FEDERAL STATE BUDGETARY EDUCATIONAL INSTITUTION OF HIGHER EDUCATION
“NORTH-OSSETIA STATE MEDICAL ACADEMY”
OF THE MINISTRY OF HEALTHCARE OF THE RUSSIAN FEDERATION

Department of normal physiology

Methodical recommendations for practical classes for 2nd year students of MD-program (IV semester)

Vladikavkaz, 2018.

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Module "PHYSIOLOGY OF SENSORY SYSTEMS", "PHYSIOLOGY OF PSYCHIC ACTIVITY".....

PART V.

PHYSIOLOGY OF EXTERNAL RESPIRATION, ENERGY EXCHANGE AND THERMOREGULATION

Practical class 1. The mechanism of external respiration

Initial level of knowledge:

1. The structure of the lung tissue.
2. The musculoskeletal skeleton of the chest (inspiratory and expiratory muscles).
3. The structure of the diaphragm.
4. Circles of blood circulation.
5. The structure of the bronchial tree.
6. The structure of the pleura.
7. What is ventilation, diffusion, perfusion.

The main questions of the topic:

1. The system of external respiration, its main stages.
2. The main processes of external respiration.
3. The inspiration and expiration mechanisms: the role of respiratory muscles, transpulmonary, intraplevral pressure, properties of pulmonary tissue, surfactant. Donders' model.
4. The structure and functions of the pulmonary circulation.
5. Ventilation and perfusion in different parts of the lungs and their physiological value.

The student should be able to:

• determine The role of air flow by pneumotachometer;
• name the main muscles involved in breathing;
• explain the results of Donders' experiment;
• make the artificial breath.

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.
Materials of the lectures.

Practical class 2. Lung volumes and indicators of functional state. Methods of research

Initial level of knowledge:

1. Types of acini.
2. Construction of the lungs.
3. Anatomical features of the upper respiratory tract.

The main questions of the topic:

1. Lung volumes and capacities.
2. Methods of external respiration functional condition research.
3. Anatomic and physiologic dead space.
4. Lung minute ventilation in different conditions.
5. Alveolar ventilation of different lungs' departments.

The student should be able to:

use spirometer, spirograph and a pneumotachometer;

- identify main parameters of breathing, lung volumes and capacities;
- choose the right method of research depending on the task;
- Calculate parameters of external respiration

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.
Materials of the lectures.

Practical class 3. Gas exchange in the lungs and gases transport by blood.

Initial level of knowledge:

1. Composition of alveolar air.
2. Partial pressure and dissolved gases.
3. Compounds and types of hemoglobin. Its meaning.
4. Oxygen capacity of blood.

The main questions of the topic:

1. The composition of the atmosphere, respiratory and alveolar air. Methods for determining.
2. Partial pressure of gases in the alveoli. The gas pressure in blood.
3. The structure and properties of aero-hematic barrier.
4. Transport of oxygen. Oxyhemoglobin. Myoglobin.
5. Dissociation curve of oxyhemoglobin.
6. Transport of carbon dioxide. The role of carbonic anhydrase..
7. Gas exchange in tissues. The amount of oxygen and carbon dioxide in the tissue fluid and cells.
8. The oxygen cascade and its value.

The student should be able to:

• explain the mechanism of pH change at blood saturation with carbon dioxide.
• work with spirometabolograph "Metatest";
• draw and explain oxyhemoglobin dissociation curve.

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.
Materials of the lectures.

Practical class 4. Regulation of respiration. The mechanism of the first inspiratory act.

Initial level of knowledge:

1. What is the respiratory center?
2. Why do we breathe?
3. Why does exhalation occur?
4. Why does breathing become more frequent during excitement, running?
5. Why is it necessary to regulate breathing?

The main questions of the topic:

1. Respiratory center. The functional characteristics of pulmonary center neurons. Mechanism of respiratory phases change.
2. The role of mechanoreceptors and afferent fibers of vagus in the regulation of respiration.
3. Humoral regulation of breathing. Frederick's experiments.
4. Reflex regulation of breathing. Heimans' experiments.
5. Central influences of hypothalamus, limbic system, cerebral hemispheres on breathing.

The student should be able to:

• explain the mechanism of activation of breathing during exercise.

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Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.
Materials of the lectures.

Practical class 5. The physiology of energy metabolism. Basic exchange.

