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: **60910400 – Preventive medicine**

TASHKENT – 2024

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

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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.

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CONTENTS OF EDUCATIONAL-METHODICAL COMPLEX

CALENDAR-THEMATIC PLAN

for 2024-2025 academic year

Department: Pharmacology Subject: Pharmacology
Faculty: International faculty
Course: 3 semester: 6
Allocated hours per semester: lecture training– 12 practical training – 48

Lecture training

№	Lecture Training Topics	Hours
1	Introduction. General pharmacology	2
2	Drugs affecting efferent innervation	2
3	Analgesic drugs	2
4	Antiinflammatory drugs	2
5	Antiseptic and disinfectant drugs	2
6	Antibiotics	2
	Total	**12**

Practical training

№	Topics of practical training	Hours
1	The importance of the recipe in the preparation of GP. Recipe and its structure. Solid and soft drug forms and rules for prescribing them.	4
2	Liquid drug forms and rules for prescribing them.	4
3	General pharmacology. Pharmacokinetics and pharmacodynamics of drugs. Drugs affecting afferent nervous system.	4
4	Drugs affecting cholinerceptors.	4
5	Drugs that stimulate adrenoreceptors.	4
6	Ethyl alcohol. Analgesics. Neuroleptics. Anxiolytics. Sedatives.	4
7	Medicines that affect the activity of respiratory organs. Antihypertensive drugs. Hypertensive drugs.	4
8	Drugs affecting the gastrointestinal system.	4
9	Antiinflammatory drugs. Antiallergic drugs.	4
10	Antiseptic and disinfectants Antibiotics - 1 part.	4
11	Antibiotics - part 2. Sulfanilamide preparations. Synthetic antimicrobial agents of various chemical structures.	4
12	Antituberculosis and antisyphilitic agents. Hyperthermia syndrome and drugs used to treat it.	4
	Total	**48**

Head of the department, professor Allaeva M. J.

Lecture

Topic 1: Introduction. General pharmacology

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

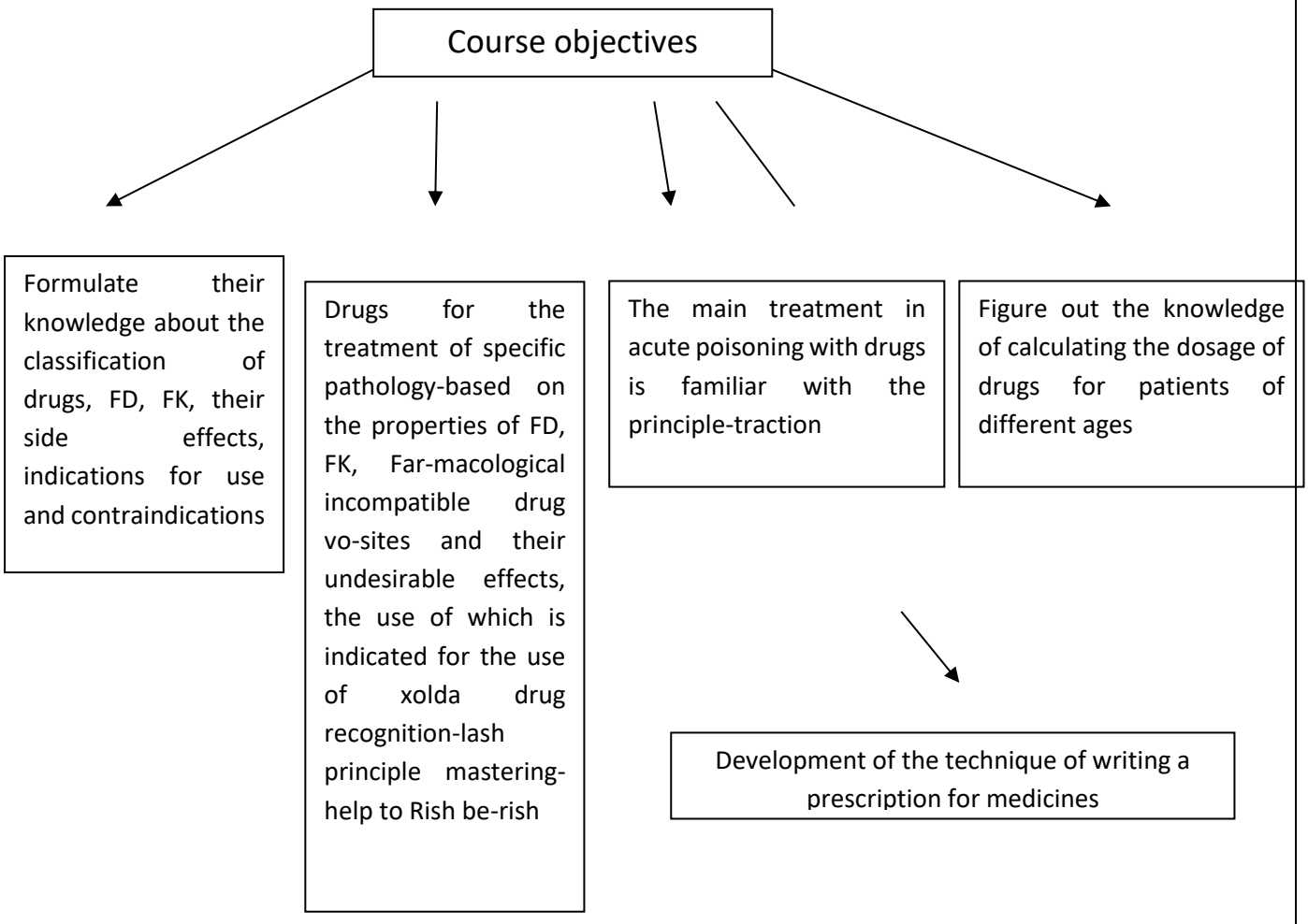
Introduction. General pharmacology

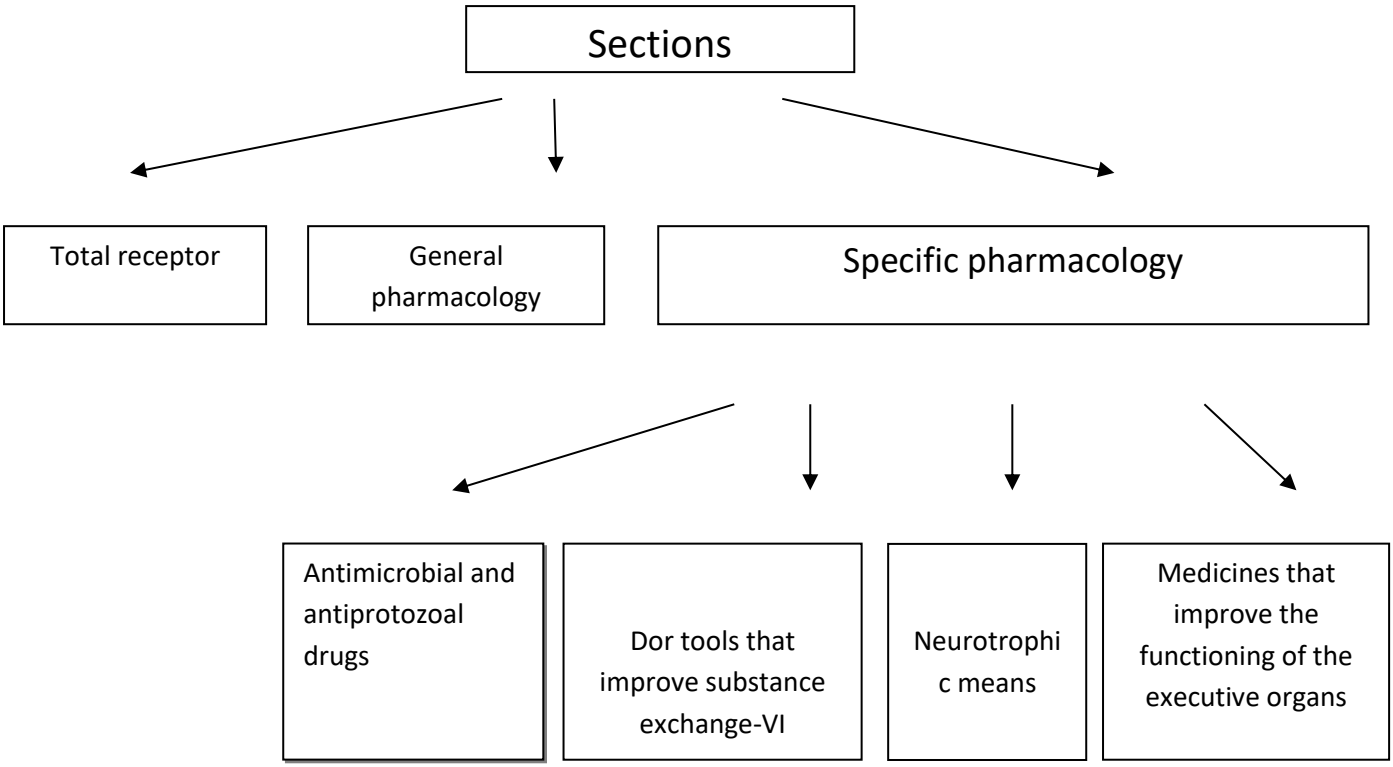
Work stage lari and time	Activity	
	Teacher	Students
Step 1. Introduction (5 minutes)	1.1. The name of the topic, its purpose and expected results.	1.1 They will listen.
2 stages Activity activation (20 minutes)	2.1. Asks thematic questions for the purpose of strengthening students' knowledge - What 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. 4.2. Invites students to ask questions and answers these questions	4.1. They listen and record 4.2. They clarify and ask questions

technological map of training on the topic

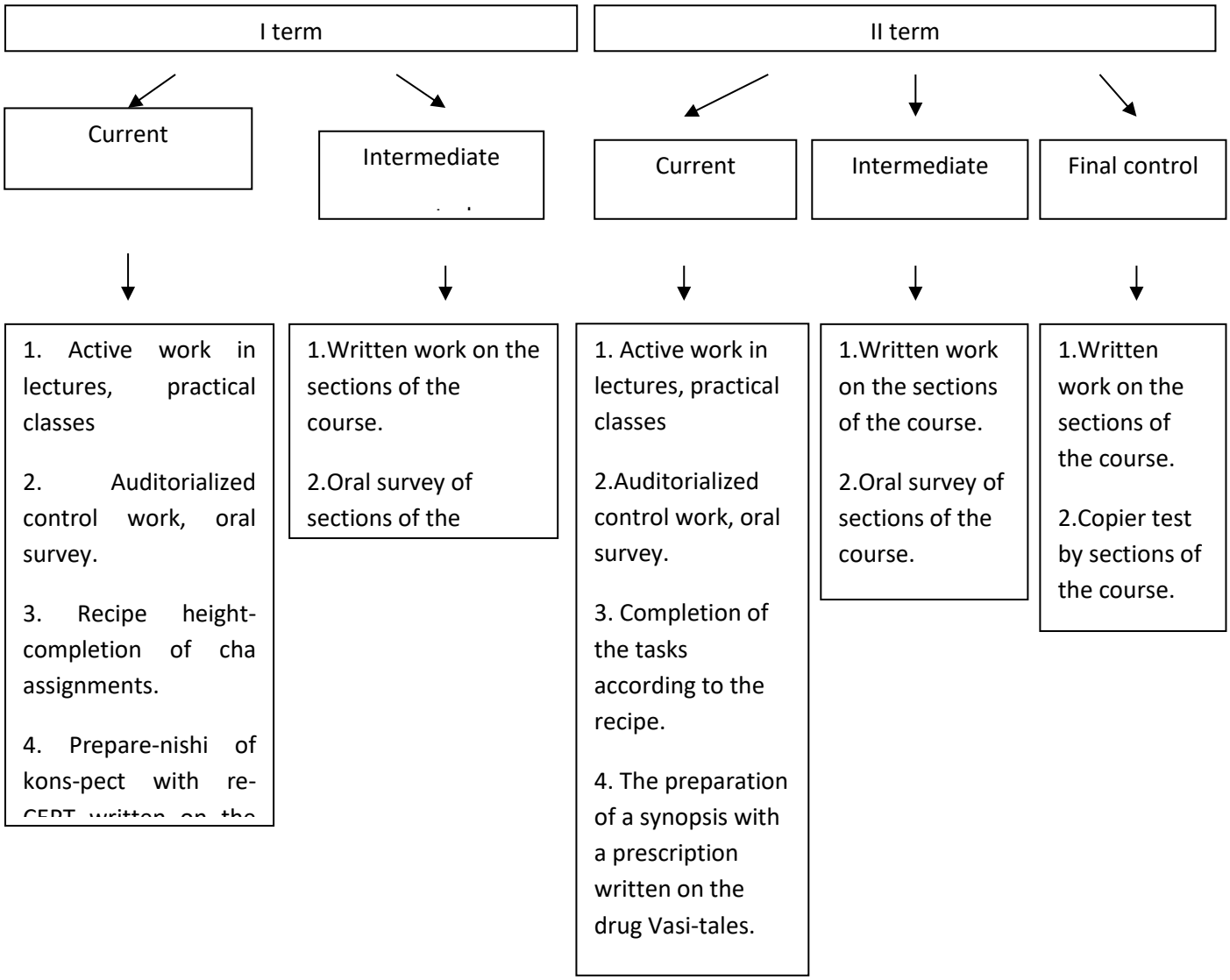
Structure of the course" pharmacology"	Application 1




Sections
Total receptor
General pharmacology
Specific pharmacology
Antimicrobial and antiprotozoal drugs
Dor tools that improve substance exchange-VI
Neurotrophi c means
Medicines that improve the functioning of the executive organs

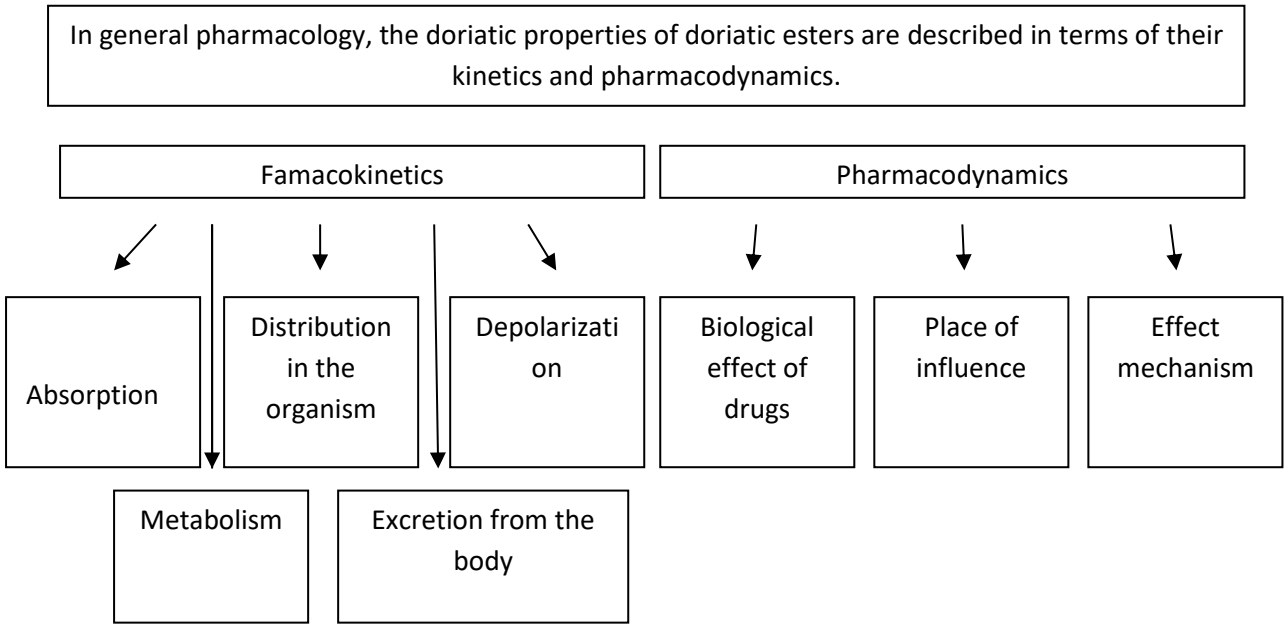
RATING CONTROL

In particular, pathologies such as FD medical care, pharmacological expertise on medicines and assistance to them as related remedies, remedies on illness as a means of influence, both related and related cultures, and medicinal remedies protection



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: Medicines affecting efferent innervation.

