

**LIST OF TESTS FOR THE EXAM**

**for the 2022-2025 academic years**

by discipline

"Normal physiology"

for the specialty 31.05.01 General medicine

(Full-time education)

**1. INTRODUCTION TO PHYSIOLOGY**

CHOOSE ONE CORRECT ANSWER.

**1–1. Specify the definition of health according to the WHO Constitution:**

1) health is a state in which normal physiological reserves of the body are manifested, allowing it to adapt to the physical environment with a minimum tension of regulatory mechanisms

2) health is a state in which the quantitative indicators of body functions at rest correspond to the norm

3) health is a state of complete physical, spiritual and social well-being, and not just the absence of disease \*

4) health is a state in which there is an absence of diseases and defects

5) health is the ability of a person to lead a healthy lifestyle

**1–2. The direction in physiology and medicine, which recognizes the dominant role of the nervous system in the regulation of the vital activity of the body in normal and pathological conditions, is called:**

1) analytical and functional principle

2) principle of determinism

3) principle of the unity of the organism and the external environment

4) principle of nervism \*

5) principle of consistency

**1–3. Simple diffusion is carried out:**

1) according to the concentration gradient and (or) the electrical gradient of the transferred substance \*

2) along the concentration gradient of the transferred substance using carrier proteins

3) against the concentration gradient of the transferred substance

4) both along the concentration gradient and against the concentration gradient of the substance

5) by carrier proteins simultaneously with an actively transported substance

**1–4. Facilitated diffusion is carried out:**

1) against the concentration gradient involving ion pumps

2) along the concentration gradient of the transferred substance using carrier proteins \*

3) along the concentration gradient without the participation of carrier proteins

4) with direct expenditure of ATP (adenosine triphosphate) energy or sodium gradient energy

5) along the electrochemical gradient

**1–5. Primary active transport is carried out:**

1) against a concentration gradient involving ion pumps and ATP energy consumption\*

2) only along the concentration gradient of the transported substance

3) without ATP energy consumption

4) directly with the energy consumption of ion gradients, but without the direct participation of ion pumps and the energy consumption of ATP

5) along the electrochemical gradient with the consumption of ATP energy

**1–6. Secondary active transport is carried out:**

1) against a concentration gradient involving ion pumps and ATP energy consumption

2) only along the concentration gradient of the transported substance

3) without ATP energy consumption

4) against a concentration gradient using the energy of ion gradients created by ion pumps\*

5) along the concentration gradient of substances with the participation of carrier proteins

**1–7. Specify the functional role of endocytosis:**

1) transferring of low molecular weight substances through the membrane into the cell

2) transport of large molecular substances into the cell, regulation of the number of membrane receptors, phagocytosis in immune reactions \*

3) excretion of enzymes, protein hormones and cytokines from the cell

4) direct implementation of oxidative phosphorylation and protein biosynthesis

4) transport of large molecular substances through the cell, which cannot be transported through the channels.

**1–8. Specify the functional role of exocytosis:**

1) transport of large molecular nutrients into the cell

2) removal of lipid-insoluble large molecular substances from the cell \*

3) ensuring the formation of energy in the cell

4) absorption of solid macromolecular substances

5) absorption of liquid colloidal solutions

**1–9. An irritant, to the perception of which cells have acquired specialized structures in the process of evolution, is called:**

1) inadequate

2) subthreshold

3) adequate\*

4) threshold

5) maximum

**1–10. Excitable tissues include:**

1) superficial epithelium

2) connective (fibrous and skeletal) tissue

3) connective (reticular, fatty and mucous) tissue

4) nervous, muscular, glandular epithelium\*

5) blood and lymph

**1–11. The physiological system is:**

1) a structural and functional unit of an organ, consisting of cells of all tissues of an organ, united by a common system of blood circulation and innervation

2) a hereditarily fixed system of organs and tissues and the apparatus of their neuroendocrine regulation, which ensures the implementation of any major body function \*

3) a temporary unification of the functions of various tissues, organs and their systems, aimed at achieving a useful result

4) a complex of structures involved in the implementation of any function

5) there is no correct answer

**1–12. The functional system is:**

1) a structural and functional unit of an organ, consisting of cells of all tissues of an organ, united by a common system of blood circulation and innervation

2) a hereditarily fixed set of organs and tissues and the apparatus of their neuroendocrine regulation, which ensures the implementation of any major body function

3) a temporary unification of the functions of various tissues, organs and their systems, aimed at achieving a useful result \*

4) a complex of secretory cells that secrete information molecules

5) a complex of nervous structures that control any function

**2. BIOPOTENTIALS**

**2–1. The resting membrane potential is:**

1) a potential difference between the outer and inner surfaces of the cell membrane in a state of functional rest\*

2) a characteristic feature of excitable tissues’ cells

3) a rapid fluctuation of the cell membrane charge with an amplitude of 90-120 mV

4) a potential difference between the excited and unexcited sections of the membrane

5) a potential difference between the damaged and undamaged sections of the membrane

**2–2. In a state of physiological rest, the inner surface of the membrane of an excitable cell in relation to the outer one is charged:**

1) positively

2) as well as the outer surface of the membrane

3) negatively\*

4) has no charge

5) there is no correct answer

**2–3. A positive shift (decrease) in the resting membrane potential under the action of a stimulus is called:**

1) hyperpolarization

2) repolarization

3) exaltation

4) depolarization\*

5) static polarization

**2–4. A negative shift (increase) in the resting membrane potential is called:**

1) depolarization

2) repolarization

3) hyperpolarization\*

4) exaltation

5) reversion

**2–5. The descending phase of the action potential (repolarization) is associated with an increase in membrane permeability in ……… ions:**

1) sodium

2) calcium

3) chlorine

4) potassium\*

5) magnesium

**2–6.The concentration of ……. ions is higher inside the cell (compared with the intercellular fluid):**

1) chlorine

2) sodium

3) calcium

4) potassium\*

5) magnesium

**2–7. An increase in potassium current during the development of an action potential causes:**

1) rapid repolarization of the membrane\*

2) membrane depolarization

3) membrane potential reversion

4) trace depolarization

5) local depolarization

**2–8. With complete blockade of fast sodium channels of the cell membrane, we can observe:**

1) reduced excitability

2) decrease in the amplitude of the action potential

3) absolute refractoriness\*

4) exaltation

5) trace depolarization

**2–9. The negative charge on the inner side of the cell membrane is formed as a result of diffusion:**

1) K+ from the cell and the electrogenic function of the K-Na pump \*

2) Na+ into the cell

3) C1 - from the cell

4) Ca2+ into the cell

5) there is no correct answer

**2–10. The value of the rest potential is close to the value of the equilibrium potential for the ……… ion:**

1) potassium\*

2) chlorine

3) calcium

4) sodium

5) magnesium

**2–11. The rising phase of the action potential is associated with an increase in ………… ion permeability:**

1) potassium

2) there is no correct answer

3) sodium\*

4) chlorine

5) magnesium

**2–12. Specify the functional role of the resting membrane potential:**

1) its electric field affects the state of protein channels and membrane enzymes\*

2) it characterizes the increase in cell excitability

3) it is the main unit of encoding information in the nervous system

4) it ensures the operation of diaphragm pumps

5) it characterizes a decrease in cell excitability

**2–13. The ability of cells to respond to the action of stimuli with a specific reaction, characterized by rapid, reversible membrane depolarization and a change in metabolism, is called:**

1) irritability

2) excitability\*

3) lability

4) conduction

5) automatism

**2–14. Biological membranes, participating in the change of intracellular content and intracellular reactions due to the reception of extracellular biologically active substances, perform:**

1) a barrier function

2) a receptor-regulatory function\*

3) a transport function

4) a cell differentiation function

5) an action potential generation function

**2–15. The minimum stimulus force necessary and sufficient for a response to occur is called:**

1) threshold\*

2) superthreshold

3) submaximal

4) subthreshold

5) maximum

**2–16. With an increase in the threshold of irritation, the excitability of the cell:**

1) has increased

2) has decreased\*

3) has not changed

4) everything is correct

5) there is no correct answer

**2–17. Biological membranes, participating in the conversion of external stimuli of non-electrical and electrical nature into bioelectrical signals, mainly perform:**

1) a barrier function

2) a regulatory function

3) a cell differentiation function

4) a transport function

5) an action potential generation function\*

**2–18. The action potential is:**

1) a stable potential that is established on the membrane when two forces are in balance: diffusion and electrostatic

2) the potential between the outer and inner surfaces of the cell in a state of functional rest

3) fast, actively propagating, phase fluctuation of the membrane potential, accompanied, as a rule, by recharging the membrane \*

4) a slight change in the membrane potential under the action of a subthreshold stimulus

5) prolonged, congestive depolarization of the membrane

**2–19. Membrane permeability for Na+ in the depolarization phase of the action potential:**

1) sharply increases and a powerful sodium current enters the cell \*

2) sharply decreases and a powerful sodium current leaving the cell appears

3) does not change significantly

4) everything is correct

5) there is no correct answer

**2–20. Biological membranes, participating in the release of neurotransmitters in synaptic endings, mainly perform:**

1) a barrier function

2) a regulatory function

3) an intercellular interaction function\*

4) a receptor function

5) an action potential generation function

**2–21. The molecular mechanism that ensures the removal of sodium ions from the cytoplasm and the introduction of potassium ions into the cytoplasm is called:**

