



METHODIC RECOMMENDATIONS

**«GENERAL PHYSIOLOGY AND HIGHER INTEGRATIVE FUNCTIONS»
FOR STUDENTS EPP 222 «MEDICINE»**



Module 1 «General physiology and higher integrative functions»

Topic 1: Object and tasks of physiology. Methods of physiological researches.

Actuality of theme: The knowledge of the topic's material is necessary for the understanding of general patterns of vital processes in healthy organism, the mechanisms of their regulation and possible ways of correction in case of their violation.

Educational aims:

To know: The study of physiology as a science. Main stages of its formation. Role of physiology for the practical medicine. Research methods of physiological functions, devices that are used in physiological experiment.

To be able to: Form a scheme of basic elements of organism's functions examination. To use devices for physiology researches.

Control questions of the topic:

1. Tasks of physiology.
2. General physiology concepts: cell, tissue, organ, physiology and functional systems, organism.
3. Physiology functions.
4. Place of physiology among other medical and biological disciplines.
5. The role of physiology in the education of a doctor.
6. Research methods of organism's functions.
7. Object of physiology researches.
8. Devices that are used in physiology experiments.
9. Physiological solutions.
10. The unity of the organism and the external environment.

Student's auditory self work:

1. Acquaintance with the order of the current normative documents (Rules for the experiments with the using of laboratory animals (1977), the Council of Europe Convention for the Protection of Vertebrate Animals Used in Experiments and Other Scientific Purposes (1986), EEC Directive № 609 (1986), the Order of the Ministry of Health of Ukraine № 281 of 01.11.2000 "About measures to further improve the organizational standards of work with the use of experimental animals" and the Law of Ukraine № 3447-IV "About the protection of animals from cruelty").
2. Acquaintance with the Instruction for the labor protection at department.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et al., 2017 – Anatomy and Physiology.

3. Karvatsky IM, editor. Practical works in physiology. Manual for practical training and individual work for English-speaking students. 2-th Vol. Kyiv: Phoenix; 2016-2017. V.1. 214p., V.2. 228p.

Additional:

1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.
2. William F. Ganong., 2001 – Review of Medical Physiology. – 20th ed.

Topic 2: Examination of irritability and excitability of nerve and muscle fibers.

Actuality of theme: The knowledge of main indicators of excitable process is important for understanding the mechanisms of tissue excitability changes in case of pathological states development and methods for its determination.

Educational aims:

To know: The origin of resting membrane potential (RMP) and action potential (AP), their features and research methods. Parameters of excitability.

To be able to: Interpret the changes of the magnitude of resting membrane potential and action potential taking into account the intra- and extracellular concentrations of K^+ and Na^+ .

Control questions of the topic:

1. The structure and functions of cell's membrane.
2. Concept about excitability and excitation.
3. Nature of resting membrane potential, methods of its determination.
4. Action potential, mechanism of its origin, phase structure, physiologic role, level of critical depolarization
5. Changes of excitability during excitation.
6. Laws of action of direct current on excitable tissues.
7. Parameters of excitability.
8. Law of Hoorveg -Weiss. Characteristic of “force - time” curve.
9. Law of Dubua Reimon.

Student's auditory self work:

1. Second experiment of Galvani (experiment without metals).
2. Examination of excitability of nerve and muscle.
3. To draw “force and time” curve.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et all., 2017 – Anatomy and Physiology.
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Additional:

1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.
2. William F.Ganong ., 2001 – Review of Medical Physiology. – 20th ed.

Topic 3: Examination of conduction the excitation through nervous fibers.

Actuality of theme: For the diagnostic and treatment of peripheral nervous system disorders the knowledge of the basic laws of conduction the excitation through nerve fibers, their functions and properties are required.

Educational aims:

To know: The laws and mechanisms of conduction the excitation through nerve fibers according to their structural features; the mechanisms of conduction the excitation in neuro-muscular junction.

To be able to: Schematically show the mechanisms of conduction the excitation through myelinated and non-myelinated nerve fibers.

Control questions of the topic:

1. Physiologic properties and functions of nerves.
2. Classification of nerve fibers and their characteristic.
3. Mechanisms of conduction the excitation through nerve fibers.
4. Laws of conduction the excitation through nervous fibers.

Student's auditory self work:

1. Law of isolated conduction of excitation through nerve fiber.
2. Law of anatomical and physiological integrity of nerve.
3. The law of two-way conduction of excitation through nerve fibers.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et all., 2017 – Anatomy and Physiology.
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1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.
2. William F.Ganong ., 2001 – Review of Medical Physiology. – 20th ed.