Lecture educational technology model of pharmacology

Time *: 90 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.* *2. 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 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.* - *adrenomimetic means ;* *-Adrenomimetic agents are clearly classified.* *-They tell the side effects of adrenomimetic drugs ;* *-They tell when to use adrenomimetics*
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? - 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? 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 65 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 ?	They listen to the lecture, see schemes, tables and visual materials, discuss and ask clarifying questions. they ask and ask questions

	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?	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 .

a , b -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)

***IZADRIN*.** 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 .

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 factors affecting them when using M and N-Cholinomimetics, M and N-Cholinoblocators, Anticholinesterase drugs.

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

Lecture

Topic 3: Analgesics.

Lecture

Topic: Narcotic and non-narcotic pain relievers (Analgesics)

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 90 minutes	Activity	
	t teacher	t 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 65 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 10 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.

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.

NON-OPIOID 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.

- Salicylats: acetylsalicylate acidase, methyl - salicylate

- Pirozolons– amidopyrin, butadione, analgin

- Paraaminophenols – 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 .

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.

PYRAZOLONS

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. $t_{1/2 \text{ of paracetamol}}$ = 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, ha**s** 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 4: Anti-inflammatory agents

Lecture educational technology model of pharmacology

Time: 80 minutes	***Number of students: 50-75***
Lecture plan	1. Introduction. 2. Inflammation and allergies. 3. Classification of anti-inflammatory and anti-allergic agents 4. Pharmacodynamics and pharmacokinetics of drugs used against inflammation and allergies 5. Basic principles of using anti-inflammatory and anti-allergic agents. 6. New anti-inflammatory and anti-allergic agents
The purpose of the lecture:	***To provide students with an understanding of the causes of inflammation and allergies, principles of treatment and side effects caused by drugs.***
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 used against inflammation and allergies;*** ***- They clearly classify anti-inflammatory and anti-allergic agents.*** ***- They tell the side effects of anti-inflammatory and anti-allergic drugs;*** ***- They will tell you when to use anti-inflammatory and anti-allergic drugs.*** *- To know the side effects of anti-inflammatory and anti-allergic drugs and to reveal the necessary measures in such cases.*
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***	
	Teachers	***Students***
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***
Stage 2 Activity activation (5 minutes)	***2.1. In order to strengthen students' knowledge, he asks themed questions:*** ***-How are anti-inflammatory and anti-allergic agents classified?*** ***- Which drugs include non-selective effects on COX-1 and -2?*** ***- Which drugs include those that selectively affect COX-1 and -2?*** ***- Indications and contraindications for the use of anti-inflammatory drugs?*** ***- Mechanism of action of anti-inflammatory drugs?*** ***- Mechanism of action of anti-allergic drugs?***	***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 anti-inflammatory agents 2. Use of anti-inflammatory agents 3. Side effects of anti-inflammatory drugs 4. Effect of acetylsalicylic acid 5. Classification of anti-allergic agents 3.2 Emphasis is placed on the necessary, necessary questions on the topic and students are invited to write them down:	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.

ANTI-INFLAMMATORY MEDICINES.

There is inflammation in many pathologies, because it is a universal response of the body to various endogenous and exogenous influences. Inflammation is local (limited) and general (widespread). At a high level of inflammation, the function of many organs and tissues is disturbed and their failure appears (burn disease, peritonitis, rheumatism, etc.). Due to this, along with etiotropic treatment, it is necessary to use anti-inflammatory agents. According to their chemical structure, anti-inflammatory agents are divided into steroidal and nonsteroidal groups.

Agents with a steroid structure are glucocorticoids. Their mechanism of action is as follows: glucocorticoids increase the synthesis and release of lipocortins in the body. Lipocortins reduce the activity of the enzyme phospholipase A2. As a result, the breakdown of phospholipids in cell membranes and the formation of arachidonic acid from them is sharply reduced. Due to this, the formation of cyclic endoperoxides and prostaglandins (PG) from them decreases. As a result, pain, fever, inflammation (which causes PG) decreases. Because they are created by PG. Therefore, the effect of glucocorticoids on inflammation is associated with a decrease in the activity of phospholipase A2 and a decrease in the formation of PGs. In addition, glucocorticoids inhibit the synthesis of oxyacids, leukotrienes, and platelet-activating factor.

Nonsteroidal anti-inflammatory drugs. They are divided into the following groups.

I. Non-selective inhibitors of cyclooxygenase (TsOG-1+TsOG-2):

1. Products of salicylic acid (acetylsalicylic acid).

2. Anthranilic acid products (mefenamic acid, flufenamic acid).

3. Pyrozolone products (amidopyrin, butadione).

4. Indoleacetic acid (indomethacin).

5. Phenylacetic acid products (diclofenac-sodium).

6. Phenyl propionic acid products (ibuprofen).

7. Sodium propionic acid products (natroken).

8. Oxicates (piroxicam).

II. Cyclooxygenase (TsOG-2) selective inhibitor (meloxicam):

Many nonsteroidal anti-inflammatory drugs also have analgesic and antipyretic properties. The basis of such effects lies in their ability to reduce the cyclooxygenase enzyme, that is, the formation of cyclin endoperoxides from arachidonic acid is reduced. As a result, PG, which causes inflammation, pain, and fever, is not synthesized. Reduction of PG simultaneously eliminates hyperemia, swelling.

Salicylic acid products (salicylic acid).

Salicylates have all three properties characteristic of nonnarcotic analgesics, in addition, they also affect other systems and organs, including breathing due to a direct stimulating effect on the respiratory center and increasing the production of carbonic anhydride (especially in large

doses). In this case, receptor alkalosis can develop. Disturbance of acid-base balance, which develops under the influence of salicylates, is limited by compensated alkalosis, because the kidney quickly separates K+ and Na+ in the urine. In this case, the buffer capacity of tissues decreases. Salicylates have almost no effect on the vascular system, only widening blood vessels in large doses. Salicylates increase the ability of the liver to secrete bile. Reabsorption (reabsorption) of urates and phosphates in the kidney is weakened. In large doses, it increases the excretion of calcium in the urine by slowing down the reabsorption of calcium in the urine (this is good for gout). Unfortunately, in small doses, it does the opposite, and the amount of uric acid in the blood increases. Large doses of salicylates reduce platelet count. Acetylsalicylic acid inhibits platelet aggregation by inhibiting thromboxane biosynthesis. Sodium salicylate does not have this property.

In large doses, salicylates increase the release of ACTG by stimulating the hypothalamus and, therefore, the amount of glucocorticoids in the blood. Salicylates increase the breakdown of proteins, fatty acids and amino acids, and slow down their synthesis. They help to eliminate hyperglycemia in diabetes. Salicylates from MIT are well absorbed, pass tissue barriers well. 50-55% of absorbed salicylates bind to proteins. Salicylates form conjugates in the liver and are excreted together with the unchanged part in the urine. T1|2=10-12 hours.

Indications: acute and chronic rheumatic diseases; as an analgesic for neuralgia, myalgia and arthritis, as an antipyretic, it should be used when the body temperature exceeds 38C (because it is useful below).

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

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

Chronic poisoning: salicylism, hemorrhages (hypothrombocytopenia), in addition to the above, vitamin K should be given. Symptomatic treatment.

Citromon, Koficil, Sedalgin and many other complex tablets contain aspirin. Current "shinugie" tab. aspirin plus "S", Aspirin vit. S-UPSA.

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 analgesic agent alone or in combination with chloroform, turpentine, oils (for joint and muscle rheumatism, arthritis, pleurisy) "Sanitas", "Naftalgin" , "Saliniment", liniments and Bon-Bengi ointment (ointment) contain methyl salicylate.

PYRAZOLON PRODUCTS.

This group of substances has anti-inflammatory (butadione), analgesic (amidopirin, analgin) and other antipyretic effects. Analgesic effect is more in analgin and amidoprine, anti-inflammatory effect is more in butadione. Butadione increases the excretion of uric acid because it reduces its reabsorption in the kidneys (gout). Amidopyrin is poorly soluble in water (4%), analgin is well soluble (50%). Pyrozolone products from MIT are full and well absorbed. Among them, butadione has the longest effect, then amidopyrin, analgin has a relatively short effect. Butadione binds well to blood proteins. Pyrozolone products are mainly used as analgesics (analgin, amidopyrine) in headache, toothache, neuralgia, myalgia. As an anti-inflammatory agent, butadione is used in infectious polyarthritis, acute gout, etc.

Adverse effects: amidopyrin, analgin-agranulocytosis, the number of neutrophils increases sharply, phagocytosis, immunity is lost, it can lead to death.

BUTADION causes dyspeptic changes in 50% of patients (nausea, vomiting, bleeding, ulcers in the stomach and intestines).

 swelling (increases reabsorption of sodium ions).

 allergic reactions, agranulocytosis, aplastic anemia, liver injury. Butadione is not used in case of stomach ulcer disease, cardiovascular insufficiency, liver disease.

MEFENAMIC ACID: Stronger than salicylates in anti-inflammatory, analgesic and antipyretic effects. Analgesic effect is similar to that of butadione. The mechanism of action is associated with the reduction of the activity of TsOG 1 and 2. It is between butadione and indomethacin in its ability to inhibit PG synthesis. Well absorbed from MIT. Binds to blood serum proteins. Excreted through the kidneys - mainly metabolites.

Indications for use: rheumatism, infectious polyarthritis, arthralgia, neuralgia in muscle pain, headache and toothache, various fevers.

Mefenamic acid should be taken with milk after a meal, because nausea, diarrhea causes abdominal pain (it has a local action property).

Sometimes there are allergic reactions (hives, itching). In stomach and intestinal ulcer disease, colitis, enterocolitis cannot be given.

FLUMEFENAM ACID: -has the same FD as mefenamic acid.

Indomethacin is the most active anti-inflammatory agent with a nonsteroid structure. Indomethacin is a potent inhibitor of PG biosynthesis. It has a strong analgesic and moderate antipyretic effect. Well absorbed from MIT. Blood serum binds with protein. T1/2=48s. Most of it is broken down in the liver and excreted in bile and urine. Due to its high toxicity, indomethacin is widely used as an analgesic and antipyretic.

Indications for use: rheumocarditis, rheumatism, infectious polyarthritis, osteoarthritis, Bekhterev's disease, gouty arthritis, bursitis, thrombophlebitis, glomerulonephritis and other inflammations.

Side effects: dyspepsia (must be drunk with milk after meals), abdominal pain, gastric and duodenal ulcers, bleeding from MIT, allergic reactions, rheumatic changes, hallucinations, visual disturbances, aplastic anemia, leukopenia.

Do not use: gastric and duodenal ulcer, pregnancy, breastfeeding women, mental illness, parkinsonism, seizures.

VOLTAREN-anti-inflammatory: is the most powerful active drug. It has a strong analgesic and antipyretic effect. Well absorbed from MIT. All amounts are combined with proteins. It is excreted mainly in the form of metabolites with urine and bile. It is superior to acetylsalicylic acid, butadione, and ibuprofen in its anti-inflammatory and analgesic effect. They are not inferior to prednisolone and indomethacin in the treatment of rheumatism and Bekhterev's disease. The toxicity of Voltaren is low, the width of the therapeutic effect is high. The drug is well accepted by patients. It rarely has unpleasant effects. Only at the beginning of treatment, the drug can cause dizziness, dyspepsia. This effect is self-resolving. However, it cannot be used in 1-3 months of pregnancy in the case of stomach and duodenal ulcers.

IBUPROFEN (brufen) has a pronounced anti-inflammatory, analgesic and antipyretic effect. It is equal to butadione in its anti-inflammatory effect. Far superior to salicylates. Fewer side effects (dyspepsia). Butadione, salicylates and indomethacin rarely have adverse effects. It is used in the same way as indomethacin.

NAPROXENE. (tab. 0.25)-in comparison to voltaren, the anti-inflammatory power is lower, but the analgesic power is higher than it. The effect is longer (drink 2 times a day). MIT is well absorbed, well tolerated by patients.

Adverse effects: dyspepsia, allergic reactions.

PIROXICAM. In terms of effect, it is similar to other drugs with a nonsteroid structure. It is well absorbed from MIT, as the effect is long-lasting (T1/2-36-45s), it is drunk once a day. Used

similarly to Voltafen and Indomethacin. The side effects are similar to theirs. Increases the effect of anticoagulants. It cannot be used during pregnancy and breastfeeding. Employees who require great attention (attention) should take the drug with caution (transport drivers). It is not allowed to drink alcoholic beverages.

LORNOXIKAM-TsOG-1 and TsOG-2 blocker. It has a strong analgesic and anti-inflammatory effect, only large doses reduce fever. To a lesser extent, it reduces platelet aggregation. It is quickly and completely absorbed from MIT (T1/2-4 s). 99% of the absorbed drug binds to serum proteins. It breaks down in the body, its metabolites are excreted through the intestines and kidneys. This drug is used as an anti-inflammatory agent. However, due to its strong anesthetic effect, it is also used in the postoperative period and in dangerous tumors for the purpose of anesthesia. The drug is given 2-3 times a day.

Adverse effects: dyspepsia, pain in MIT, damage to the gastric mucosa, diarrhea, in rare cases liver and kidney dysfunction.

MELOXIKAM selectively suppresses TsOG-2 (TsOG-2 is mainly present in the focus of inflammation). It is used like other anti-inflammatory agents. But at MIT, it doesn't hurt. Administered parenterally.

Adverse effects: dyspepsia, nausea, dizziness and pain.

Selectively attenuates NABUMETON-TsOG-2. The effect is indirect, because the active metabolite of the drug (6-methoxy-2-naphthylacetic acid) blocks TsOG-2.

TsELEKOXIB-blocks TsOG-2 100 times stronger than TsOG-1. MIT will not be adversely affected. Does not change platelet aggregation.

KRISANOL is a golden drug, the effect starts late (after 2-3 months), but is long-lasting.

There are many side effects because of high toxicity. It has a negative effect on the liver, kidney, blood formation, allergic reactions develop.

ANTI-ALLERGY MEDICINES.

The pollution of the environment with chemical compounds, the widespread use of synthetic substances in the economy, industry, agriculture and households lead to the widespread spread of allergic diseases. In this case, the role of the immune system is large, there are fast and slow developing allergic reactions.

Histamine, bradykinin, MRS-A, serotonin, PG and other biologically active substances released from basophils and mast cells are important in the pathogenesis of rapidly developing allergic reactions. Medicines are used in the treatment of allergic diseases in combination with elimination of the effect of allergens.

The following drugs are used in rapidly developing allergies.

1. Means that prevent the release of histamine, bradykinin and other biological compounds from basophilic and mast cells (glucocorticoids, cromolyn-sodium, euphyllin, adrenaline, isadrin, salbutamol, fenoterol, terbutaline).

2. Means that block histamine receptors (dimedrol, diprazine).

3. Means that repel the symptoms of anaphylactic shock (allergic reactions).

A) adrenomimetics (adrenaline)

B) broncholytics with a myotropic effect (eufillin)

4. Means that reduce tissue damage. (anti-inflammatory agents with a steroid structure).

Other than the above-mentioned agents that act on histamine receptors are known to us.

HISTAMINE is a biogenic amine formed by decarboxylation of histidine amino acid. There are special histamine receptors in the body N1, N2, N3.

When N1-receptors are stimulated, bronchitis, spastic contraction of the intestines, dilation of capillaries, decrease in blood pressure (i.e., changes when histamine is introduced), and increased skin permeability are observed.

Stimulation of N2-receptors increases gastric secretion. These receptors are also involved in controlling the tone of smooth muscles (uterus, veins, intestines).

N3-receptors are mainly located in the MNS.

N1-receptor blockers, antihistamines.

According to their chemical structure, they belong to the following compounds:

1. ethanol content - dimedrol, tavegil

2. ethylenediamines-suprastin

3. phenothiazines-diprazine

4. Quinuclidin derivatives-fencarol (blocks the N1-receptor and reduces the biosynthesis of histamine, as it activates the diamine oxidase enzyme and increases the breakdown of histamine)

5. Tetrahydrocarbolines-diazoline

6. Piperidine derivatives - terfenadine (seldan), loratadine (claritin).

In addition to histomin and anti-allergic effects, these drugs also affect other organs. Among them, dihydrol, diprazine, suprastin have a sedative and hypnotic effect that weakens the MNS.

DIPRAZIN increases the effect of narcosis, anesthetics, narcotic pain relievers, lowers body temperature. In very large doses, all three drugs cause mental and motor agitation, insomnia, tremor, reflex excitation.

TAVEGIL, FENOCAROL, TERFENADINE, LORATADINE have a weak sedative effect.

