by a sodium-dependent carrier (A). Tyrosine is converted to dopamine (see Figure 6–5 for details), and transported into the vesicle by the vesicular monoamine transporter (VMAT), which can be blocked by reserpine. The same carrier transports norepinephrine (NE) and several other amines into these granules. Dopamine is converted to NE in the vesicle by dopamine-β-hydroxylase. Physiologic release of transmitter occurs when an action potential opens voltage-sensitive calcium channels and increases intracellular calcium. Fusion of vesicles with the surface membrane results in expulsion of norepinephrine, cotransmitters, and dopamine-β-hydroxylase. Release can be blocked by drugs such as guanethidine and bretylium. After release, norepinephrine diffuses out of the cleft or is transported into the cytoplasm of the terminal by the norepinephrine transporter (NET), which can be blocked by cocaine and tricyclic antidepressants, or into postjunctional or perijunctional cells. Regulatory receptors are present on the presynaptic terminal. SNAPs, synaptosome-associated proteins; VAMPs, vesicle-associated membrane proteins.

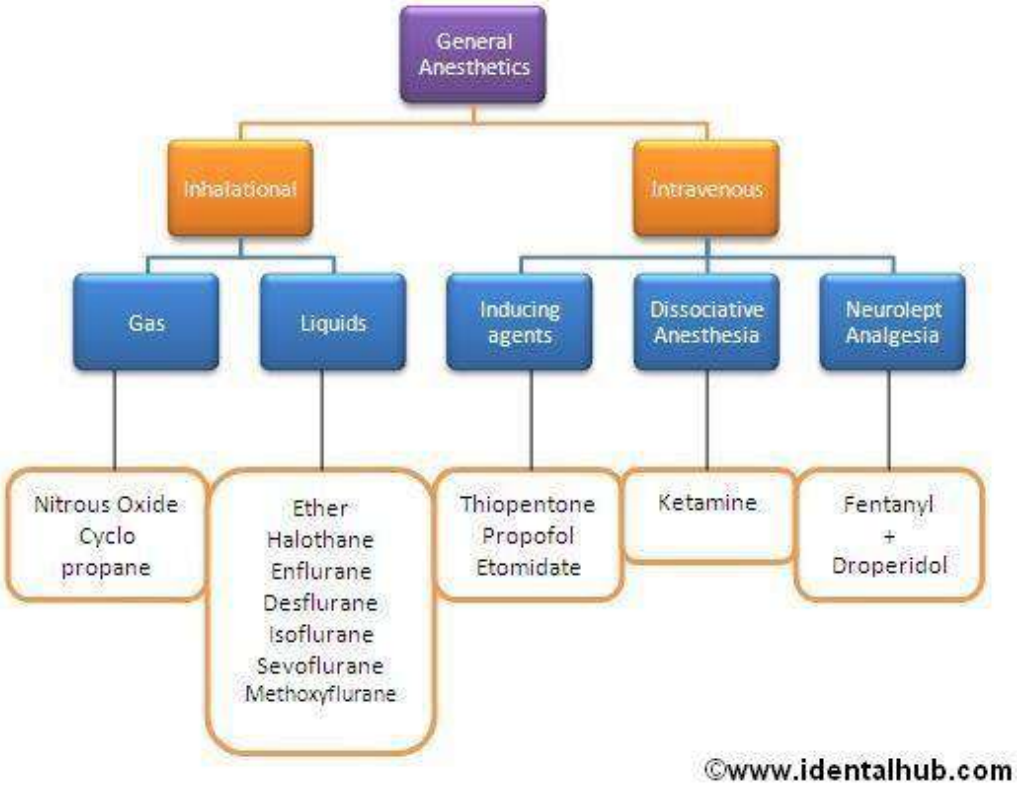
SUMMARY Drugs with Anticholinergic Actions

