

Ministry of Health of the Republic of Belarus
Education Establishment
"Gomel State Medical University"
Normal Physiology Department

It was discussed at the department meeting 30.08.16
The protocol № 8

METHODICAL INSTRUCTION

for carrying out classes by teachers with the 2nd course students
of Faculty for training specialists for foreign countries (teaching in English)
on normal physiology

Topic: Concluding class on the section "Physiology of cardiovascular system"

General time of the class 4 hours.

**1. THE STUDYING AND EDUCATIONAL PURPOSES, THE MOTIVATION FOR
ASSIMILATION OF THE SUBJECT, REQUIREMENTS TO THE INITIAL LEVEL OF
KNOWLEDGE**

Purposes of the class

To generalize and fix at students the idea of functioning of cardiovascular system, physiological properties and features of myocardium, mechanisms of hemodynamics and regulation of work of the heart and vessels.

Motivational characteristic of the subject

The student has to fix knowledge of functioning of cardiovascular system, hemodynamics mechanisms. To know properties and features of myocardium. To be able to characterize an electrocardiogram of the healthy person, to measure arterial pressure. To have modern ideas of methods of cardiovascular system research. The student has to own knowledge of reflex and humoral mechanisms of a regulation of work of the heart and vessels.

Tasks of the class

The checking of level of students' knowledge on the subject "Physiology of cardiovascular system".

As a result of carrying out the class the student has to:

To know:

- morphofunctional characteristic of heart and vessels;
- physiological properties and features of myocardium;
- hemodynamics mechanisms;
- reflex and humoral mechanisms of regulation of work of the heart and vessels;
- functional methods of research of cardiovascular system;
- the basic concepts and terms on subjects of the class;
- basic physiological constants on subjects of the class.

To be able:

- to estimate the functional condition of cardiovascular system

2. CONTROL QUESTIONS ON THE CLASS SUBJECT:

1. The role and the place of circulation in an organism. Structurally functional characteristic of the blood circulatory system. Myocardium. Physiological properties of a contractile myocardium.
2. Ratio of excitability, exaltation and contraction of myocardium. Action potential of cells of contractile myocardium, its phase and ionic mechanisms, role of calcium ions. Laws of heart contraction. Reaction of a cardiac muscle to an additional irritation. A concept about an extrasystole (ventricular, atrial).
3. A structure and functions of the conducting system of heart. The course of distribution of exaltation on the conducting system of heart. Automaticity mechanisms. Action potential of pacemaker cells. Automaticity gradient.
4. Cardial cycle, its phase structure. Work of heart. Systolic and minute volumes of a blood. Cardial index
5. Mechanical and sound manifestations of cardiac activity. Cardiac tones, their genesis. Position of valves in various phases of cardiac cycle.
6. Electrocardiography. Types of leads. Origin of the ECG components. ECG diagnostic value.
7. Regulation of cardiac activity (intracardiac and extracardiac mechanisms). Regulated parameters of pump function of heart (HR, SV, MVB).
8. Mechanisms of reflex regulation of cardiac activity. Reflexogenic zones and their value in regulation of work of the heart. Effector mechanisms of regulatory influences on work of heart (characteristic of influence of parasympathetic and sympathetic nervous fibers and their mediators on work of the heart).
9. Humoral mechanisms of regulation of cardiac activity: influence of catecholamines, angiotensin, electrolytes and metabolites on work of heart.
10. Morphological and functional classification of blood vessels. The factors providing the movement of blood on vessels of high and low pressure.
11. Fundamental laws of hemodynamics. Linear and volumetric rates of blood flow in various arias of blood channel and factors them causing.
12. Blood pressure, its types and role. Techniques of hemodynamometry. Blood pressure in various areas of vascular channel. The factors determining the size of the arterial pressure (AP). A concept about normal parameters of AP, age changes of the AP.
13. Arterial pulse, its origin and clinical-physiological characteristics. Sphygmography, analysis of a sphygmogram. Rate of distribution of a pulse wave.
14. Blood flow in veins, the factors causing venous return of blood to heart. Blood pressure in veins. Central venous pressure, techniques of its research. Venous pulse. Analysis of a phlebogram.
15. Metabolic vessels, characteristic of microcirculation. Capillary blood flow and its features. Mechanisms of transcapillary exchange of liquid and various substances between a blood and tissues. Equation of Starling. Filtration and reabsorption of liquid in capillaries.
16. Reflex mechanisms of regulation of a vascular tonus. Vasomotor center, its afferent and efferent communications. The major reflexogenic zones.
17. Humoral regulation of vascular tonus. Vasoconstrictive and vasodilating endogenic substances. (hormones, biogenic amines, kinin system, metabolites, endothelial factors, prostaglandins. Myogenetic regulation of tonus of vessels
18. The functional system providing regulation of systemic arterial pressure. Nervous and humoral regulation of arterial blood pressure. Renin —angiotensin — aldosteron system (RAAS). Short-term intermediate and long-term mechanisms of regulation of the systemic AP and VCB.
19. Lymph and lymphokinesis. Lymphization. Structure of a lymph. Movement of a lymph. Role of lymph nodes.

3. THE COURSE OF THE CLASS

- *Introduction:* The teacher answers questions of students which have caused certain difficulties in the course of independent mastering of education material;

- *Check of level of knowledge of basic physiological constants of the section "Physiology of cardiovascular system".* The teacher distributes to students forms with constants and asks to fill in them.

- *Computer testing* is held in a computer class on the questions of the section.

- *Preparation for check of level of theoretical knowledge.* The teacher distributes to students the tickets containing two theoretical questions.

- *Control of level of theoretical knowledge* of students, is carried out by method of individual poll.

- *Preparation for check of level of practical skills.* The teacher distributes to students the tickets containing two questions on practical skills.

- *Control of level of knowledge of practical skills* of students, is carried out by method of individual poll with the subsequent performance of laboratory works.

- *Summing up, exposure of estimates.* At the end of the class the teacher makes the conclusion about the level of knowledge of students, focuses attention on the general mistakes made by students at answers to theoretical questions and when performing laboratory works.

Note: time of breaks is 15 minutes during a class.

LITERATURE

Basic

1. Human physiology: textbook for overseas students = Физиология человека: учеб. пособие для иностранных студентов, обучающихся на английском языке / А. И. Киеня [и др.]; под ред. проф. Э. С. Питкевича; пер. на англ. яз. Р. А. Карпов, В. А. Мельник. — Гомель: УО ГомМУ, 2009. — 352 с.

2. Text of lectures.

Alternate

1. Textbook of medical physiology // C. Guyton, 2006. — 1116 p.

2. Human anatomy and physiology // Alexander P., Spence-Elliott B. Masson.

3. Human physiology. The mechanisms of body function // Arthur J. Vander James H Sherman Dorothy S. Luciano, 1986. — 715 p.

4. Lecture notes on human physiology // John J Bray, Patricia A. Cragg, Anthony D.C. Macknight, Roland G. Mills and Douglass W. Taylor.

5. Human anatomy and physiology // Elaine N. Marieb, 1989. — 995 p.

6. Review of medical Physiology, International edition, 2003. — 912 p.