

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 class on the section "Digestion", "Metabolism and energy exchange",  
"Nutrition", "Thermoregulation", "Excretion physiology"

The 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**

**Purposes of the class**

To create at students the integrated representation about value of digestion for vital activity of an organism, features of digestion in oral cavity, stomach and intestine. To create a comprehension of the main physiological mechanisms of exchange of proteins, lipids and carbohydrates. Value of constancy of temperature of organism internal medium for normal course of vital activity processes and knowledge of the temperature scheme of the person, and also physiological value of processes of excretion, their participation in maintenance of homeostasis.

**Motivational characteristic of the subject**

The student has to fix knowledge of conditions necessary for normal work of a digestive tract and activity of enzymes, and also the absorption and excretory functions of GIT. To know about the main indicators for assessment of protein, fat, carbohydrate metabolism of an organism. To fix knowledge of mechanisms of heat production and heat irradiation. The student has to fix knowledge of basic provisions of the filtration – reabsorption theory, data on anatomy of kidneys and metastructure of a nephron, function of its various departments in formation and concentration of urine, and also neurohumoral mechanisms of regulation of kidneys activity.

**Tasks of the class**

The checking of level of students' knowledge on the subject "Digestion", "Metabolism and energy exchange", "Nutrition", "Thermoregulation", "Excretion physiology"

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

**To know:**

- morpho-functional characteristic of structures of GIT and excretion organs;
- levels of regulation of work of GIT and excretion organs, nervous and humoral mechanisms of the basal metabolism and thermoregulation;
- mechanisms of the functional system providing constancy of body temperature;
- methods of researches of organs of GIT and kidneys;
- the basic concepts and terms on the class subject;

– basic physiological constants on the class subject .

## 2. CONTROL QUESTIONS ON THE CLASS SUBJECT:

1. Physiological bases of hunger and saturation. Theory of appearance of feeling of hunger. Saturation, its types.
2. Digestion in an oral cavity. Secretion device. Saliva, its quantity, structure, properties, physiological role. Production of saliva. Salivation and its regulation. Swallowing, its phases. Reflex nature of swallowing.
3. Digestion in stomach. Secretion device of a mucosa. Gastric juice, its structure and properties. Physiological role of the hydrochloric acid of gastric juice.
4. Phases of gastric secretion, its regulation. Appetizing (ignition) juice, its physiological value. Evacuation and motor activity of stomach, contraction types.
5. External secretion activity of pancreas. Pancreatic juice, its structure and properties. Regulation of pancreatic secretion.
6. A bile role in digestion. Features of structure and properties of hepatic and vesical bile. Bile acids, their physiological role. Enterohepatic circuit. Regulation of biligenesis and bile excretion.
7. Motility of an intestine. Types of contractions, their functional value. Regulation of motility of an intestine.
8. Features of digestion in large intestine. Structure and properties of juice. Secretion regulation. Value of microflora of large intestine. Motility. Defecation and its regulation.
9. An absorption of nutrients in various departments of a digestive tract. Villi, their structure and role in processes of an absorption.
10. Exchange of proteins, its regulation.
11. Exchange of carbohydrates, its regulation.
12. Exchange of lipids, its regulation.
13. Exchange of water and mineral substances. Regulation of water and mineral exchange.
14. Energy exchange. Energy balance. Accounting of consumption and using of energy. Concept of the basal metabolism.
15. Thermoregulation. Body temperature of the person, daily fluctuations. Methods of measurement of temperature. Physical thermoregulation.
16. Heat production. Metabolism as source of heat formation. A role of separate organs in a heat production, regulation of this process. Shivering and non-shivering thermogenesis.
17. Nervous and humoral mechanisms of thermoregulation. Disturbances of thermoregulation. Hypothermia. Hyperthermia. Fever.
18. Feverish states. Hypothermia and hyperthermia.
19. Excretion organs, their participation in maintenance of homeostasis. Kidneys, their functions. Nephron as morpho-functional unit of kidney. Types of nephrons. Features of blood supply of kidneys.
20. Filtration - reabsorption theory of uropoiesis. Features of a structure of the filtering membrane. Effective filtration pressure. Primary urine, its daily quantity, structure.
21. The characteristic of process of reabsorption of various substances in tubules and Genle's loop. Clearance. Threshold and not threshold substances.
22. The mechanism of osmotic concentration of urine in tubules of a nephron and in collective tubes. Multiplying rotary and counter-current system. Urea circuit.
23. Secretory and synthetic processes in renal tubules. Final urine, its daily quantity, structure and properties.
24. Nervous and humoral regulation of an uropoiesis. Renin, angiotensin, vasopressin, aldosteronum, natriuretic hormone, their influence on functions of kidneys and circulation. Anti-diuresis, water and osmotic diuresis.
25. Neurohumoral mechanisms of a regulation of an uropoiesis.
26. Homeostatic functions of kidneys. A role of kidneys in a regulation of arterial pressure and acid-base equilibrium.

### 3. THE COURSE OF THE CLASS

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

- *Demands to the level of knowledge:* the student has to know the morpho-functional characteristic of structures of GIT and excretion organs; levels of regulation of work of GIT and organs excretion, nervous and humoral mechanisms of the basal metabolism and thermoregulation; mechanisms of the functional system providing constancy of body temperature; methods of research of organs of GIT and kidneys; the basic concepts and terms on the class subjects; basic physiological constants on the class subjects.

- *Computer testing on sections:* "Digestion", "Metabolism and energy exchange", "Nutrition", "Thermoregulation", "Excretion physiology".

- The poll according to sections, *protection of protocols of laboratory research.*

- *Conclusion of the teacher:* At the end of the class the teacher makes the conclusion 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.