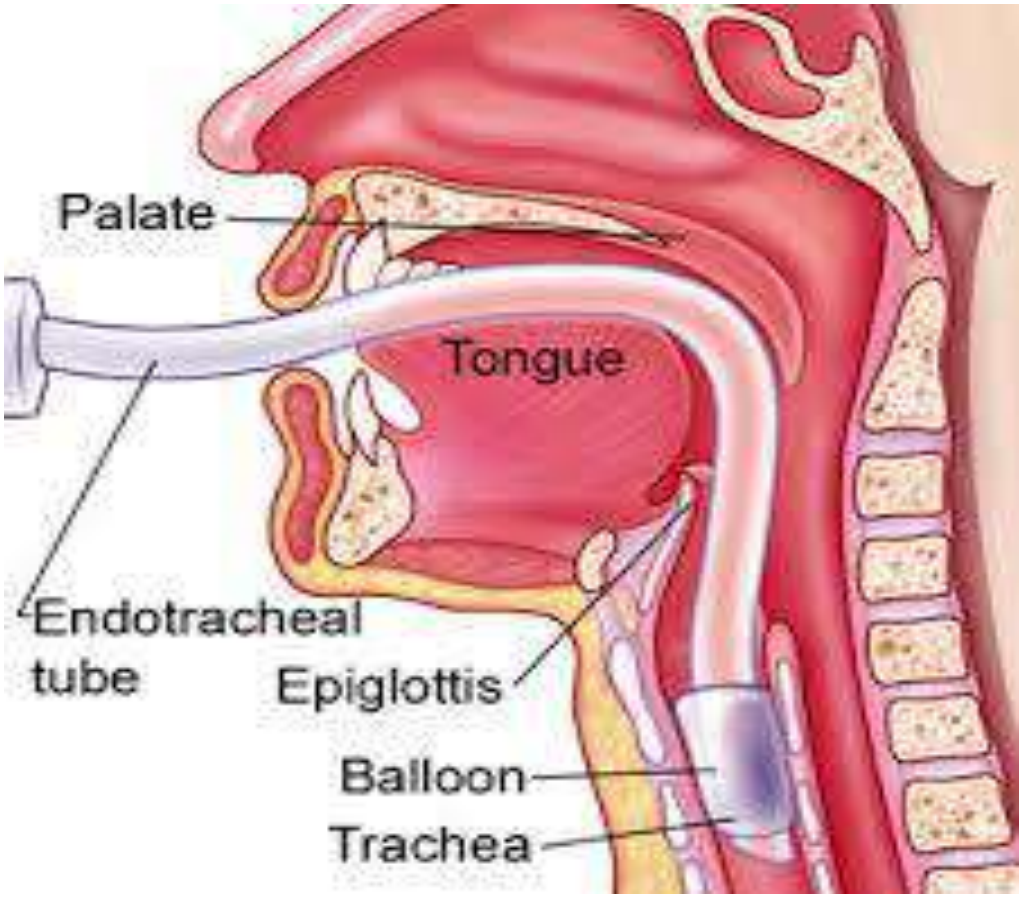
Subclass	Mechanism of Action	Effects	Clinical Applications	Pharmacokinetics, Toxicities, Interactions
MOTION SICKNESS DRUGS				
• Scopolamine	Unknown mechanism in CNS	Reduces vertigo, postoperative nausea	Prevention of motion sickness and postoperative nausea and vomiting	Transdermal patch used for motion sickness • IM injection for postoperative use • *Toxicity:* Tachycardia, blurred vision, xerostomia, delirium • *Interactions:* With other antimuscarinics
GASTROINTESTINAL DISORDERS				
• Dicyclomine	Competitive antagonism at M_3 receptors	Reduces smooth muscle and secretory activity of gut	Irritable bowel syndrome, minor diarrhea	Available in oral and parenteral forms • short $t_{1/2}$ but action lasts up to 6 hours • *Toxicity:* Tachycardia, confusion, urinary retention, increased intraocular pressure • *Interactions:* With other antimuscarinics
• *Hyoscyamine: Longer duration of action*				
• *Glycopyrrolate: Similar to dicyclomine*				
OPHTHALMOLOGY				
• Atropine	Competitive antagonism at all M receptors	Causes mydriasis and cycloplegia	Retinal examination; prevention of synechiae after surgery	Used as drops • long (5–6 days) action • *Toxicity:* Increased intraocular pressure in closed-angle glaucoma • *Interactions:* With other antimuscarinics
• *Scopolamine: Faster onset of action than atropine*				
• *Homatropine: Shorter duration of action (12–24 h)*				
• *Cyclopentolate: Shorter duration of action (3–6 h)*				
• *Tropicamide: Shortest duration of action (15–60 min)*				
RESPIRATORY (ASTHMA, COPD)				
• Ipratropium	Competitive, nonselective antagonist at M receptors	Reduces or prevents bronchospasm	Prevention and relief of acute episodes of bronchospasm	Aerosol canister, up to qid • *Toxicity:* Xerostomia, cough • *Interactions:* With other antimuscarinics
• *Tiotropium: Longer duration of action; used qd*				
URINARY				
• Oxybutynin	Slightly M_3-selective muscarinic antagonist	Reduces detrusor smooth muscle tone, spasms	Urge incontinence; postoperative spasms	Oral, IV, patch formulations • *Toxicity:* Tachycardia, constipation, increased intraocular pressure, xerostomia • Patch: Pruritus • *Interactions:* With other antimuscarinics
• *Darifenacin, solifenacin, and tolterodine: Tertiary amines with somewhat greater selectivity for M_3 receptors*				
• *Trospium: Quaternary amine with less CNS effect*				
CHOLINERGIC POISONING				
• Atropine	Nonselective competitive antagonist at all muscarinic receptors in CNS and periphery	Blocks muscarinic excess at exocrine glands, heart, smooth muscle	Mandatory antidote for severe cholinesterase inhibitor poisoning	Intravenous infusion until antimuscarinic signs appear • continue as long as necessary • *Toxicity:* Insignificant as long as AChE inhibition continues
• Pralidoxime	Very high affinity for phosphorus atom but does not enter CNS	Regenerates active AChE; can relieve skeletal muscle end plate block	Usual antidote for early-stage (48 h) cholinesterase inhibitor poisoning	Intravenous every 4–6 h • *Toxicity:* Can cause muscle weakness in overdose

AChE, acetylcholinesterase; CNS, central nervous system; COPD, chronic obstructive pulmonary disease.


Synaptic vesicle
Neurotransmitters
reserpine blockade
Neurotransmitter re-uptake pump
Axon terminal
Voltage-gated Ca++ channel
Neuro-transmitter receptors
Post-synaptic density
Synaptic cleft
Dendritic spine


Adrenalin, Noradrenalin
α1
α2
β
Phospho-lipase C
Adenylyl-cyklase
Adenylyl-cyklase
PIP2
IP3
DAG
ATP
cAMP
ATP
cAMP
Ca2+
Ca2+
Kontraktion glatter Muskulatur
Hemmung der Transmitter-freisetzung
Kontraktion glatter Muskulatur
Kontraktion des Herzmuskels, Relaxation glatter Muskulatur, Glycogenolyse


General Anesthetics
Inhalational
Intravenous
Gas
Liquids
Inducing agents
Dissociative Anesthesia
Neurolept Analgesia
Nitrous Oxide
Cyclo propane
Ether
Halothane
Enflurane
Desflurane
Isoflurane
Sevoflurane
Methoxyflurane
Thiopentone
Propofol
Etomidate
Ketamine
Fentanyl + Droperidol
©www.identalhub.com


