

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: Hormonal regulation of physiological functions

The general time of the class – 4 hours

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

Purpose of the class

To form at students idea of functions of endocrine glands, classification and properties of hormones, mechanisms of action and physiological role of hormones of adrenals, gonads, epiphysis, thymus, and also gastrointestinal hormones.

Motivational characteristic of the topic

Chromaffin cells of medullar layer of adrenals produce catecholamines the adrenalin and noradrenalin coming to a blood stream. Their secretion at rest is small. It rises in the conditions exciting a sympathetic nervous system. The various stimuli operating on various receptors (baroreceptors, thermoreceptors) are capable to increase secretion. Rising of concentration of catecholamines in a blood flow leads to rising of the arterial pressure (AP) and heart rate (HR). The rhythmic method of contraception is based on presumable definition of time of an ovulation which is observed at most of women for the 14th day of a menstrual cycle, and on continence from the sexual relations during possible offensive of conception (from the 10th to the 14th day of a 28-dnevny menstrual cycle). At the correct use and a regular cycle efficiency of this method approaches 90%. The medical student has to master a technique of influence of thermal procedures on activity of medullar layer of adrenals, construct and analyze a scale of conceptions at menstrual cycles of various duration.

Tasks of the class

To study classification, properties, mechanisms of action and physiological role of hormones. At performing laboratory work students have to get acquainted with a technique of definition of probable days of conception on a menstrual cycle, study influence of thermal procedures on functions of medullar layer of adrenals.

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

To know:

- mechanisms of action of hormones and effects caused by them. Regulation of secretion of hormones;
- characteristic manifestations of hyperfunction and hypofunction of secretion of hormones;

- mechanisms of action and physiological role of hormones of adrenals, gonads, epiphysis, thymus, gastrointestinal hormones;
- the basic concepts and terms on the topic of the class.

To be able:

- to define influence of thermal procedures on functions of medullary layer of adrenals;
- to define probable days of conception by a menstrual cycle.

2. CONTROL QUESTIONS FROM RELATED SUBJECTS:

- 1 Endocrine, exocrine and glands of the admixed secretion.
- 2 Ways of storage and removal of a secret from cells.
- 3 Classification of glands.

3. CONTROL QUESTIONS ON THE CLASS TOPIC:

1. Adrenals. Hormones of cortical substance of adrenals. Mechanisms of effect of hormones and effects caused by them. Regulation of secretion of hormones. Characteristic manifestations of excess or insufficient secretion of hormones.
2. Hormones of medullary layer substance of adrenals. Mechanisms of effect of hormones and effects caused by them. Regulation of secretion of hormones. Characteristic manifestations of excess or insufficient secretion of hormones.
3. Gonads. Androgens and their physiological role. Mechanisms of regulation of secretion of hormones. Characteristic manifestations of excess or insufficient secretion of hormones.
4. Estrogens and their physiological role. Mechanisms of regulation of hormones secretion. Hormone of a yellow body progesterone, physiological role. Hormones of placenta.
5. The regulation of homeostasis of calcium and phosphorus in an organism. Influence of calcitonin, parathormone and D3 vitamin on exchange of calcium and phosphorus. The daily need for calcium and sources of its entering in an organism. Hypo - and hyperparathyreosis.
6. Endocrine function of epiphysis and thymus.
7. Hormones of gastro-intestinal system and physiological role.

Questions for independent studying

1. Participation of endocrine glands in adaptive activity of an organism. General adaptive syndrome, stress.
2. Hormonal regulation of puberty.
3. Hormonal regulation of physiological functions at people of elderly age.

4. PRACTICAL PART OF THE CLASS

Laboratory work 13.1 Influence of thermal procedures on the activity of medullary layer of adrenal glands

Laboratory work 13.2. The analysis of a scale of conceptions at menstrual cycles of various duration.

Demonstration of virtual works:

1. Influence of thyroxine, thyrotropin and propylthiouracil on metabolism.
2. Influence of insulin and alloxan on glucose level in blood.

5. THE COURSE OF THE CLASS

- *Introduction*: the teacher answers questions of students which caused certain difficulties in the course of mastering of a training material.

- *Requirement to the initial level of knowledge*: from sections of anatomy, histology and biochemistry students have to know the morphofunctional characteristic of endocrine system. By preparation of control questions students have to give in workbooks the main definitions on a topic.

- *Check and correction of initial level of knowledge*: the teacher checks and supplements the initial level of knowledge of students of theoretical and applied questions on the topic "Endocrine

system, physiological role and regulation of formation of hormones". At this section functions of endocrine glands, classification, properties, mechanisms of action and the physiological role of hormones are considered. The teacher corrects answers of students on the considered topic.

- *Statement of problems which will be solved by students*: The teacher sets the task to study the technique of definition of probable days of conception on a menstrual cycle, study influence of thermal procedures on functions of medullar layer of adrenals.

- *Independent performance of tasks by students*:

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

- students perform practical work under control of the teacher or laboratory assistant.

- *Assessment of final level of knowledge of topic of the class*: The teacher specifies the final level of students knowledge of theoretical and practical questions, the basic concepts and terms.

- *Viewing of the video "Endocrine System"*.

- *Fixing of knowledge*: The teacher suggests students to solve several situational problems of the topic of the class, to pass computer test.

- *The conclusion of the teacher and a task for the next class*: At the end of the class the teacher does 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 is carried out.

Note: time of breaks of 15 minutes during the class.

6. QUESTIONS FOR SELF-CHECKING OF KNOWLEDGE

1. Call an endocrine gland which possess the leading role in adaptation of an organism to action of adverse factors (stress factors). List four corresponding hormones?

2. What are the main effects of catecholamines and through what adrenergic receptors are they mediated?

3. What types of disturbances of endocrine functions exist?

4. How can arterial pressure change under the influence of prostaglandins and why?

5. Main physiological effects of melatonin?

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.