1) voltage-gated sodium channel

2) non-specific sodium-potassium channel

3) chemodependent sodium channel

4) sodium-potassium pump\*

5) leakage channel

**2–22. The system of movement of ions through the membrane along the concentration gradient, which does not require a direct expenditure of energy, is called:**

1) pinocytosis

2) passive transport\*

3) active transport

4) persorption

5) exocytosis

**2–23. The level of membrane potential at which an action potential occurs is called:**

1) resting membrane potential

2) critical level of depolarization\*

3) trace hyperpolarization

4) zero level

5) trace depolarization

**2–24. With an increase in the concentration of K + in the extracellular environment with a resting membrane potential in an excitable cell, the following will occur:**

1) depolarization\*

2) hyperpolarization

3) transmembrane potential difference will not change

4) stabilization of the transmembrane potential difference

5) there is no correct answer

**2–25. The most significant change when exposed to a fast sodium channel blocker will be:**

1) depolarization (decrease in resting potential)

2) hyperpolarization (increased resting potential)

3) decrease in the steepness of the depolarization phase of the action potential \*

4) slowing down the repolarization phase of the action potential

5) there is no correct answer

**3. MAIN LAWS OF IRRITATION EXCITABLE TISSUES**

**3–1. The law, according to which with an increase in the strength of the stimulus, the response gradually increases until it reaches a maximum, is called:**

1) "all or none"

2) strength-duration

3) accommodation

4) forces (power relations) \*

5) polar

**3–2. The law, according to which an excitable structure responds to threshold and suprathreshold stimuli with the maximum possible response is called:**

1) strength

2) "all or none" \*

3) strength-duration

4) accommodation

5) polar

**3–3. The minimum time during which a current, equal to twice the rheobase (twice the threshold force) causes excitation is called:**

1) effective time

2) accommodation

3) adaptation

4) chronaxia\*

5) lability

**3–4. Which structure obeys the law of force?:**

1) cardiac muscle

2) single nerve fiber

3) single muscle fiber

4) whole skeletal muscle\*

5) single nerve cell

**3–5. Which structure obeys the law "All or none"?:**

1) whole skeletal muscle

2) nerve trunk

3) cardiac muscle\*

4) smooth muscle

5) nerve center

**3–6. The adaptation of a tissue to a slowly increasing stimulus is called:**

1) lability

2) functional mobility

3) hyperpolarization

4) accommodation\*

5) inhibition

**3–7. The paradoxical phase of parabiosis is characterized by:**

1) a decrease in response with an increase in the strength of the stimulus \*

2) a decrease in the response with a decrease in the strength of the stimulus

3) an increase in response with an increase in the strength of the stimulus

4) the same response with an increase in the strength of the stimulus

5) lack of response to stimuli of any strength

**3–8. The irritation threshold is an indicator of:**

1) excitability\*

2) contractility

3) lability

4) conductivity

5) automatism

**3–9. The ability of living tissue to respond to any kind of impact by changing metabolism is called:**

1) conductivity

2) lability

3) excitability

4) irritability\*

5) automatism

**4. NEURON AS A STRUCTURAL AND FUNCTIONAL UNIT OF THE CNS**

**4–1. A physiological system specialized in receiving, processing and storing information about the surrounding world and the internal environment of the body is:**

1) respiratory system

2) circulatory system

3) blood system

4) nervous system\*

5) digestive system

**4–2. The main form of information transmission in the nervous system is:**

1) receptor potential

2) excitatory and inhibitory postsynaptic potentials

3) action potential\*

4) prepotential (local response)

5) inhibitory postsynaptic potential

**4–3. An action potential in a neuron most easily arises in:**

1) axo-somatic synapse

2) neurodendrons

3) axon hillock\*

4) cell body

5) axo-dendritic synapse

**4–4. The shift of the membrane potential during the formation of the receptor potential, as a rule, is represented by:**

1) hyperpolarization

2) depolarization\*

3) no change in membrane polarization

4) there is no correct answer

5) the formation of an action potential

**4–5. The strength of the stimulus at the output of the sensory neuron (in its axon hillock and axon) is encoded by:**

1) frequency of action potentials\*

2) amplitude of action potentials

3) duration of action potentials

4) the shape of action potentials

5) frequency and amplitude of action potentials

**4–6. Receptors adaptation is characterized by:**

1) an increased excitability under the action of a strong stimulus

2) a decrease in excitability with prolonged exposure to a constant stimulus \*

3) an increased excitability with prolonged exposure to a constant stimulus

4) a decrease in excitability under the action of a strong stimulus

5) an increased excitability under the action of a subthreshold stimulus

**4–7. A synapse is a specialized structure:**

1) of a neuron in which the action potential most easily arises

2) ensuring the transmission of excitatory or inhibitory signals from the neuron to the innervated cell \*

3) providing perception of the action of the stimulus

4) providing the transfer of excitation from efferent to afferent fibers

5) controlling the action of the stimulus

**4–8. The excitatory postsynaptic potential develops as a result of the opening of channels for ions of ….. on the postsynaptic membrane:**

1) chlorine

2) sodium\*

3) potassium

4) magnesium

5) calcium

**4–9. ……… appears on the postsynaptic membrane:**

1) action potential

2) excitatory postsynaptic potential, inhibitory postsynaptic potential (EPSP, IPSP) \*

3) receptor potential

4) there is no correct answer

5) release of the mediator into the synaptic cleft

**4–10. An excitatory postsynaptic potential is a local depolarization process that develops on the membrane of:**

1) axon hillock

2) sarcoplasmic

3) mitochondrial

4) presynaptic

5) postsynaptic\*

**4–11. A nerve cell performs all functions except:**

1) receiving information

2) information storage

3) encoding information

4) mediator production

5) direct participation in the formation of the blood-brain barrier\*

**4–12. Under the transformation of the rhythm of excitation we mean:**

1) directed spread of excitation in the central nervous system

2) circulation of impulses in a neuron trap

3) increase or decrease in the number of impulses \*

4) random spread of excitation in the central nervous system

5) reflex aftereffect

**4–13. Diffuse irradiation of excitation is understood as:**

1) non-directional spread of excitation through the central nervous system \*

2) change in the rhythm of excitation

3) slow spread of excitation through the central nervous system

4) directed spread of excitation through the central nervous system

5) increase in the number of impulses

**4–14. Excitation occlusion is the ability of the nerve center to:**

1) prolong arousal

2) give excitation greater than the sum of its two excitations with separate stimulation of these inputs (B1 + 2 > B1 + B2) (with simultaneous stimulation from two receptor zones)

3) become dominant

4) give excitation less than the sum of its two excitations with separate stimulation of these inputs (B1 + 2 < B1 + B2) \* (with simultaneous stimulation from two receptor zones)

5) carry out the ring rhythm of the spread of excitation

**4–15. The excitatory postsynaptic potential is:**

1) hyperpolarization of the postsynaptic membrane

2) depolarization of the postsynaptic membrane\*

3) static polarization of the postsynaptic membrane

4) depolarization of the axon hillock

5) potential arising in receptors

**4–16. The inhibitory postsynaptic potential is:**

1) as a rule, depolarization of the postsynaptic membrane

2) as a rule, hyperpolarization of the postsynaptic membrane\*

3) static polarization of the postsynaptic membrane

4) depolarization of the axon hillock

5) potential arising in receptors

**4–17. Presynaptic inhibition allows to:**

1) block selectively individual synaptic inputs of a neuron\*

2) inhibit the neuron as a whole

3) inhibit the neuron back

4) increase the release of the mediator into the synaptic cleft

5) increase the efficiency of synaptic transmission

**4–18. Spatial summation of excitation in CNS neurons is:**

1) summation of excitations in one synapse, coming one after another with a short interval

2) simultaneous excitation of several synapses located on one neuron \*

3) summation of excitations in one synapse, coming one after another with an interval lasting more than one EPSP

4) prolongation of the response of the neuron

5) there is no correct answer

**4–19. The temporal summation of excitations in the central neurons is:**

1) a simultaneous excitation of several synapses located on one neuron \*

2) a summation of excitations in one synapse, coming one after another with a short interval with a duration of less than one EPSP

3) a summation of excitations in one synapse, coming one after another with an interval lasting more than one EPSP

4) a prolongation of the response of the neuron

5) a way to expand the functional capacities

**4–20. The action potential in the myelin fiber propagates:**

1) spasmodically (saltatory) \*

2) passively (electrotonic)

3) sequentially, with the involvement of the myelin sheath

4) due to the energy of the stimulus

5) in the form of a local depolarization process

**4–21. Functional role of axon transport:**

1) directly carries out the transmission of excitation in the synapse

2) directly forms the membrane potential of the neuron

3) regulates metabolism, differentiation and reproduction of innervated cells\*

4) directly forms the receptor potential

5) directly forms the action potential

**4–22. Neuroglia does not perform the following functions:**

1) barrier (delimiting)

2) metabolic

3) protective (immune)

4) action potential generation\*

5) regulatory

**5. REFLEX AS THE MAIN FORM OF NERVOUS ACTIVITY**

**5–1. A reflex is the body's response to:**

1) a change in the external environment

2) a change in the external and internal environment, carried out with the participation of the central nervous system in response to irritation of receptors \*

3) an irritation of the nerve center of the spinal cord or brain

4) a change in the internal environment

5) irritation of afferent or efferent pathways

**5–2. The reflex arc is:**

1) a structural and functional unit of the central nervous system, consisting of receptors and an executive organ

