

MINISTRY OF EDUCATION AND SCIENCE OF KYRGYZ REPUBLIC
OSH STATE UNIVERSITY
INTERNATIONAL MEDICAL FACULTY
DEPARTMENT OF ANATOMY, HISTOLOGY AND HUMAN PHYSIOLOGY

«APPROVED»

On the meeting of Dep
Prot. № 1 from 24.10 2022 year
Head of chair [Signature]
c.m.s., Assoc. Prof., Dzholdubaev S.Zh.

«AGREED»

Chairman of EMI IMF
«24» 09. 2022
Sen. lectur., [Signature]

STUDENT EDUCATION PROGRAM

(Syllabus)

ON THE DISCIPLINE: Human Physiology 2
for full-time students studying
on the specialty "560001-General Medicine (GM)"

form of study: **full-time**
total: **4 credits**
year: **2- year**
semester: **III semester**
total: **120 hours**
Of them:
Classrooms: **60 hours (lecture - 24 hours; practical classes- 36 hours)**
SIW: **60 hours**
Number of test control (TC) **2.**
Exam: **III semester**

Information about teachers:

*Candidate of Medical Sciences, Associate Professor Argynbaeva A.T.,
Senior Lecturer; Paizildaev T.R.,
Lecturers; Baigashkaev E., Abdyraimova M., Orozbek u T.*

Department of "Anatomy, Histology and Normal Physiology",

Schedule: *daily from 8 a.m. to 5.30 p.m.*

Date: 2022-23 - academic year

1. The purpose of the discipline to form students' systematic knowledge of the vital activity of the whole organism and its individual parts, the basic laws of functioning and mechanisms of their regulation in their interaction with each other and with the factors of the external environment.

2. Objectives of the discipline:

- able and willing to use basic scientific concepts and methods to analyze the anatomical and physiological characteristics of healthy body systems in solving professional problems;
- able and ready to analyze the basic laws underlying the processes occurring in the human body, their physiological essence and regulation mechanisms; physiological basis of the methods of research of body functions in solving professional tasks
- able and able to measure the most important indicators of human vital functions at rest and under load:
- able and willing to evaluate the results of electrocardiography, electroencephalography, spirometry, thermometry, blood and urine tests; use simple medical instruments (phonendoscope, neurological hammer, tonometer, thermometer, perimeter).
- able and willing to use scientific research methods in the field of human physiology, safety rules of work in physiological laboratories; able to formulate tasks, conduct analysis and statistical processing of data; skilled in information search and abstracting from various sources in the professional sphere.

3. As a result of mastering the discipline, the student must:

Know:

- basic laws of development and vital activity of the organism based on the structural organization of cells, tissues and organs
- physico-chemical essence of processes taking place in living organism on molecular, cellular, tissue and organ levels
- human body functional systems, their regulation and self-regulation under influence of external environment in norm and pathology.

Be able to:

- interpret the results of the most common functional diagnostic methods used to detect pathologies of blood, heart and blood vessels, lungs, kidneys, liver and other organs and systems
- Give a histophysiological assessment of the state of various cellular, tissue and organ structures

Own:

- simple medical instruments (phonendoscope, neurological mallet, scalpel, tweezers)
- medical-anatomical conceptual apparatus

4. Prerequisites: BP¹: Latin, MEN: chemistry, biophysics, SPD: molecular biology and medical genetics, medical biology, normal anatomy

5. Post requisites: Pathophysiology. Pharmacology. Patanatomy. Clinical disciplines. Pediatrics. Infectious diseases

6. Technological map of discipline in 1 semester

modules	total		lectures		Practical cl.		SIW		TC	FC	Points
	Aud	SIW	hour	points	hour	points	hour	points			
I	30	30	12	30	36	30	30	30	30		
II	30	30	12	30	36	30	30	30	30		
total	120		24	60	72	60	60	60	60	40	100

7. Map of points accumulation for the subject "Human Physiology2" in the context of module (3rd semester, 2022-2023 academic year, specialty: 560001-general medicine "GM")