Topic 4: Examination of skeletal muscles contraction. Physiological properties of smooth muscles. Myokines, their physiological significance.

Actuality of theme: The knowledge of mechanisms and regymes of muscle contraction will help to understand the violation of the contractile function of muscles in pathological conditions, that is accompanied by a decrease in workability.

Educational aims:

To know: Types of contraction of skeletal muscles depending on the regime of their loading and the mechanisms of combination of excitable and contractile processes, the reasons of muscle's fatigue.

To be able to: Record the contraction of isolated muscle (single and tetanic). To determine the strength of muscles.

Control questions of the topic:

1. Physiological properties and the functions of muscles.
2. Types and regimes of muscular contractions.
3. Concept about neuromotor units.
4. Mechanism of muscle contraction and relaxation.
5. The dependance between the length of a muscle fiber and its tension.
6. Energetics of muscle contraction.
7. Strength of muscles and methods of its research.
8. Law of medium loadings.
9. Mechanisms of fatigue.
10. Physiological peculiarities of smooth muscles.
11. Myogenic regulation of the strength of smooth muscle contraction.
12. The regulation of the strength of contraction of visceral muscles of hollow organs, digestive tract and blood vessels.
13. The role of calcium ions and calmodulin in the regulation of contraction strength, sources of calcium ions, importance in clinical practice.

Student's auditory self work:

1. Recording and analysis of single muscle contraction curve.
2. Tetanus toothed and smooth.
3. Determination of muscle strength.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Johnson et al., 2017 – Anatomy and Physiology.
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Topic 5: Examination of conduction the excitation through neuro-muscular synapse.

Actuality of theme: The knowledge of the structure and functions of synapses, mechanisms of transmission of excitation in them are necessary for the understanding of organization principles of nerve centres activity.

Educational aims:

To know: The mechanisms of origin and transmission of excitation in CNS and neuro-muscular synapses.

To be able to: Draw the schemes, that explain the mechanisms of transmission the excitation in central and peripheral synapses.

Control questions of the topic:

1. Types of synapses and their structure.
2. Receptors of post-synaptic membranes.
3. The potential of the end plate (EPP).
4. Mediators, function, significance in clinical practice.
5. Mechanism of action of the excitatory and inhibitory neurotransmitters.
6. Features of transmission the excitation in neuro-muscular synapses.
7. Physiologic mechanisms of blockage of neuro-muscular transmission.
8. The use of physiology data about the synaptic transmission in pharmacology and practical medicine.

Student's auditory self work:

1. To draw the schemes of mechanisms of transmission the excitation in central and peripheral synapses.

Literature:

Basic:

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Topic 6: General characteristic of biological regulation. Examination of reflex arc.

Actuality of theme: One of the main components of biological regulation of organism's functions is nervous, which is based on the reflex principle.

Educational aims:

To know: The types of biological regulation of organism's functions; stages of reflex theory development, structure of reflex arc.

To be able to: Schematically draw the contour of reflex arc.

Control questions of the topic:

1. Biological regulation, its types.
2. Nervous regulation of organism's functions.
3. Concept about the reflex.
4. Stages of reflex theory development.
5. Structure of the reflex arc.
6. Classification of reflexes.
7. Structure and mechanism of excitation of central neuron.

Student's auditory self work:

1. Analysis of reflex arc.
2. To draw a scheme of reflex arc and to sign its parts.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et al., 2017 – Anatomy and Physiology.
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Topic 7: Examination of excitation processes in the central nervous system (CNS).

Actuality of theme: The integrative activity of CNS is maintained by the interaction between the processes of excitation and inhibition. The knowledge of the features of excitation in CNS has not only theoretical, but also practical value.

Educational aims:

To know: The principle of organization of nerve centres. Features of transmission of excitation in nerve centres. Principles of coordination of reflex activity.

To be able to: Draw the schemes, that explain the features of conduction the excitation in nerve centres. To determine the time of reflex.

Control questions of the topic:

1. Excitation in CNS.
2. Development of excitatory postsynaptic potential (EPSP), its parameters, physiological role.
3. The concept of the nerve center.
4. Time of reflex and its components.
5. Basic properties of nerve centres and their mechanisms.
6. Principles of coordination of reflex activity.