Palate
Tongue
Endotracheal tube
Epiglottis
Balloon
Trachea

Classification of antipsychotic drugs

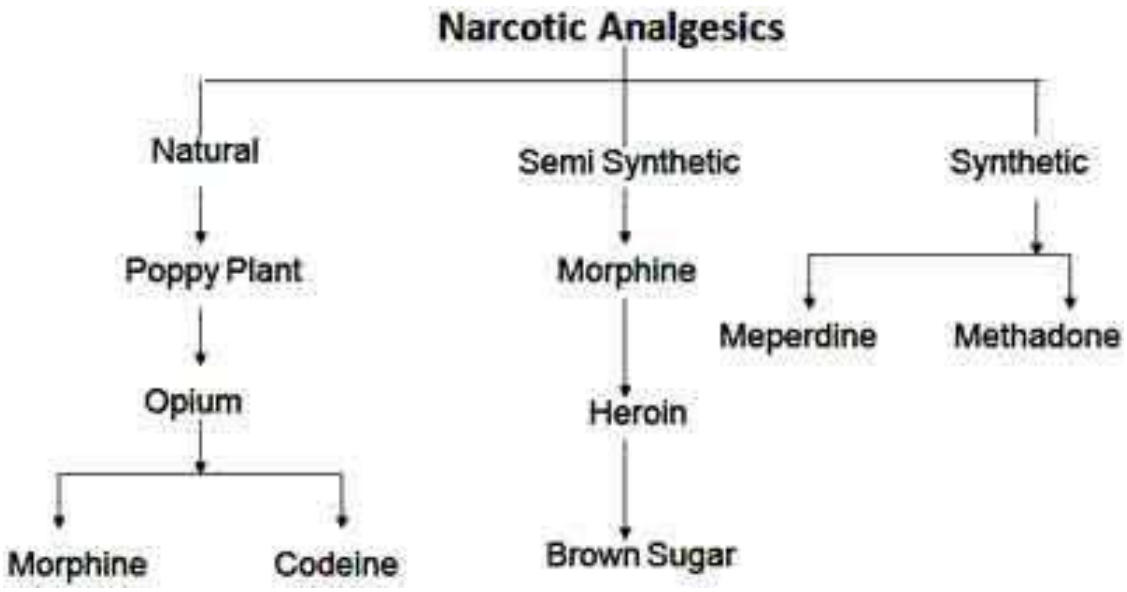
- **PHARMACOLOGICAL CLASSIFICATION**
  - **FIRST-GENERATION ANTIPSYCHOTIC (low potency)**
    - ***Chlorpromazine***
    - *Prochlorperazine*
    - *Thioridazine*
  - **FIRST-GENERATION ANTIPSYCHOTIC (high potency)**
    - ***Fluphenazine***
    - ***Haloperidol***
    - *Pimozide*
    - *Thiothixene*
  - **SECOND GENERATION ANTIPSYCHOTIC**
    - *Aripiprazole*
    - *Asenapine*
    - ***Clozapine***
    - *Iloperidone*
    - *Lurasidone*
    - ***Olanzapine***
    - ***Quetiapine***
    - *Paliperidone*
    - ***Risperidone***
    - *Ziprasidone*

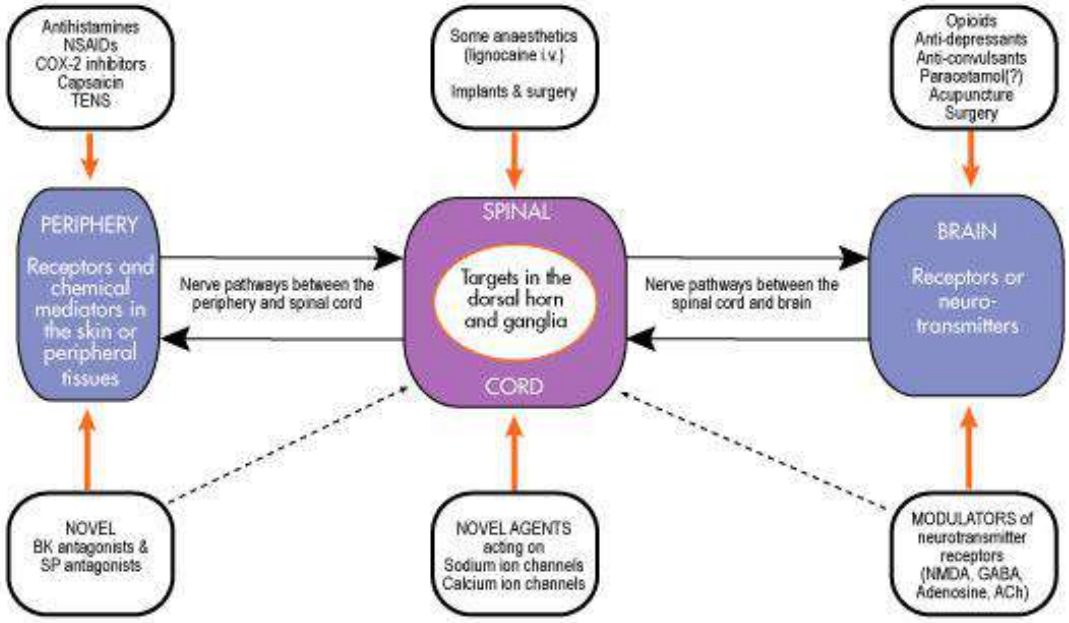
TABLE.
Antidepressants and CBT for Somatic Syndromes

Syndrome	TCAs	SSRIs	CBT/Behavior Therapy
IBS	Effective for global symptoms and pain	Probably not effective	As effective as antispasmodics
Back pain	Modestly effective, should not be used routinely	Probably not effective	Effective
Headache	Effective in prophylaxis against headaches	Not effective	Effective in prophylaxis against headache
Fibromyalgia	Effect, particularly for pain and sleep	Weak effect	Effective
Chronic fatigue syndrome	Not effective	Not effective	Effective
Tinnitus	May be effective	Not studied	Effective against annoyance
Menopausal syndrome	Not studied	Possibly effective (also SNRI study)	Not studied
Chronic facial pain	Single study suggesting effectiveness	Not studied	Not studied
Noncardiac chest pain	Single study suggesting effectivenes	Not studied	Effective
Interstitial cystitis	Single study suggesting effectiveness	Not studied	Not studied
Chronic pelvic pain	Not studied	Single study suggesting not effective	Not studied