№	Name of groups	Average point of current TC	Lecture	SIW	CW	Total
	First name/ last name of stud	30 points	30 points	30 points	30 points	60 points
1.						
2.						

$$\text{Module} = \frac{\text{Module test} + \text{Avrge of Pract}}{2} + \frac{(\text{Avrge of pr.cl.} + L + SIW)}{3}$$

Technological map of the accumulation of points of the group _____

(Discipline: "Human physiology 2", specialty: 560001- general medicine (GM), 3-semester, 2022-2023 academic year)

¹ Basic Programme of MBBS

CLASS №1		Topic № Cardiovascular system					
№	I-week	Class attendance	Copybook	Activity	Test	total	Date of rework
	First name/last name	5	5	10	10	30	
1.							
...							

**7. Calendar-thematic plan of lecture classes for MBBS students - 560001
(3rd semester, 2022-2023 academic year.)**

№ Week	№ class	List of the topics for lectures	Hours
1-3.09.22	1.	Physiology of blood. Physiology of blood elements RBC, WBC, Platelets.	2h.
5-10.09.22	2.	Blood groups and RH-factor. Overview of the circulation.	2h.
12-17.09.22	3.	Hemodynamics and Hemostasis. Physiology of cardiac muscle. Excitability, contractility, conductivity, rhythmicity. ECG basics. Nervous regulation of CVS.	2h.
19-24.09.22	4.	Physiology of respiration. Pulmonary ventilation.	2h.
26.09-1.10.22	5.	Gas exchange in lungs. Transport of gases in blood.	2h.
3-8.10.22	6.	Regulation of respiration. Hypobarium conditions aviation and space physiology. Deep-sea diving, and other hyperbarium conditions in physiology.	2h.
10-15.10.22	7.	General physiology of digestion. Basic principles of digestion absorption and motility in the alimentary tract.	2h.
17-22.10.22	8.	Digestion in oral cavity and stomach. Digestion in small intestine.	2h.
24-29.10.22		1st MODULE: PHYSIOLOGY OF CVS AND RESPIRATION	
31.10-5.11.22	9.	Liver and pancreas. Digestion in large intestines.	2h.
7-12.11.22	10.	Physiology of metabolism. Body temperature. Mechanism of thermoregulation.	2h.
14-19.11.22	11.	Physiology of excretion. Kidney's physiology.	2h.
21-26.11.22	12.	Glomerular filtration, renal blood flow. Regulation of urine formation and renal filtration. Regulation of ECF osmolarity, Na, K, Ca, Mg.	2h.
26-31.12.22		2nd MODULE: "PHYSIOLOGY OF DIGESTION AND EXCRETION"	

**8. Calendaric-thematic plan of practical classes
for MBBS students - 560001
(3rd semester, 2022 -2023 academic year)**

№ Week	№ class	Name of topics, modules	Hours
1-3.09.22	1.	Physiology of blood. Physiology of blood elements RBC, WBC, Platelets.	2 h.
5-10.09.22	2.	Blood groups and RH-factor. Overview of the circulation.	2 h.
12-17.09.22	3.	Hemodynamics and Hemostasis. Physiology of cardiac muscle. Excitability, contractility, conductivity, rhythmicity.	2 h.
19-24.09.22	4.	Cardiac output, venous return and their regulation Heart valves and heart sounds.	2 h.
26.09-1.10.22	5.	ECG basics. Nervous regulation of CVS. Physiology of respiration.	2 h.
3-8.10.22	6.	Pulmonary ventilation. Lung volumes and mechanical respiration.	2 h.