Student's auditory self work:

1. Determination of time of reflex.
2. Temporal summation.
3. Spatial summation.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et all., 2017 – Anatomy and Physiology.
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2. William F.Ganong ., 2001 – Review of Medical Physiology. – 20th ed.

Topic 8: Examination of processes of inhibition in CNS.

Actuality of theme: The activity of CNS is maintained by two processes: excitation and inhibition. The knowledge of patterns of these processes gives the possibility to correct them with the help of pharmacological substances in case of different pathological states.

Educational aims:

To know: Types of central inhibition; mechanisms of their development and functional meaning.

To be able to: Schematically show the types of central inhibition. To reproduce the reciprocal inhibition in the experiment on the spinal frog.

Control questions of the topic:

1. Characteristic of inhibition process.
2. Inhibitory synapses, their neuro-transmitters.
3. Types of the central inhibition.
4. Physiologic mechanisms of central inhibition.
5. Biological role of central inhibition.

Student's auditory self work:

1. Reciprocal inhibition of spinal reflexes.
2. To draw schematically the types of central inhibition.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et all., 2017 – Anatomy and Physiology.

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Topic 9: Examination of the role of spinal cord in regulation of motor functions of the organism.

Actuality of theme: Violation of the regulatory mechanisms of the spinal cord leads to uncoordination of various functions, maladaptation of organism and the development of various pathological states.

Educational aims:

To know: Main features of spinal cord activity. Mechanisms of spinal reflexes. Violation of physiological functions of organism in case of spinal cord injury and damage.

To be able to: Examine the main clinical reflexes of spinal cord of human and to interpret them. To draw the reflex arcs of tonic and tendon reflexes.

Control questions of the topic:

1. Parts of CNS.
2. Conductive function of spinal cord, its role in the regulation of motor functions, importance in clinical practice.
3. Motor systems of the spinal cord.
4. Analysis of sensory information by spinal cord.
5. Reflexes of spinal cord.
6. Gamma-system of spinal cord.
7. Regulation of muscle tone on the spinal cord level.
8. Clinically significant proprioceptive reflexes in humans.
9. Cross section of spinal cord and spinal shock.

Student's auditory self work:

1. Receptive field of spinal reflex of frog.
2. Examination of proprioceptive reflexes in human.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et al., 2017 – Anatomy and Physiology.
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2. William F.Ganong ., 2001 – Review of Medical Physiology. – 20th ed.

Topic 10: Examination of role of brainstem in the regulation of motor functions of organism.

Actuality of theme: CNS provides the regulation of motor function of organism. The damage to these structures of brain cause severe violations of motor and autonomous functions of the organism.

Educational aims:

To know: Structural organization of brainstem, reflex functions, their role in maintaining of body posture and phasic movements.

To be able to: Examine in the experiment static and statokinetic reflexes. To explain the mechanisms of violation of motor functions, in particular, maintaining posture and muscle tone, in case of brainstem damage.

Control questions of the topic:

1. Structural organization of brainstem.
2. The role of hindbrain in the regulation of motor functions.
3. The role of midbrain in the regulation of motor functions.
4. Role of reticular formation in regulation of motor functions.
5. Static and statokinetic reflexes.

Student's auditory self work:

1. Static and statokinetic reflexes in guinea pig.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et all., 2017 – Anatomy and Physiology.
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2. William F.Ganong ., 2001 – Review of Medical Physiology. – 20th ed.

Topic 11: Examination of forebrain and cerebellum role in the regulation of motor functions of the organism. Regulation of systemic activity of the organism. Physiological bases of electroencephalography.

Actuality of theme: Sensory, motor and associative areas are distinguished in the cortex of cerebral hemispheres. Therefore, it is important for a practical doctor to know the functional features of different parts of the cerebral cortex for the diagnostic and treatment of neurological disorders, violations of human's mental functions.

Educational aims:

To know: Morphological and functional organization of hemispheres cerebral cortex. Localization of functions in the cerebral cortex. Principles of method of electroencephalography (EEG). Frequency-amplitude characteristics of basic EEG rhythms. Origin of EEG.

To be able to: Explain the functional disturbances that arise in case of sensory, motor and associative areas injury of cerebral cortex. To apply electrodes on the surface of skull for registration of EEG. To analyze individual EEG rhythms by their frequency-amplitude characteristics.