2) a path connecting the central nervous system and the executive organ

3) the path that connects the receptors with the nerve center

4) the path of nerve impulses from the receptor to the executive organ \*

5) the path that connects the neurons of the central nervous system

**5–3. The receptor link of the reflex arc performs the function of:**

1) centrifugal conduction of excitation from the nerve center to the executive structure

2) centripetal conduction of excitation from receptors to the nerve center, frequency-spectral recoding

3) it perceives the action of the stimulus, converts its energy into a receptor potential and encodes the properties of stimuli \*

4) it analyzes and synthesizes the information received, recodes information and generates a command

5) it coordinates the activity of the effector

**5–4. The afferent link of the reflex arc performs the following functions:**

1) centrifugal conduction of excitation from the nerve center to the executive structure

2) centripetal conduction of excitation from receptors to the nerve center, frequency-spectral recoding \*

3) perceives the action of the stimulus, converts its energy into receptor potential and encodes the properties of stimuli

4) analyzes and synthesizes the information received, recodes information and generates a command

5) coordinates the activity of the effector

**5–5. The central link of the reflex arc performs the following functions:**

1) centrifugal conduction of excitation from the nerve center to the executive structure

2) centripetal conduction of excitation from receptors to the nerve center, frequency-spectral recoding

3) it perceives the energy of the stimulus, converts it into a receptor potential and encodes the properties of stimuli

4)it analyzes and synthesizes the information received, recodes information and generates a command \*

5) it perceives the receptor potential and converts it into an action potential

**5–6. Reverse afferentation is:**

1) a centrifugal conduction of excitation from the nerve center to the executive structure

2) a centripetal conduction of excitation from receptors to the nerve center

3) information about the result of the reflex coming from the receptors of the executive organ \*

4) analysis and synthesis of afferent impulses

5) perception of stimulus energy

**5–7. If one of the links of the reflex arc is completely turned off, then the reflex is:**

1) carried out

2) not carried out\*

3) carried out only with suprathreshold stimulation

4) carried out irregularly

5) carried out in the presence of return coupling

**5–8. The reason for the unilateral conduction of excitation in the reflex arc are the peculiarities of:**

1) conduction of excitation along afferent fibers

2) conduction of excitation along efferent fibers

3) conduction of excitation in synapses \*

4) conduction of excitation in the soma of the neuron

5) interactions between nerve centers

**5–9. The latent (hidden) time of the reflex, is considered the time from the onset of the stimulus to:**

1) the end of the action of the stimulus

2) the excitation of the nerve center

3) the appearance of a response from the executive body \*

4) the appearance of reverse afferentation

5) the completion of the reflex reaction

**5–10. Usually the greatest delay time of the conducted excitation in a reflex arc is found in:**

1) afferent link

2) efferent link

3) central link\*

4) back afferent link

5) there is no delay in the conduction of excitation

**5–11. For the proper reflexes it is characteristic that:**

1) receptors and effectors are within the same physiological system\*

2) receptors and effectors are located in different physiological systems

3) there is no afferent delay link

4) irregular reverse afferentation

5) no signs of delayed excitation

**5–12. The main part (core) of the nerve center, in contrast to the auxiliary parts of the center:**

1) enlarge attachable adjustable function capabilities

2) its defeat completely turns off the adjustable function \*

3) has predominantly polymodal neurons

4) inhibits the activity of surrounding neurons

5) has an insufficient number of synaptic contacts from afferents

**5–13. The plasticity of nerve centers is the ability to:**

1) change its functionality\*

2) sum up the incoming excitation and slow down nearby centers

3) transform the rhythm of excitation

4) relief

5) occlusion

**5–14. ….. have the greatest plasticity:**

1) spinal centers

2) stem centers

3) cortical centers\*

4) basal nuclei

5) pathways

**5–15. The increasing transformation of the excitation rhythm in the nerve center is caused by:**

1) low lability of efferent neurons

2) synaptic delay

3) center fatigue

4) animations of excitations\*

5) convergence of excitations

**5–16. Fatigue of nerve centers compared to nerve fibers:**

1) is higher\*

2) is lower

3) is the same

4) does not change depending on the functional state

5) there is no correct answer

**5–17. The functional significance of reverberation (circulation) of excitation in the nerve centers is:**

1) prolongation of excitation time and memory formation\*

2) weakening of excitation

3) creation of reciprocal relationships in the center

4) inhibition of excitation

5) multiplication of excitations

**5–19. Reversible inhibition:**

1) prevents overexcitation of motor neurons\*

2) creates a resting tone of motor neurons

3) creates reciprocal relationships between motor neurons

4) causes prolonged depolarization of afferents

5) provides irradiation of excitation in the central nervous system

**5–20. Reciprocal inhibition is characterized by:**

1) excitation of the center inhibits the same center through Renshaw cells

2) excitation of the neurons of one center inhibits the excitation of the center of the antagonistic reflex \*

3) the excited center surrounds itself with a zone of inhibition

4) lateral inhibition of the spread of excitation

5) prolonged depolarization of afferents

**5–21. Lateral (surrounding) inhibition performs the function:**

1) it suppresses the excitation of the center that caused it

2) it concentrates excitation in this center and limits its irradiation \*

3)it causes irradiation of excitation from this center to others

4) it creates reciprocal relationships

5) it provides reverberation of impulses in a neural network such as a "neural trap"

**6. COORDINATING AND INTEGRATING ACTIVITY OF THE CNS**

**6–1. The principle of a “final common path" is:**

1) a combination of excitation of one nerve center with inhibition of another, carrying out a functionally opposite reflex

2) strengthening of the reflex response upon repeated stimulation of the same receptive field

3) implementation of various reflexes through the same efferent neurons \*

4) multiplication of excitations

5) concentration of excitation in a given center

**6–2. The principle of blazing a path is**:

1) a combination of excitation of one center with inhibition of another, carrying out a functionally opposite reflex

2) strengthening of the reflex response of the center when it is repeatedly stimulated from the same receptive field \*

3) the property of the same stimulus in different situations to evoke different reflexes

4) multiplication of excitations

5) implementation of various reflexes through different efferent neurons

**6–3. The principle of blazing a path:**

1) makes it possible for the same efferent neurons to participate in different reflexes

2) facilitates the reflex response, participates in the formation of temporary connections between neurons \*

3) inhibits the reflex response

4) concentrates excitation in this center

5) causes irradiation of excitations

**6–4. The switching principle is:**

1) a combination of excitation of one nerve center with inhibition of another, carrying out a functionally opposite reflex

2) strengthening of the reflex response upon repeated stimulation of the same receptive field

3) the ability of the same stimulus to evoke different reflexes in different situations\*

4) movement of excitation along the ring structures of neurons

5) facilitation of the reflex response

**6–5. The principle of reciprocity is:**

1) a combination of excitation of one nerve center with inhibition of another, carrying out a functionally opposite reflex \*

2) strengthening of the reflex response upon repeated stimulation of the same receptive field

3) the ability of the same stimulus to evoke different reflexes in different situations

4) movement of excitation along the ring structures of neurons

5) facilitation of the reflex response

**6–6. The principle of feedback is:**

1) movement of excitation from the receptor to the effector

2) the entry into the central nervous system of information about the state of the external environment and the body

3) receipt of information on the result of reflex activity in the central nervous system \*

4) facilitation of the reflex response

5) increased reflex response after prolonged rhythmic stimulation of the nerve center

**6–7. Positive feedback:**

1) enhances the functional parameters of the body \*

2) stabilizes the functional parameters of the body

3) stops any bodily function

4) switches the body's activity to perform other functions

5) stops the reflex response

**6–8. Negative feedback provides:**

1) strengthening any function of the body

2) stabilization of any body function\*

3) the emergence of any function of the body

4) multiplication of excitations

5) the movement of excitation along the ring chains of neurons

**6–9. The dominance principle is:**

1) the ability of the nerve center to surround itself with a zone of inhibition

2) the ability of the excited center to direct (subordinate, unite) the work of other nerve centers \*

3) the possibility of the same stimulus in different situations to cause different reflexes

4) the ability of the nerve center to inhibit the reflex response

5) there is no correct answer

**6–10. The threshold of excitation and excitability of the dominant focus is usually:**

1) increased, excitability is decreased

2) reduced, excitability is increased \*

3) increased, excitability is increased

4) not changed

5) decreased, excitability is decreased

**6–11. During the formation of a dominant, its receptive field usually:**

1) decreases

2) increases\*

3) does not change

4) limits the possibility of a response from various receptor inputs

5) there is no correct answer

**6–12. The functional system is:**

1) the dynamic self-regulating association of various parts of the nervous system, physiological systems and their components to achieve a specific result useful for the body \*

2) a temporary association of excited nerve centers that cooperate to perform a biologically important function

3) the response of the body to irritation of receptors, carried out with the participation of the nervous system

4) the presence in the central nervous system of excitation foci, which determine the direction and nature of body functions

5) association of physiological systems and their components under the action of various stimuli

**6–13. All components that form the stage of afferent synthesis of a functional system are named correctly, except for:**

1) starting afferentation

2) dominant motivation

3) situational afferentation

4) efferent program of action\*

5) memory

**6–14. The component of the afferent synthesis of a functional system that answers the question "what to do" is:**

1) starting afferentation

2) situational afferentation

3) dominant motivation\*

4) memory

5) program of action

**6–15. The component of the afferent synthesis of a functional system that answers the question "how to do" is:**

1) starting afferentation

2) dominant motivation

3) memory\*

4) situational afferentation

5) reverse afferentation

**6–16. The component of the afferent synthesis of a functional system that answers the question "when to do" is:**

1) memory

2) situational afferentation

3) dominant motivation

4) starting afferentation \*

5) program of action

**6–17. The component of the afferent synthesis of a functional system that answers the question “under what conditions to do it” is:**