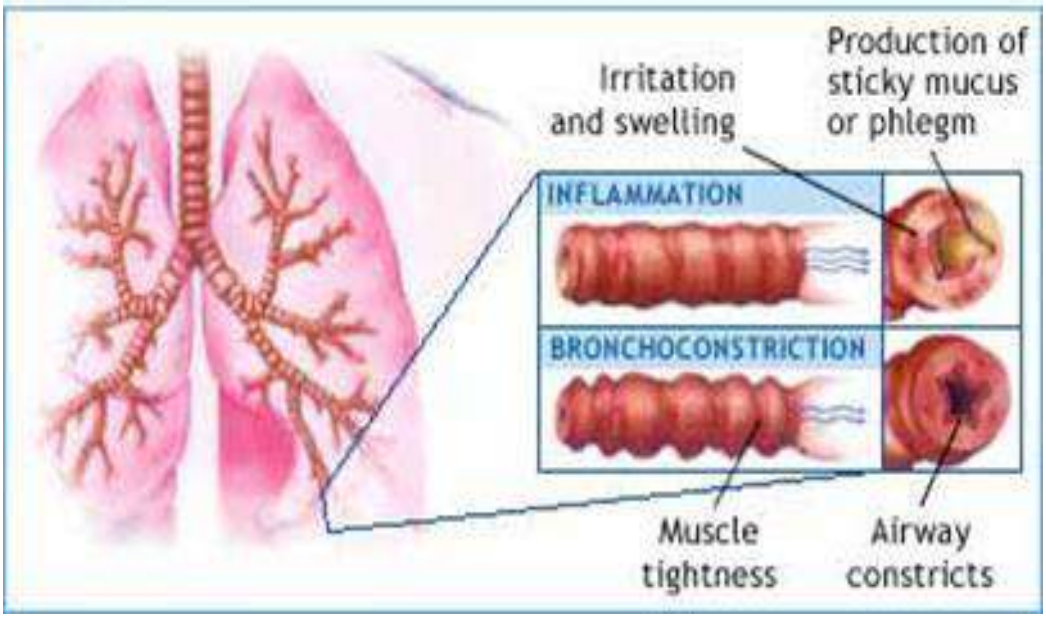
CBT–cognitive-behavioral therapy; TCAs–tricyclic antidepressants; SSRIs–selective serotonin reuptake inhibitors; IBS–irritable bowel syndrome; SNRI–serotonin and norepinephrine reuptake inhibitor.

Jackson JL, O'Malley PG, Kroenke K. *CNS Spectr.* Vol 11, No 3. 2006.

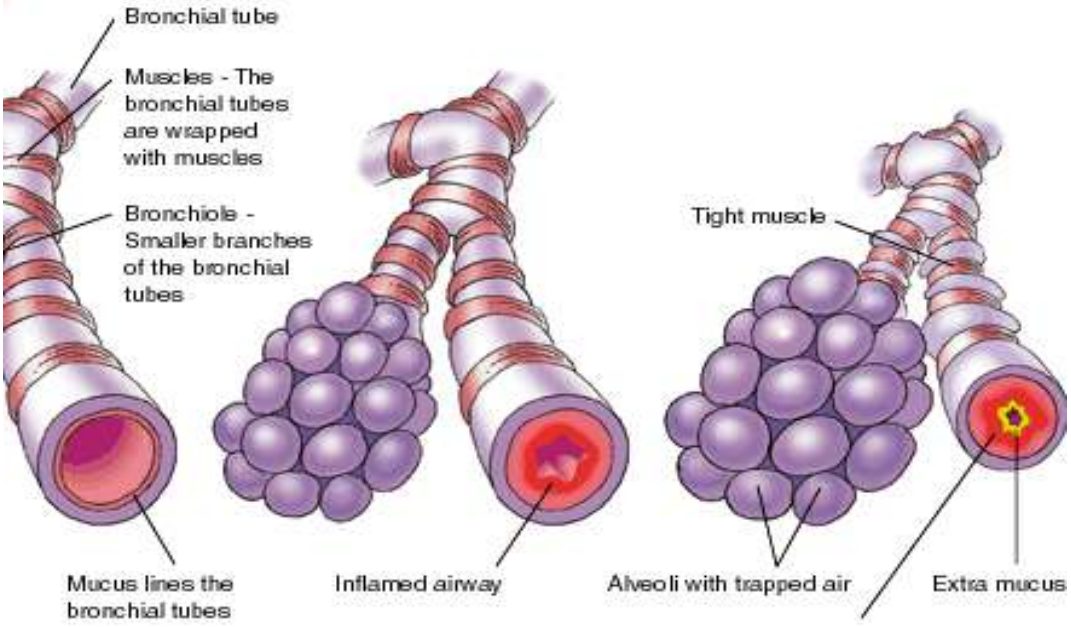

Narcotic Analgesics
Natural
Semi Synthetic
Synthetic
Poppy Plant
Morphine
Meperdine
Methadone
Opium
Heroin
Morphine
Codeine
Brown Sugar


Antihistamines
NSAIDs
COX-2 inhibitors
Capsaicin
TENS
Some anaesthetics
(lignocaine i.v.)
Implants & surgery
Opioids
Anti-depressants
Anti-convulsants
Paracetamol(?)
Acupuncture
Surgery
PERIPHERY
Receptors and chemical mediators in the skin or peripheral tissues
Nerve pathways between the periphery and spinal cord
SPINAL
Targets in the dorsal horn and ganglia
CORD
Nerve pathways between the spinal cord and brain
BRAIN
Receptors or neuro-transmitters
NOVEL
BK antagonists &
SP antagonists
NOVEL AGENTS
acting on
Sodium ion channels
Calcium ion channels
MODULATORS of
neurotransmitter
receptors
(NMDA, GABA,
Adenosine, ACh)

Asthmatic



When You Have Asthma



Tests on Pharmacology topics

1. List 3 features the preparation of infusions :

extracts prepared from the soft parts of plants *

boiled for 15 minutes infusions *

infusions filtered after cooling *

extracts prepared from the hard parts of plants

infusions boil 20-30 minutes

infusions filtered hot

2. List the three main differences between infusions and decoctions :

extracts prepared from the soft parts of plants; decoctions prepared from the hard parts of plants*

infusions of boiled for 15 minutes ; broths boil 20-30 minutes *

infusions filtered after cooling , filtered hot broths *

decoctions made from the soft parts of plants; infusions prepared from the hard parts of plants

decoctions boiled for 15 minutes ; infusions boil 20-30 minutes

broths filtered after cooling , filtered hot infusions

3. 3 Specify the standard concentration of infusions and decoctions :