Control questions of the topic:

1. Morphological and functional organization of hemispheres cerebral cortex.
2. Division of cortex on zones according to their function.
3. Functions of separate fields of the cortex (motor, sensory and associative).
4. Functional asymmetry of cerebral hemispheres. Dominance of left hemisphere.
5. Functions of frontal lobes.
6. Functions of basal ganglia, their role in regulation of motor functions.
7. Functions of cerebellum, its role in regulation of motor functions.
8. Role of thalamus in regulation of motor functions.
9. Role of limbic system in formation of systemic activity.
10. Electrophysiological methods of examination of cerebral cortex (electroencephalography, method of induced potentials).
11. Method of electroencephalography (EEG).
12. EEG rhythms and their frequency-amplitude characteristics.
13. Nature of EEG.
14. Changes of EEG indexes in case of different functional states of cerebral cortex.
15. Clinical role of EEG.

Student's auditory self work:

1. Examination of localizations of functions of medulla oblongata in a frog.
2. To draw a scheme of representation of motor functions in cerebral cortex.
3. In the form of table show the frequency-amplitude characteristics of basic EEG rhythms.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Johnson et al., 2017 – Anatomy and Physiology.
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1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.

2. William F. Ganong., 2001 – Review of Medical Physiology. – 20th ed.

Topic 12: Examination of mechanisms of nervous regulation of visceral functions of the organism.

Actuality of theme: The knowledge of features of nervous regulation of visceral functions is necessary for understanding the mechanisms of development and pharmacological correction of different disturbances in the organism, that take place in case of majority of organism's diseases.

Educational aims:

To know: The role of autonomic nervous system in regulation of physiological functions of the organism.

To be able to: To interpret the mechanisms of influence of sympathetic and parasympathetic nervous systems on the functions of organism.

Control questions of the topic:

1. Features of morphological and functional organization of autonomic nervous system (ANS).
2. Divisions of ANS and their centers.
3. Types, features and functions of autonomic ganglions.
4. Mechanism of transmission of excitation in ANS.
5. Types of cytoresceptors (cholinergic, adrenergic, purinergic, serotonergic and others).
6. Blockers of transmission of excitation in synapses of ANS.
7. Autonomic reflexes.
8. Enteric nervous system.
9. Central regulation of visceral functions.
10. Role of hypothalamus in regulation of visceral functions.
11. Integrative centers of regulation of visceral functions
12. The influences of sympathetic, parasympathetic and metasympathetic nervous systems on organism's functions.

Student's auditory self work:

1. Reflex of eyes convergence.
2. Erben's reflex.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Johnson et al., 2017 – Anatomy and Physiology.
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Additional:

1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.

Topic 13: Examination of somato-sensory system. Pain and antinociception.

Actuality of theme: The knowledge of the principles of organization of somato-sensory system is necessary for the doctor to diagnose and treat various pathological states that arise in case of nervous system damage, internal organs and motor sphere. The formation of pain perception depends on physiological features of nociceptors and central mechanisms of afferent information analysis.

Educational aims:

To know: General principles of structural and functional organization of sensory systems. Structure and functions of somato-sensory system, physiological mechanisms of skin, visceral and proprioception. The peculiarity of nociceptor's structure; the mechanism of their excitation. Nervous pathways of nociceptive system. Centres of pain sensitivity. The concept of antinociceptive system. Physiologic bases of analgesia.

To be able to: Draw a scheme of somato-sensory system, examine the sensitivity in human. To examine the pain sensitivity of different parts of the skin.

Control questions of the topic:

1. The concept of sensory system (analyzer).
2. Structural and functional organization of sensory systems, characteristics of separate divisions of sensory systems.
3. Structural and functional organization of somato-sensory system.
4. Types of receptors for skin sensation.
5. Receptors of muscular and joint sensation.
6. Mechanism of excitation of somato-sensory receptors.
7. Central mechanisms of analysis of somato-sensory information.
8. Temperature sensory system.
9. Visceral sensation and its role in maintaining of homeostasis.
10. Pain, its types and physiological meaning.
11. Theory of pain, neurophysiological and neurochemical bases of pain sensation.
12. Structural and functional organization of nociceptive system.
13. Endogenous antinociceptive system, its structural and functional organization, opioid and non-opioid mechanisms, physiological role and clinical meaning.
14. Physiological bases of analgesia.

Student's auditory self work:

1. Examination of tactile sensation of human's skin.
2. Examination of cold and heat sensations of human's skin.
3. To draw schemes of nociceptive and antinociceptive systems.
4. To represent as a scheme the painful areas of the skin surface, that appear in case of pathology of internal organs (zones of Zakharenko-Head).

