**REGIONAL AND PERIPHERAL VASODILATOR MEDICATION**

* **Medicines that improve coronary circulation (antianginal).**
* **Cerebral vasodilators. Peripheral vasodilators.**
* **Venotropic drugs.**

**A. Actuality.** Ischemic heart disease (angina pectoris, acute myocardial infarction) is one of the most common causes of patients’ disability and lethality. For the treatment of this pathology, are used drugs that improve coronary circulation, blood coagulability and myocardial metabolism. Also, cerebral and peripheral circulation disturbances constitute a considerable weight in medical practice, and for their treatment are used multiple drug groups with influence on vascular tone, blood coagulability, metabolic and energetic processes.

**B. The purpose of the training is:** The student must acquire basic knowledge in the field of antianginal drugs, emergency medical care issues (treatment of acces of angina pectoris, principles of medical treatment of acute myocardial infarction). Familiarizing the student with the pharmacology of cerebral and venotrope vasodilators.

**C. Learning objectives:**

1) The student must **know**: definition, classification, mechanism of action, effects, indications, contraindications and adverse reactions of antianginal drugs, cerebral, peripheral and venotrope vasodilators, principles of treatment of acute myocardial infarction, optimal routes of administration and principles of dose-setting according to situation.

2) The student must **be able to:** prescribe the main mandatory drugs in all possible drug forms, select medications depending on the disease and pathological conditions.

**D. Initial level of knowledge required for interdisciplinary integration:**

**Anatomy.** Arteries, veins, capillaries, anastomoses of the heart vessels. Pulmonary and systemic circulation. The age particularities of the heart and of the coronary circulation. Arteries and veins of the brain. Brain structure and innervation.

**Histology.** Cytochemical and functional features of the myocardium.

**Physiology** Circulating blood volume, systolic volume and minute-volume, blood return to the cord (preload), diastolic pressure in the left ventricle, peripheral resistance (afterload). Physiology of cerebral and peripheral circulation.

**Pathophysiology.** Parameters of heart failure: changes in systolic volume, minute volume, frequency and cardiac contractions, heart activity.

**Internal meticines.** Concept of ischemic heart disease. Risk factors for ischemic heart disease. The main clinical forms of angina pectoris (stable and unstable angina). Acute myocardial infarction.

**E. Self-training questions:**

1. Definition and classification of antianginal drugs that improve coronary circulation, blood coagulability and myocardial metabolism.

2. Organic nitrates. Pharmacokinetics. Mechanism of action. Influence on heart and hemodynamics. Indications. Adverse reactions. Contraindications.

3. The particularities of molsidomine. The comparative characteristic of nitrates and molsidomine.

4. Calcium channel blockers. Classification. Pharmacokinetics. Mechanism of anti-anginal action. Influence on heart and hemodynamics. Indications. Adverse reactions. Contraindications.

5. β-adrenoblockers as antianginal drugs and bradycardiac drugs. Classification. Mechanism of anti-angina action, effects. Indications and adverse reactions. Contraindications.

6. Musculotrope coronarodilators. Mechanism of action, effects. Indications. Adverse reactions.

7. Medicines that improve myocardial metabolism (cardioprotective). Mechanism of action, effects. Indications. Adverse reactions.

8. Drugs used in acces of angina pectoris.

9. Drugs used in the treatment of acute myocardial infarction. Principles of action.

10. Classification of drugs used in cerebral, peripheral and venotrophic circulation disorders.

11. Peripheral vasodilators. Classification. Mechanism of action, effects, indications and adverse reactions.

12. Classification of anti-ischemic cerebral vasodilators.

13. Myotropic vasodilators. Vinca minor alkaloids. Mechanism of action, effects, indications and adverse reactions.

14. Xanthine derivatives. Mechanism of action, effects, indications and adverse reactions.

15. Calcium channel blockers used as cerebral anti-ischemic agents. Mechanism of action, effects, indications and adverse reactions.

16. Broad-spectrum myotropic spasmolytics. Mechanism of action, effects, indications and adverse reactions.

17. Neurotropic vasodilators:

a) ergot alkaloids. Mechanism of action, effects, indications and adverse reactions.

b) α-adrenoblockers. Mechanism of action, effects, indications and adverse reactions.

c) β-adrenomimetics. Mechanism of action, effects, indications and adverse reactions. Contraindications.

d) Antiserotoninics. Mechanism of action, effects, indications and adverse reactions. Contraindications.

18. Classification of drugs that modified rheological properties of blood used in cerebral circulation disorders. Mechanism of action, effects, indications and adverse reactions.

19. Medicines with influence on cerebral metabolism, used in cerebral circulation disorders. Mechanism of action, effects, indications and adverse reactions.

20. Classification of antimigraine drugs. Characteristics of drugs used in acces and treatment of migraine.

21. Principles of the medical treatment of cerebral stroke (haemorrhagic and ischemic).

22. Classification of angioprotectors. Mechanism of action, effects, indications of vegetal, animal and synthetic medicines.

23. Venotropic drugs.

a) Venodilators

b) Venoconstrictive (venotonic) and venoprotective drugs. Mechanism of action, effects, indications.

c) Drugs used in the prophylaxis and treatment of venous thrombosis.

d) Venosclerotherapy. Principles of drug therapy.

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

**1.) Brief characteristics of compulsory drugs:**

**Down:**Drug name. 1. Nitroglycerin. 2. Dipiridamol. 3. Isosorbide dinitrate. 4. Molsidomine. 5. Vinpocetine. 6. Pentoxifylline. 7. Cinarizine. 8. Nicergoline. 9. Xanthinol nicotinate. 10. Piricarbat. 11. Sumatriptan. 12. Ravimig. 13. Troxerutin.