from plants that do not contain potent substances - 1:10

of potent plants - 1:30 *

of poisonous plants - 1:300 , 1:400 *

from plants , not containing potent substances - 1:300 , 1:400

of potent plants - 1:10

of poisonous plants - 1:30

4.3 Specify laxatives containing antraglikozidy :

buckthorn extract liquid *

rhubarb pills *

senna leaf infusion *

valerian extract

infusion of herbs spring adonis

phenolphtalein

5. Select 5 main liquid dosage forms:

solution / solutio / *

infusion / infusum / *

broth / decoctum / *

tincture / tinctura / *

injection / injectio / *

suppository / suppositorium /

solution / infusum /

broth / solutio /

infusion / tinctura /

tincture / mucilago /

6. Select 5 main liquid dosage forms:

solution / solutio / *

infusion / infusum / *

broth / decoctum / *

tincture / tinctura / *

injection / injectio / *

suppository / suppositorium /

solution / infusum /

broth / solutio /

infusion / tinctura /

tincture / mucilago /

7. Select 5 main liquid dosage forms:

solution / solutio / *

infusion / infusum / *

broth / decoctum / *

tincture / tinctura / *

injection / injectio / *

suppository / suppositorium /

solution / infusum /

broth / solutio /

infusion / tinctura /

tincture / mucilago /

8. List the three main differences between infusions and decoctions :

extracts prepared from the soft parts of plants; decoctions prepared from the hard parts of plants*

infusions of boiled for 15 minutes ; broths boil 20-30 minutes *

infusions filtered after cooling , filtered hot broths *

decoctions made from the soft parts of plants; infusions prepared from the hard parts of plants

decoctions boiled for 15 minutes ; infusions boil 20-30 minutes

broths filtered after cooling , filtered hot infusions

9 . List 3 features cooking broths :

decoctions prepared from the hard parts of plants *

broths boil 20-30 minutes *

broths filtered hot *

decoctions made from the soft parts of plants

boiled for 15 minutes broths

broths filtered after cooling

1.List 3 features the preparation of infusions :

extracts prepared from the soft parts of plants *

boiled for 15 minutes infusions *

infusions filtered after cooling *

extracts prepared from the hard parts of plants

infusions boil 20-30 minutes

infusions filtered hot

2. List the three main differences between infusions and decoctions :

extracts prepared from the soft parts of plants; decoctions prepared from the hard parts of plants*

infusions of boiled for 15 minutes ; broths boil 20-30 minutes *

infusions filtered after cooling , filtered hot broths *

decoctions made from the soft parts of plants; infusions prepared from the hard parts of plants

decoctions boiled for 15 minutes ; infusions boil 20-30 minutes

broths filtered after cooling , filtered hot infusions

3. 3 Specify the standard concentration of infusions and decoctions :

from plants that do not contain potent substances - 1:10

of potent plants - 1:30 *

of poisonous plants - 1:300 , 1:400 *

from plants , not containing potent substances - 1:300 , 1:400

of potent plants - 1:10

of poisonous plants - 1:30

4 . 3 Specify laxatives containing antraglikozidy :

buckthorn extract liquid *

rhubarb pills *

senna leaf infusion *

valerian extract

infusion of herbs spring adonis

phenolphtalein

5. Select 5 main liquid dosage forms:

solution / solutio / *

infusion / infusum / *

broth / decoctum / *

tincture / tinctura / *

injection / injectio / *

suppository / suppositorium /

solution / infusum /

broth / solutio /

infusion / tinctura /

tincture / mucilago /

6. Select 5 main liquid dosage forms:

solution / solutio / *

infusion / infusum / *

broth / decoctum / *

tincture / tinctura / *

injection / injectio / *

suppository / suppositorium /

solution / infusum /

broth / solutio /

infusion / tinctura /

tincture / mucilago /

7. Select 5 main liquid dosage forms:

solution / solutio / *

infusion / infusum / *

broth / decoctum / *

tincture / tinctura / *

injection / injectio / *

suppository / suppositorium /

solution / infusum /

broth / solutio /

infusion / tinctura /

tincture / mucilago /

8. List the three main differences between infusions and decoctions :

extracts prepared from the soft parts of plants; decoctions prepared from the hard parts of plants*

infusions of boiled for 15 minutes ; broths boil 20-30 minutes *

infusions filtered after cooling , filtered hot broths *

decoctions made from the soft parts of plants; infusions prepared from the hard parts of plants

decoctions boiled for 15 minutes ; infusions boil 20-30 minutes

broths filtered after cooling , filtered hot infusions

9 . List 3 features cooking broths :

decoctions prepared from the hard parts of plants *

broths boil 20-30 minutes *

broths filtered hot *

decoctions made from the soft parts of plants

boiled for 15 minutes broths

broths filtered after cooling

1. . Select 5 main types of powders:
   Simple *

   Difficult *

   Close *

   small *

   smallest *

   largest

   average

   naikrupneyshim

   naimelchayshy

   semisimple
2. List the five major solid dosage forms:
   Powder *

   Tablet *

   Dragees *

   Capsule *

   Granules *

   ointment

   pasta

   liniment

   suppositories

   infusion
3. Enter 3 kinds of dosage forms (depending on their consistence)
   liquid *

   soft *

   solid *

oil

Jelly

water

4. Select 5 main liquid dosage forms:
   solution / solutio / *

   infusion / infusum / *

   broth / decoctum / *

   tincture / tinctura / *

   injection / injectio / *

   suppository / suppositorium /

   solution / infusum /

   broth / solutio /

   infusion / tinctura /

   tincture / mucilago /

5. List the five major solid dosage form
   Powder *

   Tablet *

   Dragees *

   Capsule *

   Granules *

   ointment

   pasta

   liniment

   suppositories

   infusion

001. Pharmacokinetics is:
a) The study of biological and therapeutic effects of drugs
b) The study of absorption, distribution, metabolism and excretion of drugs
c) The study of mechanisms of drug action
d) The study of methods of new drug development
002. What does “pharmacokinetics” include?
a) Complications of drug therapy
b) Drug biotransformation in the organism
c) Influence of drugs on metabolism processes
d) Influence of drugs on genes