Initial level of knowledge:

1. The concept of metabolism and energy.
2. Types of metabolism.

The main questions of the topic:

1. The concept of the energy balance of the body.
2. The main exchange and the factors that determine it.
3. General exchange.
4. Classification of methods for determining the intensity of exchange processes.
5. Characteristics of the “direct” calorimetry method .
6. Method of "indirect" calorimetry.
7. Determination of the respiratory coefficient.
8. Regulation of metabolism.

The student should be able to:

• calculate the required values of basal metabolism;
• explain the magnitude of the IC.

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.
Materials of the lectures.

Practical class 6.. Physiology of thermoregulation.

Initial level of knowledge:

1. The concept of hypo- and hyperthermia.
2. Types of thermoreceptors.
3. Types of thermogenesis and heat transfer.

The main questions of the topic:

1. The meaning of constancy of internal temperature . Daily temperature fluctuations, temperature scheme of the body.
2. Heat production and heat return in thermoregulation.
3. The mechanism of heat production contractile and non- contractile thermogenesis.
4. Heat transfer mechanism. Regulation of sweat glands activity.
5. Nervous and humoral mechanisms of thermoregulation.
6. The concept of overheating and hypothermia

The student should be able to:

use the electrothermometer

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.
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Module " PHYSIOLOGY OF EXTERNAL RESPIRATION, ENERGY EXCHANGE AND THERMOREGULATION "

PART VI. PHYSIOLOGY OF KIDNEYS AND WATER-SALT EXCHANGE,PHYSIOLOGY OF DIGESTION.

Practical class 1. Functions of the kidneys. The basic processes of urine formation (glomerular filtration).

Initial level of knowledge:

1. What are the functions of the kidneys?
2. What is the structural and functional unit of the kidney?
3. What are the departments of the nephrons?
4. What are the types of nephrons and by what are the criteria of this differentiation?
5. What is a juxtaglomerular complex?
6. What are the main processes of urination?

The main questions of the topic:

1. Kidneys and their functions.
2. Nephron as a structural and functional unit of the kidney. The structure of the nephron.
3. Types of nephrons. Features of blood supply.
4. Mechanisms of urination. Glomerular filtration:
   a) the structure of the glomerular filter;
   b) factors providing filtration;
   c) glomerular filtration rate;
   d) methods for evaluating the filtration;
   e) the composition of the primary urine.

The student should be able to:

draw a diagram of the structure of the nephron;
explain the mechanisms of the filtration process;
calculate the value of glomerular filtration

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
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Materials of the lectures.

Practical class 2. The basic processes of urine formation (tubular reabsorption, tubular secretion).

Initial level of knowledge:

1. What is tubular reabsorption?
2. In which departments of the nephron does the reabsorption of substances take place?
3. What is the renal clearance threshold?
4. What substances are called threshold and non-threshold?
5. What structures of the nephron make up the countercurrent multiplying system of the kidney?
6. What is tubular secretion?

The main questions of the topic:

1. The main processes of urination. Tubular reabsorption of substances:
   a) features of water, salts and organic substances reabsorption in the proximal and distal sections of the nephron; the concept of selective and obligate reabsorption;
   b) mechanisms of osmotic concentration and dilution of urine; countercurrent multiplying tubular system of the medulla of the kidney, participation of sodium and urea in the processes of urine concentration, the importance of juxtamedullar nephrons in these processes;
   c) vascular countercurrent system of the medulla of the kidney.
2. Tubular secretion.
3. Composition and properties of the final urine.
4. Excretory function of the kidneys

The student should be able to:

calculate the tubular reabsorption of the substance;
sketch the localization scheme for reabsorption of substances;
draw a diagram of the countercurrent multiplying system functioning

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.
Materials of the lectures.

Practical class 3. Regulation of kidneys. The involvement of the kidneys in the regulatory processes of the body.

Initial level of knowledge:

1. What mechanisms support the constancy of blood flow in the glomeruli and filtration pressure?
2. What are the V1 receptors, what activates them, what is the effect of their activation?
3. What are the ways of regulating tubular reabsorption?
4. What is the main regulator of water reabsorption in the distal areas of the nephron?
5. Where are V2 receptors localized and what hormone effects through them?
6. What hormones, in addition to vasopressin, have a regulatory effect on the reabsorption of water?
7. What effects does the sympathetic nervous system have on the processes of urination?