Diazolin-in contrast to other drugs (diprazine, dimedrol, suprastin), does not affect the MNS at all. Most drugs have the feature of causing more or less local anesthesia. DIMEDROL has a pronounced gangliobolocatoric effect and lowers blood pressure. DIPRAZINE, similar to other phenothiazine products, has an alpha-adrenoblocking effect. Diprazine, dimedrol, suprastin - moderately spasmolytic effect. Most of the drugs of this group (suprastin, diprpzin) act like M-cholinoblockers, that is, they have a central and peripheral cholinolytic effect.

Antihistamines (N1 blockers) are well absorbed when administered by enteral and parenteral routes. Duration of effect is different: dimedrol, suprastin, diprazine, fenkarol-4-6 hours, tavegil-8-12 hours. Terfenadine-12-24 hours, loratadine-24 hours, diazolin-more than 2 days.

Indications for use: urticaria, angioneurotic edema, hay fever, allergic rhinitis and conjunctivitis, allergic disease to drugs, serum sickness, allergic rheumatism, itchy dermatitis, in anesthesiology-inducing artificial hibernation, enhancing the effect of narcotics, analgesia, anesthetic agents.

Antihistamines can cause local inflammation. Therefore, it is impossible to enter diazolin under the skin and into the muscle (infiltrate is formed).

Diprazine, fenkarol, diazolins should be taken after meals.

Adverse effects: sedation, drowsiness, slowing down the speed of thought. It is not advisable for transport drivers to take these drugs during working hours, in case of liver and kidney disease.

INTAL.

CROMOLIN-SODIUM-INTAL. Decreased degranulation of labrocytes (fat cells) reduces the release of biologically active substances (histamine bradykimin, MSR-A) from the mucous membrane of the respiratory tract. In this case, the drug's ability to block adreno-cholino receptors of lymphocytes, as well as receptors acting on inflammatory mediators, may be important. Cromolyn sodium has the properties of N1-receptor blocking drugs. It is mainly used to prevent bronchospasms. Bronchospasm does not prevent an attack. With continued use, attacks decrease in frequency, are milder, and reduce the need for bronchodilators and corticosteroids.

Cromolyn-sodium is mainly effective in young patients, because they do not have pulmonary inflammation and changes.

The effect of the drug is evident mainly in atopic bronchial asthma, asthmatic bronchitis, pneumosclerosis and infectious allergic bronchial asthma. The drug should be used in one capsule 4 times (every 4-6 hours). In severe cases, it is inhaled 8 times (every 3 hours). If you drink it, it won't affect your appetite. This drug can be used together with bronchodilators and corticosteroids. Treatment with cromolyn sodium should be continued. The result of the treatment becomes invisible after 2-4 weeks. If the reception is stopped, the attacks of the disease will recur.

Adverse effects: cough, bronchospasm may occur after inhalation. Can not be used in 1-3 months of pregnancy and children under 5 years.

Drugs used in slowly developing allergic reactions:

1. Immunodepressants (glucortinoids, cyclosporine, cytotoxic agents).

2. Means that reduce tissue damage (steroidal and nonsteroidal anti-inflammatory drugs).

Final conclusion on the topic of the lecture

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 their influencing factors when using anti-inflammatory and anti-allergic agents.

Lecture

Topic 5: Antiseptic and disinfectant drugs.

Lecture educational technology model of pharmacology

Time: 80 minutes	***Number of students: 50-75***
Form and type of training	The lecture is informative
Lecture plan	1. Understanding of the main criteria of chemotherapy and antibiotics. 2. Classification of antibiotic and chemotherapeutic agents. 3.Penicillin pharmacodynamics, pharmacokinetics, side effects, indications for use and contraindications. 4. Cephalosporin pharmacodynamics, pharmacokinetics, side effects, indications for use and contraindications. 5. Pharmacodynamics, pharmacokinetics, side effects, indications for use and contraindications of monobactams. 6. Pharmacodynamics, pharmacokinetics, side effects, indications for use and contraindications of carbapenems. 7. Pharmacodynamics, pharmaco-kinetics, side effects, indications for use and contraindications of macrolides and azalides.
The purpose of the lecture:	Formation of knowledge about the basic criteria of chemotherapy and antibiotic agents
Pedagogical tasks: *- to provide general knowledge about the main criteria of chemotherapy and antibiotics, their use;* *- classification of antibiotics;* *- introducing the concept of the main effect of antibiotics;* *- reveal the mechanisms of action of antibiotics;* *- to explain the pharmacodynamics, pharmacokinetics, side effects of penicillin, cephalosporin, monobactam, carbapenem, macrolide and azalide antibiotics;* *- formation of knowledge about instructions for use,*	***Results of educational activities:*** ***students should know*** *- tell the basics of using antibacterial chemotherapy;* *- show the classification of antibiotics and the mechanism of action;* *- some groups of antibiotics, penicillin, cephalosporin, monobactam, carbapenem, macrolide and azalide, describe their effects on the body;* *- explain the mechanism of action of penicillin, cephalosporin, monobactam, carbapenem, macrolide and azalide antibiotics;* *- reveal the instructions for the use of penicillin, cephalosporin, monobactam, carbapenem, macrolide and azalide antibiotics;*

contraindications of penicillin, cephalosporin, monobactam, carbapenem, macrolide and azalide antibiotics; - to teach the analysis and use of drugs of penicillin, cephalosporin, monobactam, carbapenem, macrolide and azalide groups based on general pharmacodynamics;	- side effects of penicillin, cephalosporin, monobactam, carbapenem, macrolide and azalide antibiotics are described.
Educational methods	The lecture is informative Technique: blitz survey, thematic questions
Form of education	Teamwork, frontal work
Educational tools	Lecture text, laser projector, instructional materials, information support.
Educational conditions	A room designed for group work, equipped with special equipment
Monitoring and evaluation	Oral questions

Basic criteria of chemotherapy. Antibiotics

technological map of the educational session on the topic

Work stage- and time	Activity	
	таълим берувчи	таълим олувчилар
Stage 1. Enter (5 minutes)	1.1. It conveys the topic's name, purpose, and expected results.	1.1 They listen.
Stage 2 Activity activation (5 minutes)	2.1. Asks thematic questions for the purpose of strengthening students' knowledge - What do you think antibiotics can be used for? - What groups of antibiotics do you know? - What are the main principles of chemotherapy?	2.1. They answer the questions.
Stage 3. Basic information section (75 minutes)	3.1. Describes the order of actions for the organization of the educational process in accordance with the plan and structure of the lecture 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. What is the classification of antibiotics according to their chemical structure?	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.

	2. What is the classification of antibiotics according to the antimicrobial spectrum? 3. What is the classification of penicillins? 4. What are the advantages and disadvantages of biosynthetic penicillins? 5. What is the main mechanism of action of antibiotics? 6. Indications for use of cephalosporins? 7. What are the advantages and disadvantages of macrolides? 8. Antimicrobial action of carbapenems what is the mechanism?	
Step 4. Finisher (5 minutes)	4.1. Concludes on the topic (appendix #1), draws students' attention to the importance of the work done in their future professional activities. 4.2. Invites students to ask questions and answers these questions	4.1. They listen and record 4.2. They clarify and ask questions

ANTIBACTERIAL CHEMOTHERAPEUTIC AGENTS.

- Chemotherapy (a term introduced by P. Ehrlich) refers to the treatment of infectious diseases with agents that have a negative effect on the causative factor of the disease in its resorptive effect.
- Chemotherapeutic agents are targeted synthesized compounds that selectively act against microbes (after absorption into the blood). Nowadays, there are many types and number of chemotherapeutic agents, which are used in the treatment of infectious diseases caused by protozoa, bacteria, rickettsiae, cataviruses, and others.
- Chemotherapeutic agents must meet the following requirements:
- 1. The bacteriostatic effect should not be lost even when introduced into the body.
- 2. It should not affect the functions of the human body. That is, their toxicity is low and they should selectively affect only microorganisms. In this case, they should have a bacteriostatic, not a bactericidal effect (that is, they should stop the development and reproduction of microorganisms). P. Ehrlich (1854-1915) in the quantitative assessment of chemotherapeutic agents. He proposed the chemotherapeutic coefficient: Q=Dosis lethalisDosis curativa
- Currently, the chemotherapeutic index is used: I=LD 50ED 50
- The bigger the better;

- P. Ehrlich indicated that there should be at least 3.
-
- BASIC PRINCIPLES OF CHEMOTHERAPY:
- 1. Correct choice of chemotherapy agent, i.e. determining the nature of the microorganism and its sensitivity to this chemotherapeutic agent. If this is not known, a broad-spectrum antimicrobial should be used.
- 2. Chemotherapy of an infectious disease should be started as early as possible, because at this time, the number of microbes will not be large, and the functions of the body organs will not be seriously disturbed.
- 3. Chemotherapeutic agents should be used in doses sufficient to create a bacteriostatic concentration in body tissues.
- 4. Even after the symptoms of the disease disappear, chemotherapeutic agents should be used for a certain period of time, because the non-killed microorganisms can reproduce and due to this they may develop adaptation and resistance to this agent (acquired resistance).
- 5. If the treatment is carried out with 2 or more chemotherapeutic agents with different mechanisms of action, the development of increased resistance is not allowed.
- 6. It is necessary to choose an effective route of drug administration, because some drugs are poorly absorbed in the MIT, some do not pass through the GEB, and hokozo...
- Antibacterial chemotherapeutic agents consist of the following groups.
- 1. Antibiotics. 3. Preparations with different structures
- 2. Sulfanilamides. 4. Anti-syphilis drugs.
- 5. anti-tuberculosis (tuberculosis) drugs.
- Antibiotics.
- Biologically active substances producing antibiotics-microorganisms have the ability to stop the development of other microorganisms even in small doses. This is antibiosis- (L. Pasteur)-appearance. English scientist A. Fleming (1928). Accidentally discovered (green muxor-staphylococcus-penicillin) in 1940 by H.V. Florey, E.B. Cheyenne took it apart cleanly. Today, the number and type of antibiotics is very large, they are divided into the following groups:
- 1. Antibiotics containing beta-lactams (penicillin, cephalosporins, carbapenems, monobactams).
- 2. Macrolides - antibiotics containing a macrocyclic lactone family (erythromycin, oleandomycin) and azalides (azithromycin).
- 3. Tetracyclines - antibiotics containing 4 condensed six-membered rings (oxytetracycline, tetracycline, metacycline, morphocycline).
- 4. Dioxyaminophenyl propane products (levomycetin).
- 5. Aminoglycosides - antibiotics with an amino sugar in the molecule. (streptomycin, neomycin, gentamicin, monomycin, kanamycin, sisomycin).
- 6. Antibiotic in the group of cyclic polypeptides (polymyxins).
- 7. Lincosamides (lincomycin, clindamycin).

- 8. Glycopeptides (vancomycin, etc.).
- 9. Fusidic acid.
- 10. Various antibiotics (fuzafungin).
- Despite the abundance of antibiotics, the number of drugs used in medical practice is quite small, because they must meet the following requirements:
- • should have strong antimicrobial activity, selective action, wide spectrum of action:
- • should have a bactericidal or bacteriostatic effect.
- • they should pass well through biological membranes /GEB.../ and should not lose their activity in different environments of the organism.
- • microorganisms should not develop resistance.
- • it should have a low toxic effect on the microorganism, no sensitization and other unpleasant effects.
- • The width of the therapeutic effect should be large.
- • duration of antimicrobial effect should be sufficient.
- • should be intact when stored and suitable for parenteral administration.
- • should be easy to make, easy to buy and cheap.

Penicillins.

Penicillins are among the best antibiotics due to their high activity, low toxicity and few side effects. Under the influence of penicillin, the synthesis of the cell envelope of bacteria (mucoproteid consisting of murein and peptide chains) is disrupted. Currently, the group of penicillins includes many drugs:

I. Penicillin preparations obtained by the method of biological synthesis (biosynthetic penicillins).

1. Parenterally administered (disintegrates at MIT)

a) short-acting agents (Na, K-benzylpenicillins)

b) persistent agents (novocaine salt of benzylpenicillin, Bitsillin-3, Bitsillin-5).

2. Enteral administration (phenoxymentilpenicillin-acid resistant).

II. Semi-synthetic penicillins.

1. administered parenterally (degraded at MIT).

a) Penicillinase resistant. (Methacillin Na)

b) drugs with a broad spectrum of action (diNa salt of carbenicillin, Tikartsillin, Azlotsillin).

2. Those introduced by enteral and parenteral routes (acid resistant).

a) Penicillinase resistant (oxacillin Na, Naftcillin).

b) have a wide spectrum of action (ampicillin, Amoxicillin).

Penicillins have a bactericidal effect. They affect only dividing cells. They disrupt the synthesis of the structural acid of the cell membrane, that is, they prevent the formation of peptide bonds due to the weakening of the transpeptidase enzyme.

3. Those administered by enteral route (acid resistant). Carbenicillin indanyl sodium.

BIOSYNTHETIC PENICILLINS.

BENZYLPENITILLIN has a strong but limited antibacterial effect. Mainly gram-positive bacteria: cocci (staphylococci, streptococci, pneumococci, which do not produce penicillinase enzyme), gram-negative cocci (meningococcus, gonococci), diphtheria bacillus (corenobacteria), anthrax bacillus, the causative agent of gas gangrene, cocci (stolbniak), spirochetes, pathogenic fungi (actinomycetes)) are affected. But benzylpenicillins do not affect fungi such as intestinal bacteria, tuberculosis, viruses, rickettsiae, protozoa, and yeasts. In the acidic environment of gastric juice, benzylpenicillins are decomposed and, therefore, are administered only parenterally. Different types of penicillin are obtained by adding various compounds to the environment where mold fungi grow. For example: phenylacetic acid is added to form benzylpenicillin. Penicillins are acids and form salts with inorganic and organic bases.

The effect of Na OR K salts of BENZYLPENTCYLLIN lasts about 3-4 hours. Therefore, it is necessary to enter 5-6 times a day, which is quite inconvenient. It is used in the treatment of various purulent diseases: ulcers, purulent pleurisy, septic endocarditis, pneumonia, bronchitis, angina, diphtheria, anthrax, epidemic meningitis, syphilis, gonorrhea, whooping cough, etc. Benzylpenicillins pass poorly through the GEB, so they are injected into the spinal canal to treat meningitis. The novocaine salt of benzylpenicillin is poorly soluble, it is administered intramuscularly as a suspension, and a slowly absorbed antibiotic depot is formed.

The effect lasts about 24 hours.

BITTsILIN-1. The effect of the dibenzylethylenediamine salt of benzylpenicillin lasts 7-10 days.

BITSILIN-3. A mixture of equal parts of benzylpenicillin, novocillin and bicillin-1. Has a quick and lasting effect.

BITSILIN-5. It consists of four parts Bitcillin-1 and one part Novocillin. Entered once a month.

PHENOXYMETHYLPENICYLLINE is not degraded in MIT. Mold is obtained by adding phenoxy wax to the mold fungi. It should be administered 4-6 times a day, but it is less effective in severe infectious diseases because it is difficult to create a large concentration in the blood.

SEMI-SYNTHETIC PENICILLINS.

Antibiotics of this group are products of 6-aminopenicillinic acid, which breaks down benzylpenicillin with amidose enzymes, that is, by chemical deacetylation. Semi-synthetic penicillins have their own characteristics:

• Penicillinosis (beta-lactamase) resistance (this enzyme is produced by many microbes).

• They do not break down in the stomach because they are resistant to acid.

• They have a broad-spectrum effect.

METACILLIN-spectrum of action is equal to benzylpenicillin. The effect is decomposed in the acidic environment of the stomach for 4-6 hours; It has a good effect on penicillinase-producing staphylococci, which do not produce this enzyme.

Does not affect staphylococci. does not pass through the GEB. Most of it is excreted by the kidneys and a small amount through the biliary tract. Blood serum is bound to proteins by 20-50%. It is injected into the muscle.

OXATSILLIN is resistant to penicillinase and is highly effective when administered enterally. Its activity is 5-8 times stronger than methacillin. More than 90% of the drug binds to blood proteins. does not pass through the GEB. It should be taken every 4-6 hours.

Dicloxacillin has a stronger antimicrobial effect than oxacillin, is resistant to penicillinase, does not break down in the stomach. Well absorbed from MIT.

AMPITCILIN affects gram-positive and gram-negative microorganisms (salmonella, shigella, some strains of proteus, Escherichia coli, Friedlander's bacillus, etc.). But like all semi-synthetic penicillins, it has a weaker effect on gram-positive bacteria than benzylpenicillin, but more strongly than oxacillin and methacillin. Penicillinase-forming agent does not affect microorganisms, but does not break down in the stomach. Better than MIT, but less absorbed than other penicillins. Better transfer from GEB to oxacillin. Binds less with blood oxygen. (10-30%). Effect 4-8 hours. The drug is less toxic, and patients accept it well.