1) starting afferentation

2) situational afferentation\*

3) dominant motivation

4) memory

5) program of action

**6–18. In a functional system, the acceptor of the result of an action is:**

1) primary analysis in the central nervous system of the conditions of the external and internal environment

2) neural model of the expected beneficial result of the activity\*

3) a set of excited nerve centers that trigger the activity of the executive organs

4) result parameters

5) afferent synthesis component

**6–19. The efferent program of action is:**

1) a set of excited autonomic and somatic nerve centers that trigger the activity of the executive organs \*

2) neural model of the intended result of the activity

3) information about the individual stages and the final result of the systems

4) analysis of the situation in the external and internal environment in which the organism operates

5) result parameters

**6–20. Reverse afferentation in a functional system is:**

1) decision making

2) formation of a model of the future result

3) information about the result and its intermediate stages\*

4) efferent program of action

5) afferent synthesis

**6–21. Electroencephalography is a method of recording:**

1) total electrical activity of the brain\*

2) action potential of individual neurons

3) only excitatory postsynaptic potentials

4) only inhibitory postsynaptic potentials

5) activity of nerve conductors

**6–22. Electroencephalogram desynchronization is:**

1) the presence of alpha rhythm in a state of physical and emotional rest

2) the presence of theta rhythm with prolonged emotional stress and light sleep

3) the presence of a delta rhythm during deep sleep

4) the appearance of high-frequency irregular waves of the beta rhythm, which change the alpha rhythm during sensory stimulation, intellectual and emotional stress \*

5) the presence of a beta rhythm at rest

**6–23. The predominance of the alpha rhythm on the electroencephalogram is typical for:**

1) states of physical and emotional rest\*

2) deep sleep

3) fatigue and light sleep

4) high brain activity during sensory stimulation, intellectual and emotional stress

5) narcotic sleep

**6–24. The predominance of the beta rhythm on the electroencephalogram is typical for:**

1) states of physical and emotional rest

2) deep sleep

3) fatigue and light sleep

4) high brain activity during sensory stimulation, intellectual and emotional stress\*

5) narcotic sleep

**6–25. An increase in the proportion of theta rhythm on the electroencephalogram is typical for:**

1) states of physical and emotional rest

2) deep sleep

3) fatigue and light sleep\*

4) high brain activity during sensory stimulation, intellectual and emotional stress

5) narcotic sleep

**6–26. An increase in the proportion of the delta rhythm on the electroencephalogram is typical for:**

1) states of physical and emotional rest

2) deep sleep\*

3) fatigue and light sleep

4) high brain activity during sensory stimulation, intellectual and emotional stress

5) there is no correct answer

**6–27. Registration of the delta rhythm in all leads of the electroencephalogram indicates:**

1) the presence of seizures in the patient

2) that the electroencephalogram was taken during deep sleep\*

3) that during registration the patient was given physical activity

4) that the patient was given a mental task during registration

5) the presence of emotional stress in the patient

**6–28. In patients with a lesion in the hypothalamus, the following disorder may be observed:**

1) unstable posture

2) sharply increased appetite \*

3) speech disorders

4) hyperkinesis

5) hypokinesis

**6–29. The most striking manifestation of the complete blockade of the ascending influence of the reticular formation will be:**

1) hyperreflexia

2) coma (unconscious) state \*

3) motor dysfunction

4) visual impairment (nystagmus and diplopia)

5) the occurrence of seizures

**7. AUTONOMOUS NERVOUS SYSTEM**

**7–1. The autonomic nervous system does not innervate:**

1) muscle fibers of skeletal muscles\*

2) smooth muscles of blood vessels and internal organs

3) heart muscle

4) glandular cells

5) liver

**7–2. The mediator of postganglionic fibers of the parasympathetic nervous system is:**

1) acetylcholine, it interacts with M-cholinergic receptors \*

2) norepinephrine, it interacts with M-cholinergic receptors

3) acetylcholine, it interacts with α- and β-adrenergic receptors

4) norepinephrine, it interacts with α- and β-adrenergic receptors

5) dopamine, it interacts with D-receptors

**7–3. In the sympathetic and parasympathetic parts of the autonomic nervous system, transmission from pre- to the postganglionic neuron is carried out with:**

1) acetylcholine\*

2) norepinephrine

3) serotonin

4) adrenaline

5) dopamine

**7–4. Choose a feature that is absent in the metasympathetic part of the autonomic nervous system:**

1) it innervates only internal hollow organs that have their own motor activity

2) it has direct inputs from the sympathetic and parasympathetic divisions

3) it has direct inputs from the somatic nervous system\*

4) it has mediators other than the sympathetic and parasympathetic divisions

5) it has its own sensory link

**7–5. Autonomy in the autonomic nervous system is most peculiar for:**

1) sympathetic part

2) parasympathetic part

3) metasympathetic part\*

4) all the parts

5) autonomic ganglia

**7–6. Stimulation of the secretion of sweat glands is provided by:**

1) sympathetic fibers, the mediator of which is acetylcholine \*

2) parasympathetic fibers, the mediator of which is acetylcholine

3) sympathetic fibers, the mediator of which is norepinephrine

4) parasympathetic fibers, the mediator of which is norepinephrine

5) somatic fibers

**7–7. When the sympathetic part of the autonomic nervous system is irritated, the following occurs:**

1) increase in heart rate\*

2) decrease in heart rate

3) increased peristalsis of the gastrointestinal tract

4) constriction of the pupil

5) no correct answer

**7–8. With irritation of the parasympathetic part, it is noted:**

1) pupil dilation, increase in heart rate

2) constriction of the pupil, increased peristalsis of the gastrointestinal tract \*

3) weakening of peristalsis

4) increase in heart rate

5) decreased salivation

**7–9. Pupil constriction is provided by increased activity of ….. fibers:**

1) sympathetic

2) parasympathetic\*

3) somatic

4) both sympathetic and parasympathetic

5) metasympathetic

**7–10. When cutting an efferent nerve fiber, immediately after its exit from the spinal cord, atrophic processes occur in the innervated organ. What was cut?:**

1) somatic fiber\*

2) vegetative sympathetic fiber

3) both somatic and vegetative fiber

4) parasympathetic fiber

5) fiber that is part of the vagus nerve

**7–11. Cholinergic neurons:**

1) secrete norepinephrine in their endings and these include all preganglionic neurons of the autonomic nervous system

2) secrete acetylcholine at their endings and these include all preganglionic neurons of the autonomic nervous system and all postganglionic neurons of the parasympathetic nervous system \*

3) secrete acetylcholine at their endings and these include all postganglionic neurons of the sympathetic nervous system

4) release dopamine in their endings

5) secrete neuropeptides in their endings

**7–12. In order to block inhibitory parasympathetic influences on the heart, it is necessary to prescribe:**

1) blocker of M-cholinergic receptors \*

2) blocker of H-cholinergic receptors

3) blocker of β-adrenergic receptors

4) blocker of -adrenergic receptors

5) there is no correct answer

**7–13. In order to block sympathetic influences on the heart, it is necessary to prescribe:**

1) blocker of M-cholinergic receptors

2) blocker of H-cholinergic receptors

3) blocker of β-adrenergic receptors\*

4) blocker of α-adrenergic receptors

5) there is no correct answer

**8. THE ENDOCRINE SYSTEM**

**8–1**. **Most of the hormones are:**

1) steroid

2) protein-peptide\*

3) derivative of amino acids

4) there is no correct answer

5) thyroid

**8–2. The main amount of the hormone is transported in the blood in:**

1) freely soluble form

2) connections with leukocytes and erythrocytes

3) connections with plasma proteins (especially with globulins) \*

4) connections with lipids

5) connections with carbohydrates

**8–3. Specific binding of the hormone in the blood occurs with:**

1) blood cells

2) plasma albumin

3) plasma globulins \*

4) chylomicrons

5) micelles

**8–4 The binding of the hormone to blood proteins provides:**

1) hormone activation

2) strengthening the effects of its action

3) deposition of an easily mobilized reserve of the hormone in the blood, which protects the body from excess hormones \*

4) destruction of the hormone

5) filtration of low molecular weight hormones in the kidneys

**8–5. The leading organs in the inactivation and excretion of hormones from the body are:**

1) respiratory organs

2) sweat glands

3) liver and kidneys\*

4) gastrointestinal tract

5) salivary glands, liver and kidneys

**8–6. The second mediators involved in the intracellular realization of the effects of hormones are *not*:**

**1)** membrane hormone-receptor complexes \*

2) cyclic nucleotides

3) calcium ions

4) diacylglycerol, inositol triphosphate

5) calcium-calmodulin complex

**8–7. The endocrine function of the adrenal medulla is mainly regulated by:**

1) humoral mechanisms

2) endocrine factors

3) direct nervous (sympathetic) influences\*

4) through the pituitary gland

5) nervous somatic influences

**8–8. The leading role in the regulation of secretion of thyroid hormones by the thyroid gland is played by:**

1) direct nerve control

2) hypothalamic-pituitary control \*

3) humoral control

4) thyroid hormones

5) parasympathetic division of the autonomic nervous system

**8–9. Select the mechanism that plays a leading role in the regulation of pancreatic hormone secretion:**

1) direct nerve control

2) hypothalamic-pituitary control

3) blood metabolite level and hormones of the gland itself \*

4) hormones of the gland itself

5) mechanical irritation of the mucous membrane of the duodenum

**8–10. With an increase in the level of glucocorticoids in the blood:**

1) the production of hypothalamic corticoliberins increases as a result of negative feedback