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.

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Topic 14: Examination of visual sensory system.

Actuality of theme: Being in constant contact with the environment, a living organism can exist when it continuously receives information about the changes that take place in it. Significant place in the relationship of human and environment belongs to the visual sensory system.

Educational aims:

To know: The structure and functions of visual sensory system components.

To be able to: Determine vision acuity, visual field and color vision.

Control questions of the topic:

1. Morphological and functional organization of visual sensory system.
2. The structure of optical system of eye.
3. Refraction and accommodation of eye.
4. The structure of retina. Mechanism of excitation of visual receptors.
5. Theories of color perception, main forms of color perception disturbances.
6. Binocular vision.
7. Visual nervous pathways and cortical representation of vision.

Student's auditory self work:

1. Examination of acuity of vision.
2. Examination of visual field.
3. Examination of color vision.

Literature:

Basic:

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Topic 15: Examination of auditory and vestibular sensory systems.

Actuality of theme: The knowledge about the peculiarities of auditory and vestibular sensory systems functions are necessary for complete understanding of mechanisms of cognitive process, orientation of organism in space, its interaction with the external environment and disturbances, that are connected with hearing and equilibrium impairments.

Educational aims:

To know: The structure and functional organization of auditory and vestibular sensory systems and their physiologic meaning.

To be able to: Examine the acuity of hearing, conduction of sound by air and by bone, the sensitivity of vestibular system.

Control questions of the topic:

1. Morphological and functional organization of auditory sensory system.
2. Functions of external, middle and inner ear.
3. Mechanism of excitation of auditory receptors.
4. Theories of sound perception.
5. Binaural hearing.
6. Conductive and cortical deviations of auditory sensory system.
7. Sensorineural and conductive deafness. Diagnostic methods and their clinical significance.
8. Structure and functions of vestibular sensory systems.
9. Mechanism of excitation of vestibular receptors.
10. Perception of head position in space and direction of movement.
11. Vestibular reactions, their characteristics and research methods.

Student's auditory self work:

1. Audiometry.
2. Examination of sound conduction via bone and via air (tests of Weber and Rinne).
3. Examination of after-rotation nystagmus in human.

Literature:

Basic:

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2. J. Gordon Betts, Peter Desaix, Eddie Johnson et al., 2017 – Anatomy and Physiology.
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Topic 16: Humoral regulation and role of endocrine glands in regulation of visceral functions of organism.

Actuality of theme: The knowledge of basic rules of endocrine regulation is necessary for the understanding of mechanisms of development of significant quantity of pathological states of organism, their prevention and purposeful treatment.

Educational aims:

To know: The functions of endocrine glands. The features and mechanisms of hormones action. The links between the hypothalamus and hypophysis. Hormones of hypophysis, their physiological role.

To be able to: Draw hypothalamus-hypophysis links, the schemes of regulation of endocrine glands.

Control questions of the topic:

1. Characteristic and classification of humoral regulation factors.
2. The relationship between nervous and humoral regulation.
3. Organization of endocrine system.
4. Endocrine glands, their physiological role.
5. Hormones, their classification, features, mechanisms of action.
6. Methods of examination of endocrine glands.
7. Hypophysis, its role in the regulation of endocrine glands.
8. Hypothalamus-hypophysis links.
9. Tropic and effector hormones of hypophysis, their physiologic effects.
10. Hormones of hypothalamus and their physiologic role.
11. Self-regulation of receptor sensitivity.
12. Endocrine function of adipose tissue.
13. Physiological functions, mechanisms of adipokines action.
14. The influence of circadian biorhythms on the release of hormones.
15. Endocrine function of the endothelium, factors of endothelial nature.
16. Hormone resistance and internalization of receptors.

Student's auditory self work:

1. To show in the form of table the hormones of hypothalamus and hypophysis, to indicate the place of their formation, chemical nature and physiologic action on the target organs.
2. To draw schematically the structure of hypothalamus-hypophysis system, as a base of neurohumoral regulation of organism's functions.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Johnson et al., 2017 – Anatomy and Physiology.
3. Karvatsky IM, editor. Practical works in physiology. Manual for practical training and individual work for English-speaking students. 2-th Vol. Kyiv: Phoenix; 2016-2017. V.1. 214p., V.2. 228p.