The main questions of the topic:

1. Types of renal functions' regulation. Mechanisms of glomerular filtration regulation.
2. Regulation of tubular reabsorption of substances:
   a) hormones regulating the reabsorption of water and the mechanism of their action;
   b) regulation of tubular reabsorption of electrolytes.
3. Regulation of tubular secretion.
4. Nervous regulation of kidneys.
5. The endocrine function of the kidneys. The meaning of erythropoietin. Influence of renin, kinin, prostaglandin on the processes of urination. Kidneys' role in regulation of arterial pressure.

The student should be able to:

Explain the mechanisms of the regulation of urinary processes

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
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Materials of the lectures.

Practical class 4. Mechanisms of regulation of water-salt metabolism and homeostatic function of the kidneys

Initial level of knowledge:

1. What are the main characteristics of the water-salt balance.
2. List water spaces of the body.
3. What factors can lead to dehydration of the body?
4. What is thirst?
5. Where is the drinking center?
6. What dipsoogenic factors do you know?
7. What are the conditions leading to hyperhydration of the body?

The main questions of the topic:

1. Excretion as the component of the functional system, which ensures the stability of the water-salt balance of the organism.
2. The importance of osmo- and volumoreceptors in the implementation of the homeostatic function of the kidneys.
3. The role of ionoreceptors in the regulation of water-salt metabolism and the importance of natriuretic hormone.
4. The meaning of the thirst. Dipsogenic factors and the mechanism of their action. Dehydration, hyperhydration.
5. Functional system that ensures the constant volume of fluid in the body and osmotic pressure.

The student should be able to:

to explain the mechanisms of homeostatic regulation of water-salt metabolism in de- and hyper-hydration; explain the mechanisms of thirst

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Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
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Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.
Materials of the lectures.

Practical class 5. Functional system of nutrition. Digestion and its types. Functions of the oral cavity, esophagus. Digestion in the stomach

Initial level of knowledge:

1. What is the composition of saliva and its physiological significance?
2. How is the innervation of large salivary glands carried out?
3. What are the functions of the stomach?
4. What is the composition and daily amount of gastric juice?
5. Are pepsins produced in active form?

The main questions of the topic:

1. Digestion in the oral cavity.
2. The composition of saliva, its functions; regulation of salivation.
3. Definition of the concept of "functional food system of nutrition".
4. Functions of the stomach.
5. Composition and properties of gastric juice; phase of gastric secretion; regulation of gastric secretion.
6. The processes of gastric motility and their regulation.

The student should be able to:

• explain the technique for collecting saliva for research in humans and animals;
• to give qualitative and quantitative characteristics of saliva, depending on the type of stimulus;
• explain the phases of gastric secretion, lead experimental data;
• Explain the methods of studying the gastric juice secretion and gastric motility.

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.
Materials of the lectures.

Practical class 6. Secretion and enzymatic properties of pancreatic juice

Initial level of knowledge:

1. Which glands secrete in the lumen of the duodenum?
2. Name the secretory nerves that stimulate the release of pancreatic juice.
3. Name the enzymes of pancreatic juice and the optimal conditions for their action.

The main questions of the topic:

1.External secretion of the pancreas.
2. Phases of the pancreatic proenzymes activation.
3. Composition and properties of pancreatic juice.
4. Types of pancreatic secretion regulation.
5. Phases of pancreatic secretion.
6. Mechanisms of pancreatic juice production.

The student should be able to:

• provide experimental evidence for the 1st phase of pancreatic secretion;
• draw curves of the pancreatic juice production for various food substances;
• explain the methods of collecting pure pancreatic juice.

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.
Materials of the lectures.

Practical class 7. Physiology of the liver. Properties and significance of bile.

Initial level of knowledge:

1. What is the role of the liver in digestion?
2. How does the egg yolk affect bile formation and bile secretion?
3. What substances can be used to stimulate bile secretion in duodenal probing?

The main questions of the topic:

1. Functions of the liver.
2. The composition of bile.
3. The role of bile in digestion.
4. The main functions of bile.
5. Mechanism of bile formation.
6. Regulation of bile formation and bile secretion.

The student should be able to:

• explain and prove by experimental data the involvement of the liver in the protective, metabolic and digestive functions;
• explain the principle of duodential probing;
• name substances that stimulate choleresis;

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.
Materials of the lectures.

Practical class 8..Digestion in the small and large intestine. Nutritional behavior.