2) the release of corticoliberins and ACTH falls as a result of negative feedback \*

3) does not change

4) ACTH secretion decreases as a result of positive feedback

5) the release of corticoliberins falls as a result of positive feedback

**8–11. With a decrease in the level of testosterone in the blood, the production of hypothalamic gonadoliberin:**

1) amplifies as a result of negative feedback\*

2) slowed down as a result of negative feedback

3) does not change

4) there is no correct answer

5) slowed down as a result of positive feedback

**8–12. Increased production of ACTH by the adenohypophysis leads to:**

1) activation of the secretion of corticoliberin in the hypothalamus and glucocorticoids in the adrenal cortex

2) inhibition of the secretion of corticoliberin and glucocorticoids

3) increased production of glucocorticoids by the adrenal cortex and inhibition of the secretion of corticoliberin \*

4) increased production of sex hormones

5) increased production of growth hormone

**8–13. With an increase in the concentration of glucocorticoids in the blood, the secretion of ACTH by the cells of the adenohypophysis:**

1) amplifies

2) decreases\*

3) does not change

4) fluctuates

5) irreversibly stops

**8–14. Increased ACTH production is influenced by:**

1) liberin formed in the adrenal cortex

2) statin produced in the hypothalamus

3) pancreatic statin

4) liberin formed in hypothalamus\*

5) glucocorticoids

**8–15. Lyberins are substances produced in the hypothalamus that have a stimulating effect on the release of hormones directly in:**

1) adrenal glands

2) thyroid gland

3) adenohypophysis\*

4) neurohypophysis

5) epiphysis

**8–16. The adrenal cortex produces all hormones except:**

1) mineralcorticoids

2) adrenaline and noradrenaline\*

3) glucocorticoids

4) sex steroids

5) glucocorticoids and sex steroids

**8–17. Blood glucose levels are increased by all hormones *except*:**

1) somatotropic hormone

2) glucocorticoids

3) glucagon

4) insulin\*

5) adrenalin

**8–18.** **Insulin, when injected into the body, causes:**

1) hyperglycaemia

2) glycogenesis and hypoglycaemia\*

3) glycogenesis and hyperglycemia

4) hypoglycemia and blockage of glucose transport into tissue cells

5) glycogen breakdown and glucose release from the liver into the blood

**8–19. Glucagon when injected into the body causes:**

1) glycogen synthesis in the liver and muscles

2) glycogen breakdown and hypoglycemia

3) glycogen breakdown and hyperglycemia\*

4) ACTH secretion

5) glucose transport to tissue cells

**8–20. The posterior lobe of the pituitary gland secretes the following two hormones:**

1. STH and TSH
2. antidiuretic hormone and oxytocin \*
3. TSH and ACTH
4. ACTH and MSG

5) follicle-stimulating and luteinizing hormones

**8–21. The anterior lobe of the pituitary gland (adenohypophysis) does not secrete:**

1. STH
2. ACTH
3. antidiuretic hormone and oxytocin\*
4. TSH

5) follicle stimulating and luteinizing hormones

**8–22. Insulin is produced in the islets of Langerhans:**

1) alpha cells

2) beta cells\*

3) delta cells

4) everything is correct

5) there is no correct answer

**8–23. The most important mineralocorticoid hormone of the adrenal cortex is:**

1) hydrocortisone

2) cortisol

3) aldosterone\*

4) androgens

5) estrogens

**8–24. Aldosterone in the kidneys has all the effects except:**

1) increase the reabsorption of sodium ions

2) increase the secretion of potassium ions

3) increase ACTH secretion\*

4) increase the secretion of hydrogen ions

5) lowering the pH of urine

**8–25. With an increase in the volume of circulating blood reflexively:**

1) the production of antidiuretic hormone is inhibited\*

2) the production of antidiuretic hormone increases

3) the secretion of antidiuretic hormone does not change

4) there is no right answer

**8–26. In addition to the sex glands, sex hormones are produced and secreted by:**

1) parathyroid glands

2) pituitary gland

3) reticular zone of the adrenal cortex \*

4) adrenal medulla

5) cells of the APUD system

**8–27. In the follicular phase of the ovarian-menstrual cycle occurs:**

1) increase in the formation of estrogen and maturation of the follicle in the ovary \*

2) the formation of a corpus luteum and an increase in the formation of progesterone

3) rupture of the Graafian vesicle and release of the egg

4) fertilization of the egg

5) menstruation

**8–28. Interstitial Leydig cells produce predominantly:**

1) androgens\*

2) estrogen

3) progesterone

4) luteinizing hormone

5) prolactin

**8–29. The formation of testosterone in Leydig cells is controlled by:**

1) follicle stimulating hormone

2) luteinizing hormone \*

3) oxytocin

4) ACTH

5) prolactin

**8–30 Of the hormones of the placenta, the greatest anabolic effect has:**

1) chorionic somatomammotropin \*

2) chorionic gonadotropin

3) estrogens

4) progesterone

5) relaxin

**8–31. Uterine contractions are enhanced mainly under the influence of hormones:**

1) adenohypophysis (follicle-stimulating and luteinizing hormones)

2) neurohypophysis (antidiuretic hormone)

3) neurohypophysis (oxytocin)\*

4) adenohypophysis (prolactin)

5) adenohypophysis (melanocyte-stimulating hormone)

**8–32. Heart rate with hyperthyroidism:**

1) is slowed down

2) is not changed

3) is increased \*

4) there is no correct answer

5) depends on the function of the parathyroid glands

**8–33. The level of basal metabolism in hyperthyroidism:**

1) is reinforced \*

2) is not changed

3) is reduced

4) there is no right answer

5) depends on the function of the parathyroid glands

**8–34. Under the influence of STH protein biosynthesis and nitrogen balance:**

1) biosynthesis is weakened, the balance becomes positive

2) both indicators do not change

3) biosynthesis is enhanced, the balance becomes positive \*

4) biosynthesis increases, the balance becomes negative

5) biosynthesis is weakened, the balance becomes negative

**8–35. Glucose transport across the cell membrane is strongly controlled by insulin in:**

1) liver

2) nerve cells and kidney cells

3) the heart

4) muscle and adipose tissue\*

5) the spleen

**8–36. Hyperglycemia above a threshold level (eg, 30 mmol/L) will result in:**

1) decrease in diuresis and specific gravity of urine

2) increased diuresis and specific gravity of urine\*

3) the amount of diuresis and the specific gravity of urine will not change

4) increased diuresis and decreased specific gravity of urine

5) decrease in diuresis

**8–37. The maximum activity of the pineal gland (secretion of melatonin) is noted:**

1) at night\*

2) in the afternoon

3) does not depend on the time of day

4) with increased secretion of somatostatin

5) with increased secretion of sex hormones

**8–38.** **Thymus hormones have a pronounced effect on the development of:**

1) T-lymphocytes\*

2) B-lymphocytes

3) neutrophils

4) monocytes

5) macrophages

**8–39. When consuming a large amount of table salt, an increased amount of … is released:**

1) aldosterone

2) ADH (antidiuretic hormone) \*

3) ACTH (adrenocorticotropic hormone)

4) oxytocin

5) growth hormone

**8–40. Gastrointestinal hormones are produced primarily in:**

1) gastrointestinal tract, chemically they are peptides\*

2) kidneys, are steroids

3) bone marrow, are peptides

4) gonads, are steroids

5) are formed in the central nervous system, are steroids

**8–41. Endocrine activity of … decreases to the greatest extent and first of all with aging:**

1) hypothalamic-pituitary system

2) gonads \*

3) adrenal glands

4) pancreas

5) thyroid gland

**8–42. Gonadoliberin causes:**

1) stimulation of the secretion of luteinizing and follicle-stimulating hormones \*

2) suppression of prolactin secretion

3) suppression of STH secretion

4) stimulation of ACTH secretion

5) stimulation of STH secretion

**8–43. Corticoliberin causes:**

1) stimulation of the secretion of luteinizing hormone

2) suppression of prolactin secretion

3) suppression of STH secretion

4) stimulation of ACTH secretion \*

5) suppression of ACTH secretion

**9. PHYSIOLOGY OF THE MUSCLE**

**9–1. … ions are released from the sarcoplasmic reticulum of the muscle fiber during contraction:**

1) potassium

2) chlorine

3) sodium

4) calcium\*

5) magnesium

**9–2. The structural and functional unit of the muscle fiber is:**

1) actin

2) myosin

3) sarcomere\*

4) tropomyosin

5) troponin

**9–3. When a striated muscle fiber contracts, the following occurs:**

1) a decrease in the length of myosin filaments

2) shortening of actin filaments

3) sliding of actin filaments along myosin\*

4) all answers are correct

5) there is no correct answer

**9–4. Excitation is conducted through the neuromuscular junction:**

1) in one direction\*

2) in both directions

3) faster than along the nerve fiber

4) no synaptic delay

5) there is no correct answer

**9–5. An isotonic contraction is one in which:**

1) muscle fibers shorten while internal tension remains constant\*

2) the length of the muscle fibers is constant, and the tension increases

3) the length of muscle fibers and tension change

4) all answers are correct

5) there is no correct answer

**9–6.** **Contraction of skeletal muscles is mainly caused by Ca2+ ions:**

1) extracellular, entered the sarcoplasm when the muscle fiber is excited

**2**) intracellular, entered the sarcoplasm when the muscle fiber is excited from the sarcoplasmic reticulum \*

3) intracellular, entered the sarcoplasm from mitochondria

4) all answers are correct

5) there is no correct answer

**9–7. The property of smooth muscles that is absent in skeletal muscles is called:**

1) excitability

2) conductivity

3) contractility

4) plasticity\*

5) lability

**9–8… ions play the main role in the formation of the depolarization phase of the action potential of a smooth muscle cell:**

1) sodium

2) chlorine

3) calcium\*

4) potassium

5) magnesium

**9–9. Smooth muscle contraction is not regulated by the:**

1) the sympathetic part of the autonomic nervous system

2) parasympathetic part of the autonomic nervous system

3) metasympathetic part of autonomic nervous system

4) somatic nervous system\*.

