

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: Mechanisms of respiratory movements. Pulmonary volumes and capacities

The general time of the class – 4 hours

1. THE STUDYING AND EDUCATIONAL PURPOSES, MOTIVATION FOR ASSIMILATION OF THE TOPIC, REQUIRMENT TO THE INITIAL LEVEL OF KNOWLEDGE

Purpose of the class

To get acquainted with the basic data on physiological essence of respiration and its main stages, to study the most important physiological patterns of functioning of the device of external respiration.

Motivational characteristic of the topic

The research of external respiration is the important diagnostic indicator allowing to determine pulmonary volumes and capacities, and also to compare the received results with normal indicators. Therefore the medical student has to master techniques of pneumotachometry and spirometry.

Tasks of the class

In the course of the class students have to master at the level of knowledge techniques of definition of external respiration indicators by means of pneumotachometry, spirometry and to give their corresponding assessment. As a result of the given class the student has to

To know:

- sequence of processes of gas exchange;
- adaptive features of lungs for respiration;
- respiration types, its frequency;
- surfactant role in change of surface tension of alveoli;
- the basic concepts and terms on the topic of the class.

To be able:

- to determine pulmonary volumes and capacities, methods of their measurement;
- to count MVR, MVL.

2. CONTROL QUESTIONS FROM RELATED SUBJECTS:

1. Structure of an aerohematic barrier.
2. The factors which are taking part in gas exchange.

3. CONTROL QUESTIONS ON THE CLASS TOPIC:

1. Value of respiration for an organism. Sequence of processes of gas exchange. External and internal respiration. Adaptive features of lungs for respiration. Not respiratory functions of lungs.

2. Physiological role of respiratory tracts and lungs. Respiratory cycle. Respiratory movements. Mechanism of inspiration and exhalation. Respiration types, its frequency.

3. Elastic traction and elastic properties of thorax and lungs. Surfactant, its role in change of surface tension of alveoli. Pressure in pleural cavity, its origin, size and physiological value. Pneumothorax.

4. Indicators of external respiration - pulmonary volumes and capacities and methods of their measurement. Anatomic and functional dead space.

5. Alveolar ventilation. MVR. MVL.

Report:

Pressure in pleural cleft, its origin, size, physiological value. Pneumothorax.

4. PRACTICAL PART OF THE CLASS

14.1. Spirometry. Definition of vital capacity of lungs and its volumes.

6. THE COURSE OF THE CLASS

- *Introduction:* The teacher answers questions of students which caused certain difficulties in the course of independent development of a training material;

- *Requirement to the initial level of knowledge:* From sections of anatomy, biophysics and histology students have to know the morphofunctional characteristic of respiratory system.

- *Correction of initial level of knowledge:* The teacher checks and supplements the initial level of knowledge of students of theoretical and applied questions on a class topic "Respiration physiology. Mechanism of respiratory movements. Pulmonary volumes". In this section questions of essence of processes of respiration, mechanics of respiratory movements, pressure in pleural cavity, pulmonary volumes and capacities are considered. The teacher corrects answers of students on the considered topic;

- *Statement of problems which will be solved by students:* The teacher sets a task to master at the level of ability technology of determination of respiratory volumes and capacities by methods of pneumotachometry and spirometry.

- *Independent performance of tasks by students:*

- students make out the protocol of the class with the subsequent discussion of techniques of performance;

- students perform practical works under control of the teacher and laboratory assistant. For work performance students are provided with methodical guiding, pneumotachometers, water and dry spirometers. Presentation is provided by tables, drawings;

- students read reports on the class topic with the subsequent their discussion;

- *assessment of final level of knowledge of the class topic:* 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 topic;

- *Viewing of the video*

- *Fixing of knowledge:* The teacher suggests students to solve several situational problems of a topic of class and to answer test questions;

- *The conclusion of the teacher and a task for the next class.* At the end of class the teacher becomes the conclusion about the carried-out work and offers students home task for independent work. Then summing up class and signing of protocols of experience, and also assessment of practical skills in a leaf of their account is carried out.

Note: time of breaks of 15 minutes during the 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 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.