Initial level of knowledge:

1. How much of the intestinal juice is secreted in an adult person for a day?
2. What happens to the juice of the small intestine during centrifugation? Why?
3. What types of digestion occur in the small intestine?
4. What is the pH of the small intestine juice?
5. How is juicing regulated in the small intestine?
6. How does the vagus nerve affect juices?
7. What factors stimulate the secretion of intestinal juice?

The main questions of the topic:

1. The components of the small intestine juice.
2. The role of the small intestine in digestion.
3. Mechanism of regulation of the formation of small intestine juice.
4. Types of the small intestine motility.
5. Mechanisms of absorption in the small intestine (modes of transport of nutrients through the wall of the intestine into the blood and lymph), in the thick intestine.
6. The role of the large intestine in digestion; types of motility of the large intestine.
7. The links of the functional system of nutrition.
8. Definition of the concept of "food behavior." Emotions of hunger and satiety.
9. Theories of hunger. Types of saturation; way of saturation.

The student should be able to:

• explain the method of intestinal juice collecting.
• give examples of experiments that prove the theory of hunger.

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.
Materials of the lectures.

Module "PHYSIOLOGY OF KIDNEYS AND WATER-SALT EXCHANGE","PHYSIOLOGY OF DIGESTION"

PART VII. PHYSIOLOGY OF THE ENDOCRINE SYSTEM

Practical class 1. Physiology of the endocrine system.

Initial level of knowledge:

1. What organs are called endocrine glands?
2. Name organs with endocrine tissue.
3. Name organs with endocrine function of cells.

The main questions of the topic:

1. Local humoral self-regulation.
2. The system of hormonal regulation.
3. Links of the total hormonal integration.
4. Pituitary, parahypophysial and interglandal ways of management.
5. Types and mechanism of action of hormones.

The student should be able to:

- explain the mechanisms of action of the hormones

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Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
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Materials of the lectures.

Practical class 2. Physiology of the anterior lobe of the pituitary gland (adenohypophysis).

Initial level of knowledge:

1. Name the parts of the pituitary gland
2. What are the hormones of the pituitary gland?

The main questions of the topic:

1. Functional connections of the hypothalamus with the pituitary gland. Liberians and statins.
2. The anterior pituitary and its hormones. Physiological effects of gonadotropin, thyroid-tropin, corticotropin, prolactin.
3. Physiological effects of somatotropin, somatomedin.

The student should be able to:

- explain the mechanisms of action of the hormones of pituitary gland anterior lobe

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Materials of the lectures.

Practical class 3. Physiology of the endocrine system. Thyroid and parathyroid glands. Calcium regulating hormones.

Initial level of knowledge:

1. General ideas about the anatomical structure of the thyroid and parathyroid glands.
2. Features of the histological characteristics of the structure of the thyroid and parathyroid glands.
3. Which of the tropic hormones adenohypophysis regulates the activity of the thyroid gland?
4. What hormones are related to calcium regulating hormone?

The main questions of the topic:

1. General ideas about the synthesis and secretion of iodine-containing hormones of the thyroid gland.
2. Regulation of the activity of the thyroid gland: the role of the hormone adenogy-porphysis of thyrotropin and the autonomic nervous system. Regulation by the principle of "feedback".
3. The main metabolic effects of iodine-containing thyroid hormones.
4. The main functional effects of iodine-containing thyroid hormones.
5. Hyperfunction and hypofunction of the thyroid gland.
6. Calcium regulating hormones.

- Parathyroid hormone, calcitonin - regulation of synthesis and secretion, main effects.
- Calcitriol. Stages of hormone formation, its main effects.

7. Manifestations of excess and deficiency in the body of calcium regulating hormones.

The student should be able to:

- explain the mechanisms of action of thyroid hormones, as well as the principles of the regulation of calcium metabolism in the body, establish signs of hyper- and hypothyroidism of the thyroid gland

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Materials of the lectures.

Practical class 4. Physiology of the endocrine system. Function of the adrenal gland and gonads.

Initial level of knowledge:

1. Anatomic-histological structure of the adrenal and gonadal glands.
2. Where else, in addition to the adrenal medulla, does chromaffin tissue occur?

The main questions of the topic:

1. Hormones of the adrenal cortex. mineralocorticoids and water-salt homeostasis of the body.
2. Glucocorticoids, their physiological significance and effects.
3. Physiological effects of hormones of the adrenal medulla adrenaline and norepinephrine. α- and β-adrenergic regulation of body functions.
4. Physiological basis of stress.
5. Female sex hormones. Ovarian and uterine cycle.
6. Male sex hormones. Anabolic effects. Formation of primary and secondary sexual characteristics

The student should be able to:

explain the mechanisms of the action of the studied hormones.