5) no correct answer

**9–10. The mediator in skeletal muscle synapses is:**

1) adrenaline

2) norepinephrine

3) GABA

4) Acetylcholine\*

5) glycine

**9–11. The contraction of a muscle, in which both its ends are motionless, is called:**

1) isotonic

2) auxotonic

3) pessimal

4) isometric\*

5) optimal

**9–12. Muscle contraction that occurs when stimulated by a series of super-threshold pulses, in which the interval between pulses is longer than the duration of a single contraction, is called:**

1) smooth tetanus

2) dentate tetanus

3) single contraction\*

4) optimal tetanus

5) pessimal tetanus

**9–13. Muscle contraction as a result of stimulation by a series of superthreshold impulses, each of which acts in the relaxation phase of the previous one, is called:**

1) smooth tetanus

2) single contraction

3) optimal tetanus

4) dentate tetanus\*

5) pessimal tetanus

**9–14. Muscle contraction as a result of stimulation by a series of superthreshold impulses, each of which acts in the contraction phase of the previous one, is called:**

1) single contraction

2) dentate tetanus

3) smooth tetanus\*

4) optimal tetanus

5) pessimal tetanus

**9–15. The motor neuron and the muscle fibers it innervates are called:**

1) the motor field of the muscle

2) the nerve center of the muscle

3) motor unit\*

4) sensory field of the muscle

5) a generator of motor programs

**9–16. Set the correct sequence of changing the mode of muscle contractions with an increase in the frequency of stimulation:**

1) dentate tetanus, smooth tetanus, single contraction

2) smooth tetanus, dentate tetanus, single contraction

3) single contraction, dentate tetanus, smooth tetanus\*

4) dentate tetanus, single contraction, smooth tetanus

5) smooth tetanus, single contraction, dentate tetanus

**9–17. Skeletal muscle fibers do *not* perform the function:**

1) body movements in space

2) maintaining posture

3) performing manipulation movements

4) ensuring the tone of blood vessels \*

5) installation of the body in space

**9–18. Smooth muscle cells perform the following functions:**

1) body movements in space

2) maintaining posture

3) ensuring the tone of the limb flexors

4) movement and evacuation of chyme in the digestive tract \*

5) ensuring the tone of the extensors of the limbs

**10. THE ROLE OF THE CNS IN THE REGULATION OF MUSCLE TONE AND PHASE MOVEMENTS**

**10–1. Phase contraction is directly provided by… muscle fibers:**

1) intrafusal (muscle receptors)

2) red (slow motor units)

3) white (fast motor units)\*

4) intrafusal and white

5) intrafusal and red

**10–2. Tonic contraction (posture) is directly provided by… muscle fibers:**

1) intrafusal (muscle receptors)

2) white (fast motor units)

3) red (slow motor units\*)

4) intrafusal and white

5) intrafusal and red

**10–3. The receptors of the motor analyzer are not:**

1) muscle spindles

2) tendon receptors

3) pain muscle receptors\*

4) joint receptors

5) there is no right answer

**10–4. Muscle spindles (receptors) are:**

1) muscle length sensors\*

2) muscle tension sensors

3) joint position sensors

4) sensors of movement in space

5) limb flexion angle sensors

**10–5. The excitation of the muscle spindle (receptor) is caused by:**

1) stretching the muscle\*

2) muscle contraction

3) directly by excitation of the alpha motor neuron of the motor center

4) inhibition of the corresponding gamma motor neuron

5) excitation of neurons of the cerebral cortex

**10–6. Extrafusal (working) muscle fibers are innervated by the:**

1) alpha motor neurons\*

2) spinal interneurons

3) gamma-motor neurons

4) sympathetic fibers

5) parasympathetic fibers

**10–7 The intrafusal fibers of the muscle receptor perform the function of the:**

1) physical muscle contraction

2) formation of muscle tone

3) an indicator of the degree of stretching of the muscle\*

4) pain receptors

5) indicator of the degree of muscle tension

**10–8. The intrafusal fibers of the muscle receptor are innervated by the:**

1) alpha motor neurons

2) interneurons of the spinal motor center

3) gamma-motor neurons\*

4) sympathetic fibers

5) parasympathetic fibers

**10–9. The excitation of the Golgi tendon receptors leads to:**

1) muscle contraction

2) does not affect muscle contraction

3) inhibition of muscle contraction \*

4) to increase muscle tone

5) to the development of contracture

**10–10. Tendon receptors are:**

1) muscle length sensors

2) muscle tension sensors\*

3) joint position sensors

4) sensors of movement in space

5) limb flexion angle sensors

**10–11. The bodies of alpha-motor neurons are located in the… horns of the spinal cord:**

1) rear

2) side

3) front\*

4) without a clear localization

5) in the intermediate plate

**10–12. The bodies of gamma motor neurons are located in the… horns of the spinal cord:**

1) rear

2) side

3) front\*

4) without a clear localization

5) in the intermediate plate

**10–13. Gamma motor neurons:**

1) have a direct activating effect on extrafusal (working) muscle fibers

2) have a direct inhibitory effect on extrafusal (working) muscle fibers

3) innervating intrafusal fibers, regulate the sensitivity of muscle spindles\*

4) do not affect the sensitivity of muscle spindles

**10–14. The… reflex arc does not close in the spinal cord:**

1) elbow

2) plantar

3) urethra

4) knee

5) rectifier\*

**10–15. When cutting the anterior roots of the spinal cord, the muscle tone:**

1) will practically not change

2) extensors will strengthen

3) it will decrease moderately

4) will disappear\*

5) flexors will strengthen

**10–16. With a complete lesion of the anterior horns of the spinal cord in the corresponding zone of innervation will be observed:**

1) loss of voluntary movements while maintaining reflexes

2) complete loss of movement and increased muscle tone

3) complete loss of sensitivity while maintaining reflexes

4) complete loss of movement and muscle tone\*

5) complete loss of sensitivity and movement

**10–17. The center of the knee reflex is:**

1) in the 10-12 thoracic segments of the spinal cord

2) in the 2-4 lumbar segments of the spinal cord\*

3) in the 1-2 sacral segments of the spinal cord

4) in the medulla oblongata

5) in the midbrain

**10–18. In the spinal body, after the termination of spinal shock, the spinal cord directly provides:**

1) maintaining a vertical posture

2) preservation of locomotion (walking, running)

3) spinal reflexes and increased muscle tone with a high level of destruction\*

4) there is no right answer

5) implementation of arbitrary movements

**10–19. The vestibulospinal tract has an exciting effect:**

1) on alpha and gamma motor neurons of extensors

2) exclusively on alpha motor neurons of extensors\*

3) everything is wrong

4) on inhibitory neurons that provide reciprocal relationships

5) exclusively on gamma motor neurons of extensors

**10–20. The rubrospinal tract has an exciting effect:**

1) on the alpha and gamma motor neurons of the flexors\*

2) only on alpha motor neurons of flexors

3) everything is wrong

4) on inhibitory neurons that provide reciprocal relationships

5) exclusively on gamma motor neurons of flexors

**10–21. The strongest muscle tone of the extensors is observed in the experiment in an … animal:**

1) intact (all parts of the central nervous system are preserved)

2) diencephalic

3) mesencephalic

4) bulbar (decerebrate rigidity)\*

5) spinal

**10–22. The reflexes that occur to maintain a posture during movement are called:**

1) static (posture-tonic)

2) rectifier

3) vegetative

4) statokinetic\*

5) spinal

**10–23. Statokinetic reflexes occur:**

1) with changes in the position of the head, not related to the movement of the body in space

2) with rectilinear uniform motion

3) when rotating and moving with linear acceleration\*

4) when changing posture

5) when straightening the body

**10–24. When cutting between the red nucleus of the midbrain and the nucleus of the Deuters medulla oblongata, the muscle tone:**

1) will practically not change

2) will disappear

3) will decrease significantly

4) extensors will become higher flexor tone (decerebration rigidity)\*

5) flexors will become higher than extensor tone

**10–25. The cerebellum has all efferent outputs *except*:**

1) from the nuclei of the tent to the vestibular nuclei of Deiters

2) directly to spinal motor centers\*

3) on the red nuclei of the midbrain

4) to the ventrolateral nuclei of the thalamus and further to the motor cortex

5) on the reticular formation of the medulla oblongata and pons

**10–26. In case of cerebellar insufficiency, it is *not* observed:**

1) impaired coordination of movements

2) change of muscle tone

3) vegetative disorders

4) loss of consciousness\*

5) muscle atony

**10–27.** **With lesions of the basal nuclei , there is:**

1) severe sensitivity disorders

2) pathological thirst

3) hyperkinesis and hypertonus\*

4) loss of consciousness

5) speech disorders

**10–28. The pyramidal system, which regulates mainly the phasic activity of muscles, includes:**

1) corticospinal tract\*

2) corticorubral tract

3) the corticoretic tract

4) spinal-cervical tract

5) the rubrospinal tract

**10–29. The motor cortex is located in:**

1) occipital region (17 field)

