

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: Heart cycle. Heart tones. Systolic and minute volumes of blood.

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**

Motivational characteristic of the subject

To study haemodynamic function of heart. To carry out the phase analysis of a heart cycle. To master standard indicators of hemodynamic function of heart at rest and in case of physical activity: systolic volume (SV), MVB.

Purposes of the class

Functional condition of heart work is evaluated by various external manifestations of his activity which are followed by a number of mechanical and sound effects. The research of these manifestations and their analysis is one of the most important methods of assessment of a functional condition of heart.

Tasks of the class

To study the sequence of phases and the periods of cardiac cycle, and also main indicators of a functional condition of heart. To define diagnostic value of the used methods at the level of knowledge.

As a result of the given class the student has to

To know:

– ways of definition by calculation way of systolic and minute volumes of blood, duration of a cardiac cycle on pulse.

To be able:

– to give an assessment of a condition of cardiovascular system, to master skills of listening of cardiac tones.

2. CONTROL QUESTIONS FROM RELATED SUBJECTS:

1. Heart structure.
2. Heart innervation.
3. An arrangement of clack-valves and semilunar valves in heart and vessels.

3. CONTROL QUESTIONS ON THE CLASS SUBJECT:

1. Pump functions of heart. Regulation of indicators of pump function of heart, heart rate, a systolic volume, minute volume of blood flow in the conditions of relative rest and at physical exercise. Comparative characteristic of pump function of the right and left ventricle.

1.1. Cardiac cycle. Sequence of the periods and phases of cardiac cycle. Work of heart.

1.2. Cardiac emission, its fractions.

1.3. Systolic and minute volumes of blood. Cardiac index.

1.4. Mechanical and sound implications of cardiac activity. Cardiac tones, their genesis. Position of valves in various phases of a cardiac cycle.

1.5. Polycardiography. Comparison in time of the periods and phases of cardiac cycle, ECG and FCG and mechanical manifestations of cardiac activity.

2. Regulation of cardiac activity.

2.1. Intracardiac regulatory mechanisms (myogenetic regulation).

2.2. Extracardiac regulatory mechanisms.

2.2.1. Reflexogenic zones, their value in regulation of action of the heart.

2.2.2. Nervous regulation, influence of sympathetic and parasympathetic nervous fibers and their mediators on action of the heart.

2.2.3. Humoral mechanisms of regulation of cardiac activity: influence of catecholamins, angiotensin, electrolytes and metabolites on work of heart.

Questions for independent studying

1. Tones of heart, their genesis and diagnostic value.

2. Humoral regulation of heart activity.

4. PRACTICAL PART OF THE CLASS

Laboratory work 20.1. Definition of cardiac cycle duration in person by pulse

Laboratory work 20.2. Auscultation of cardiac tones.

Laboratory work 20.3. Influence of physical exercise on systolic and minute volumes of blood.

Laboratory work 20.4. Danini-Achner's ocular-cardiac reflex

5. THE COURSE OF THE CLASS

- *Introduction*: Students ask the teacher questions which caused certain difficulties in the course of independent mastering of educational material;

- *Requirement to the initial level of knowledge*: from sections of anatomy students have to know heart structure, its innervation, position of clack-valves and semilunar valves.

- *Assessment of level of knowledge of students*: The student answers control questions on the class subject "Cardiac cycle. Cardiac tones. Systolic and minute volumes of blood". Questions of a heart innervation, position of clack-valves and semilunar valves considered. The teacher corrects answers of students on a subject;

- *Statement of problems which will be solved by students*: The teacher sets a task to master listening of cardiac sounds at the level of ability, at the level of knowledge to master determination of volumes of cardiac emission, duration of cardiac cycle.

- *Independent performance of tasks by students*: - students make out the protocol of laboratory work with the subsequent discussion of a technique of its performance:

- students perform practical work under control of the teacher or laboratory assistant. For work performance students are provided with methodical guiding, phonendoscopes, tonometers, a stop watch. Presentation is provided by tables, drawings, a slide projector;

- students read reports with the subsequent discussion;

- *Assessment of final level of knowledge of the class subject*: The teacher specifies the final level of knowledge of students of theoretical and practical questions, the basic concepts and terms, and also knowledge of basic physiological constants of the class subject;

- *Fixing of knowledge of students*: Students solve situational problems of a subject of the class and answer test questions;

- *The conclusion of the teacher and a task to the next class:* At the end of the class the teacher becomes the conclusion of the carried-out work becomes, students receive home task for independent work. Summing up is carried out and protocols of experience are signed.

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

6. QUESTIONS FOR SELF-CHECKING OF KNOWLEDGE

1. At the healthy person at physical exercise systolic blood pressure moderately raised and diastolic blood pressure little decreased. What is mechanism of this phenomenon?
2. How will pulse pressure change at decrease of elasticity of aorta and large arteries?
3. Why does character of a sound at each person have individual character when listening cardiac tones by auscultation?
4. As pressure in pulmonary artery is significantly lower, than in aorta, the systolic volume of a right ventricle is more, than left. Is it so?
5. Massage of a neck in the area of carotid sinus at the patient with paroxysmal tachycardia is often effective and stops an attack. Why?

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 ГoГМУ, 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.