10-15.10.22	7.	Pulmonary circulation. Gas exchange in lungs	2 h.
17-22.10.22	8.	Transport of gases in blood. Hypobaric conditions aviation and space physiology.	2 h.
24-29.10.22	9.	Deep-sea diving, and other hyperbaric conditions in physiology. Regulation of respiration.	2 h.
24-29.10.22	1st MODULE: PHYSIOLOGY OF CVS AND RESPIRATION		2 h.
31.10-5.11.22	10.	General physiology of digestion. Basic principles of digestion absorption and motility in the alimentary tract.	2 h.
7-12.11.22	11.	Digestion in oral cavity. Digestion in stomach.	2 h.
14-19.11.22	12.	Digestion in small intestine. Liver and pancreas. Digestion in large intestines.	2 h.
21-26.11.22	13.	Propulsion and mixing in GIT tract. Metabolism of carbohydrates, ATP formation.	2 h.
28.11-3.12.22	14.	Proteins, fats metabolism. Liver as an organ.	2 h.
5-10.12.22	15.	Body temperature. Mechanism of thermoregulation.	2 h.
12-17.12.22	16.	Physiology of excretion. Kidney's physiology. Mechanism of urine formation.	3 h.
19-24.12.22	17.	Glomerular filtration, renal blood flow. Regulation of urine formation and renal filtration. Regulation of ECF osmolarity, Na, K, Ca, Mg.	3 h.
26-31.12.22	2nd MODULE: "PHYSIOLOGY OF DIGESTION AND EXCRETION"		2 h.
Total	Lectures		24 h.
	Practical classes		36 h.
	Module		4 h.

9. Students individual work (SIW)

№	Topics	Hours
1	Age-related changes in blood parameters.	2h
2	Changes in the body's protective systems, immunity in the process of aging.	2h
3	Problems of organ transplants, histocompatibility of human tissues	2h
4	Features of the leukocytic formula and changes in the number of leukocytes in the blood at an early age.	2h
5	Clinical and forensic determination of genetic markers of blood.	2h
6	Blood depot.	2h
7	Lymph circulation. Composition and properties and importance of lymph. Lymphatic vessels and glands. Mechanisms of lymph movement	2h
8	The heart as a self-regulating system. Artificial heart and its application in medicine.	2h
9	The functional system that maintains blood pressure in the body.	2h
10	Circulation during physical exertion.	2h
11	Pathological types of breathing and the causes of their occurrence.	2h
12	Features of breathing at physical load, high and low barometric pressure.	2h
13	Methods of research of the functional state of the respiratory system using functional tests.	2h
14	Influence of muscular load, hypokinesia, stress on secretory, motor function of the digestive tract.	2h
15	Modern methods of examination of the gastrointestinal tract.	2h
16	Mechanisms of adaptation of the digestive organs to the action of internal and external environment factors.	2h
17	The importance of vitamins for humans. The body's need for vitamins.	2h
18	Physiological basis of hunger and satiety.	2h
19	The dependence of taste sensations on the activity of olfactory, tactile, temperature and other sensory systems.	2h
20	Functional connection of processes of breathing, chewing, swallowing.	2h
21	Water-salt metabolism in the human body.	2h
22	Clinical and physiological studies of the kidneys. Analysis of urine.	2h
23	Regulation of calcium and phosphate balance in the blood.	2h

24	Regulation of the processes of urine formation.	2h
25	Artificial kidney.	2h
26	Peculiarities of thermoregulation in the elderly and old people, energy expenditure in aging.	2h
27	Peculiarities of metabolic processes and thermoregulation in childhood.	2h
28	The concept of rational nutrition, the importance of a rational diet for the physical and mental development of man.	2h
29	Thermoregulation during muscular activity in the conditions of production and other types of work.	2h
30	Increasing the resistance of the body to the effects of high and low temperatures.	2h
	total	60 hours

10. Educational technology

With a competency-based approach in education, the main factor in educational activity is not so much the component of knowledge acquisition as the component of the acquisition by students of various methods of activity for solving the set educational tasks. Therefore, to achieve the expected learning outcomes of the discipline, it is necessary to use various new technologies and interactive methods.