AMPIOKS (ampicillin+oxacillin) has a broad spectrum of action. It is also highly effective in severe diseases. (sepsis, endocarditis). Carbicillin-spectrum of action is wide. The antimicrobial effect is similar to that of ampicillin, but unlike it, it has a strong effect on all types of protein and blue pus bacillus. Penicillinase resistant. It breaks down in the acidic environment of the stomach and is therefore introduced into a vein or muscle. Passes through GEB badly. 50% of the drug binds to serum oxils. It lasts for 4-6 hours.

CARBENITISILLIN is especially effective in diseases caused by blue pus bacillus, proteus, intestinal bacillus (pyelonephritis, pneumonia, septasia, peritonitis, etc.).

Although penicillin group drugs are less toxic, they have unpleasant side effects:

- allergic reactions (1-10%, medical personnel, production workers also appear a few days after the start of use). All kinds of rashes on the skin, dermatitis, fever, arthritis, swelling of mucous membranes, arthralgias, erythroderma, kidney surgery. Sometimes (after 20 min.) anaphylactic shock;

- non-allergic toxic effects. (local inflammation: glossitis, stomatitis, nausea, diarrhea).

Pain may occur when injected into a muscle, infiltrates, aseptic necrosis, phlebitis thrombophlebitis may develop when injected into a vein.

- neurotoxic effects develop when endolumbar is inserted (arachnoiditis, encephalopathies);

- when administered enterally, especially broad-spectrum drugs: dysbacteriosis, candidomycosis can develop.

CEPHALOSPORINS.

These are semi-synthetic antibiotics produced by Cephalosporinum fcremonium fungi: include cephalothin, cephaloridine, cephalexin, etc. The mechanism of action is similar to that of penicillin, disrupting the biosynthesis of the bacterial envelope by weakening the transpeptidase enzyme. Antimicrobial action similar to that of ampicillin. It is resistant to the action of the penicillinase enzyme, but is degraded by the cephalosporinase of some gram-negative bacteria. Cephalosporins are divided into two groups:

1. Those administered parenterally (cefalotin, cephaloridine, cefatoxime).

2. Those used enterally (cephalexin, cefacles).

Cephalotin and Cephaloridine are widely used, administered parenterally. gram-positive microorganisms are very sensitive to these preparations, gram-negative microorganisms are less sensitive. Both drugs are similar in antimicrobial activity, resistant to amniotic fluid, but poorly absorbed from MIT. Therefore, both drugs are used parenterally (t/i, m/i). Passes poorly through the GEB, but passes well through the placental barrier. Cefalotin is administered intravenously for 4-6 hours. Cephalordin, when administered intramuscularly, has an effect of about 8 hours.

CLOFARAN-(cefatoxime) is a promising drug, resistant to cephalosporinase of gram-negative microorganisms. The spectrum of action is significantly wider than that of other cephalosporins. This drug has a strong effect against the blue pus bacillus.

Cephalolexin is also effective when administered by enteral route. The antimicrobial spectrum is similar to that of cephalothin, but weaker. Penicillinase is resistant, but gram-negative microorganisms are resistant to cephalosporinase. Absorbed quickly and completely from MIT. It passes GEB poorly, it is taken 4 times a day.

Tsefaradin-cephalexin is administered enterally and parenterally.

Tsefaklor is superior to cefaklexin in terms of effectiveness against many microorganisms, but its concentration in the blood is 2 times higher. It is also effective when administered enterally.

Cephalosporins are mainly used as reserve drugs in diseases caused by gram-negative microbes, when penicillins are ineffective or when penicillins cannot be used, in diseases caused by gram-positive microbes. It can also be used in pneumonia caused by Fredlander's stick. Adverse effects of cephalosporins - allergic reactions (very common) - sensitization to penicillin:

• Kidney damage (cephaloridine).

• Local inflammation (cefalotin)-pain, phlebitis, infiltrates.

• Superinfection, especially Pseudomonas aeruginosa.

• Dyspepsia when drinking.

CARBAPENEMS

They belong to the group of antibiotics with a beta-lactam group in the molecule.

IMIPENEM is a highly active semisynthetic broad-spectrum antibiotic. An effective drug against many aerobic and anaerobic bacteria. They disrupt the synthesis of the cell wall of microbes and have a bactericidal effect. Although it is resistant to the action of the penicillinase enzyme, it is broken down by the action of the dehydropeptidase enzyme in the proximal tubules of the kidney. Therefore, the concentration of the drug in the urine is low. It is not absorbed from MIT, therefore parenteral btlan (T/I) is introduced every 6 hours.

There is a combination of imipenemnine and cilastatin called PRIMAXIN. Cilastatin blocks the dehydropeptidase enzyme. This drug is injected into a vein.

MEROPENEM is resistant to dehydropeptidase and beta-lactamase enzymes. Antimicrobial mechanism of action, spectrum of action similar to imipenem, T ½ about 1.5 hours. Only 2% of the absorbed drug binds to serum proteins. It passes through tissue barriers, membranes, and is broken down in the liver. 98% of the drug is excreted through the kidneys. Mainly administered parenterally (M/I, T/I). The effect lasts 8-12 hours.

CARBAPENEMS are mainly used in severe infections: zotiljam, peritonitis, sepsis, meningitis, etc.

Side effects: allergic reactions, local inflammation (inflammation), dyspepsia, leukopoiesis disorder, dysbacteriosis.

MONOBACTAM

AZTREONAM is resistant to beta-lactamase action of gram-negative bacteria (Klebsiella, Pseudomonas, Serratia). Does not affect gram positive and anaerobes. Disrupts the synthesis of the cell wall of microorganisms, that is, it has a bactericidal effect. Entered parenterally. T 1/2 is about 1.7 hours. Excreted by the kidneys (secretion). Duration of effect is 6-8 hours. Indications: urinary, respiratory, skin infections, etc. Side effects: Dyspepsia, allergic reactions (on the skin), superinfection, rarely - hepatotoxic effect develops.

MACROlides.

This group of antibiotics has a macrocyclic lactone ring connected to various sugars in its molecule.

ERYTHROMYCIN is an antibiotic produced by Streptomyces erythrens. Since erythromycin is a base, it forms salts with acids. In the dry state, erythromycin is a stable substance, but it decomposes quickly in alkaline and especially acidic environments. It is similar to benzylpenicillin in its effect on various microorganisms, but its spectrum is somewhat wider. Strains of microorganisms that have increased resistance to penicillin are sensitive to the effects of erythromycin. In addition to Gram+ bacteria and spirochetes, Gramcocci, diphtheria bacillus pathogenic anaerobes, rickettsiae, trachoma, amoeba, dysentery causative agents and others are sensitive to erythromycin. Microorganisms quickly become resistant to erythromycin, so it is used together with other antibiotics.

The mechanism of action of erythromycin is related to the weakening of the peptide translocase enzyme and, as a result, the reduction of protein synthesis in bacterial ribosomes. Erythromycin is a less toxic substance. It is covered with a crust. it is drunk in the form (so that it does not break down under the influence of stomach acid). Even if it is not completely absorbed from MIT, it creates a bacteriostatic concentration in the blood and in the internal environment of the body. It is worse than GEB, but easily crosses the placental barrier. The effect lasts 4-6 hours. Erythromycin belongs to the group of reserve antibiotics. It rarely causes unpleasant effects (dyspepsia, allergy). It should be taken with food.

Indications: in diseases caused by penicillin-resistant staphylococci, pneumococci. Penicillin in patients with severe allergic reactions.

Oleandomycin is a product of Streptomyces antibioticus. Its chemical structure is similar to erythromycin. The mechanism of action is the same, but the potency is lower than erythromycin. Low toxicity, 6 hours effect. Oleandomycin is a chemically stable compound that is not degraded by MIT sap. But erythromycin causes strong local inflammation. does not pass through the GEB. Allergy, nausea, vomiting, diarrhea are possible. Indications: similar to erythromycin.

OLEANDOMYTICIN - belongs to the group of reserve antibiotics. It is often combined with tetrocycline: (oleotetrin, tetroolein).

SEMI-SYNTHETIC MACROLIDES.

Clarithromycin is 2-4 times stronger than erythromycin in terms of effectiveness against staphylococci and streptococci. It also has a good effect on Helicobacter pylori. Well absorbed from MIT. does not pass through the GEB. It is partially broken down in the liver with the formation of an active metabolite. It has a longer effect than erythromycin (8-10 hours).

Roxiromitsin has a wide range of antibacterial effects. Well absorbed from MIT. Resistant to beta-lactamase. It affects both producing and non-producing bacteria. It is taken in tablet form 2 times a day.

Indications: respiratory infections, otitis, sinusitis, whooping cough, whooping cough, etc.

Side effects: dyspepsia, diarrhea, allergies, liver diseases, pregnant women and lactating women cannot be given.

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, when using antibiotics from a general practitioner, their pharmacodynamic and pharmacokinetic properties and their effect on them

must analyze the factors.

Lecture

Topic 6: Antibiotics (continuation)

Lecture educational technology model of pharmacology

Time: 80 minutes	***Number of students: 50-75***
Form of training and type	The lecture is informative
Lecture plan	1. 1. Tetracycline pharmacodynamics, pharmacokinetics, side effects, indications for use and contraindications. 2. 2. Levomycetin pharmacodynamics, pharmacokinetics, side effects, indications for use and contraindications. 3. 3. Pharmacodynamics, pharmacokinetics, side effects, indications for use and contraindications of aminoglycosides. 4. 4. Pharmacodynamics, pharmacokinetics, side effects, indications and contraindications of polymyxin and glycopeptides. 5. 5. Pharmacodynamics, pharmacokinetics, side effects, indications and contraindications of fusidic acid and fuzafungin.
The purpose of the lecture:	formation of knowledge about tetracycline, levomycetin, aminoglycoside, polymyxin, fusidic acid and fusafungin, agents belonging to the glycopeptide group
Pedagogical tasks: ***- to introduce the pharmacodynamics, pharmacokinetics, side effects, indications and contraindications of tetracycline;*** ***- explain the pharmacodynamics, pharmacokinetics, side effects, indications and contraindications of levomycetin;*** ***- reveal the pharmacodynamics, pharmacokinetics, side effects,***	***Results of educational activities:*** ***students should know*** ***- tell the pharmacodynamics, pharmacokinetics, side effects, indications for use and contraindications of tetracycline;*** ***- show the pharmacodynamics, pharmacokinetics, side effects, indications and contraindications of levomycetin;*** ***- tell about the pharmacodynamics, pharmacokinetics, side effects, indications and contraindications of aminoglycosides;***

indications and contraindications of aminoglycosides; ***- introduction to the pharmacodynamics, pharmacokinetics, side effects, indications and contraindications of polymyxin and glycopeptides;*** ***- teaching the pharmacodynamics, pharmacokinetics, side effects, indications and contraindications of fusidic acid and fuzafungin;*** - to explain the specific characteristics of antibiotics used in pediatrics;	***- reveal the pharmacodynamics, pharmacokinetics, side effects, indications and contraindications of polymyxin and glycopeptides;*** ***- describe the pharmacodynamics, pharmacokinetics, side effects, indications and contraindications of fusidic acid and fuzafungin;*** - reveal the unique properties of antibiotics used in pediatrics;
Educational methods	The lecture is informative Technique: blitz survey, thematic questions
Form of education	Teamwork, frontal work
Educational tools	Lecture text, laser projector, instructional materials, information support.
Educational conditions	A room designed for group work, equipped with special equipment
Monitoring and evaluation	Oral questions

Technological map of the educational session on the topic

Work stage-and time	Activity	
	educator	learners
Stage 1. Enter (5 minutes)	1.1. It conveys the topic's name, purpose, and expected results.	1.1 They listen.
2 stages Activity activation (5 minutes)	2.1. Asks thematic questions for the purpose of strengthening students' knowledge - Do you know how antibiotics are classified according to their chemical structure? - How are antibiotics classified according to the antimicrobial spectrum?	2.1. They answer the questions.
Stage 3. Basic information section (75 minutes)	3.1. Describes the order of actions for the organization of the educational process in accordance with the plan and structure of the lecture and analyzes its content by showing the slides with this information. Emphasizes the keywords of the topic	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.

	3.2. Blitz - conducts a survey and uses a system of thematic questions: - What antibiotics do you know with a wide spectrum of action? - Do you know the mechanism of action, side effects, instructions for use of tetracycline? - What are Levomycetin's instructions for use? - What means are included in the reserve antibiotics? - What are the side effects of streptomycin? - What are the positive and negative effects of aminoglycosides? - Do you know how to use Polymyxin? - What are the indications for use of fusidic acid and fuzafungin?	
Step 4. Finisher (5 minutes)	4.1. Concludes on the topic (appendix #1), draws students' attention to the importance of the work done in their future professional activities. 4.2. Invites students to ask questions and answers these questions	4.1. They listen and record 4.2. They clarify and ask questions

TETRACYCLINES.

They form stable salts with acids as bases. Oxytetrocycline and tetracycline are obtained by biosynthetic, methacycline and doxycycline by semi-synthetic way. All tetracyclines have the same spectrum of action. That is, it affects gram-positive and gram-negative bacteria, rickets, cataviruses, spirochetes, leptospirosis, some simple animals (amoebae). Therefore, tetrocyclines are included in the group of antibiotics with a wide spectrum of action. But tetracyclines do not affect the causative agents of typhoid fever, paratyphoid, blue pus bacillus, pathogenic molds, and true viruses. The potency of tetrocyclines against Gram-positive microorganisms is lower than that of penicillin. Microbial resistance to tetrocyclines develops slowly. Mechanism of action: tetrocyclines bind to Mg++, Ca++, Mn++ ions and form cholate compounds, and due to this, the activity of enzymes involved in respiration of mitochondria decreases, energy production decreases (oxidation and phosphorylation). As a result, protein synthesis in ribosomes stops due to lack of energy.

Tetracyclines from MIT are well absorbed. It accumulates in the blood in maximum concentration 2-4 hours after drinking. It binds to blood proteins and forms a depot, so the effect lasts 12-24 hours. Compared to tetracycline-chlortetracycline and oxytetracycline, a large amount passes through the GEB. This process increases again in meningitis. Tetracycline passes through

the placental barrier very well. It accumulates in the liver in high concentration. Excreted in bile and urine.

Application: diseases caused by cocci, bacterial and amoebic dysentery, brucellosis, cholera, tularemia, relapsing and rash typhus, psitoccosis, trachoma, etc. In addition, when the resistance of microbes to penicillin and streptomycin increases, these two antibiotics are developed in patients with sensitization; trachoma (smear). Tetracyclines are mainly administered enterally, 3-4 times a day, but there are also salts that are administered parenterally (t/i, m/i).

Unpleasant effect:- allergic reactions (less common).

- Causes local inflammation (especially oxytetracycline, morphocycline: dyspepsia, glossitis, stomatitis, pain when injected into a muscle, thrombophlebitis when injected into a vein.

- Hepatotoxic effect /oxytetracycline/.

- Disrupts the development of skeleton in children, because with Sa++, it causes brikma, yellows the tooth, damages it.

- Decreases protein synthesis, increases excretion of some vitamins, amino acids and Na+ ion.

- Superinfection: candidomycosis, staphylococci (nystatin is given), staphylococcal enterocolitis and severe pneumonia - Avitaminosis V - because it kills saprophytic bacteria in the intestine. (vitacycline is given.)

Cannot be taken during pregnancy.

Carboxamic derivative of morphocyclic-tetracyclic, administered intravenously. The spectrum of action is similar to that of tetracycline.

LEVOMITSITIN is a biosynthetic and synthetic antibiotic, a derivative of dioxyaminophenyl propane. Chemically stable compound. It does not break down in MIT, it is absorbed quickly. It is usually used enterally (tab, rectal suppository). It is slowly removed from the body, it has an effect for 6-8 hours. The main part of levomycitin is broken down in the liver and only 10% is excreted unchanged in the urine. Therefore, it is used in pyelitis, cystitis, urethritis. Levamycin is a broad-spectrum antibiotic. It has a bacteriostatic effect on various gram-positive and gram-negative bacteria, rickettsiae (typhoid fever), large viruses (psittacosis, venereal lymph granuloma, trachoma, viral pneumonia). Affects the causative agents of typhoid and paratyphoid, bacterial dysentery, atypical pneumonia, whooping cough. Levamycin is effective in diseases where penicillin is ineffective. Levomycetin can be used locally in purulent wounds, trachoma.

The mechanism of action: due to its structure being similar to phenylalanine, levomycetin competes with it and replaces it by forming a defective protein molecule that is damaged in the polypeptide chain and the microbe stops living and multiplying. Its toxicity hinders the widespread use of Levamytsiti.

