

Concluding II: “DRUGS ACTING ON THE PERIPHERAL NERVOUS SYSTEM”

A. Actuality. Drugs of this group are widely used in the ophthalmology, neurology, anesthesiology, gastroenterology, urology, etc.

B. The purpose of the training consists in strengthening students' knowledge about pharmacodynamics of drugs that affect peripheral innervation, their selection according to indications, knowledge of side effect and first aid measures in case of overdose.

C. Learning objectives:

1) The student must **know**: the pharmacological characteristics of these groups of drugs (pharmacokinetics and pharmacodynamics), the main indications for administration, adverse reactions and first aid measures in overdose.

2) The student must **be able to**: make out prescriptions of mandatory drugs of this group, indicate them in various diseases and pathological conditions, and primarily in emergencies.

D. Self-training questions:

1. Classification of drugs with influence on cholinergic synapses.
2. M-cholinomimetics. Mechanism of action. Influence on the eye, heart, smooth muscles of the internal organs, exocrine glands. Indications. Contraindications. Adverse reactions. Muscarinic intoxication, clinical picture and treatment.
3. N-cholinomimetics. Mechanism of action. Influence of N-cholinomimetics on sino-carotid chemoreceptors, vegetative ganglia, striated muscles, adrenal medulla, organs and systems. Indications. Toxic action of nicotine. Use of N-cholinomimetics for smoking cessation.
4. Anticholinesterase drugs. Classification and mechanism of action. The characteristic of interaction with cholinesterase. Effects. Indications. Contraindications and adverse reactions. Particularities of the action of organophosphorus compounds. Clinical picture of intoxications with organophosphorus compounds and first aid measures. The peculiarities of atropine use. Cholinesterase reactivators: mechanism of action, indications.
5. Classification of cholinoblockers. M- cholinoblockers. Classification, mechanism of action. Their influence on CNS, eye, cardiovascular system, bronchial tone, smooth muscles of the digestive tract, biliary and urinary tract, bladder detrusor and sphincter, gastric secretion, etc. Particularities of action of M-cholinoblockers. Indications. Contraindications and adverse reactions. Clinical picture of poisoning with plants, containing atropine and its treatment.
6. Classification of N- cholinoblockers. Ganglioblockers. Classification by location, duration of action, mechanism of action and chemical structure.

Influence on cardiovascular system, digestive tract, myometrium. Indications, contraindications and adverse reactions.

7. Miorelaxants with peripheral action. Classification by duration and mechanism of action. Indications, contraindications and adverse reactions. Antagonists of miorelaxants and principles of decurarization.
8. Adrenomimetics that predominantly stimulate peripheral α and β adrenoreceptors. Their influence on the cardiovascular system, microcirculation, organs with smooth muscles, metabolism. Indications, contraindications and adverse reactions.
9. Adrenomimetics that predominantly stimulate α adrenoreceptors. Classification. Their influence on the cardiovascular system, microcirculation. Indications. Contraindications. Adverse reactions.
10. Adrenomimetics with influence on β adrenoreceptors. Classification. Their actions on the tonus of the bronchi, myometry, vessels and heart. Indications, contradictions and adverse effects.
11. Alpha-adrenoblockers. Classification. Pharmacodynamics. Main properties, indications and contraindications. Adverse reactions.
12. Beta-adrenoblockers. Classification. Mechanism of action. Effects. Indications. Contraindications. Adverse reactions.
13. Alpha- and beta-adrenoblockers. Effects. Indications. Contraindications. Adverse reactions.
14. Classification of medicines that influence the dopaminergic system. Dopaminomimetics, dopaminoblockers: mechanism of action, effects, indications.
15. Sympatholytics. Classification, mechanism of action, effects. Their influence on the cardiovascular system, the gastrointestinal tract, the CNS and the catecholamine content. Indications. Contraindications. Adverse effects.
16. Local anesthetics. Classification by mechanism of action. Effects. Comparative characteristic of drugs. Indications. Adverse reactions. Pharmacokinetics.
17. Astringent drugs. Classification. Mechanism of action, pharmacological effects. Indications.
18. Adsorbent drugs. Mechanisms of action, pharmacological effects. Indications.
19. Irritating drugs. Mechanisms of action, effects. Indications.
20. Mucilaginous drugs. Mechanism of action, pharmacological effects. Indications.

E. Independent work (is done in written form while preparing for the lesson)

- 1) To prescribe** the following drugs in all the possible medicinal forms:
1. Pilocarpine hydrochloride.
 2. Aceclidine.
 3. Cititone.
 4. Neostigmine.
 5. Galanthamine hydrobromide.
 6. Physostigmine salicylate.
 7. Trimedoxime.