Additional:

1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.
2. William F.Ganong ., 2001 – Review of Medical Physiology. – 20th ed.

Topic 16: Examination of the role of hormones in the regulation of physical and mental development.

Actuality of theme: Hormones of thyroid, parathyroid glands and pancreas take part in regulation of metabolism, processes of growth and development of organism, maintaining of homeostasis and adaptation reactions.

Educational aims:

To know: Hormones of thyroid, parathyroid glands and pancreas, their physiologic role and mechanisms of action.

To be able to: Examine the influence of insulin on the level of blood glucose and interpret the results. To draw schemes of regulation of endocrine functions of thyroid, parathyroid glands and pancreas. To explain the basic aspects of violation of these glands functions.

Control questions of the topic:

1. Adenohypophysis.
2. Processes of growth and development. Regulation of somatotropin synthesis and secretion, circadian rhythms.
3. Hormones of thyroid gland, their chemical nature and physiological role.
4. Regulation of internal secretion of thyroid gland.
5. Hormones of parathyroid glands and their role in calcium metabolism.
6. Regulation of internal parathyroid secretion.
7. The role of other hormones that affect on growth processes (insulin, gonadal steroid hormones, cortisol).
8. Age features of endocrine gland functions.

Student's auditory self work:

1. The influence of insulin on the level of blood glucose.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et all., 2017 – Anatomy and Physiology.
3. Karvatsky IM, editor. Practical works in physiology. Manual for practical training and individual work for English-speaking students. 2-th Vol. Kyiv: Phoenix; 2016-2017. V.1. 214p., V.2. 228p.

Additional:

1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.
2. William F.Ganong ., 2001 – Review of Medical Physiology. – 20th ed.

Topic 18: Examination of the role of hormones in the regulation of sexual development.

Actuality of theme: Sexual glands play important role in prenatal and postnatal development of the organism, processes of reproduction. The knowledge of physiological role of sexual hormones is important for the understanding of mechanisms of reproductive function of human in norm and pathology.

Educational aims:

To know: The physiologic role of sex hormones.

To be able to: Explain the changes in human's organism that occur in case of insufficient or excessive secretion of sex hormones.

Control questions of the topic:

1. Sex hormones and their physiological role.
2. Sexual differentiation, development and functions of the reproductive system.
3. Puberty.
4. Hormonal regulation of the gonads.
5. Female reproductive system, its structure and functions.
6. Ovarian hormones, their role, regulation of ovarian function.
7. Menstrual cycle.
8. Pregnancy. Placental hormones. Lactation.
9. Male reproductive system, its structure and functions. Spermatogenesis.
10. Endocrine function of the testes, regulation of testicular function, the contour of regulation with the participation of the hypothalamic-pituitary system.
11. Erection and ejaculation, hormonal and nervous mechanisms of regulation.

Student's auditory self work:

1. Sperm Galli-Mainini reaction.

Literature:

Basic:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et all., 2017 – Anatomy and Physiology.
3. Karvatsky IM, editor. Practical works in physiology. Manual for practical training and individual work for English-speaking students. 2-th Vol. Kyiv: Phoenix; 2016-2017. V.1. 214p., V.2. 228p.

Additional:

1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.
2. William F.Ganong ., 2001 – Review of Medical Physiology. – 20th ed.

Topic 19: Examination of the role of hormones in regulation of homeostasis and adaptation of organism to the action of stress factors

Actuality of theme: Stress is an answer of organism on the action of damaging factors. The saving of the main indexes of homeostasis is done by the complex processes of adaptation. The knowledge of the mechanisms of adaptation processes is important for doctors of different professions according to the profile of activity.

Educational aims:

To know: Hormones that take part in regulation of homeostasis and adaptation of organism to the action of stressor agents.

To be able to: To draw the scheme of regulation of endocrine function of adrenal glands.

Control questions of the topic:

1. Hormones of the pancreas.
2. Hormonal regulation of maintaining a constant concentration of glucose in the blood.
3. Hormones of adrenal glands, their chemical nature.
4. Physiological role of zona glomerulosa hormones.
5. Physiological role of zona fasciculata hormones.
6. Physiological role of zona reticularis hormones.
7. Hormones of adrenal medulla, their chemical nature and physiological effects.
8. Regulation of secretion of adrenal glands.
9. Biological and social factors that provide the processes of adaptation.
10. General adaptation syndrome (H. Selye).
11. Phases, criteria and mechanisms of adaptation.
12. Age features of adaptation reactions.
13. Hormones that take part in regulation of homeostasis.
14. Hormones that take part in adaptation of organism to the action of stress factors.