002. What does “pharmacokinetics” include?
a) Pharmacological effects of drugs
b) Unwanted effects of drugs
c) Chemical structure of a medicinal agent
d) Distribution of drugs in the organism
003. What does “pharmacokinetics” include?
a) Localization of drug action
b) Mechanisms of drug action
c) Excretion of substances
d) Interaction of substances
004. The main mechanism of most drugs absorption in GI tract is:
a) Active transport (carrier-mediated diffusion)
b) Filtration (aqueous diffusion)
c) Endocytosis and exocytosis
d) Passive diffusion (lipid diffusion)
005. What kind of substances can’t permeate membranes by passive diffusion?
a) Lipid-soluble
b) Non-ionized substances
c) Hydrophobic substances
d) Hydrophilic substances
006. A hydrophilic medicinal agent has the following property:
a) Low ability to penetrate through the cell membrane lipids
b) Penetrate through membranes by means of endocytosis
c) Easy permeation through the blood-brain barrier
d) High reabsorption in renal tubules
007. What is implied by «active transport»?
a) Transport of drugs trough a membrane by means of diffusion
b) Transport without energy consumption
c) Engulf of drug by a cell membrane with a new vesicle formation
d) Transport against concentration gradient
008. What does the term “bioavailability” mean?
a) Plasma protein binding degree of substance
b) Permeability through the brain-blood barrier
c) Fraction of an uncharged drug reaching the systemic circulation following any route administration
d) Amount of a substance in urine relative to the initial doze
009. The reasons determing bioavailability are:
a) Rheological parameters of blood
b) Amount of a substance obtained orally and quantity of intakes
c) Extent of absorption and hepatic first-pass effect
d) Glomerular filtration rate
010. Pick out the appropriate alimentary route of administration when passage of drugs through liver is minimized:
a) Oral
b) Transdermal
c) Rectal
d) Intraduodenal
011. Which route of drug administration is most likely to lead to the first-pass effect?
a) Sublingual
b) Oral
c) Intravenous
d) Intramuscular
012. What is characteristic of the oral route?

a) Fast onset of effect
b) Absorption depends on GI tract secretion and motor function
c) A drug reaches the blood passing the liver
d) The sterilization of medicinal forms is obligatory
013. Tick the feature of the sublingual route:
a) Pretty fast absorption
b) A drug is exposed to gastric secretion
c) A drug is exposed more prominent liver metabolism
d) A drug can be administrated in a variety of doses
014. Pick out the parenteral route of medicinal agent administration:
a) Rectal
b) Oral
c) Sublingual
d) Inhalation
015. Parenteral administration:
a) Cannot be used with unconsciousness patients
b) Generally results in a less accurate dosage than oral administration
c) Usually produces a more rapid response than oral administration
d) Is too slow for emergency use
016. What is characteristic of the intramuscular route of drug administration?
a) Only water solutions can be injected
b) Oily solutions can be injected
c) Opportunity of hypertonic solution injections
d) The action develops slower, than at oral administration
017. Intravenous injections are more suitable for oily solutions:
a) True
b) False
018. Correct statements listing characteristics of a particular route of drug administration include all of the following EXCEPT:
a) Intravenous administration provides a rapid response
b) Intramuscular administration requires a sterile technique
c) Inhalation provides slow access to the general circulation
d) Subcutaneous administration may cause local irritation
019. Most of drugs are distributed homogeneously.
a) True
b) False
020. Biological barriers include all except:
a) Renal tubules
b) Cell membranes
c) Capillary walls
d) Placenta
021. What is the reason of complicated penetration of some drugs through brain-blood barrier?
a) High lipid solubility of a drug
b) Meningitis
c) Absence of pores in the brain capillary endothelium
d) High endocytosis degree in a brain capillary
022. The volume of distribution (Vd) relates:
a) Single to a daily dose of an administrated drug
b) An administrated dose to a body weight
c) An uncharged drug reaching the systemic circulation
d) The amount of a drug in the body to the concentration of a drug in plasma
023. For the calculation of the volume of distribution (Vd) one must take into account:
a) **Concentration of a substance in plasma**

b) Concentration of substance in urine
c) Therapeutical width of drug action
d) A daily dose of drug
024. A small amount of the volume of distribution is common for lipophylic substances easy penetrating through barriers and
widely distributing in plasma, interstitial and cell fluids:
a) True
b) False
025. The term "biotransformation" includes the following:
a) Accumulation of substances in a fat tissue
b) Binding of substances with plasma proteins
c) Accumulation of substances in a tissue
d) Process of physicochemical and biochemical alteration of a drug in the body
026. Biotransformation of the drugs is to render them:
a) Less ionized
b) More pharmacologically active
c) More lipid soluble
d) Less lipid soluble
027. Tick the drug type for which microsomal oxidation is the most prominent:
a) Lipid soluble
b) Water soluble
c) Low molecular weight
d) High molecular weight
028. Pick out the right statement:
a) Microsomal oxidation always results in inactivation of a compound
b) Microsomal oxidation results in a decrease of compound toxicity
c) Microsomal oxidation results in an increase of ionization and water solubility of a drug
d) Microsomal oxidation results in an increase of lipid solubility of a drug thus its excretion from the organism is facilitated
029. Stimulation of liver microsomal enzymes can:
a) Require the dose increase of some drugs
b) Require the dose decrease of some drugs
c) Prolong the duration of the action of a drug
d) Intensify the unwanted reaction of a drug
030. Metabolic transformation (phase 1) is:
a) Acetylation and methylation of substances
b) Transformation of substances due to oxidation, reduction or hydrolysis
c) Glucuronide formation
d) Binding to plasma proteins
031. Biotransformation of a medicinal substance results in:
a) Faster urinary excretion
b) Slower urinary excretion
c) Easier distribution in organism
d) Higher binding to membranes
032. Conjugation is:
a) Process of drug reduction by special enzymes
b) Process of drug oxidation by special oxidases
c) Coupling of a drug with an endogenous substrate
d) Solubilization in lipids
033. Which of the following processes proceeds in the second phase of biotransformation?
a) Acetylation
b) Reduction
c) Oxidation