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.

Practical class 5. Physiology of the endocrine system. Sugar-regulating hormones.

Initial level of knowledge:

1. Anatomic-histological features of the structure of the pancreas.
2. Synthesis and secretion of pancreatic hormones.

The main questions of the topic:

1. The incremental function of the pancreas. The islets of Langerhans.
2. The main effects of insulin. Influence on carbohydrate, fat, protein metabolism.
3. Regulation of the synthesis and secretion of insulin. The value of the feedback principle.
4. The main metabolic effects of glucagon. Mechanisms of regulation of synthesis and secretion of glucagon. Somato-statin is a specific inhibitor of insulin production.
5. Type I diabetes mellitus as a manifestation of insulin deficiency.
6. The main physiological effects of the hormone of epithelial cells of the excretory ducts of the pancreatic gland of lipocaine

The student should be able to:

explain the mechanisms of action of sugar-regulating hormones, as well as the causes of the development of hyper- and hypoglycemic states.

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Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.

Practical class 6. Physiology of the endocrine system. Hormones of the posterior lobe of the pituitary gland. Hormones of the placenta, epiphysis, thymus, myocardium and kidneys.

Initial level of knowledge:

1. In what structures of the hypothalamus are synthesized vasopressin and oxytocin?
2. How is the relationship between the hypothalamus and the pituitary gland?

The main questions of the topic:

1. Neurosecretory systems of the hypothalamus and their interrelation with the neurohypophysis. The concept of neurosecretion.
1. Basic physiological effects and mechanisms of vasopressin action.
2. Basic physiological effects of the mechanisms of oxytocin action.
3. Regulation of synthesis and secretion of hormones neurohypophysis.
4. Manifestations of deficiency and hyperproduction of vasopressin are diabetes insipidus and Parkhon syndrome.
5. Hormones of the placenta. The value of chorionic gonadotropin for clinical medicine (pregnancy diagnosis, chorionic epithelioma).
6. The main physiological effects of melatonin.
7. Endocrine function of the myocardium, thymus.

The student should be able to:

- explain the mechanisms of action and the main effects of vasopressin, oxytocin, chorionic gonadotropin

Books recommended:

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Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
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Module "PHYSIOLOGY OF THE ENDOCRINE SYSTEM ".

PART VIII. PHYSIOLOGY OF SENSORY SYSTEMS, PHYSIOLOGY OF PSYCHIC ACTIVITY

Practical class 1. Sensory systems of skin and mucous, musculoskeletal system. Visceral sensory system.

Initial level of knowledge:

1. The concept of sensory system.
2. Departments of sensory systems.

The main questions of the topic:

1. Characterization of the concepts "sensory system" and "analyzers."
2. Types of sensory systems.
3. Characteristics of receptors.
4. Ways of carrying out signals from receptors.
5. Tactile, proprioceptive and visceral sensory systems.

The student should be able to:

• determine thresholds for tactile sensitivity.

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Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.

Practical class 2. Physiology of the visual and olfactory sensory systems.

Initial level of knowledge:

1. Where does the refraction of light occur in the eye?
2. What photoreceptors perceive color?
3. What are the main colors?
4. Does the pupil expand or contract in the light?
5. What are of the visual pathways?
6. Where is the visual area of the cortex?
7. What is a blind spot?
8. What is a yellow spot?

The main questions of the topic:

1. Structure of the retina.
2. The mechanism of photoreception.
3. Mechanisms of image analysis.
4. Theory of color vision.
5. Mechanisms of myopia and hypermetropia.

The student should be able to:

• determine visual acuity and field of vision.
• explain the mechanism of the pupillary reflex.
• draw a ray path in the eye.

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
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Practical class 3.. Sensory system of hearing. Sensory systems of balance and taste

Initial level of knowledge:

1. Give a definition of the function of the sensory system of hearing.
2. List the auditory ossicles, call their localization.
3. "Corti's organ", its localization.
4. List the functions of the taste sensory system.
5. What are the types of taste buds?
6. List the functions of the equilibrium system.