Adverse effects: decreased hemopoiesis, agranulocytosis and aplastic anemia, especially with prolonged use:

- Inflammation in MIT causes: stomatitis, glossitis, nausea, note diarrhea.

- Kills microbes synthesizing group B vitamins in the intestine, stops their development, and due to this, avitaminosis develops.

- Dysbacteriosis, candidomycosis-allergic reactions-toxic myocarditis-psychomotor changes.

AMINOGLYCOSIDES.

Antibiotics of this group have a bactericidal effect. The mechanism of action is related to disruption of protein synthesis by affecting ribosomes. In addition, due to the violation of oxidation of pyruvic acid in the body of microbes, the supply of energy decreases sharply.

STREPTOMYTSIN-antimicrobial action spectrum is wide: affects gram-negative bacteria. The bacteriostatic effect is aimed at the causative agents of streptococci, staphylococci, pneumococci, gonococci, plague, anthrax, diphtheria, tularemia, cholera, brucellosis and tuberculosis, Escherichia coli, proteus, pneumococci, brucellosis. But streptomycin does not affect anaerobes, spirochetes, rickettsiae, true viruses, pathogenic molds, simple animals. Streptomycin forms stable salts with acids as a base. Microbial resistance to streptamycin develops rapidly. It is poorly absorbed from MIT, the maximum concentration in the blood is formed 1-2 hours after intramuscular injection. It is excreted unchanged by the kidneys for 24 hours. When a large concentration is formed in the urine, it gives good results in diseases of the urinary tract, especially in diseases caused by gram-negative flora. Streptamycin passes through the abdominal, pleural cavity, placental barrier well, but does not pass through the GEB (passes in meningitis). Streptamycin is mainly used in tuberculosis and tularemia, plague brucellosis, urinary tract infections and others. The drug is injected m/i 1-2 times a day. It is appropriate to use the chlorcalcium complex of streptamycin in meningitis (subarachnoidal). Because it causes less local changes compared to other streptamycin preparations. But due to the high toxicity of this drug, it is used in cases where it is absolutely necessary, when there is no other option. Since streptamycin is a highly toxic drug, the following side effects and complications occur when using it:

- ototoxic effect (labyrinth, hearing);

- weakens the nerve-muscle synapse, disrupts relaxation;

- strong local effect (pain);

- allergic reactions (LASH, zoosinophilia, dermatitis).

NEOMITsIN-sulphate-neomycin is a mixture of A,V and S. It has a wide spectrum. Affects gram-positive and gram-negative microorganisms. Resistance of microorganisms to neomycin develops slowly. It is poorly absorbed from MIT, so it is used in eneritis and in preparation for bowel surgery. (in partial sterilization of the intestine). Neomycin has a strong effect on Escherichia coli, some strains of Proteus, and Pseudomonas aeruginosa. Side effects - allergic reactions, dyspepsia, candidomycosis. Neomycin is used locally in wound infection, pyoderma, conjunctivitis. It is not administered parenterally, because it has a strong toxic effect on the kidneys, auditory nerve (deafness), muscle synapses (stops breathing).

GENTAMITSIN sulfate has a broad spectrum of action. It has a strong effect on the blue pus bacillus, proteus, and Escherichia coli. Microbial resistance to gentamicin develops slowly. It is not well absorbed from MIT, therefore it is administered parenterally m/i, where it acts for 8-12 hours. Passes poorly through GEB, mostly unchanged in urine. Gentamicin is less toxic than neomycin.

Indications:- urinary tract infection (pyelonephritis, cystitis);

- sepsis, burns, suppurating wounds with gram-negative microbes

Adverse effects:

- ototoxic effect (vestibular apperat, less-hearing);

- nephrotoxic effect is less than that of neomycin;

- effect similar to curare. Toxic effects of aminoglycosides occur especially when kidney function is weakened.

SIZOMITSIN-similar to gentomycin, but stronger than gentamicin in its effect on protea, blue pus bacillus, klebsiella, enterobacteria. It is poorly absorbed from MIT, administered m/i, the effect lasts about 8 hours. Indications and side effects are similar to gentamicin.

CYCLIC POLYPEPTIDES (POLYMYXINS).

Polymyxin M is mainly used in our country (MDX). V and E are also used in foreign countries. Polymyxin M-especially affects gram-negative microbes: blue pus bacillus, shigella, salmonella and capsular bacteria, pastrella and brucella. But pathogenic cocci and anaerobes, proteus, Escherichia coli are resistant to polymyxin M.

Mechanism of action: the permeability of the cytoplasmic membrane of bacteria breaks for many substances and causes them to go out. Bacteriocidal effect. In this case, polymyxin affects microorganisms located outside the cell. Microbial resistance to polymyxin M develops slowly. Polymyxin is poorly absorbed from MIT. When administered parenterally, its neuro- and nephrotaxic effects are strongly manifested. Therefore, it is used in the treatment of local or intestinal infections (enterocolitis) in wounds caused by microbes sensitive to it, and is used for partial sterilization of the intestine before operations.

Side effects: Rarely, dyspepsia, sometimes superinfection. Cannot be taken in kidney disease.

LINCOSAMIDES.

LINCOMICIN and KLINDOMICIN disrupt protein synthesis in bacteria and thus have a bacteriostatic effect on them.

Clindomycin is several times stronger than lincomycin in terms of its effect on anaerobes and is better absorbed than MIT. Both pass GEB poorly, but pass well in meningitis, are broken down in the liver, and are excreted in urine and bile. After intramuscular injection, they are quickly absorbed and accumulate in many organs, including bones.

Application: in diseases caused by bacteroids, osteomyelitis, it is administered parenterally 2 times a day, orally 4 times a day. Food products in the stomach and intestine disrupt their absorption, so it should be taken 1-2 hours before or 3-4 hours after eating.

Side effects: pseudomembranous colitis (diarrhea mixed with blood and mucus, abdominal pain, due to dysbacteriosis). Rarely, leukopenia, liver damage, allergic reactions.

GLYCOPEPTIDES.

The main drug of this group is vancomycin. It belongs to complex glycopeptides. Mechanism of action: disrupts the synthesis of the bacterial shell and has a bactericidal effect. It is believed to disrupt RNA synthesis and cytoplasmic membrane permeability. It also has a good effect on gram-positive cocci, including beta-lactamase-producing and methacillin-resistant staphylococci. It also affects clostridium and enterobacteria. Bad absorption from MIT. The drug passes through GEB, especially in meningitis. But the drug is not widely used because it is poisonous.

Application: in diseases caused by gram-positive cocci, especially enterocolitis, pseudo-membranous colitis caused by penicillin-resistant strains. The drug has an ototoxic, nephrotoxic effect. Phlebitis calls. Allergic reactions, neutropenia, thrombocytopenia are rarely caused.

FUSIDIC ACID.

An antibiotic with a narrow spectrum of action. Mainly affects gram positive bacteria. It has a bacteriostatic effect by inhibiting protein synthesis in microbes.

Well absorbed from MIT. Accumulates in large quantities in tissues. It is broken down in the liver. Excreted in bile. Indications: in infections caused by penicillin-resistant staphylococci, especially in osteomyelitis.

Adverse effects: dyspepsia, ascites (skin rashes), jaundice.

MISCELLANEOUS ANTIBIOTICS.

FUZAFUNJIN is an antibiotic with anti-inflammatory action. The chemical structure is characteristic of polypeptides. It is mainly used locally (in the form of an aerosol for inhalation). It has an effective effect on many cocci, anaerobes, mycoplasmas, molds of the genus Candida. Recommended for use in infections of the nose, throat and respiratory tract.

Unpleasant effects: in rare cases it causes local inflammation. If used for more than 10 days, it can cause dysbacteriosis.

Azithromycin is an antibiotic-azamine from the group of macrolides. Beta-lactamase separator has a good effect on gram-positive and gram-negative cocci, mycoplasmas, legionella, bacteroids. Bacteriocidal effect in large doses. Effective in sexually transmitted diseases (gonococcus, trichomonads, chlamydia, spirochetes). It is also highly effective when administered enterally. Drink 1 hour before meals. The effect lasts about 24 hours.

Adverse effects: allergic reactions, nausea, vomiting, severe liver and kidney function disorders cannot be used.

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 factors affecting them when using antibiotics.

Practical training

Topic 1: The value of recipe in the preparation of the GP. Recipe and its structure. Solid 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 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

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: 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 4: Drugs effecting cholinoreceptors

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).

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.

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 5: Drugs that stimulate adrenoreceptors

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.

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.

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 6: ETHYL ALCOHOL. ANALGESICS. NEUROLEPTICS.ANXIOLITICS.SEDATIVES.

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.

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.

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

Theme 7: DRUGS AFFECTING THE FUNCTION OF THE RESPIRATORY ORGANS. ANTIHYPERTENSIVE AND HYPERTENSIVE 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 – 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).

ANTIHYPERTENSIVE DRUGS (HYPOTENSIVE DRUGS)

Antihypertensive drugs decrease systemic arterial blood pressure. They are mostly used for the treatment of arterial hypertension.

The level of arterial blood pressure depends on many factors such as cardiac workload, peripheral vessel tone and their elasticity, volume, electrolytic content and viscosity of the circulating blood. All of this is under neurohumoral control .

The effect of antihypertensive drugs may be directed at different parts of the physiological system regulating arterial blood pressure. Thus an important role belongs to neurotropic agents that decrease vasoconstrictor and cardiostimulating adrenergic effects. They can suppress both vasomotor centers and peripheral parts of the adrenergic (sympathetic) system, i.e. ganglia,

postganglionic fibre terminals and adrenoceptors that lead to the dilation of the blood vessels and a reduction of cardiac work.

The possibility to eliminate the vasopressor effect produced by endogenous substances (catecholamines, angiotensin II) and/or to increase the effect of vasodilators (bradykinin, other) is also important. Peripheral vascular resistance can be decreased by influencing the vascular smooth muscles (for example, with the help of drugs affecting ion channels, drugs releasing NO and other myotropic spasmolytics).

One of the possible ways to decrease arterial blood pressure is to decrease circulating blood volume and to change its electrolyte content.

These principles form the basis of the present classification of antihypertensive agents used for the treatment of arterial hypertension.

I. DRUGS REDUCING THE STIMULATING EFFECT OF ADRENERGIC INNERVATION ON THE CARDIOVASCULAR SYSTEM (NEUROTROPIC EFFECT)

- *Drugs decreasing the tone of the vasomotor centers:* Clonidine (clofelinum), Guanfacine, Methyldopa, Moxonidin

- *Drugs blocking autonomic ganglia (ganglioblockers):* Azamethonium (pentaminum), Trepirium (hygronium)

- *Drugs suppressing adrenergic neurons at the level of the presynaptic endings (sympatholytics):* Reserpine

- *Drugs blocking adrenoceptors (adrenoblockers)*:

A. α-Adrenoblockers:

1) Drugs blocking post- and presynaptic α-adrenoceptors: Phentolamine, Tropaphenum

2) Drugs blocking postsynaptic α-adrenoceptors: Prazosin

B. β-Adrenoblockers:

1) Drugs blocking β-1- and β-2-adrenoceptors: Propranolol (anaprilinum)

2) Drugs mostly blocking β-1-adrenoceptors: Atenolol, Talinolol, Metoprolol

C. β-, α-Adrenoblockers: Labetalol

II. DRUGS AFFECTING SYSTEMIC HUMORAL REGULATION OF ARTERIAL BLOOD PRESSURE

- *Drugs affecting renin-angiotensin system*

A. Angiotensin II synthesis inhibitors (inhibitors of angiotensin- converting enzyme): Captopril, Enalapril

B. Angiotensin receptors (AT1) blockers: Losartan

- *Vasopeptidase inhibitors:* Omapatrilate

III. DRUGS OF MYOTROPIC ACTION (MYOTROPIC DRUGS)

- *Drugs affecting ion channels:*

A. Calcium channels blockers: Phenigidin, Diltiazem

B. Potassium channels activators: Minoxidil, Diazoxide

- *Nitric oxide donors (NO):* Sodium nitroprusside

- *Other drugs:* Apressin, Dibazolum, Magnesium sulphate

IV. DRUGS AFFECTING WATER AND ELECTROLYTE BALANCE (DIURETICS)

Hydrochlorothiazide, Furosemide, Spironolactone

This classification lists only the basic antihypertensive drugs. These drugs are very important for the patients, that is why new and more effective and less toxic agents of different synthetic and plant alkaloid origins are currently being developed. The investigation of different levels of physiological and biochemical mechanisms of vascular tone control is also very important. Such investigations help find new antihypertensive drugs and make the use of available drugs more rational.

HYPERTENSIVE DRUGS (DRUGS USED

FOR THE TREATMENT OF ARTERIAL HYPOTENSION)

Acute arterial hypotension may be associated with acute heart failure and (or) vascular collapse.

Before the administration of any drug the physician should find out what factors are causing hypotension (myocardial infarction or dystrophy, chemical or microbial toxins, other) because aetiologic treatment is the best in many cases. Drugs that increase arterial blood pressure can lead to symptomatic therapy of arterial hypotension. However, these drugs can be used only if they do not affect regional circulation especially in the organs of vital importance.

A decrease in arterial blood pressure is associated with a decrease in cardiac output and (or) peripheral vascular resistance; therefore the main drugs used for the treatment of acute hypotension may be classified into the following groups.

I. DRUGS INCREASING CARDIAC OUTPUT AND PERIPHERAL VASCULAR TONE

- *Adrenomimetics:* Epinephrine

II. DRUGS THAT MOSTLY INCREASE THE PERIPHERAL VASCULAR TONE

- *Adrenomimetics:* Norepinephrine, Phenylephrine

- *Angiotensinamide*

Alkylisotiuronic compounds metyron and etyron are also used as hypertensive drugs.

Several drugs produce a cardiotonic effect and decrease the resistance of regional vessels. One example of such a drug is dopamine (dopmine).

In hypotension associated with hypovolemia a positive effect can be achieved by transfusing whole blood, plasma and their substitutes or isotonic solutions of sodium chloride (especially in blood loss or dehydration).

Therefore, the selection of the drugs for the treatment of severe hypotension should be done on a strictly individual basis. It should be remembered that the main principle of shock therapy is not to increase arterial blood pressure but to restore the blood supply of tissues and organs (the heart, the brain and the kidneys). Therefore the main task is to determine the cause of inadequate regional circulation and to select the optimal methods of treatment.

For treatment of chronic hypotension it is advisable to use drugs that stimulate the vasomotor center (caffeine, niketamide, strychnine-like drugs), sympathomimetics (ephedrine), tonics (preparations schizandra and ginseng), and mineralocorticoids (desoxycorticosterone drugs).

Used in this lesson, the new educational technology "brainstorming."

USE OF THE "BRAIN STORM"

To work on this technique to establish trust and overcome the psychological stress as an obstacle to open discussion. The method combines the ability to extend the stereotype of thinking to abstract from existing constraints and develop a dynamic mental activity, to intensify its training activities. The method taught to argue and defend their own point of view, to find the optimal solution, to build communication and persuading others to faithfulness advocated position.

The method includes:

- Greeting soaring thoughts, given that the unusual idea, the better;

- Receiving the largest number of proposals;

- A combination of ideas and their development;

- No comments and criticisms that interfere with the formation of ideas;

- Brief statement without arguments deployed;

- The division of those who generate ideas and those who work it.

Students are encouraged to discuss the problem of the influence of antihypertensive drugs on cardiac function. Everyone expresses their proposals, which are written on the blackboard. Then in turn open position the template and compared with the responses of students. After being assessed the correctness of the assignment and tabulation.

Pattern of answers. The basic properties of captopril:

- Selectively inhibits angiotensin-converting enzyme;

- Reduces the formation of angiotensin-2;

- Reduces the secretion of aldosterone;

- Increases the excretion of sodium ions from the body;

- Reduces the amount of extracellular fluid;

- Reduces the OPS;

- Lowers blood pressure;

- Is well absorbed from the gastrointestinal tract;

- The action develops in 30-60 minutes;

- Duration of 4-8 hours.

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?

16. What is the reason the therapeutic effect of ethanol in pulmonary edema?

17. What is the reason the therapeutic effect of urea in pulmonary edema?

18. What is the reason for the therapeutic value ganglioblockers pulmonary edema?

19. To write prescriptions for: 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).

Practical training

Topic 8: DRUGS AFFECTING THE GASTROINTESTINAL SYSTEM.

