

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: Physiology of spinal cord and brain stem

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**

Purpose of the class

To create idea of functions of spinal cord, medulla, midbrain, reticular formation, cerebellum, intermediate brain, their interrelation. To study participation of these structures in implementation of sensor, motor, vegetative, integrative and conduction functions, to study the nature of violations of functions at damage of each of these structures. To learn to use the gained theoretical knowledge for assessment of condition of functions of CNS separate structures.

Motivational characteristic of the subject

The qualified doctor-specialist needs to know participation of CNS structures in implementation of sensor, motor, vegetative, integrative and conduction functions, to give an assessment to violations of functions at damage of each structure.

Tasks of the class

To study morpho-functional features of spinal cord, medulla, midbrain, reticular formation, cerebellum, intermediate brain, their interrelation.

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

To know:

- morpho-functional features of spinal cord, medulla, midbrain, reticular formation, cerebellum, intermediate brain, their interrelation;
- the basic concepts and terms on the class subject,
- features of sensor and motor functions at the person in conditions of:
 - a) final and partial fracture of communications between spinal cord and brain (the spinal patient),
 - b) destructions of communications of brain stem with intermediate brain, subcortical structures and cerebral cortex (mesencephalic patient),
 - c) dysfunction of cerebellum or removal of cerebellum

To be able:

To estimate redistributive vascular reactions of an organism by method of rheovasography.

2. CONTROL QUESTIONS FROM RELATED SUBJECTS:

1. Morphological organization of spinal cord.
2. Conductive ways of spinal cord.
3. Localization of nuclei of craniocerebral nerves in CNS.

3. CONTROL QUESTIONS ON THE CLASS SUBJECT:

1. Spinal cord.
 - 1.1. Morpho-functional organization of spinal cord.
 - 1.2. Reflex and conductive functions of spinal cord. The law of Bella-Mazhandi.
 - 1.3. Spinal mechanisms of regulation of muscular tone and phase movements. Clinically important spinal reflexes. Spinal shock.
2. Brain stem.
 - 2.1. Medulla and pons varolii, their centers and participation in processes of self-control of functions.
 - 2.2. Midbrain. Reflex and conduction functions. Decerebrate rigidity.
 - 2.3. The reticular formation of brain stem, its descending influences on activity of spinal cord and the ascending influences on cortex.
3. Intermediate brain.
 - 3.1. Thalamus. Nonspecific and specific nuclei. Participation of thalamus in formation of pain sensitivity.
 - 3.2. Hypothalamus - the highest subcortical vegetative center.
4. Cerebellum, his role in coordination of motor and vegetative reactions.
5. Multilevel system of regulation of muscular tone, pose and movements. The role of cerebellum, basal nuclei and cerebral cortex in mechanisms of maintenance of muscular tone, poses and implementation of movements.

Questions for independent studying

1. Diagnostic value of reflex activity of spinal cord.

Report:

1. Consequences of injury of spinal cord. Spinal shock.

4. PRACTICAL PART OF THE CLASS

Laboratory work 9.1. Examination of redistributing vascular reactions of the organism by rheovasography method.

5. THE COURSE OF THE CLASS

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

- *Requirements to the initial level of knowledge*: from sections of anatomy, histology, biophysics students have to know a structure of the main structures of CNS, the conductive ways of CNS.

- *Correction of the initial level of knowledge*: The teacher checks preparation of students according to the set section "CNS Physiology", supplements, specifies answers, the basic concepts and mechanisms of activity.

- *Setting of problems which will be solved by students*: - The teacher sets the task to master a technique of research of mechanisms of redistributive vascular reactions by means of rheovasography.

- *Independent performing of tasks by students*:

-students make out the protocol of laboratory work with the subsequent discussion of its performance techniques:

-students perform practical work under monitoring of the teacher and laboratory assistant,

For work performance students are provided with methodical guiding. Presentation is presented by tables, drawings, a slide projector;

- students report papers on the class subject with the subsequent discussion;

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

- *Fixing of knowledge:* The teacher suggests students to solve several situation-dependent problems on the class subject, to pass computer test on the class subject; viewing of the video movie;

- *The conclusion of the teacher and the task to the next class:* At the end of the class the teacher makes the conclusion about the carried-out work and tells students the home task for the independent work. Then summing up the results of the class and signing of experience protocols and also an assessment of practical skills in an account leaf is carried out.

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

6. QUESTIONS FOR SELF-CHECKING OF KNOWLEDGE

1. After a trauma the person had an involuntary urination. At what level in CNS localization of damage is supposed and what causes the infringement of function?

2. At the person the trauma was resulted by unilateral injury of a spinal cord. What can be the consequences?

3. What nervous centers and the functions which are carried out with their participation are vital, where are these centers localized?

4. At the request of the doctor the person tries to touch nose tip by a forefinger (blindly) and misses. What department of a brain is damaged?

5. With violation of formation of what mediator is the disease parkinsonism connected?

6. After a cerebral hemorrhage at the person the speech was gone. What is the localization of a stroke, if the person – the right-handed person?

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.