d) Hydrolysis
034. Conjugation of a drug includes the following EXCEPT:
a) Glucoronidation
b) Sulfate formation
c) Hydrolysis
d) Methylation
035. Metabolic transformation and conjugation usually results in an increase of a substance biological activity:
a) True
b) False
036. In case of liver disorders accompanied by a decline in microsomal enzyme activity the duration of action of some drugs
is:
a) Decreased
b) Enlarged
c) Remained unchanged
d) Changed insignificantly
037. Half life (t ½) is the time required to:
a) Change the amount of a drug in plasma by half during elimination
b) Metabolize a half of an introduced drug into the active metabolite
c) Absorb a half of an introduced drug
d) Bind a half of an introduced drug to plasma proteins
038. Half life (t ½) doesn't depend on:
a) Biotransformation
b) Time of drug absorption
c) Concentration of a drug in plasma
d) Rate of drug elimination
039. Elimination is expressed as follows:
a) Rate of renal tubular reabsorption
b) Clearance speed of some volume of blood from substance
c) Time required to decrease the amount of drug in plasma by one-half
d) Clearance of an organism from a xenobiotic
040. Elimination rate constant (Kelim) is defined by the following parameter:
a) Rate of absorption
b) Maximal concentration of a substance in plasma
c) Highest single dose
d) Half life (t ½)
041. The most rapid eliminated drugs are those with high glomerular filtration rate and actively secreted but aren't passively
reabsorbed:
a) True
b) False
042. Systemic clearance (CLs) is related with:
a) Only the concentration of substances in plasma
b) Only the elimination rate constant
c) Volume of distribution, half life and elimination rate constant
d) Bioavailability and half life

001. This drug is a Class IA antiarrhythmic drug:
a) Sotalol
b) Propranolol
c) Verapamil
d) Quinidine

002. This drug is a Class IC antiarrhythmic drug:
a) Flecainide
b) Sotalol
c) Lidocaine
d) Verapamil
003. This drug is a Class IC antiarrhythmic drug:
a) Flecainide
b) Sotalol
c) Lidocaine
d) Verapamil
004. This drug is a Class II antiarrhythmic drug:
a) Flecainide
b) Propranolol
c) Lidocaine
d) Verapamil
005. This drug is a Class III antiarrhythmic drug:
a) Flecainide
b) Sotalol
c) Lidocaine
d) Verapamil
006. This drug prolongs repolarization:
a) Flecainide
b) Sotalol
c) Lidocaine
d) Verapamil
007. This drug is a Class IV antiarrhythmic drug:
79
a) Flecainide
b) Sotalol
c) Lidocaine
d) Verapamil
008. This drug is used in treating supraventricular tachycardias:
a) Digoxin
b) Dobutamine
c) Amrinone
d) Dopamine
009. This drug is associated with Torsades de pointes.
a) Flecainide
b) Sotalol
c) Lidocaine
d) Verapamil
010. This drug has beta-adrenergic blocking activity:
a) Flecainide
b) Sotalol
c) Lidocaine
d) Verapamil

001. All of the following are normally involved in the pathogenesis of heart failure EXCEPT:
a) A cardiac lesion that impairs cardiac output
b) An increase in peripheral vascular resistance
c) A decrease in preload
d) An increase in sodium and water retention
002. All of the following are compensatory mechanisms that occur during the pathogenesis of congestive heart failure
EXCEPT:
a) An increase in ventricular end-diastolic volume
b) An increase in the concentration of plasma catecholamines
c) An increase in vagal tone
d) Increased activity of the renin-angiotensin-aldosterone system
003. All of the following are recommended at the initial stages of treating patients with heart failure EXCEPT:
a) Reduced salt intake
b) Verapamil
c) ACE inhibitors
d) Diuretics
004. All of the following agents belong to cardiac glycosides EXCEPT:
a) Digoxin
b) Strophantin K
c) Amrinone
d) Digitoxin
005. The non-glycoside positive inotropic drug is:
a) Digoxin
b) Strophantin K
c) Dobutamine
d) Digitoxin
006. Sugar molecules in the structure of glycosides influence:
a) Cardiotonic action
b) Pharmacokinetic properties
c) Toxic properties
d) All of the above
007. Aglycone is essential for:
a) Plasma protein binding
b) Half-life
c) Cardiotonic action
d) Metabolism
008. Choose the derivative of the plant Foxglove (Digitalis):
a) Digoxin
b) Strophantin K
c) Dobutamine
d) Amrinone
009. All of the following statements regarding cardiac glycosides are true EXCEPT:
a) They inhibit the Na+/K+-ATPase and thereby increase intracellular Ca++ in myocardial cells
b) They cause a decrease in vagal tone

c) Children tolerate higher doses of digitalis than do adults
d) The most frequent cause of digitalis intoxication is concurrent administration of diuretics that deplete K+

010. An important action of digitalis is to increase vagal tone. It's:
a) True
b) False

001. This drug reduces blood pressure by acting on vasomotor centers in the CNS:
a) Labetalol
b) Clonidine
c) Enalapril
d) Nifedipine

002. All of the following are central acting antihypertensive drugs EXCEPT:
a) Methyldopa
b) Clonidine
c) Moxonidine
d) Minoxidil

003. A ganglioblocking drug for hypertension treatment is:
a) Hydralazine
b) Tubocurarine
c) Trimethaphan
d) Metoprolol

004. Pick out the sympatholythic drug:
a) Labetalol
b) Prazosin
c) Guanethidine
d) Clonidine

005. Tick the drug with nonselective beta-adrenoblocking activity:
a) Atenolol
b) Propranolol
c) Metoprolol
d) Nebivolol

006. Choose the selective blocker of beta-1 adrenoreceptors:
a) Labetalol
b) Prazosin
c) Atenolol
d) Propranolol

007. Pick out the drug – an alpha and beta adrenoreceptors blocker:
a) Labetalol
b) Verapamil
c) Nifedipine
d) Metoprolol

008. This drug inhibits the angiotensin-converting enzyme:
a) Captopril
b) Enalapril
c) Ramipril
d) All of the above

009. This drug is a directly acting vasodilator:
a) Labetalol
b) Clonidine
c) Enalapril
d) Nifedipine
010. Pick out the diuretic agent for hypertension treatment:
a) Losartan
b) Dichlothiazide
c) Captopril
d) Prazosin