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 9: ANTI-INFLAMMATORY DRUGS. ANTIALLERGIC 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

- To form a general idea of anti-inflammatory and antiallergic medications, to their destination;

- To give an idea about the basic effects of anti-inflammatory and antiallergic agents;

- Give an idea of the mechanisms of action of anti-inflammatory and antiallergic agents;

- To give knowledge of side effects of anti-inflammatory and antiallergic agents;

- Build knowledge of indications and contraindications to the use of anti-inflammatory and antiallergic agents;

- Ability to analyze the effect of shape, the appointment of the individual funds based on the total pharmacodynamics of anti-inflammatory and antiallergic agents;

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

Tasks

Student should know:

- Classification of anti-inflammatory drugs;

- Mechanism of action of anti-inflammatory drugs;

- Indications for use of anti-inflammatory drugs;

- Side effects and complications of anti-inflammatory drugs;

- Classification of antiallergic agents;

- Mechanism of action of antiallergic agents;

- Indications for use of antiallergic agents;

- Side effects and complications of antiallergic agents.

Student should be able to:

Perform practical skills - to perform the task according to a recipe (to write prescriptions for acetylsalicylic acid (table), phenylbutazone (butadionum) (table), metamizole (analginum) (table, amp.), indomethacin (table, Bean), diclofenac sodium (table), hydrocortisone (ointment), prednisolone (tablets, ointment), dexamethasone (table), diphenhydramine (dimedrolum) (table, amp), chloropyramine (suprastinum) (table, amp.), mebhydrolin (diazolin) (bean), ranitidine (table) with a release form , dose, quantity, and the indications for use).

4. Motivation

Anti-inflammatory drugs are widely used in many fields of clinical medicine. They are used in the clinic of internal medicine as a means used by polyarthritis, rheumatism, rheumatoid arthritis, myalgia, neuralgia, arthralgia. Antiallergic agents are used in various allergic diseases and conditions. Antihistamines that block H-2 histamine receptors are used in the treatment of gastric ulcers and duodenal ulcers, however, revealed 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, 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 endocrine system, respiratory system and digestive system. Acquired during the course knowledge will be used during the passage of medicine, surgery, anesthesiology, and other clinical disciplines, as well as further exploration of the themes of private pharmacy, as a means of influencing the function of respiratory organs, funds, affecting the function of the gastrointestinal tract, preparations of adrenal hormones, as well as the passage of medicine, surgery and other clinical disciplines.

6. The content of lessons

6.1. Theoretical part

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 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 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. A child recovering from measles, rubella were pains in the joints of the hands and elbows. On examination, the doctor noted swelling of joints, tenderness and feeling of warmth to the touch, limiting their mobility. What drugs and from a group of drugs should be included in the further treatment of this patient and why?

Response. Since a child recovering from measles, rubella developed a complication in the form of arthritis, its further treatment should be performed using anti-inflammatory drugs, in particular - butadiona, ibuprofen, etc.

2. In a patient with rheumatoid arthritis after prolonged use of anti-inflammatory drugs appeared dyspeptic symptoms, pain in the epigastric region, bleeding gums. A doctor at the patient survey also found a hemorrhage in the skin and on mucous membranes, and in the urine sample revealed haematuria. Which drug a patient received? What is the reason the observed complication? Which drug treatment should be patient in order to reduce these phenomena?

Response. The patient received aspirin, ulcerogenic and antiplatelet effect which leads to the complications described. The basis of the observed phenomena is the ability to inhibit the synthesis of acetylsalicylic acid, cyclooxygenase, which, depending on the localization of the enzyme leads to bleeding (platelet disaggregation) and reduces the protective properties of gastric mucosa

(ulceration). To facilitate the expression of these complications, the patient should stop medication and antacid assign (Almagel, magnesium oxide) and coagulants - vikasol and calcium chloride.

3. The patient with deforming osteoarthrosis with a history in which - a stomach ulcer, your doctor has prescribed a derivative of propionic acid. The drug is used in tablets of 0.4 (2 tablets) 3 times a day for two weeks. After treatment, the patient appeared heartburn, vomiting, flatulence, pain in the stomach. Which drug prescribed by a doctor? Was the doctor, appointing him to this patient? What he left out? Make a correction in the treatment carried out?

Response. Doctor prescribed ibuprofen, which, unlike most anti-inflammatory drugs is not irritating to the stomach. From this perspective, the doctor did the right thing by choosing this drug. However, he did not consider that this drug is contraindicated in acute peptic ulcer disease and should be given to patients who have had an ulcer in the past, with caution. For this reason, treatment with ibuprofen given patient should be at lower doses (0.2 g per dose) 3-4 times a day for 3-4 weeks, the recommended daily dose pe5rvuyu take before meals, and the next - after a meal, and by asking the patient to control the condition of the stomach.

4. In a patient with bronchopneumonia in the process of penicillin appeared intense itching and a feeling of stretching the skin of the face and neck, severe swelling of the face, especially on the eyelids and lips, increased asthmatic phenomena in other areas of the skin rash revealed urticaria. What is described complication? What is the mechanism of its occurrence in the treatment of penicillin? What are the measures help?

Response. The patient appeared angioedema, which is one of allergic reactions to drugs. During treatment with penicillin such a reaction is caused by the interaction of antibodies and antigens (haptens), which act as a penicillin-protein complexes formed on the basis of a strong bond with the antibiotic blood proteins. For the treatment of angioedema should be applied protivogistaminnye funds: diphenhydramine, suprastin, tavegil and other drugs by injection, as well as a vasoconstrictor (noradrenaline mezaton) and sosudoukreplyayuschie means: calcium chloride or calcium gluconate, ascorbic acid, vitamin P (rutin)..

6.3. Practical part

Write prescriptions for these drugs: acetylsalicylic acid (table), phenylbutazone (butadionum) (table), metamizole (analginum) (table, amp.), indomethacin (table, Bean), diclofenac sodium (table), hydrocortisone (ointment), prednisolone (tablets, ointment), dexamethasone (table), diphenhydramine (dimedrolum) (table, amp), chloropyramine (suprastinum) (table, amp.), mebhydrolin (diazolin) (bean), ranitidine (table).

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 anti-inflammatory drugs?

2. The mechanism of action of anti-inflammatory drugs?

3. What is the use and side effects of steroidal anti-inflammatory drugs?

4. The use and side effects of salicylates?

5. The use and side effects of anthranilic acid derivatives?

6. The use and side effects of pyrazolone derivatives?

7. The use and side effects of derivatives indoluksus acid?

8. The use and side effects of phenylpropionic acid derivatives?

Practical training

Topic 10: ANTISEPTIC AND DISINFECTANTS. ANTIBIOTICS – PART 1

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.).

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. 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 11: ANTIBIOTICS PART 2. SULFONAMIDES. SYNTHETIC ANTIBACTERIAL AGENTS OF VARIOUS CHEMICAL STRUCTURES

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 12: ANTITUBERCULOSIS DRUGS.

DRUGS FOR THE TREATMENT OF SYPHILIS.

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.

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
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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 literature

Basic

1A 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 6th semester

№	Topics
1	Laws and orders of the President of the Republic of Uzbekistan according to the recipe.
2	Regulatory documents for drug control.
3	Anaphylactic shock and its treatment.
4	Alcoholism and its complications. The effect of alcohol on pregnant women
5	General anesthetics. Hypnotics.
6	Psycostimulants. Antidepressants.
7	Cardiotonics. Antiarrythmics.
8	Antianginal drugs. Phytopreparations and their application.
9	Means affecting liver function. Diuretics. Means affecting uterus.
10	Means affecting blood system.
11	Hormonal drugs of protein and steroid structure.
12	Antifungal, antitumor,antihelmint and antiprotozoal drugs

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.Roymuradov
«___» _____, 2024

MODULE PROGRAM

On Pharmacology

Area of knowledge:	900 000	-	Healthcare and social affairs
Field of education:	910 000	-	Healthcare
Direction of education:	60910400	-	Preventive medicine

Toshkent -2024

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	Websites: 1. http://evbmed.fbm.msu.ru/ Московский центр доказательной медицины 2. http://www.fda.gov Администрация по продуктам и лекарствам США(FDA) 3. http://www.pharmgkb.org/ Ресурс по фармакогенетике. 4. http://www.tga.health.gov.au/adr/audrb.htm Австралийский бюллетень нежелательных лекарственных реакций 5. http://www.mhra.gov.uk/Publications/Safetyguidance/DrugSafetyUpdate/index.htm Британский ежемесячный бюллетень по безопасности лекарственных средств 6. http://www.drugreg.ru Фонд фармацевтической информации 7. http://www.rlsnet.ru Российская энциклопедия лекарств (РЛС) 8. 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 "___"_____of 2024 (Annex _____of the order). Head of the educational and methodological department F.Kh. Azizova
8.	**Responsibilities for the module:** **M.J.Allaeva** – head of the "Pharmacology" department, doctor of biological sciences, TMA **M.A.Mamadjanova** – associate professor of the "Pharmacology" department, TMA **Sh.B.Kakhorova** – 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. Rizvanadov
«____» _____ 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:	60910400	- Preventive medicine

Tashkent -2024

1

DEPARTMENT OF PHARMACOLOGY

SYLLABUS
OF THE "PHARMACOLOGY" MODULE
for the 3rd course of Preventive medicine faculty

Subject Name:	**Pharmacology**
Module type:	**Mandatory**
Code of module:	**FR1504**
Academic year:	**2024/2025**
Semester:	**6**
Form of education:	**Daytime**
Form of classes and hours allocated to the semester:	**120**
Lecture	**12**
Practical training	**48**
Laboratory training	**-**
Seminar	**-**
Independent education	**60**
Credit amount:	**4**
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)	
6th semester	
L1	General pharmacology. Pharmacokinetics and pharmacodynamics of drugs
L2	Efferent innervation. Medicines affecting cholinergic synapses.
L3	Painkillers
L4	Anti-inflammatory drugs.
L5	Antiseptic and disinfectants.
L6	Antibiotics.

Form of training: practical training (Pr)	
6th semester	
P1	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. Liquid drug forms and rules for prescribing them (I).
P2	General pharmacology. Pharmacokinetics and pharmacodynamics of drugs.
P3	Medicines affecting the afferent nervous system.
P4	Medicines affecting M- and N- cholinergic receptors. Anticholinesterase agents. Medicines affecting M-cholinergic receptors.
P5	Medicines that affecting adrenoreceptors.
P6	Narcotics. Ethyl alcohol. Neuroleptics. Anxiolytics. Sedatives.
P7	Medicines affecting the activity of respiratory organs.
P8	Hypotensive agents. Hypertensive agents.
P9	Medicines affecting the digestive system.
P10	Anti-inflammatory agents. Anti-allergic agents.
P11	Antiseptic and disinfectants. Basic criteria and requirements of chemotherapy. Antibiotics.
P12	Sulfanilamide preparations. Anti-tuberculosis, antisyphilitic drugs. Antiviral and anti-fungal agents.

Independent education (IE)		**hours**
6th semester		
1.	Prescriptive laws and orders of the President of the Republic of Uzbekistan.	**4**
2.	Regulatory documents used in drug control. State Register of Medicines.	**4**
3.	Anaphylactic shock and its treatment.	**4**
4.	Alcoholism and its complications. Effects of alcoholism on the fetus.	**4**
5.	Narcotics. Sleep aids. Drug addiction and its complications	**4**
6.	Psychostimulants. Antidepressants	**4**
7.	Cardiotonics. Antiarrhythmic agents	**4**

8.	Antianginal agents. . Phytopreparations and their use	**4**
9.	Medicines affecting liver function. Hepatoprotectors.	**4**
10.	Diuretics. Means affecting the muscles of the uterus.	**4**
11.	Means affecting the blood system.	**4**
12.	Hormonal drugs with protein and polypeptide structure. Hormonal preparations with a steroid structure.	**4**
13.	Antifungal agents. Dewormers	**4**
14.	Antiprotozoal drugs	**4**
15.	Drugs against malignant tumors.	**4**
	Total:	**60**

Main literature	
1.	Karen Whalen. Pharmacology. Textbook. 6- edition. «Lippincott illustrated reviews». 2015.
2.	Allaeva M,J., Xakimov Z.Z., Ismailov S.R., Aminov S.S., Mustanov B.T.. Farmakologiya. Darslik, T., 2020. (elektron).
3.	Д.А. Харкевич. Фармакология. Учебник. М.-2017 г.
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.	Azizova S.S. Farmakologiya. Darslik, T., 2006 y..
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 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;	5	excellent

			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 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;	4	good

			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; 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;	3	Satisfa-ctory
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	2	unsatisfied

			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.		

Information about the science teacher

Authors:	M.J. Allayeva, d.b.s., professor M.A.Mamadjanova, d.b.s., professor J.A.Kholmatov, teacher-assistant
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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**

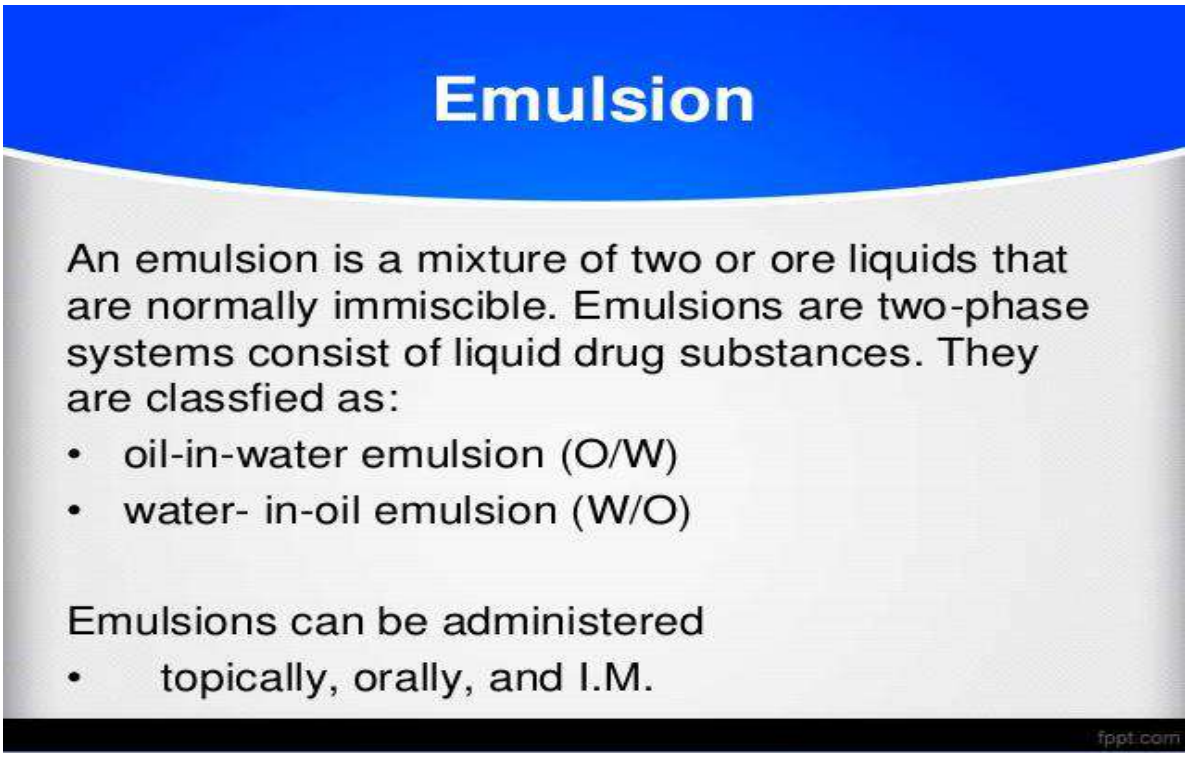
Compilers: **M.J. Allayeva**

M.A.Mamadjanova

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

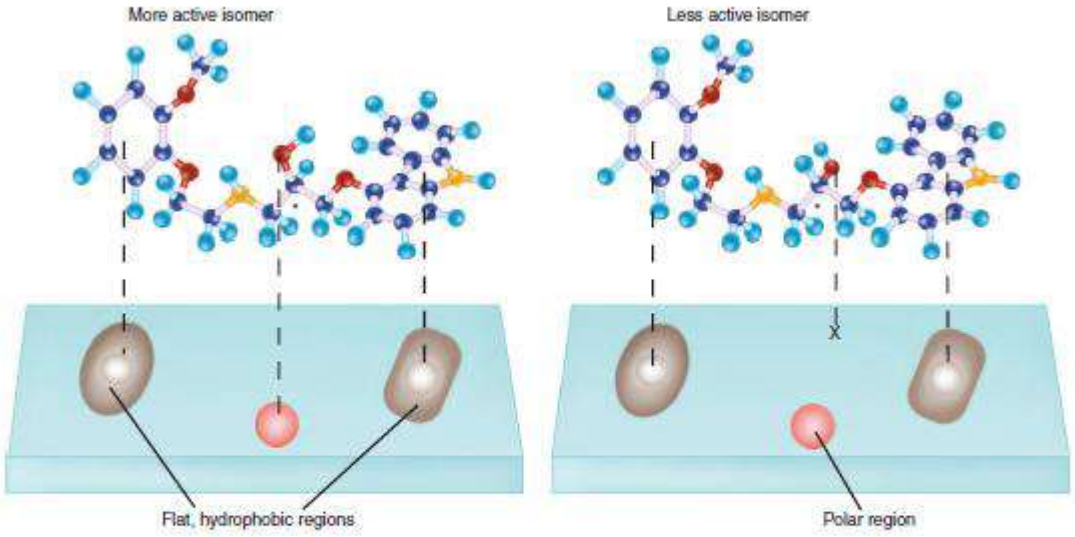


FIGURE 1–2 Cartoon illustrating the nonsuperimposibility of the two stereoisomers of carvedilol on the β receptor. The "receptor surface" has been grossly oversimplified. The chiral center carbon is denoted with an asterisk. One of the two isomers fits the three-dimensional configuration of binding site 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].)