Student's auditory self work:

1. The effect of adrenaline on the width of the frog's eye pupil.
2. To draw in a form of scheme the physiologic role of hormones of adrenal glands.
2. To draw a scheme of development of general adaptation syndrome.

Literature:**Basic:**

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et al., 2017 – Anatomy and Physiology.
3. Karvatsky IM, editor. Practical works in physiology. Manual for practical training and individual work for English-speaking students. 2-th Vol. Kyiv: Phoenix; 2016-2017. V.1. 214p., V.2. 228p.

Additional:

1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.
2. William F. Ganong ., 2001 – Review of Medical Physiology. – 20th ed.

Topic 20: Physiologic basics of behavior. Examination of formation and inhibition of conditioned reflexes

Actuality of theme: The knowledge of conditions for formation of individual psychic functions, behavior of human is important for understanding the development

of different pathologic violations of psychics and the rational use in medical deontology, the rational method of their treatment.

Educational aims:

To know: Inborn and acquired forms of human behavior. Difference between conditioned and unconditioned reflexes. Mechanism of formation of temporary links. The meaning of conditioned reflexes in adaptation reactions of the organism. Types of cortical inhibition.

To be able to: To create a conditioned motor reflex in human with the following modeling of its inhibition.

Control questions of the topic:

1. Inborn forms of behavior (unconditioned reflexes, instincts, motivations).
2. Conditioned reflex and its neurophysiological mechanisms.
3. Classification of conditioned reflexes.
4. Features and differences between conditioned and unconditioned reflexes.
5. Method of conditioned reflexes formation.
6. Types of cortical inhibition.
7. Modern concepts about the mechanisms of cortical inhibition.
8. Biological role of cortical inhibition.

Student's auditory self work:

1. Formation of conditioned pupil reflex on the bell's ring with its following inhibition.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et all., 2017 – Anatomy and Physiology.

Additional:

1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.
2. William F. Ganong ., 2001 – Review of Medical Physiology. – 20th ed.
3. Vander, Arthur J., 1993 – Human Physiology: the mechanisms of body function / Arthur Vander, James Sherman, Dorothy Luciano . – 7th ed.
4. Texts of physiology lectures.
5. Internet medical sites.

Topic 21: Examination of memory and attention in humans. Examination of the role of motivations and emotions in the behavioral reactions.

Actuality of theme: The knowledge of the role and the mechanisms of development of some needs, motivations, emotions and nervous structures that are responsible for these processes has not only a diagnostic meaning in case of nervous and psychic disorders, but also is needed for doctor for understanding the reasons of human's deeds, everyday behavior and emotional reactions.

Educational aims:

To know: Mechanisms of formation of different types of memory and their brain apparatus. Role of needs in behavior, mechanisms of formation of motivational excitation; role of emotions in human's life, mechanism of their formation.

To be able to: Evaluate the volume of short-term memory and the stability and intensity of human's attention. To draw a scheme of formation of motivational excitation.

Control questions of the topic:

1. Types of memory and its role for the processes of thinking and education.
2. Modern concepts about the mechanisms of short-term memory.
3. Biochemical theories of long-term memory.
4. Role of different areas of cerebrum in the processes of memory creation and for the reproduction of information.
5. Memory disturbances.
6. Types of attention in human.
7. Terms "needs" and "motivations", mechanisms of their formation.
8. Emotions, their types, mechanisms of formation, expression and biological role.
9. Theories of emotions.
10. Emotional stress, its meaning in formation of psychosomatic disorders of organism.

Student's auditory self work:

1. Evaluation of the volume of short-term auditory memory .
2. Performing of the corrective probe.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et all., 2017 – Anatomy and Physiology.
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Additional:

1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.
2. William F.Ganong ., 2001 – Review of Medical Physiology. – 20th ed.

Topic 22: Examination of types of HNA.

Actuality of theme: A feature of higher nervous activity in humans, in contrast to the animal world, is a conscious perception of the world around.

Educational aims:

To know: The characteristics of I and II signaling systems; stages and physiologic mechanisms of their formation. Functions of language. Features of temperament and character of human.

To be able to: Create a conditioned reflex in human in response to word. To examine the features of human's character according to Aizenk method.