Criteria for evaluating the current control

№	Progress %	Ball	The level of student knowledge
1	96-100%	Excellent "5"	Complete the correct answer to the questions on classification, pharmacokinetics, pharmacodynamics, indications and contraindications to drugs, their side effects. Sums up the results and make decisions, think creatively, independently analyzed. Situational problem resolves correctly, with a creative approach, with full justification for the answer. Actively and creatively participate in interactive games, right to make informed decisions and summarize, analyze. Recipes are written in accordance with the dosage form and with the correct indication of the dose and indication for use. The correct spelling of all drugs of this pharmacological group with faithful indication of the form of release.
2	91-95%	Excellent "5"	Complete the correct answer to the questions on classification, pharmacokinetics, pharmacodynamics, indications and contraindications to drugs, their side effects. Creative thinking, self-analyzing. Situational problem resolves correctly, with a creative approach, the rationale for the answer. Actively and creatively participate in interactive games, correct decision maker. Recipes are written in accordance with the dosage form is a grammatical error. The correct spelling of all drugs of this pharmacological group with faithful indication of the form of release.
3	86- 90%	Excellent "5"	The questions on classification, pharmacokinetics, pharmacodynamics, indications and contraindications to drugs, their side effects are covered in full, but there are 2.1 errors in the response. Independently analyzed. Inaccuracies in the solution of case problems, but with the right approach. Actively involved in interactive games, make the right decisions. Recipes are written in accordance with the dosage form, with the proper indication of indication for use, but there are 3.2 grammatical errors. The correct spelling of all drugs of this pharmacological group, but there is a discrepancy in the forms of release.
4	81-85%	Good "4"	The questions on classification, pharmacokinetics, pharmacodynamics, indications and contraindications to drugs, their side effects are covered in full, but is 2-3 inaccuracies, errors. Into practice, understand the essence of the issue, says confidently, has fine

			performances. Situational problems solved correctly, but not adequately support the answer. Actively participating in interactive games, correctly makes the decisions. Recipes are written in accordance with the dosage form, with the proper indication of indication for use, but there are 3.2 grammatical mistakes, errors in dose. The correct spelling of all drugs of this pharmacological group, but is 2-3 errors in registration forms.
5	76-80%	Good "4"	Correct, but incomplete coverage of the issue. The student knows the classification, the indications for the use of drugs, their side effects, the basic properties, but do not fully understand the mechanism of action and the development of side effects. Understands the issue, says confidently, has fine views. Actively involved in interactive games. On case studies give incomplete solutions. Recipes are written in accordance with the dosage form, with the proper indication of the dose, but not all are testimony to the application. The correct spelling of all drugs of this pharmacological group, but there are 4.3 errors in the title and registration forms.
6	71-75%	Good "4"	Correct, but incomplete coverage of the issue. The student knows the classification, but not complete lists indications for the use of drugs, their side effects, the basic properties that do not fully understand the mechanism of action and the development of side effects. Understands the issue, says confidently, has fine views. On case studies give incomplete solutions. Recipes are written in accordance with the dosage form, with the proper indication of the dose, but not all are indications for use, is 2-3 grammatical errors. The correct spelling of all drugs of this pharmacological group, but there are 4.3 errors in the forms of release.
7	66-70%	Satisfactorily "3"	The correct answer to half of the questions posed. The student knows the classification is not complete lists the indications for the use of drugs, basic properties, but poorly versed in the mechanism of action, entangled in side effects. Understands the issue, says confidently, has fine performances only on selected topics. Situational problems solved correctly, but there is no justification response. Recipes are written with the correct indication of the dose, but not completely given testimony to the application and there is an error in specifying the form of release. Proper transfer of drugs of this pharmacological group, but there are grammatical errors in writing the names of drugs and mistakes in the registration forms.

8	61-65%	Satisfactorily "3"	The correct answer to half of the questions posed. Errors in classification errors in the testimony to the use of drugs, the properties are poorly versed in the mechanism of action, entangled in side effects. Says uncertainly, has fine performances only on selected topics. Mistakes in solving situational. Recipes are written in accordance with the dosage form, but without the indications for use and there are errors in the indication of the dose. The correct spelling of the drugs pharmacological symmetric group, but there are errors in the registration forms.
9	55-60%	Satisfactorily "3"	Reply with errors on half the issues raised. Student makes mistakes in classification, the indications for use, the properties are poorly versed in the mechanism of action, entangled in side effects. Says uncertainly, has a partial view on the subject. Situational problems solved incorrectly. Recipes are written with grammatical mistakes, without instructions for use and there are errors in the indication of the dose. Correct spelling of only half of the preparations of this pharmacological group, there are errors in the forms of release.
10	50-54%	Not satisfactorily "2"	The correct answer is 1 / 3 of the questions. The student does not know the classification, the indications for use, poorly versed in the mechanism of action, entangled in side effects. Situational problems solved incorrectly by the wrong approach. Recipes are written incorrectly, without instructions for use and there are errors in the indication of the dose. Correct spelling of less than half of drugs, there are errors in the forms of release.
11	46-49%	Not satisfactorily "2"	The correct answer is 1 / 4 of the questions posed. The student does not know the classification, the indications for use, poorly versed in the mechanism of action, entangled in side effects. Situational problems solved incorrectly by the wrong approach. Recipes are written incorrectly, without instructions for use and there are errors in the indication of the dose, grammatical errors. Correct spelling of less than half of drugs, there are errors in the registration forms and grammatical errors.
12	41-45%	Not satisfactorily "2"	Coverage of 1 / 5 of the questions correctly. The student does not know the classification does not fully transfer the products of this pharmacological group. Gives incomplete and partially incorrect answers to questions on the pharmacokinetics and pharmacodynamics of drugs. Half of the prescriptions written incorrectly, mistakes in dose formulations, and indications for use. Writing less than half the drugs without a release form.
13	36-40%	Not satisfactorily	Lighting 1 / 10 of the questions in the wrong approach. Do not know the classification, the indications for use,

		"2"	confuses the basic properties of drugs. Practically does not understand the mechanism of action and side effects of drugs. All recipes are written incorrectly with blunders. The list of drugs of this pharmacological group is not given.
14	31-35%	Not satisfactorily "2"	Questions not answers. Do not know the mechanisms of action, adverse effects, the basic properties of drugs. . Can not write prescriptions for this section of pharmacology, since there is no logical link between the dosage form and by the introduction, does not know the indications for use.