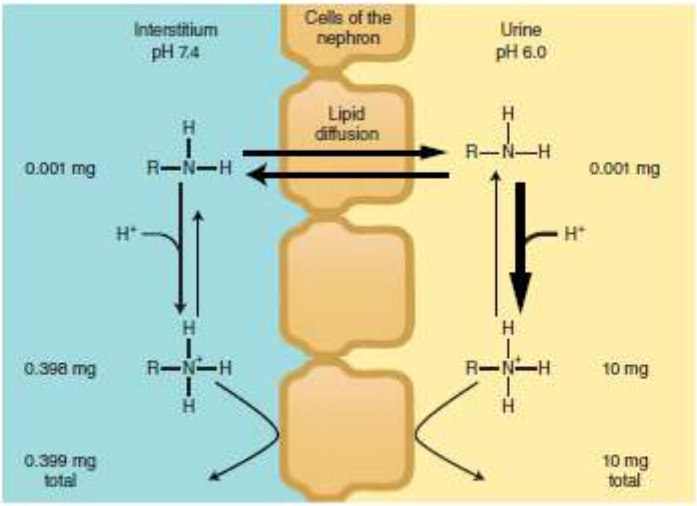


FIGURE 1–6 Trapping of a weak base (methamphetamine) in the urine when the urine is more acidic than the blood. In the hypothetical case illustrated, the diffusible uncharged form of the drug has equilibrated across the membrane, but the total concentration (charged plus uncharged) in the urine (more than 10 mg) is 25 times higher than in the blood (0.4 mg).

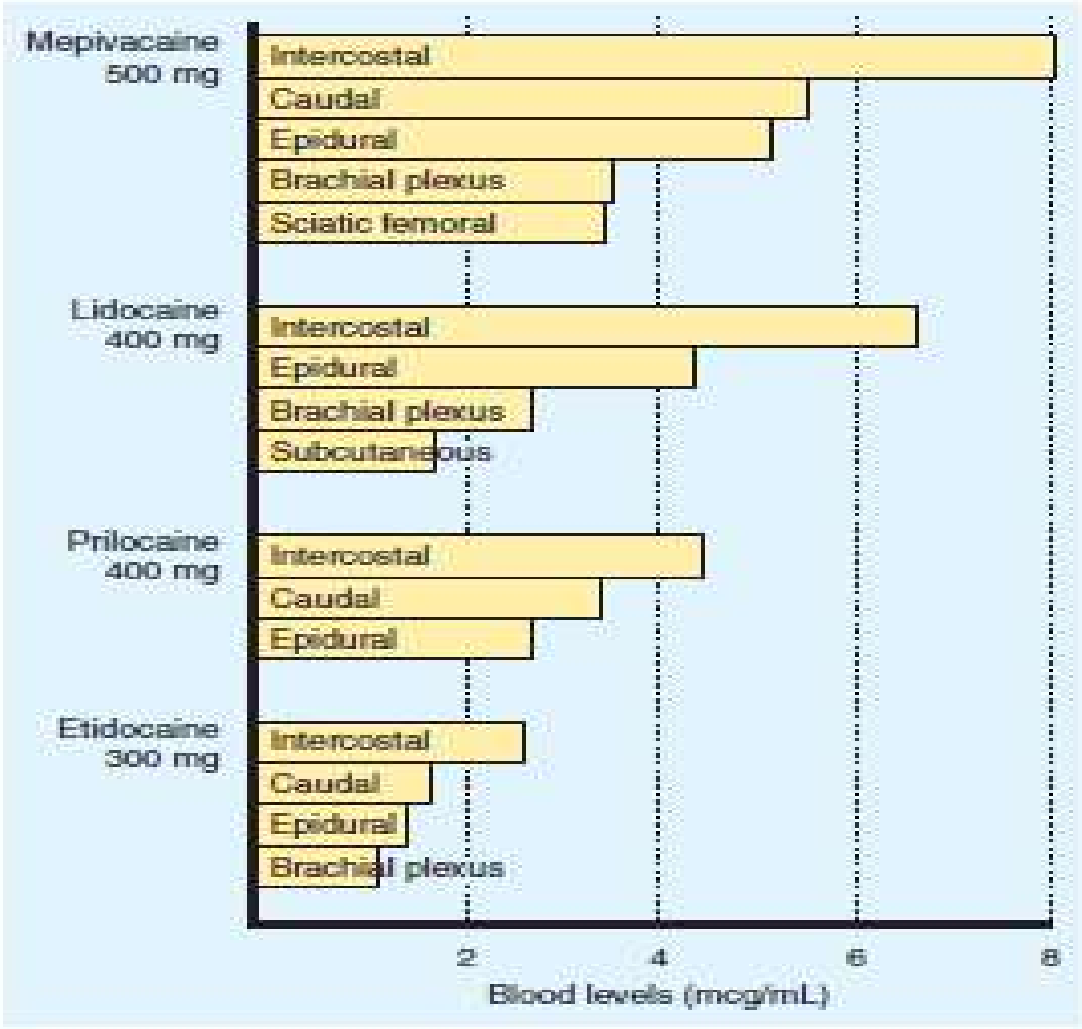


FIGURE 26–2 Comparative peak blood levels of several local anesthetic agents following administration into various anatomic sites. (Modified, with permission, from Covino BD, Vassals HG: *Local Anesthetics: Mechanism of Action in Clinical Use*. Grune & Stratton, 1976.)

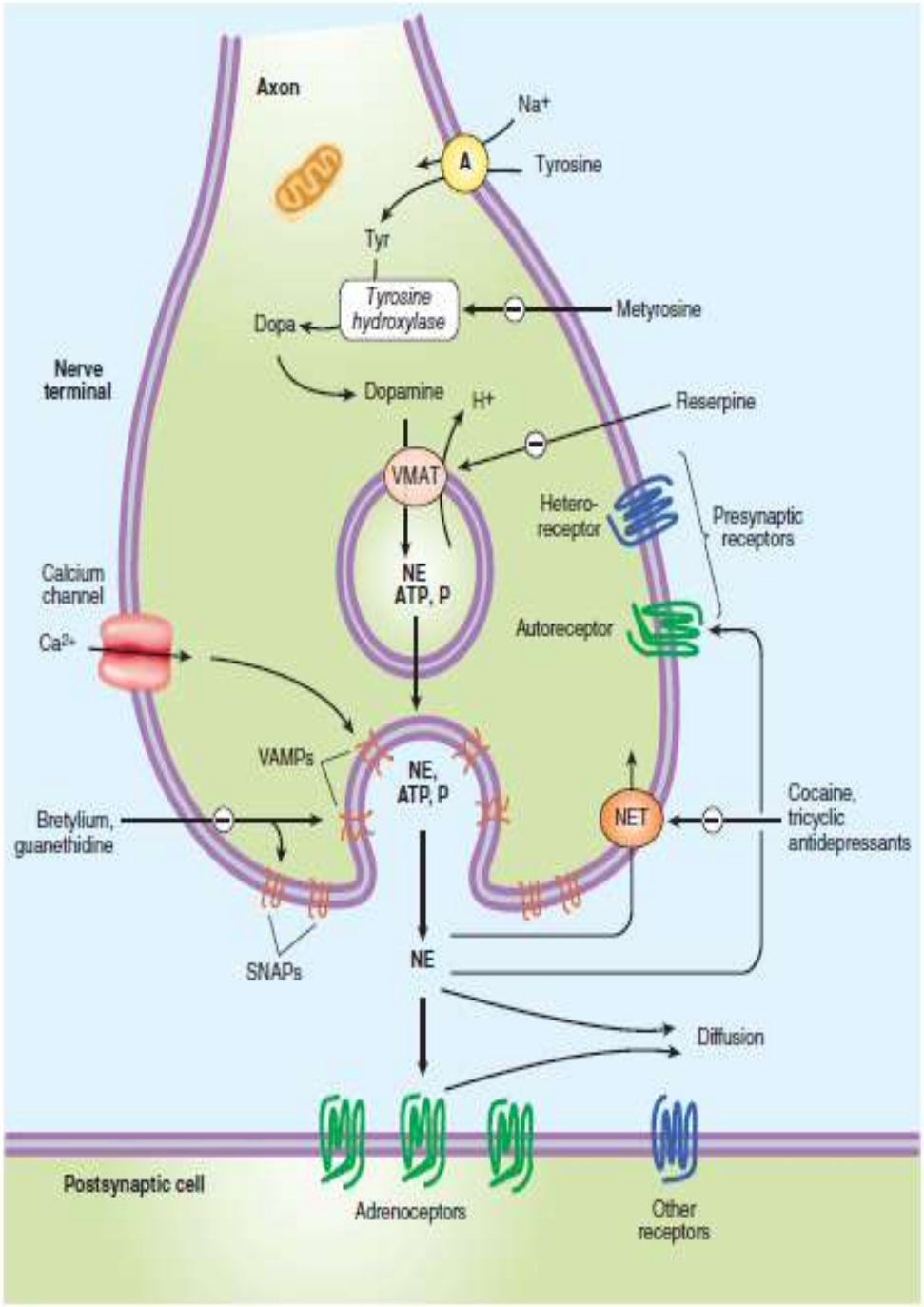
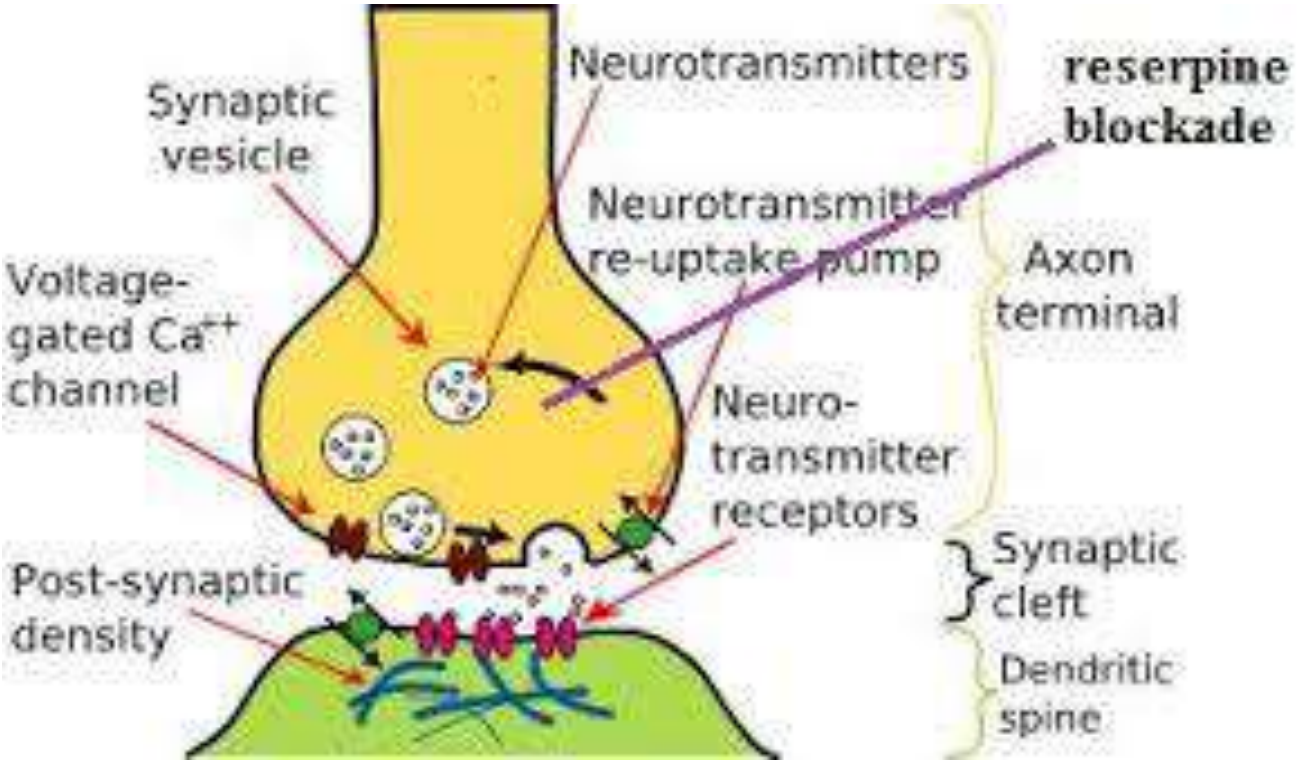


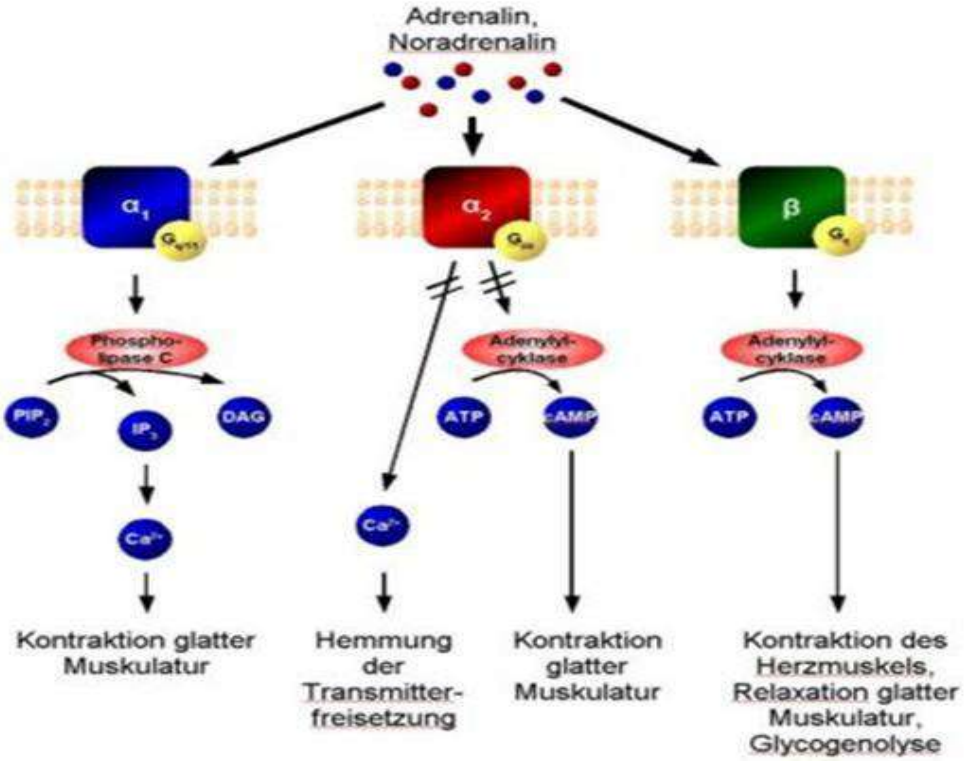
FIGURE 6–4 Schematic diagram of a generalized noradrenergic junction (not to scale). Tyrosine is transported into the noradrenergic ending or varicosity by a sodium-dependent carrier (A). Tyrosine is converted to dopamine (see Figure 6–5 for details), and transported into the vesicle by the vesicular 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.