Control questions of the topic:

1. The first and the second signaling systems.
2. Development of signaling systems in philo- and ontogenesis.
3. The role of social factors in development of second signaling system.
4. Language, its functions. Language disturbances.
5. "Word" as a curing factor.
6. Physiologic bases of medical deontology.
7. Definition of temperament, character and individual.
8. Physiologic characteristics of the types of higher nervous activity in humans, methods of their research.

Student's auditory self work:

1. Examination of the features of human character according to the method of Aizenk.
2. Determination of human temperament by psychological test.
- 3.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et all., 2017 – Anatomy and Physiology.
3. Karvatsky IM, editor. Practical works in physiology. Manual for practical training and individual work for English-speaking students. 2-th Vol. Kyiv: Phoenix; 2016-2017. V.1. 214p., V.2. 228p.

Additional:

1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.
2. William F.Ganong ., 2001 – Review of Medical Physiology. – 20th ed.

Topic 23: Examination of energy metabolism.

Actuality of theme: The basis of the living organism is the metabolism and energy exchange, associated with the external environment. In clinical practice, the doctor find the diseases that are based on metabolic disorders. Therefore, he must know the physiological basis of energy metabolism for diagnostic and treatment of its disorders.

Educational aims:

To know: Basics of energy metabolism, methods of its examination and mechanisms of regulation.

To be able to: Determine the energy expenditure of the organism by indirect calorimetry and evaluate the results of examination.

Control questions of the topic:

1. Organism as an opened thermodynamic system.
2. Types of energy expenditure of the organism.
3. Methods of calorimetry (direct, indirect).
4. Caloric ratio of one liter of oxygen. Respiratory quotient.
5. Basic metabolic rate and conditions of its measurement.
6. Gross and labor metabolism.
7. Energy expenditures of the organism during different types of labor.
8. The need for proteins, fats, carbohydrates depending on age, type of labor activity and condition of organism.
9. Mechanisms of regulation of energy metabolism.
10. Age features of energy expenditures of organism.

Student's auditory self work:

1. Measurement of energy expenditure by the method of indirect calorimetry based on the gaseous analysis of expired air.
2. Determination of proper basic metabolic rate in human.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et all., 2017 – Anatomy and Physiology.
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Additional:

1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.
2. William F.Ganong ., 2001 – Review of Medical Physiology. – 20th ed.

Topic 24: Examination of thermoregulation

Actuality of theme: Human's body temperature is one of the indicators of homeostasis and is an important index of many diseases. Therefore, it is important for the doctor to know the mechanisms of thermoregulation and the possible causes of their violations.

Educational aims:

To know: Mechanisms of thermoregulation, human's body temperature and methods for its determination.

To be able to: Analyze the mechanisms of thermoregulation in different conditions of external enviroment. To determine the human's body temperature.

Control questions of the topic:

1. Classification of the organism on the basis of thermoregulation mechanisms.
2. Human body temperature, its daily variations. Temperature of different areas of skin and internal organs.

3. Physiological bases of heat gain and loss. Possible limits of the thermoregulation mechanisms.
4. Thermoregulation centre. Nervous and humoral mechanisms of regulation of body temperature.
5. Functional system of isothermia maintenance.
6. Thermometry in the clinic.
7. Age and sex features of thermoregulation.

Student's auditory self work:

1. Measurement of human's body temperature in different parts of the skin using an electrothermometer.
2. Examination of human body temperature and temperature topography of human skin.

Literature:

Basic:

1. Kim E. Barrett, Susan M. Barman, Heddwen L. Brooks, Jason X.-J. Yuan., 2019 - Ganong's Review of Medical Physiology, by McGraw-Hill Education. – 26th ed.
2. J. Gordon Betts, Peter Desaix, Eddie Jonhson et al., 2017 – Anatomy and Physiology.
3. Karvatsky IM, editor. Practical works in physiology. Manual for practical training and individual work for English-speaking students. 2-th Vol. Kyiv: Phoenix; 2016-2017. V.1. 214p., V.2. 228p.

Additional:

1. Guyton and Hall., 2005 – Textbook of Medical Physiology, 11th ed.
2. William F.Ganong ., 2001 – Review of Medical Physiology. – 20th ed.

A + B



X + Y

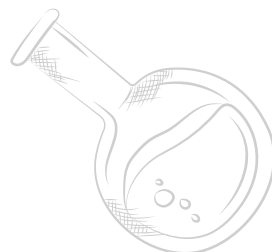
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