

I. DRUGS ACTING ON THE PERIPHERAL NERVOUS SYSTEM

CHOLINOMIMETIC AND ANTICHLINESTERASIS DRUGS (parasympathomimetics)

A. Actuality. The vegetative nervous system intervenes in the regulation of the body's fundamental physiological processes by controlling the functions of different organs and metabolic processes. Cholinomimetic and anticholinesterase preparations exhibit various pharmacodynamic actions on the autonomic nervous system and are widely used in ophthalmology, neurology, anesthesiology, gastroenterology, urology, surgery, etc.

B. The purpose of the training consists in familiarizing the student with the pharmacology of cholinomimetic and anticholinesterase preparations , with the principles of use in medical practice and the toxicological aspects of their.

C. Learning objectives:

- a) The student must **know:** the characteristics of cholinomimetics and anticholinesterases (classification, mechanism of action, pharmacological effects, indications, contraindications, adverse reactions, the clinical picture of intoxication and the treatment).
- b) The student must **be able to:** make out prescriptions of mandatory drugs in various forms and indicate them in various diseases and pathological conditions.

D. Initial level of knowledge required for interdisciplinary integration:

Human physiology. Efferent innervation. The vegetative and somatic efferent way of transmission of excitation. Ultrastructure of the cholinergic synapse. The mechanism of nerve impulse transmission through the synapse. The role of acetylcholine in this process. The importance of acetylcholinesterase in the process of nerve impulse transmission. The postsynaptic potential of the terminal plate. The structural and functional peculiarities of the vegetative (parasympathetic) nervous system. The influence of the parasympathetic nervous system on the organs. The types and subtypes of cholinoreceptors , their location and the effects upon their excitation.

Biochemistry. Mediators of impulse transmission in the parasympathetic nervous system (acetylcholine).

Histology. The structure and histochemical characteristic of the synapse. Classification of synapses.

E. Self-training questions:

1. Classification of cholinomimetics (parasympathomimetics) according to the type of receptors and the type of action.
2. Pharmacodynamics of M-cholinemimetics . The mechanism of action. Their action at the level of the eye (pupil diameter, intraocular tension, accommodation), the heart, the smooth muscles of the internal organs (bronchi, digestive tube, urinary bladder, etc.), the secretion of the glands (stomach, intestinal, sweating etc.).
3. Indications, contraindications and adverse reactions of M-cholinomimetics .
4. The toxic action of muscarine (the picture of poisoning with variegated sponges, the antidote and the principle of action).
5. N-cholinomimetics . The mechanism of action. Action on sinocarotid receptors , vegetative ganglia, striated muscles, adrenal medulla, organs and systems. The indications. Contraindications. SIDE adverse.
6. Physiological importance and toxic action of N-cholinemimetics .
7. The main components of cigarette smoke. Diseases caused by smoking. The use of N-cholinomimetics in combat smoking.
8. Anticholinesterase preparations . Definition, classification, mechanism of action, effects. Interaction of anticholinesterases with cholinesterase. The particularities of the action of the compounds organophosphorus .
9. Indications, contraindications and adverse reactions of anticholinesterase preparations . The toxic action of organophosphorus compounds. The clinical picture of poisoning with organophosphorus compounds . Antidotes: the particularities of action and use.

F. Independent work (points 2, 3 and 4 are done in written form while preparing for the lesson)

1. Brief characteristics of compulsory drugs: (Medicinal form. Mode of administration. Doses (maximum for one intake, for 24 hours and therapeutic). Mechanism of action. Indications. Contraindications. Adverse reactions.

- Pilocarpine hydrochloride.
- Aceclidine.
- Cytiton.
- Neostigmine.
- Galantamine hydrobromide.
- Physostigmine salicylate.
- Trimedoxime.

2) Questions on medical prescriptions.

To prescribe the following drugs in all medicinal forms: 1. Pilocarpine hydrochloride. 2. Aceclidine. 3. Cytiton. 4. Neostigmine. 5. Galantamine hydrobromide. 6. Physostigmine salicylate. 7. Trimedoxime.

No.	The name of the medicine	Form of delivery, dose
1.	Pilocarpine hydrochloride	Sol. (ophthalmic drops) in vials 1%-10 ml and 2%-10 ml Ointment (ophthalmic) 1%-5.0 and 2%-5.0 Ophthalmic films 0.0027
2.	Aceclidine	Ampoules sol.0, 2%-2ml. Vials (ophthalmic drops) sol.2%-5ml
3.	Cytiton	Sol in vials. 1 ml Tablets 0.0015 Films 0.0015
4.	Neostigmine	Powder (for internal use) 0.015 Tablets 0.015 Sol. in vials. 0.05%-1ml Granules (for internal use) 60.0
5.	Galantamine hydrobromide	Sol. in vials. 0.1%-1ml and 1%-1ml
6.	Physostigmine salicylate	Sol. in vials. 1%-1ml and 0.1%-1ml Sol. (ophthalmic) in vials. 1%-5ml Ophthalmic ointment 0.25%-10.0 Tablets 0.001 and 0.005.
7.	Trimedoxime	Sol. in ampoules 15%-1ml

List the groups and drugs used in (for): glaucoma, bladder atony, intestinal atony, breathing stimulation, myasthenia gravis, xerostomia, residual phenomena of traumatic central and peripheral nervous system injury, residual phenomena of poliomyelitis, Alzheimer's disease, intoxication with organophosphorus compounds, intoxication with fly agaric mushrooms, smoking cessation.

3) Tests (Guidelines for Laboratory Work in Pharmacology).

4) Tables (knowledge summary)

Table 1

Indicate the pharmacological effects of the cholinomimetic and anticholinesterase drugs

Systems and organs	Parameters	M-cholinomimetics	M and N-cholinomimetics	Anticholinesterases
Eye	Diameter of the pupil			
	Accommodation			
	Intraocular pressure			
Exocrine glands	Tear			
	Salivary			

	Sweat			
Bronchi	Tone			
	Secretion			
Heart	Heart rate			
	A-V conduction			
Blood vessels	Tone			
GIT	Sphincter tone			
	Peristalsis			
	Secretion			
Urinary bladder	The tone of the detrusor			
	Urine elimination			
Myometrium	Tone			
Striated muscle	Neuromuscular transmission			

Note! The presence of the effect is indicated with the sign ↑ or ↓

Table 2

Provide indications for the use of cholinomimetic and anticholinesterase drugs

Indications	Pilocarpine	Aceclidine	Neostigmine	Galanthamine	Physostigmine	Paraoxon
Glaucoma						
GIT atony						
Urinary bladder atony						
Myasthenia						
Neurological disorders						
Residual phenomena of poliomyelitis						
Alzheimer's disease						
Overdose of antidepolarizing miorelaxants						
Overdose of M-cholinoblockers						

Note! The presence of the indication is noted with the sign "+ "

5) Interactive activity

- 1. Experimental and virtual didactic film** (elaboration of minutes, conclusions)
- 2. Clinical cases** (Guidelines for Laboratory Work in Pharmacology).
- 3. Virtual situations** (Guidelines for Laboratory Work in Pharmacology).
- 4. Solve the case:**

The patient with the urinary bladder atony was given a drug, the dose of which the patient increased himself. Diuresis has normalized, but sweating, intense salivation, and frequent defecation has occurred.

What medicine was administered? What was the cause of the complications that occurred?

From what group is it?