8. Atropine sulphate. 9. Scopolamine hydrobromide. 10. Platyphylline hydrotartrate. 11. Hexamethonium. 12. Trepirium iodide. 13. Suxamethonium. 14. Melictine. 15. Metacine. 16. Pirenzepine. 17. Tubocurarine chloride. 18. Ipratropium bromide. 19. Trihexyphenidyl hydrochloride. 20. Adiphenine. 21. Tropicamide. 22. Norepinephrine hydrotartrate. 23. Epinephrine hydrochloride. 24. Salbutamol. 25. Dopamine. 26. Phentolamine. 27. Propranolol. 27. Reserpine. 28. Dobutamine. 29. Phenylephrine. 30. Prazosin. 31. Ephedrine hydrochloride. 32. Naphazoline. 33. Atenolol. 34. Nebivolol. 35. Carvedilol. 36. Procaine. 37. Lidocaine. 38. Benzocaine. 39. Tetracaine. 40. Medicinal charcoal. 41. Articaine. 42. Trimecaine. 43. Bupivacaine.

2) Drugs used in (for): glaucoma, urinary bladder atony, intestinal atony, intoxication with fly agaric mushrooms, 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, smoking cessation, intoxication with atropine containing plants, intestinal spasms, gastric ulcer disease with hypersecretion, fundoscopic eye examination, premedication, hypersalivation, prophylaxis of kinesis, skeletal muscle relaxation, tracheal intubation, bone fragments reposition, hypertensive crisis, controlled hypotension, bronchial asthma, acute hypotension, anaphylactic shock, asthma attacks, hypertensive crisis, heart failure, trophic ulcers of leg and foot, prostate adenoma, rhinitis, cardiogenic shock, myocardial infarction, migraine, metrorrhagia, cerebral circulatory insufficiency, pheochromocytoma, vascular spasms, hypertension, angina pectoris, cardiac arrhythmias, hyperthyroidism, endarteritis, hypoglycemic coma, conjunctivitis, acute respiratory infections, surface anesthesia, spinal anesthesia, epidural anesthesia, infiltration anesthesia, conduction anesthesia, treatment of wounds and burns, mucilaginous drug enema, treatment of myositis, acute intoxication.

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

4.) Clinical case (Guidelines for Laboratory Work in Pharmacology).

5.) Virtual situations (Guidelines for Laboratory Work in Pharmacology).

6.) Virtual didactic movie.

7.) Tables

Table 1

Pharmacological effects of sympathetic and parasympathetic stimulation

Organs and systems	Parameters	Effects of sympathetic stimulation	Effects of parasympathetic stimulation
Eye	Pupil diameter		
	Accommodation		
Heart	Heart rate		
	Strength of contraction		

	AV conduction		
	Automaticity		
Smooth muscles of blood vessels	Tone		
Smooth muscles of internal organs	Tone		
Exocrine glands	Secretion		

Note! The presence of the effect is marked with the "+"

Table 2

Mediators and receptors of efferent innervation

Type of nerve fibers	Released neurotransmitter	Sensitive receptors
Parasympathetic preganglionic		
Parasympathetic postganglionic		
Somatic		
Sympathetic preganglionic		
Sympathetic postganglionic		
Sympathetic fibers that innervate adrenal medulla		

Note! The presence of the effect is marked with the "+"

Table 3

Types, localization, and effects of stimulation of cholinergic receptors

Type of cholinergic receptors	Localization	Effects of stimulation
Nn	1. Ganglionic neurons 2. Neurons of the CNS 3. Adrenal medulla 4. Sinocarotid zone	
Nm	Skeletal muscles	
M1	1. CNS 2. Parietal cells	
M2	1. Heart 2. Presynaptic membrane	
M3	1. Smooth muscles of internal organs 2. Exocrine glands 3. Endothelium	

Note! The presence of the effect is marked with the "+"

Table 4

Types, localization, and effects of stimulation of adrenergic receptors

Type of adrenergic receptors	Localization	Effects of stimulation
Alpha 1	1. Radial muscle of the iris 2. Blood vessels	

Alpha 2	1. Blood vessels 2. Presynaptic membrane	
Beta 1	1. Heart 2. Juxtaglomerular apparatus	
Beta 2	1. Bronchi 2. Myometrium 3. Blood vessels 4. Liver 5. Presynaptic membrane	
Beta 3	Adipocytes	

Note! The presence of the effect is marked with the "+"

8.) Solve the case:

A patient suffering from hypertension, after a long-term treatment with a drug, complains of pain in the epigastric region, hypersalivation, congestion of the nasal mucosa. After the patient's investigation, the diagnosis of gastric ulcer was established.

Determine the group and the possible drug that the patient used.

What is the mechanism and cause of complication?

What groups and medications could be used to avoid this complication?