***Medicines with action related to the topic, to be foreseen in the previous compartiments***:1. Propranolol. 2. Verapamil, 3 Nifedipine. 4. Nebivolol. 5. Phentolamine. 6. Piracetam.

**Across:** 1. Medicinal form. 2. Way of administration. 3. Doses (therapeutic, maximal for one intake and for 24 hours). 4. Spectrum of action 5. Mechanism of action. 6. Indications and contraindications. 7. Side effects.

**2.) Questions on medical prescriptions.**

**To prescribe** the following drugs in all the possible medicinal forms**:**

1. Nitroglycerin. 2. Dipiridamole. 3. Isosorbide dinitrate. 4. Molsidomine.5. Vinpocetine. 6. Pentoxifylline. 7. Cinarizine. 8. Nicergoline. 9. Xanthinol nicotinate. 10. Piricarbat. 11. Sumatriptan. 12. Ravimig. 13. Troxerutin.14. Propranolol. 15. Verapamil. 16 Nifedipine. 17. Nebivolol. 18. Phentolamine.19. Piracetam.

**Drugs used in (for):**

Acute myocardial infarction, pain control in acute myocardial infarction, thrombosis prophylaxis in acute myocardial infarction, acces of angina pectoris, prophylaxis of angina pectoris access, migraine attacks, migraine treatment, hypertensive encephalopathy, vestibular-cochlear disorders, ischemic stroke, chronic circulatory cerebral failure, sequelae of cerebral trauma, Raynaud's syndrome, obstructive endartritis, cerebral atherosclerosis, ischemic ophthalmologic disorders, chronic venous failure, trophic ulcers of the lower limbs.

**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

**Mechanism of action of various groups of antianginal drugs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Principles of treatment of  ischemic cardiopathy  of myocardium | Effects | Nitrates | β-AB | Ca-channel blockers | Dipiridamol |
| Reducing the need of myocardium in O2 by: | Decreasing the preload |  |  |  |  |
| Decreasing the afterload |  |  |  |  |
| Decreasing the FHR |  |  |  |  |
| Increase O2 supply to myocardium by: | Dilatation of large-sized coronary vessels |  |  |  |  |
| Dilatation of small-sized coronary vessels |  |  |  |  |
| Improvement of subendocardial circulation |  |  |  |  |
| Blocking central levels of coronary artery reflexes |  |  |  |  |

Note: mark the presence of the effect using the sign “+”.

Table 2

**Side effects of antianginal drugs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Adverse reactions | Nitroglycerin | Propranolol | Verapamil | Nifedipine | Dipyridamole |
| Headache |  |  |  |  |  |
| Dizziness |  |  |  |  |  |
| Tachycardia |  |  |  |  |  |
| Bradycardia |  |  |  |  |  |
| Hypotension |  |  |  |  |  |
| Bronchospasm |  |  |  |  |  |
| Maleolar edema |  |  |  |  |  |
| Hyperremia of the face skin |  |  |  |  |  |
| The "theft" phenomenon |  |  |  |  |  |
| Rebound effect |  |  |  |  |  |

Note: mark the presence of the effect using the sign “+”.

Table 3

**Groups that are used in the treatment of acute myocardial infarction**

|  |  |  |
| --- | --- | --- |
| The aims of pharmacotherapy | The drug group | Medicines |
| Removal of pain syndrome |  |  |
| Removal of arrhythmias |  |  |
| Prophylaxis and treatment of thrombosis |  |  |
| Stimulation of the contractile function of myocard |  |  |
| Improvement of cardiac circulation |  |  |
| Pulmonary edema therapy |  |  |

Table 4

**The comparative characteristic of organic nitrates**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameters | | Medicinal form | Route of administration | Onset of action  (sec,min) | Duration of action (min,ore) | Indications |
| Drugs  with nitroglycerin | Ntroglycerine |  |  |  |  |  |
| Nitromint |  |  |  |  |  |
| Trinitrolong |  |  |  |  |  |
| Sustac-forte |  |  |  |  |  |
| Nitrong-forte |  |  |  |  |  |
| Nitrogranulong |  |  |  |  |  |
| Nitro |  |  |  |  |  |
| Nitrodisc |  |  |  |  |  |
| Drugs  with isosorbide dinitrate | Nitrosorbit |  |  |  |  |  |
| Cardiket |  |  |  |  |  |
| Isoket retard |  |  |  |  |  |
| ISOMAC retard |  |  |  |  |  |
| Drugs  with isosorbide mononitrate | Monosan |  |  |  |  |  |
| Olicard retard |  |  |  |  |  |

Table 5

**Tissue selectivity of calcium channel blockers**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Chemical structure | Medicines | Predominant blockage of calcium channels | | |
| Cardiomyocytes | Peripheral arterial vessels | Cerebral arterial vessels |
| Dihydropyridine derivatives |  |  |  |  |
| Phenylalkylamines derivatives |  |  |  |  |
| Benzodiazepine derivatives |  |  |  |  |
| Diphenylpiperazine derivatives |  |  |  |  |

Note! The presensce of the effect is marked with „++” – maximum effect; „+” –less than maximum effect.

**8.) Solve the case:**

A patient experienced a severe pain in the heart region. He used a medicine. Access of pain has disappeared, but vertigo, weakness immediately occurred, the patient lost consciousness. The examination showed an acute hypotension.

What medicine did the patient use?

What is the cause of acute hypotension?

A patient was hospitalized with symptoms of cerebral circulatory disturbances and heavy and frequent headache. As a result of the examination, was established a migraine status.

What medications will you use for headache treatment and the systematic treatment of migraine?