

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 session on sections: "Endocrine system", "Respiration physiology"

The general time of the class – 4 hours

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

Purpose of the class

To generalize and consolidate at students idea of functions of endocrine glands, classification and properties of hormones, mechanisms of action and physiological role of hormones, functioning of respiratory system, mechanisms of respiratory movements and regulation of respiratory activity.

Motivational characteristic

The student has to set knowledge about mechanisms of action and role of hormones of endocrine system, about functioning of respiratory system, mechanisms of respiratory movements, indicators of external respiration. To know features of transport of gases by blood. To be able to estimate human height in comparison with the prognosticated body height calculated on the basis of the average height of his parents, to characterize the curve of dissociation of oxyhemoglobin. To have modern ideas of structure and localization of the respiratory center. The student has to have knowledge of reflex and humoral mechanisms of respiration regulation, features of respiration in different conditions.

Tasks of the class

Check of level of knowledge of students of the subjects "Endocrine System", "Respiration Physiology".

As a result of the given class the student has to

To know:

- structure and functions of endocrine glands, classification and properties of hormones;
- methods of researches of endocrine system;
- mechanisms of action and physiological role of hormones of pituitary gland, thyroid gland, parathyroid glands, adrenals, pancreas, gonads, epiphysis, thymus, gastrointestinal hormones.
- morphofunctional characteristic of respiratory organs;
- mechanisms of respiratory movements, indicators of external respiration;
- features of transport of gases by blood;
- structure and localization of the respiratory center;
- reflex and humoral mechanisms of respiration regulation;
- methods of researches of functioning of respiratory system;
- the basic concepts and terms on the class topic;

– basic physiological constants on the class topic.

2. CONTROL QUESTIONS ON THE CLASS SUBJECT:

1. A concept about endocrine glands. General characteristic of endocrine glands, their functions. Interaction of nervous and humoral mechanisms of the regulation of functions at the hypothalamic level.

2. Hormones, their chemical nature, classification and properties. Mechanisms of the reception of hormones and their action on cells targets. Daily frequency. The principles of interrelations in endocrine system.

3. Hormones of anterior lobe of the hypophysis and their physiological role. Regulation of function of adenohypophysis. Role of hypothalamic factors. Effects hypo - and hyperproductions of separate hormones of adenohypophysis.

4. Hormones of medium and posterior lobe of the hypophysis, their physiological role. A hypothalamus role in a regulation of function of neurohypophysis.

5. Thyroid gland, its structural organization. The iodated hormones (T3 and T4), their biosynthesis, transport a blood, a physiological role. Influence of hormones of thyroid gland on processes of body height and development of CNS. Participation of thyroid hormones in adaptation processes. Regulation of secretion of hormones.

6. Hyper- and hypothyroid states. Cretinism, myxedema. Bazedov's disease. Physiological hyperfunction of thyroid gland. Endemic goiter and its prevention.

7. Contours of neurohumoral regulation of function of thyroid gland. Methods of diagnostics of functional condition of thyroid gland.

8. 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 a hyperparathyreosis.

9. Adrenals. Hormones of cortical substance of adrenals. Mechanisms of action of hormones and effects caused by them. Regulation of secretion of hormones. Characteristic manifestations of excess or insufficient secretion of hormones.

10. Hormones of medullary layer substance of adrenals. Mechanisms of action of hormones and effects caused by them. Regulation of secretion of hormones. Characteristic manifestations of excess or insufficient secretion of hormones.

11. Endocrine function of pancreas. A role of hormones of pancreas in regulation of carbohydrate, fat and protein metabolism. Regulation of the secretion of hormones. A concept about hypo - and hyperglycemia states and their reasons.

12. Gonads. Androgens and their physiological role. Mechanisms of regulation of secretion of hormones. Characteristic manifestations of excess or insufficient secretion of hormones.

13. Estrogens and their physiological role. Mechanisms of regulation of hormones secretion. Hormone of yellow body progesterone, physiological role. Hormones of placenta.

14. Endocrine function of epiphysis and thymus.

15. Hormones of gastro-intestinal system and physiological role.

16. 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.

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

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

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

20. Alveolar ventilation. MVR. MVL.

21. Gas exchange in lungs. Partial pressure of oxygen and carbon dioxide in the inhaled, alveolar and exhaled air. Voltage of gases in blood. The factors influencing on process of diffusion of oxygen and carbon dioxide between alveolar air and a blood. Ventilation-perfusion coefficient. Diffusion ability of lungs for gases.

22. Oxygen transport by blood. Transport forms of oxygen by blood. Analysis of dissociation curve of oxyhemoglobin. The factors influencing affinity of hemoglobin to oxygen, their physiological value. Oxygen capacity of blood.

23. Transport of carbon dioxide blood. Transport forms of carbon dioxide in blood. Diffusion of carbon dioxide from tissues into blood. Carbonic anhydrase. Interrelation between gas exchange of oxygen and carbon dioxide.

24. Gas exchange between blood and tissues. Efficiency (utilization) of oxygen tissues at rest and at physical exercise.

25. Respiratory center. Modern idea of its structure and localization. Humoral regulation of respiration. carbon dioxide role. Receptors of pH, CO₂ and O₂ in an organism, their localization and role in respiration regulation. Automaticity of the respiratory center and its features. Role of the pneumotoxic center.

26. Reflex self-regulation of respiration. Mechanism of change of respiratory phases. Receptors of lungs, respiratory tracts and respiratory muscles. Participation in regulation of respiration of mechanoreceptors of lungs (Goering-Breyer's reflexes), irritant receptors, J-receptors, proprioceptors of respiratory muscles, receptors of the upper airways, baroreceptors of aorta and carotid sine. Their physiological value.

27. Periodic of respiration and its regulation. Regulatory influences on the respiratory center from the highest departments of brain (hypothalamus, limbic system, cortex of larger hemispheres). Coordination activity of respiratory and cardiovascular systems.

28. Mechanism of the first inspiration of the newborn, theories.

29. Features of respiration in different conditions. Respiration at the lowered atmospheric pressure. Hypoxia, its types. Mountain (altitude) disease. Effective thresholds of hypoxia. Respiration at the increased pressure of air. Caisson disease, its mechanism, prophylaxis. Respiration by pure oxygen.

30. Age changes in system of respiration.

3. THE COURSE OF THE CLASS

- *Introduction:* The teacher answers questions of students which caused certain difficulties in the course of development 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, has to know the morphofunctional characteristic of respiratory organs; mechanisms of respiratory movements, indicators of external respiration; features of transport of gases by blood; structure and localization of the respiratory center; reflex and humoral mechanisms of regulation of respiration; methods of researches of functioning of respiratory system; the basic concepts and terms on subjects of class; basic physiological constants on subjects of class.

- *Computer testing according to sections:* "Endocrine system", "Respiration physiology".

- *Control of level of theoretical knowledge.* Control of level of knowledge of practical skills. Summing up, exposure of estimates.

- *Conclusion of the teacher:* At the end of the class the teacher concludes about the carried-out work and sums up the class results.

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.