Interactive learning is first of all dialogue learning, during which there is an interaction between the student and the teacher, and between the students themselves. Interactive methods contribute to the formation of competencies and the achievement of certain learning outcomes - the acquisition of knowledge, the formation of skills.

lecture-visualization (LP), problem lecture (PL), mini-lecture (ML), lecture - press conference (LPC), lesson - conference (LC), brainstorming (BS), master class (MC), business and role-playing educational game (BG, REG), the method of small groups (SG), participation in scientific and practical conferences (SPC), student research and development work (SRDW), subject Olympiads (O), preparation and defense of abstracts (R), Tests (T), situational tasks (ST), interactive whiteboard (IW), handouts (H), videos (V), slides (S), multimedia presentation (MPres), assignments for independent work, teamwork (TW), research method (RM).

12. Educational-methodical and informational support of discipline

Main Literature:

1. Arthur C. Guyton, John Edward Hall Textbook of Medical Physiology. - 11th edition. - University of California: Elsevier Saunders, 2006. - 1116 c.
2. K. Sembulingam, Prema Sembulingam-Essentials of Medical Physiology - 6th edition. - Jaypee Brothers Medical Publishers (P) Ltd, 2012. - 1092 p. - ISBN-10: 9350259362. - ISBN-13: 978-9350259368.

Additional literature.

1. Ganong's Review of Medical Physiology 25th Edition / Kim E. Barrett, Susan M. Barman, Scott Boitano, and Heddwen Brooks, 25th ed. - CA: McGraw Hill Professional, 2015. - 768 c.
2. Cindy L. Stanfield Principles of Human Physiology, Global Edition. - 6th ed. Pearson Education Limited, 2016. - 816 c.
3. n. Geetha Practical Physiology. - Jaypee: Jaypee, 2017. - 393 c.

13. The politics of pointing

100 point system	30 point system	Points	Mark	Traditional
87 – 100	26 – 30	A	4,0	Excellent
80 – 86	24 – 25	B	3,33	Good
74 – 79	22 – 23	C	3,0	
68 -73	20 – 21	D	2,33	
61 – 67	18 – 19	E	2,0	Satisfactory
31-60	9 – 17	FX	0	Unsatisfactory
0-30	0 – 8	X	0	-

14. Questions for modules in Human physiology 2

1. The internal environment of the organism, its components and properties. The concept of homeostasis.
2. Blood as part of the internal environment; definition, quantity, composition. Functions of blood.
3. Blood plasma, its composition. Functions of components of plasma.
4. Physicochemical properties of blood.
5. Osmotic pressure of blood, definition, magnitude, value.
6. Solutions, types of solutions (physiological or isotonic, iso ionic, hypertonic, hypotonic solutions).
7. Plasmolysis and hemolysis of blood. Types of hemolysis.