The main questions of the topic:

1.Construction and function of the peripheral and receptor departments of the ear.
2. Theory of perception of sounds. The mechanism of the receptor potential in the hair cells of a spiral organ.
3. Features of the conductor and cortical parts of the auditory sensory system.
4. The mechanism of adaptation to a strong sound.
5. Binaural hearing.
6. The structure of vestibular organ.
7. Mechanisms of reception.
8. Ways of information passing in the sensor system of gravity, balance and position of the body.
9. Taste sensory system, its departments.
10. Theory of taste.

The student should be able to:

- conduct an auditorial study, to name the main sections of the labyrinth.
- conduct a test of Romberg;
- determine the threshold of taste sensitivity

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
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Practical class 4. Physiology of pain Nociceptive system. Antinociceptive system. Physiological basis of anesthesia.

Initial level of knowledge:

1. Concept of nociceptive system
2. Antinociceptive system

The main questions of the topic:

1. Types of nociceptors. Their localization
2. Information transfer in the nociceptive system
3. Antinociceptive system.
4. Ways and mechanisms of anesthesia.

The student should be able to:

- explain the main principles of anesthesia.

Books recommended:

Costanzo L.S. Physiology, 5th ed. Saunders, 2014.
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Practical class 5. Instincts. Unconditional and conditioned reflexes. Physiology of memory.

Initial level of knowledge:
1. What is a reflex?
2. Types of reflexes

The main questions of the topic:
1. Unconditioned reflexes and instincts.
2. The conditioned reflex, as a form of animals' and human adaptation to changing conditions of existence.
3. Stages of conditioned reflex formation (generalization and concentration), their electrophysiological manifestation. The role of the dominant phenomenon and the orienting reflex.
4. Short-term and long-term memory.
5. Concept of a dynamic stereotype.
6. The architecture of a holistic behavioral act by Anokhin.

The student should be able to:
• explain the structure of the behavioral act by Anokhin.

Books recommended:
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Practical class 6. Inhibition of psychic activity. Physiology of sleep. Structure of the behavioral act.

Initial level of knowledge:

1. List the processes underlying the activity of the central nervous system.
2. Basic EEG rhythms.

The main questions of the topic:

1. Types of inhibition (IP Pavlov):
a) unconditional;
b) conditional.
2. Modern concepts of inhibition mechanisms.
3. Phases of sleep. "Slow" and "fast" sleep. Theories of sleep.
4. Types of higher nervous activity according to Pavlov, their characteristics. Experimental neuroses.
5. Modern concepts of the type of mental activity.

The student should be able to:

• explain the braking mechanism in GNI;
• schematically depict changes in brain electrical activity during different phases of sleep.

Books recommended:

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Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
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Practical class 7. Physiological basis of human mental functions. Properties of personality.

Initial level of knowledge:

1. What is the I signal system?
2. What is the II signal system?

The main questions of the topic:

1. Forms of reflection of the surrounding reality by the brain. I and II signal systems (according to IP Pavlov).
2. Thinking and speech. Functional asymmetry of the cerebral cortex associated with the processes of thinking and speech.
3. Emotions, their role in the realization of mental functions. Structural supply of emotions.
4. Concept of the subconscious mind, consciousness, self-awareness, superconsciousness. The idea of the nerve substrate of consciousness. The role of consciousness in the formation of human behavior.
5. Personality and its properties. Types of personality.

The student should be able to:

• explain the relationship between the instincts and the processes of consciousness, subconsciousness and superconsciousness.

Books recommended:

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Guyton A. C., Hall J. E. Textbook of Medical Physiology, 13th ed; Elsevier Ltd, 2016.
Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.

Practical class 8. Physiological basis of labor.

Initial level of knowledge:
1. What is labour?
2. The concept of a dynamic stereotype.

The main questions of the topic:
1. Labor as a purposeful activity of a person. Different types of labor. Degree of labor severity.
2. The value of the motor apparatus, sensory systems and cortical regulation in labor activity. Work skills. The role of dominant phenomenon in the dynamic stereotype formation.
3. Change in physiological functions in various types of physical labor. Monotonous work. Hypokinesia.
4.Physiological features of mental work.
5. Functionality and fatigue.

The student should be able to:
• Assess the severity of physical labor; determine the level of physical condition.

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Brown T.A. Rapid Review Physiology, 2nd ed. Elsevier Ltd, 2011.
Boron W.F., Boulpaep E.L. Medical Physiology, 3rd ed. Elsevier Ltd, 2016.

Module "PHYSIOLOGY OF SENSORY SYSTEMS", "PHYSIOLOGY OF PSYCHIC ACTIVITY".