2) temporal region (41 fields)

3) mainly in the posterior central gyrus (fields 1,2,3)

4) mainly in the anterior central gyrus (field 4)\*

5) mainly at the base of the brain

**10–30. The patient periodically has uncontrolled convulsive movements of the left hand, which indicates the location of the pathological focus:**

1) in the left hemisphere of the cerebellum

2) in the right hemisphere of the cerebellum

3) in the cerebellar worm

4) in the lower part of the precentral gyrus on the right\*

5) in the upper part of the postcentral gyrus on the right

**11. PHYSICO–CHEMICAL PROPERTIES OF BLOOD**

11–1. **The blood system includes 4 main components. Everything is correct, *except*:**

1) organs of hematopoiesis

2) different types of blood vessels\*

3) circulating blood

4) organs of blood destruction

5) apparatus of neurohumoral regulation of hematopoiesis

**11–2. The body of an adult contains blood:**

1) 2–3 l (2–4%)

2) 4.5–6 l (6–8%) \*

3) 8–9 l (9–12%)

4) 10–14 l (13–15%)

5) 17–19 l (16–18%)

**11–3. Hypovolemia is called:**

1) decrease in circulating blood volume\*

2) reduction of osmotic blood pressure

3) decrease in the number of red blood cells and hemoglobin in the blood

4) increasing the volume of circulating blood

5) reduction of oncotic blood pressure

**11–4. The respiratory function of the blood is provided mainly by:**

1) heparin

2) plasma

3) prothrombin

4) hemoglobin\*

5) fibrinogen

**11–5. The respiratory function of the blood consists in:**

1) the transfer of oxygen to tissues and carbon dioxide from tissues\*

2) oxygen consumption by red blood cells

3) glucose transfer

4) intracellular oxygen consumption in various tissues

5) oxygen transfer by platelets

**11–6. The presence of antibodies in the blood and the phagocytic activity of leukocytes causes:**

1) trophic function

2) transport function

3) respiratory function

4) protective function\*

5) plastic function

**11–7. Blood provides all cells of the body with nutrients, thanks to:**

1) respiratory function

2) excretory function

3) thermoregulatory function

4) trophic function\*

5) protective function

**11–8. Hematocrit is the percentage of:**

1) the amount of hemoglobin to the volume of blood

2) the volume of formed elements (more precisely, erythrocytes) to the volume of blood \*

3) plasma volume to blood volume

4) the percentage of blood cells

5) the number of leukocytes to the volume of blood

**11–9. Plasma proteins create:**

1) osmotic pressure

2) hydrostatic pressure

3) hemodynamic pressure

4) oncotic pressure\*\*

5) filtration pressure

**11–10. The of proteins count in blood plasma is (g / l):**

1. 6.5–8,5
2. 65–85\*
3. 165–185
4. 200–250
5. 300 – 350

**11–11. The oncotic pressure of blood plasma is mainly created by:**

1) Albumins\*

2) globulins

3) fibrinogen

4) sodium and chlorine ions

5) glucose

**11–12. With hypoproteinemia , there will be:**

1) tissue edema with accumulation of water in the intercellular space\*

2) cellular edema

3) equally both

4) proteinuria

5) increased blood pressure

**11–13. With hyperproteinemia will be observed:**

1) tissue edema with accumulation of water in the intercellular space

2) cellular edema

3) equally both

4) increase in the volume of circulating blood (hypervolemia) \*

5) lowering blood pressure

**11–14. Oncotic blood pressure plays a decisive role:**

1) in the transport of proteins between blood and tissues

2) in the transport of water between blood and tissues (maintaining the volume of circulating blood) \*

3) in maintaining blood pH

4) in the change of hydrostatic pressure

5) in the transport of oxygen by the blood

**11–15. Immune antibodies are mainly included in the fraction of:**

1) albumin

2) gamma globulins\*

3) fibrinogen

4) only alpha globulins

5) only beta globulins

**11–16. Most of the osmotic pressure of blood plasma is created by ions of:**

1) sodium and chlorine\*

2) potassium and calcium

3) bicarbonate and phosphates

4) magnesium

5) hydrogen

**11–17. When administered intravenously, the solution of… will not change the osmotic pressure of the blood plasma:**

1) glucose 40%

2) sodium chloride 0.2%

3) calcium chloride 20%

4) sodium chloride 0.9%\*

5) calcium chloride 3%

**11–18. Calcium ions are not involved as a leading factor in:**

1) creation of osmotic blood pressure\*

2) blood clotting

3) regulation of neuromuscular excitation

4) bone formation

5) there is no correct answer

**11–19. … sodium chloride solution is isotonic with blood**

1. 0,3%
2. 0,9% \*
3. 1,2%
4. 3%
5. 9%

**11–20. The destruction of the erythrocyte membrane and the release of hemoglobin into the plasma under the influence of various factors is called:**

1) Plasmolysis

2) fibrinolysis

3) hemostasis

4) hemolysis\*

5) lysis

**11–21. The active reaction (pH) of arterial blood in a healthy person is equal to:**

1. 7,40+/–0,04\*
2. 7,30+/–0,04
3. 7,20+/–0,04
4. 7,60+/–0,04
5. 7,0 +/–0,04

**11–22. The most important in the regulation of blood pH constancy are two organs:**

1) lungs and kidneys\*

2) heart and liver

3) stomach and intestines

4) bones and muscles

5) mucous membranes and skin

**11–23. Increase in blood viscosity:**

1) reduces resistance to blood flow

2) increases resistance to blood flow\*

3) does not affect the resistance to blood flow

4) causes hydremia

5) lowers the concentration of proteins

**11–24. The ESR is normally:**

1) in men - 2 - 15 mm / hour; in women - 2 - 10 mm / hour

2) in men - 2 - 10 mm / hour; in women - 2 - 15 mm / hour \*

3) for men and women - 2 - 15 mm / hour

4) for men and women - 2 - 10 mm / hour

5) for men and women - 20 - 25 mm / hour

**12. PHYSIOLOGY OF ERYTHROCYTES AND LEUKOCYTES**

**12–1. The count of red blood cells:**

1) in men and women - 4.0–9.0 x 109 / l

2) in men - 4.0–5.0 x 1012/l, in women - 3.9–4.7 x 1012/l\*

3) for men and women - 180-320 x 109 / l

4) in men - 3.9-4.7x1012/l, in women - 4.0-5.0x1012/l

5) for men - 1.3 - 1.5x1012 / l, for women - 2.0 - 2.5x 10 / l

**12–2. The main function of red blood cells:**

1) transport of oxygen from lungs to tissues and carbon dioxide from tissues to lungs \*

2) transport of hormones

3) participation in glucose metabolism

4) participation in blood coagulation

5) transport of nutrients

**12–3. Hemoglobin in the blood contains:**

1) for men – 120-140 g/l, for women – 130-160 g/l

2) for men – 140-160 g/l, for women – 120-140 g/l\*

3) for men – 80-100 g/l, for women – 60-80 g/l

4) for men and women – 130-160 g/l

5) for men and women -170 – 180 g/l

**12–4. The main function of hemoglobin is:**

1) transport of oxygen from lungs to tissues\*

2) creating oncotic blood pressure

3) ensuring blood viscosity

4) transport of carbon dioxide from tissues to lungs

5) maintaining osmotic pressure

**12–5. The highest affinity for oxygen has:**

1. fetal hemoglobin (HbF)\*
2. adult hemoglobin (НbA)

3) carboxyhemoglobin

4) carbohemoglobin

5) there is no correct answer

**12–6. In muscles, it performs functions similar to Hb:**

1) carbhemoglobin

2) oxyhemoglobin

3) deoxyhemoglobin

4) myoglobin\*

5) carboxyhemoglobin

**12–7. Lifespan of erythrocytes:**

1) from several hours to 5 days

2) 90-120 days\*

3) 1-2 weeks

4) from several months to 5 years

5) no more than one year

**12–8. The main mechanism and place of destruction of erythrocytes in the body is:**

1) ineffective erythropoiesis in myeloid tissue

2) intracellular hemolysis in the spleen and liver\*

3) intravascular hemolysis

4) lysis in the thymus

5) agglutination and hemolysis in the lymph nodes

**12–9. Iron in erythropoiesis is necessary for:**

1) heme synthesis\*

2) globin synthesis

3) activation of folic acid

4) Vitamin В12 absorption

5) assimilation of vitamin C

**12–10. The daily need for iron is mainly replenished by:**

1) absorption of iron in the intestine

2) using iron of decayed erythrocytes\*

3) equally by both processes

4) mobilization of iron from the liver depot

5) everything is correct

**12–11. Iron in the body is deposited mainly:**

1) in the liver, spleen, bone marrow, intestinal mucosa\*

2) in the brain, heart, kidneys

3) in the bones

4) in the muscles

5) in the skin

**12–12. The color indicator of blood is called:**

1) the ratio of the volume of erythrocytes to the volume of blood in%

2) the ratio of the count of erythrocytes to reticulocytes

3) relative saturation of erythrocytes with hemoglobin \*

4) the ratio of the volume of erythrocytes to the volume of leukocytes

5) the ratio of the volume of platelets to the volume of erythrocytes

**12–13. The value of the color index of the blood in an adult:**

1) 0.65–0.75

2) 0.85–1.05\*

3) 0.9–1.3

4) 1.5–2.0

5) 2.1 - 2.5

**12–14. The main specific mediator through which the nervous and endocrine influences on erythropoiesis are carried out is:**