8. Blood plasma proteins. Functions of proteins.
9. Blood oncotic pressure, definition, magnitude, significance.
10. Active blood reaction (pH), its state, significance. Mechanisms that maintain the acid-base state of the blood (physical-chemical and physiological).
11. Formational elements of blood, their types.
12. Erythrocytes: number, structure, functions.
13. Hemoglobin: number, structure, types and functions. Hb compounds (physiological and pathological).
14. Leukocytes: number, types, functions. Leukocytic formula.
15. Neutrophils: types, functions.
16. Basophils and their functions.
17. Eosinophils and their functions.
18. Monocytes and their functions.
19. Lymphocytes and their types of functions.
20. Platelets, their number, functions.
21. Modern concepts of blood antigenic systems.
22. Basic principles underlying the group classification of blood antigenic systems. Group antigenic and group antibodies.
23. Immunological reactions occurring during interaction of agglutinin with agglutinin (antigen with antibody). Agglutination reaction.
24. ABO antigenic system. Blood groups of the ABO system. Their characteristics.
25. The importance of the ABO system in medicine.
26. Blood transfusion according to the ABO system. The concepts of "donor" and "recipient".
27. Rhesus antigenic system and its peculiarities. The groups of the Rh system.
28. The importance of the Rh-factor in the clinic (in blood transfusion and pregnancy).
29. Methods of determination of blood groups by ABO and Rh systems.
30. Basic principles of blood transfusion. Biological testing.
31. Hemostasis: definition, significance, trigger factor.
32. Basic mechanisms of hemostasis (vascular-platelet and coagulation).
33. Vascular-platelet mechanism of hemostasis. Vascular response to vascular injury.
34. Coagulation mechanism of hemostasis, its essence in the process.
35. Phases of coagulation hemostasis.
36. Structure of the red thrombus.
37. Retraction of the blood clot, its significance.
38. The anti-clotting system of blood, its importance in maintaining the fluid state of blood.
39. Fibrinolysis: definition, biological significance.
40. Cardiovascular system, structure, significance.
41. Structure and functions of the heart.
42. Properties of typical and atypical myocardium.
43. Cardiac conduction system, structure.
44. Excitability of the heart muscle, characterization.
45. Automatism of the heart muscle, characteristic.
46. Conduction of the heart muscle, characteristic.
47. Cardiac muscle contractility, characteristic.
48. Disorders of the properties of the heart muscle.
49. Cardiac cycle, definition. Calculation of the duration of the cardiac cycle.
50. Structure of the cardiac cycle.
51. Phase analysis of cardiac cycle.
52. Periods and phases of ventricular systole, characterization.
53. Periods and phases of ventricular diastole, characteristic.
54. Minute blood volume, magnitude, report.
55. Electrical manifestations of the heart and their characterization.
56. Electrocardiogram, characteristic of its main elements.
57. Algorithm of ECG analysis.
58. Sound manifestations of cardiac activity. Phonocardiography, the essence of the method. Auscultation.
59. Tones of the heart, and their characteristics.
60. Hemodynamics definition, functions of hemodynamics.
61. Morphological classification of vessels.

62. Functional classification of vessels.
63. Basic indices of hemodynamics.
64. Pressure, types of pressure. Factors affecting the value of pressure in the CVS.
65. Vascular pressure variation.
66. Resistance, types of resistance. Factors affecting resistance in the CVS.
67. Changes in resistance in vessels.
68. Blood flow velocities. Characteristics of volumetric and linear velocity along the vessels.
69. Blood flow velocity, characteristic.
70. Continuity of blood flow and factors providing it.
71. Arteries, functions. Characteristics of blood flow in the arteries.
72. Blood pressure, factors influencing it.
73. Blood pressure indexes. Methods of measuring blood pressure.
74. Microcirculatory systems. Arterioles, functions, characteristics of blood flow in arterioles.
75. Capillaries, functions, characteristics of blood flow in capillaries.
76. Venous vessels, functions. Characteristics of blood flow in veins.
77. Factors determining the venous return of blood through the veins.
78. Functional purpose of mechanisms of hemodynamic regulation.
79. Levels of circulatory regulation.
80. Local regulation of circulation, the essence of its mechanisms.
81. Central regulation of circulation. Nerve-reflex mechanism of hemodynamic regulation. The role of CNS divisions in regulation of vascular tone. Sympathetic and parasympathetic vascular reflexes.
82. Humoral regulation of blood circulation. Vasoconstrictors and vasodilators.
83. Physiology of the airways, regulation of their lumen. Resistance of the airways.
84. The concept of anatomical, physiological dead space, their functional significance.
85. Mechanisms of external respiration. Biomechanics of respiratory act. Respiratory muscles and ventilation of lungs.
86. Mechanism of inhalation and exhalation. Thoracic and abdominal type of breathing.
87. Pleural pressure, its origin and significance. Changes of pressure in pleural cavity in different phases of respiratory cycle. Pneumothorax.
88. Elastic properties of the lungs. Changes in pressure in the lungs. Alveolar ventilation.
89. Alveolar air. Mechanism of maintenance of constancy of composition of alveolar air.
90. Pulmonary volumes and capacities. Minute respiratory volume. Maximum ventilation of the lungs.
91. The exchange of gases in the lungs. Partial pressure of gases (O_2 , CO_2) in alveolar air and tension of gases in blood. Diffusion of gases through the arohematic barrier.
92. Pulmonary gas exchange. Composition of inhaled, exhaled, and alveolar air.
93. Diffusion of O_2 and CO_2 between alveolar air and blood. The concept of partial pressure and gas tension in a fluid.
94. Diffusion capacity of the lungs. Factors affecting the amount of dissolved gas in fluids.
95. Features of pulmonary circulation. Relationship between blood supply and ventilation of the lungs.
96. Functional purpose of respiratory regulation.
97. Basic mechanisms of respiratory regulation.
98. CNS divisions involved in the regulation of respiration, their significance.
99. The respiratory center. Current views on the structure of the respiratory center and its localization. Inspiratory and expiratory neurons. Autonomy of the respiratory center. Functions of the respiratory center (motor, homeostatic).
100. Types, localization and functional properties of respiratory neurons. Generation of respiratory rhythm. Mechanism of change of inhalation and exhalation. The pneumotactic center.
101. Reflex regulation of breathing. Chemoreflexes of breathing. Central and peripheral chemoreceptors. Role of chemoreceptors and mechanoreceptors in the regulation of respiration. Gehring-Breyer reflex, its physiological significance.
102. Humoral regulation of respiration. Role of carbon dioxide. Effect of excess CO_2 on respiratory center. Effect of hypo- and hypercapnia, acidosis and alkalosis on body functions.
103. Hypoxia: definition of the concept, types. Effect of hypoxia on metabolism. Effect of hypoxia on functions of organs and organ systems. Hypoxemia.
104. Protective respiratory reflexes. Reflexes from the mucous membrane of the nasal cavity. Reflexes from the pharynx. Reflexes from the receptors of the bronchioles.
105. Mechanism of the child's first breath. Age-related changes in respiratory functions.