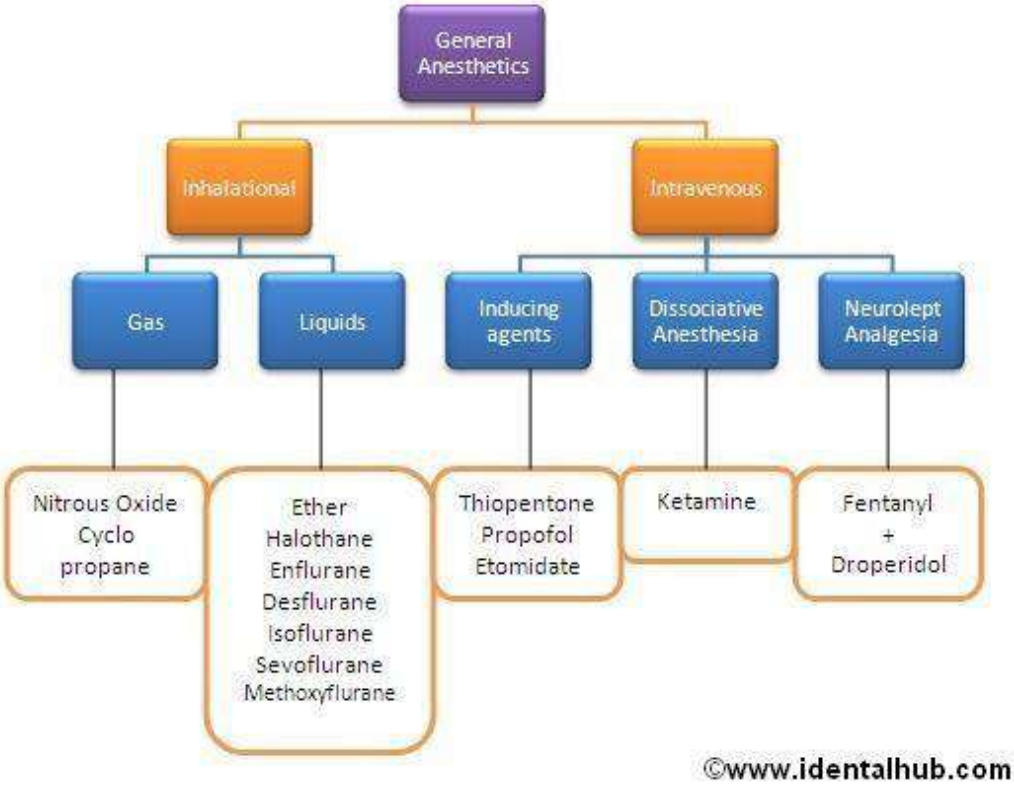
SUMMARY Drugs with Anticholinergic Actions

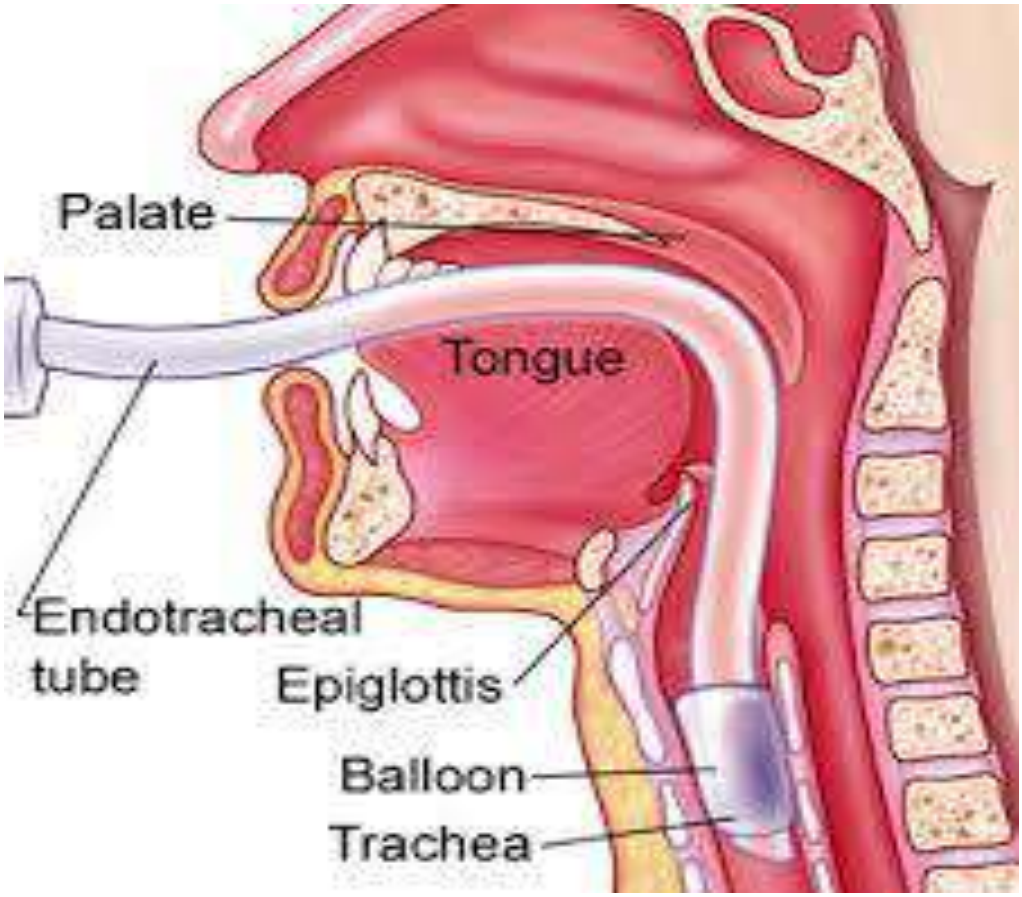
Subclass	Mechanism of Action	Effects	Clinical Applications	Pharmacokinetics, Toxicities, Interactions
MOTION SICKNESS DRUGS				
• Scopolamine	Unknown mechanism in CNS	Reduces vertigo, postoperative nausea	Prevention of motion sickness and postoperative nausea and vomiting	Transdermal patch used for motion 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
Synaptic cleft
Post-synaptic density
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

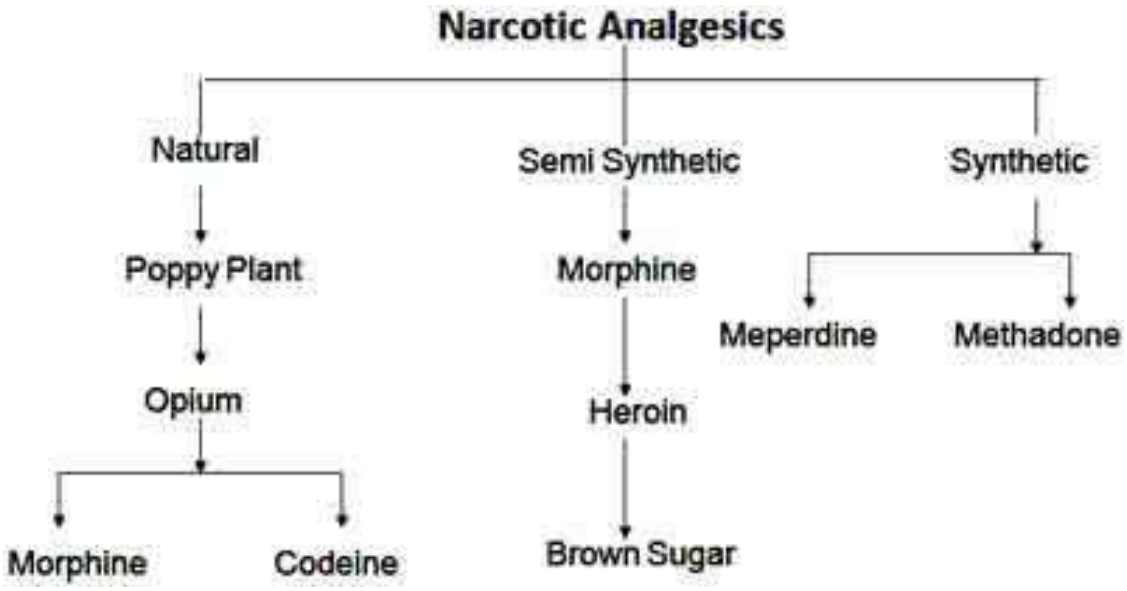
- **PHARMACOLOGICAL CLASSIFICATION**
  - **FIRST-GENERATION ANTIPSYCHOTIC (low potency)**
    - ***Chlorpromazine***
    - *Prochlorperazine*
    - *Thioridazine*
  - **FIRST-GENERATION ANTIPSYCHOTIC (high potency)**
    - ***Fluphenazine***
    - ***Haloperidol***
    - *Pimozide*
    - *Thiothixene*
  - **SECOND GENERATION ANTIPSYCHOTIC**
    - *Aripiprazole*
    - *Asenapine*
    - ***Clozapine***
    - *Iloperidone*
    - *Lurasidone*
    - ***Olanzapine***
    - ***Quetiapine***
    - *Paliperidone*
    - ***Risperidone***
    - *Ziprasidone*

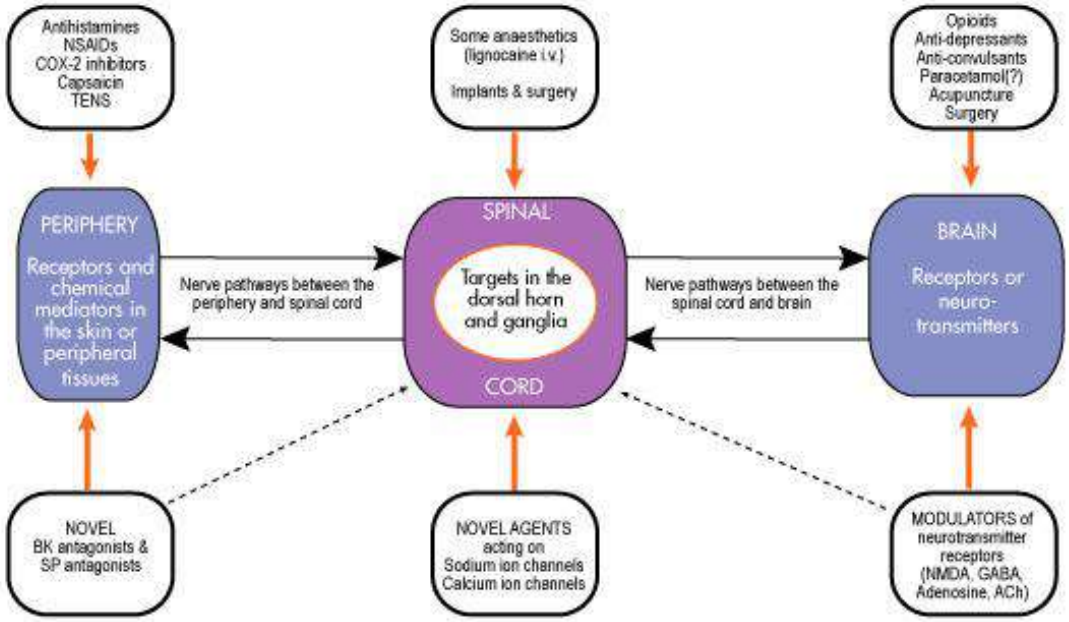
TABLE.
Antidepressants and CBT for Somatic Syndromes

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

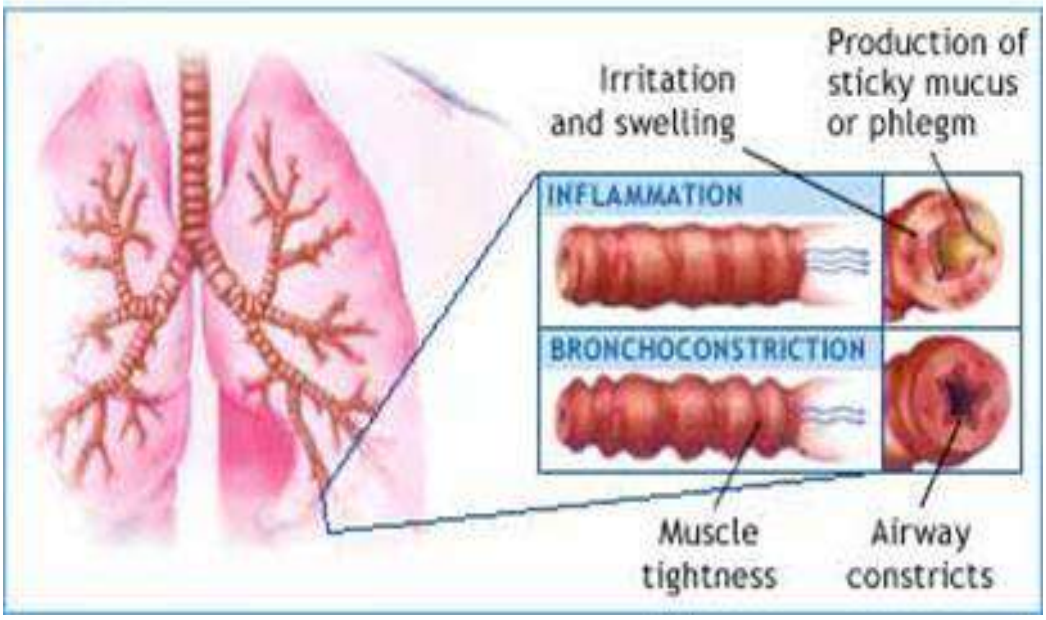
CBT=cognitive-behavioral therapy; TCAs=tricyclic antidepressants; SSRIs=selective serotonin reuptake inhibitors; IBS=irritable bowel syndrome; SNRI=serotonin and norepinephrine reuptake inhibitor.

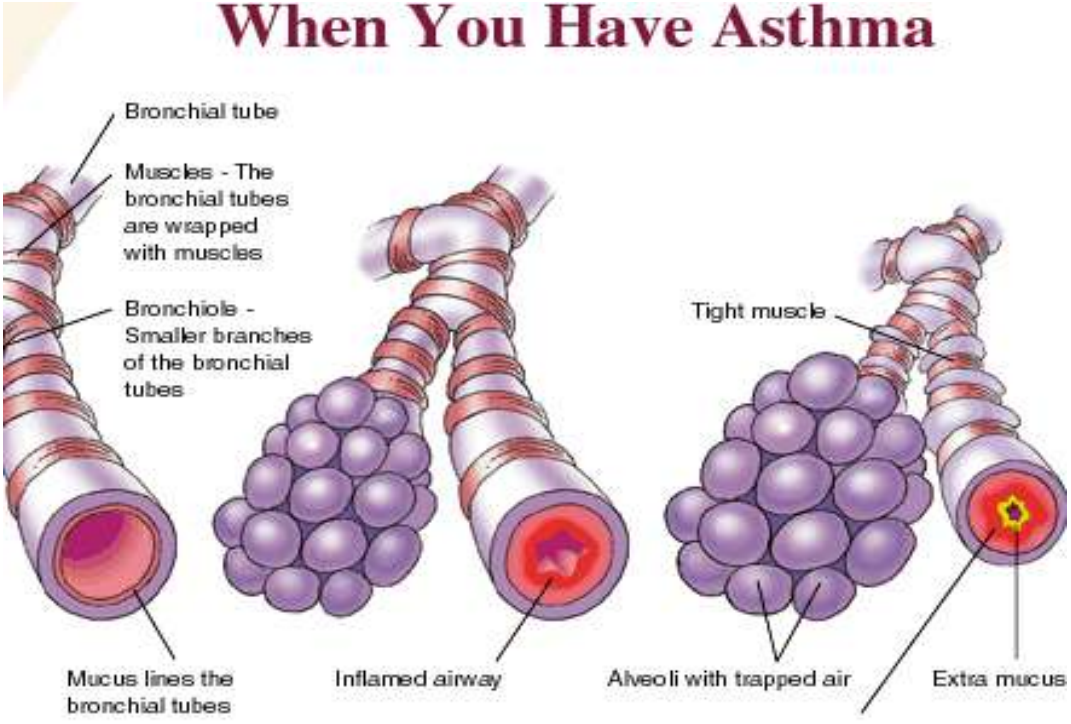
Jackson JL, O'Malley PG, Kroenke K. *CNS Spectr.* Vol 11, No 3. 2006.


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


Irritation and swelling
Production of sticky mucus or phlegm
INFLAMMATION
BRONCHOCONSTRICTION
Muscle tightness
Airway constricts


When You Have Asthma
Bronchial tube
Muscles - The bronchial tubes are wrapped with muscles
Bronchiole - Smaller branches of the bronchial tubes
Tight muscle
Mucus lines the bronchial tubes
Inflamed airway
Alveoli with trapped air
Extra mucus

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 /

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infusion / tinctura /

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tincture / tinctura / *

injection / injectio / *

suppository / suppositorium /

solution / infusum /

broth / solutio /

infusion / tinctura /

tincture / mucilago /

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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

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extracts prepared from the soft parts of plants *

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injection / injectio / *

suppository / suppositorium /

solution / infusum /

broth / solutio /

infusion / tinctura /

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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 /

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   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 "2"	Lighting 1 / 10 of the questions in the wrong approach. Do not know the classification, the indications for use, 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.