106. Coordination of breathing with other functions of an organism. Changes of ventilatory indices, blood gas composition and acid-base balance during physical activity.
107. Breathing in conditions of increased barometric pressure. Co-sleeping sickness. Conditions of occurrence.
108. Breathing in conditions of low barometric pressure. Basic physiological mechanisms of changes in breathing during ascent to altitude. Causes of altitude (mountain) sickness.
109. Features of breathing in conditions of low temperatures.
110. Functional system providing constancy of gas constant of blood.
111. Digestion, definition, significance
112. Methods of studying the functions of the digestive tract.
113. Nutritional motivation. Physiological basis of hunger and satiety.
114. Functions of the digestive tract; secretion, motility, absorption.
115. Non-digestive functions of the digestive tract; endocrine, incretory, excretory, immune.
116. The main stages of digestion. Types of digestion depending on the origin and localization of hydrolysis (cavity, membrane, own, autolytic, symbiont). Periodic activities of the digestive organs.
117. Principles of regulation of the activity of the digestive system. The role of reflex, humoral and local mechanisms of regulation.
118. Hormones of the gastrointestinal tract, their classification.
120. Digestion in the oral cavity. Analysis of the properties of food. Mechanical and chemical digestion of food.
121. Chewing, its peculiarities in relation to the properties of food. Regulation of the act of chewing.
122. The amount, composition, properties, physiological role of saliva. Salivation, its regulation.
123. Swallowing, its phases, regulation of swallowing. Functional features of the esophagus.
124. Digestion in the stomach. The composition and properties of gastric juice.
125. Regulation of gastric secretion. Phases of gastric juice secretion.
126. Features of gastric secretion during the digestion of proteins, fats and carbohydrates. Adaptive nature of gastric secretion to types of food and food rations.
127. Motor and evacuatory activities of the stomach. Types of gastric contraction. Neurohumoral regulation of gastric motility.
128. Age features of digestion in the oral cavity and the stomach.
129. Digestion in the duodenum. External secretory activity of the pancreas. Composition and properties of pancreatic juice.
130. Regulation and adaptive nature of pancreatic secretion to types of food and diet.
131. Role of the liver in digestion. Regulation of the formation of bile, its excretion into the duodenum. Composition and functions of bile.
132. The composition and properties of intestinal juice. Regulation of the secretion of intestinal juice.
133. Cavity and membrane hydrolysis of food substances in different parts of the small intestine.
134. Motor activity of the small intestine. Types of motor activity. Regulation of motor activity.
135. Features of digestion in the large intestine. Microflora, its functions and importance. Causes and consequences of dysbacteriosis.
136. Regulation of motor activity of the large intestine. The act of defecation.
137. Absorption of substances in different parts of the digestive tract. Types and mechanism of absorption of substances through biological membranes.
138. The functions of the digestive tract performed by the small intestine and large intestine.
139. The evacuatory function of the GI tract. Mechanisms of differentiation of digestion in different parts of the GI tract.
140. Age features of digestion in the small and large intestine.
141. Body temperature and isothermia. The human temperature chart.
142. Chemical thermoregulation. Role of various organs in heat production.
143. Physical thermoregulation. Heat conduction, convection, radiation, evaporation.
144. Nodal links of the functional system that maintain a constant temperature of the body. Role of thermoreceptors.
145. Role of nervous and humoral factors in thermoregulation.
146. Adaptation of the organism to different temperature regimes.
147. The significance of metabolism and energy. Its main stages. Nutrients and their significance.
148. Protein metabolism. The importance of proteins in the body. Composition, structure and functions of proteins. Substitutable and indispensable amino acids. Biological value of proteins.
149. Nitrogen balance. Muscle work and protein metabolism. Regulation of protein metabolism.
150. Metabolism of lipids (fats). The importance of simple and complex lipids in the body. Transformation of lipids in the body. Fat depot. Regulation of fat metabolism.

151. The metabolism of carbohydrates. Composition and functions of carbohydrates and their transformation in the body. Reserves of carbohydrates in the body. Glucose content in blood. Hyper- and hypoglycemia.
152. Regulation of carbohydrate metabolism. Influence of various factors on carbohydrate metabolism.
153. The energetic side of metabolism. Transformation of energy in the body. Methods of research of energy balance of the body. Calorimetry. Respiratory coefficient. Basic and total metabolism.
154. The physiological excretory system, its structure and functions.
155. The organs of excretion (kidneys, skin, lungs, digestive tract, etc.), their participation in the maintenance of homeostasis of the body.
156. Kidneys - the main organs of the excretory system. Nephron - structural and functional unit of the kidney. Blood circulation in the kidney, its features.
157. The main processes of urination: filtration, reabsorption, secretion. Mechanisms of glomerular filtration, composition of primary urine. Regulation of filtration rate. Rate of glomerular filtration.
158. Reabsorption in the tubules, its mechanisms. Features and mechanisms of reabsorption and secretion of various substances.
159. Secretory processes in the proximal and distal tubules and collecting tubes.
160. The rotary and contralateral system of the medulla of the kidney, the mechanism of urine concentration.
161. Excretory secretion and synthesis in the kidney. Indicators of urinary system function (frequency, volume of urination, nocturnal and diurnal diuresis).
162. Secondary urine, its composition, quantity. Daily volume of urine in man, origin of its components.
163. Experimental and clinical methods of evaluation of mechanisms of urine formation - filtration, reabsorption, secretion in formation of primary and secondary urine (Bowman, Ludwig, Richards, O.G. Gynecinsky, Natochin).
164. Clearance rate (clearance) and determination of filtration rate, reabsorption, secretion, value of renal plasma flow and blood flow.
165. Regulation of urine formation. Renal involvement in the maintenance of nitrogen balance, homeostasis parameters.
166. Regulation of osmotic pressure constancy, role of vasopressin. Mechanisms of thirst.
167. Regulation of constancy of concentration of sodium and potassium ions, volumes of water and circulating blood in organism with the participation of kidneys: role of angiotensin-aldosterone system, atrial natriuretic hormone.
168. Regulation of calcium and phosphate ions concentration constancy with the participation of the kidney.