1) internal hematopoietic factor (gastromucoprotein)

2) vitamin В12

3) erythropoietin\*

4) folic acid

5) nicotinic acid

**12–15. Erythropoietin is produced predominantly in two organs:**

1) in the red bone marrow and in the lymph nodes

2) in the kidneys and in the liver\*

3) in the spleen and intestines

4) in the stomach and pancreas

5) in the heart and blood vessels

**12–16. Hormones that inhibit erythropoiesis are:**

1) estrogen\*

2) androgens

3) thyroxine

4) glucocorticoids

5) mineralocorticoids

**12–17. Hormones that stimulate erythropoiesis are:**

1) thyroxine, androgens, glucocorticoids, adrenaline\*

2) female sex hormones

3) antidiuretic hormone

4) glucocorticoids

5) LH

**12–18. The most important nutrient for vitamin В12 absorption is:**

1) vitamin C

2) erythropoietin

3) intrinsic factor (gastromucoprotein)\*

4) folic acid

5) vitamin E

**12–19. The normal count of leukocytes in the blood:**

1. 4.0–9.0 x 109 /l\*
2. 4.5–5.0 x1012/ l
3. 10.0–15.0 x 109 / l
4. 180–200 х 109/ l
5. 1.0 - 3.5 x 10/ l

**12–20. An increased number of leukocytes in the peripheral blood is called:**

1) leukopoiesis

2) leukopenia

3) leukocytosis\*

4) thrombocytosis

5) leukemia

**12–21. Leukopenia is defined as:**

1. adecrease in the number of leukocytes below 4.0 x109/ l \*
2. an increase in the number of leukocytes above 9.0 x 109/ l
3. leucocyte count in the range 4.0 - 9.0 x 109/ l
4. the absence of a nuclear shift to the left in the neutrophilic series

5)a pronounced increase in the blood of young forms of leukocytes

**12–22. The percentage ratio of individual forms of leukocytes is called:**

1) color indicator

2) hematocrit

3) leukocyte formula\*

4) nuclear index

5) osmotic resistance

**12–23.** **Eosinophils are *not* characterized by:**

1) antiparasitic action

2) formation of immunoglobulins\*

3) inactivation of heparin, leukotrienes, anaphylaxis factor

4) accumulation in tissues in contact with the external environment

5) inhibition of basophil function

**12–24. The percentage of eosinophils to all leukocytes in the blood of a healthy person is:**

1. 10–12
2. 25–30
3. 40–45
4. 1–5\*
5. 15 – 20

**12–25. The function of eosinophils is to:**

1) transport of carbon dioxide and oxygen

2) maintaining osmotic pressure

3) antibody production

4) detoxification in case of allergic reactions\*

5) phagocytosis and destruction of microbes and cellular debris

**12–26. Granular leukocytes with the property of antiparasitic and antiallergic activity are called:**

1) neutrophils

2) monocytes

3) lymphocytes

4) eosinophils\*

5) agranulocytes

**12–27. The main function of neutrophils is:**

1) synthesis and secretion of heparin, histamine, serotonin

2) phagocytosis of microbes, toxins, cytokine production\*

3) phagocytosis of mast cell granules, destruction of histamine by histaminase

4) participation in the regulation of the aggregate state of blood

**12–28. The percentage of neutrophils to all leukocytes in the blood of a healthy person is:**

1. 1–5
2. 6–10
3. 10–20
4. 47–72\*
5. 35 – 40

**12–29. The main functions of basophils are:**

1) phagocytosis of microbes

2) neutralization and destruction of protein toxins, inhibition of mast cell degranulation, destruction of histamine by histaminase

3) production of heparin, histamine, thromboxane, leukotrienes\*

4) implementation of immune reactions

5) destruction of microbes and cellular debris

**12–30. The percentage of basophils to all leukocytes in the blood of a healthy person is:**

1. 3–5
2. 10–12
3. 20–25
4. 0–1\*
5. 15 – 17

**12–31. Lymphocytes play the most important role in the process of:**

1) blood clotting

2) hemolysis

3) fibrinolysis

4) immunity

5) haemostasis

**12–32. The percentage of lymphocytes to all leukocytes in the blood of a healthy person is:**

1. 0.5–1
2. 60–70
3. 75–85
4. 18–40\*
5. 3 – 5

**12–33. The main function of B–lymphocytes is to:**

1) phagocytosis and provision of the reparative stage of the inflammatory process

2) maintaining blood pH

3) the production of immunoglobulins (antibodies) and the formation of humoral immunity\*

4) maintenance of oncotic pressure

5) everything is wrong

**12–34. The plasma cells that form immunoglobulins are transformed into:**

1) T–lymphocytes

2) B–lymphocytes\*

3) neutrophils

4) basophils

5) monocytes

**12–35. Non-granular leukocytes capable of amoeboid movement and phagocytosis are called:**

1) eosinophils

2) lymphocytes

3) platelets

4) monocytes\*

5) granulocytes

1**2–36. State the main immunological function of monocytes:**

1) phagocytosis of microbes

2) capture, processing and presentation of antigens on its surface to other immunocompetent cells, the formation of interleukin-1, which stimulates T- and B-lymphocytes \*

3) direct formation of immunoglobulins

4) inhibition of the function of basophils

5) everything is wrong

**12–37. The percentage of monocytes to all leukocytes in the blood of a healthy person is:**

1. 20–30
2. 50–75
3. 10–18
4. 2–9\*
5. 35 – 40

**12–38. Leukopoiesis is not stimulated by factors:**

1) leukopoietins

2) ionizing radiation in large doses\*

3) breakdown products of tissues and leukocytes

4) interleukins

5) colony-stimulating factors

**13. THE PHYSIOLOGICAL SYSTEM FOR REGULATING THE AGGREGATE STATE OF THE BLOOD. BLOOD GROUPS**

**13–1. The totality of physiological processes that ensure the stopping of bleeding is called:**

1) homeostasis

2) fibrinolysis

3) hemolysis

4) hemostasis\*

5) plasmolysis

**13–2. Vascular-platelet hemostasis mainly reflects the function of:**

1) red blood cells

2) leukocytes

3) blood platelets (platelets)\*

4) monocytes

5) reticulocytes

**13–3. The platelet count in the blood of an adult::**

1. 4 – 9 х 109/ l
2. 30 – 40 х 109/ l
3. 180 – 320 х 109/ l \*
4. 4 – 5 х 1012/ l
5. 10 – 12 х 109/ l

**13–4. Hemostatic functions of platelets are:**

1) maintaining the structure and permeability of the vascular wall, participation in blood coagulation\*

2) transport of oxygen and carbon dioxide

3) neutralization of toxins

4) transport of enzymes

5) transport of nutrients

**13–5. An indicator of vascular-platelet hemostasis is a laboratory test:**

1) blood clotting time

2) bleeding time\*

3) fibrinogen count

4) the number of leukocytes in the blood

5) prothrombin index

**13–6.** **In the first phase of coagulation hemostasis occurs:**

1) synthesis of fibrinogen in the liver

2) fibrin formation

3) fibrin thrombus retraction

4) formation of thrombin

5) formation of prothrombinase\*

**13–7. As a result of the second phase of coagulation hemostasis, the following occurs:**

1) synthesis of fibrinogen in the liver

2) the formation of prothrombinase

3) fibrin formation

4) fibrin thrombus retraction

5) formation of thrombin\*

**13–8. Prothrombin is formed:**

1) in the red bone marrow

2) in erythrocytes

3) in the liver\*

4) in platelets

5) in the stomach

**13–9. The result of the third phase of coagulation hemostasis is:**

1) synthesis of fibrinogen in the liver

2) the formation of prothrombinase

3) formation of thrombin

4) fibrin formation\*

5) fibrinolysis

**13–10. The transformation of soluble fibrin polymer into insoluble fibrin provides:**

1) prothrombin

2) convertin

3) antihemophilic globulin A

4) fibrin-stabilizing factor\*

5) antihemophilic globulin C

**13–11. For the course of all phases of hemocoagulation, the participation of… ions is necessary:**

1) sodium

2) potassium

3) fluorine

4) calcium\*

5) magnesium

**13–12. Specify the correct sequence of coagulation hemostasis processes:**

1) formation of thrombin, formation of prothrombinase, conversion of fibrinogen to fibrin

2) the formation of prothrombinase, the formation of thrombin, the transformation of fibrinogen into fibrin \*

3) the conversion of fibrinogen to fibrin, the formation of thrombin, the formation of prothrombinase

4) fibrinolysis, thrombin formation, prothrombinase formation

5) the formation of prothrombinase, the conversion of fibrinogen into fibrin, the formation of thrombin

**13–13. Retraction of a blood clot is defined as:**

1) dissolution of blood clots

2) reduction and sealing of blood clots \*

3) fibrin polymerization and the formation of insoluble fibrin in the blood clots

4) fixation of blood clots in the place of damage

5) platelet aggregation

**13–14. The functional role of fibrinolysis is:**

1. to fix a blood clot in a vessel
2. limitation of thrombus formation, its dissolution and restoration of the vascular lumen\*
3. conversion of fibrin monomer into fibrin polymer
4. expansion of the coagulation zone

5)thrombus retraction

**13–15. Fibrin is cleaved by an enzyme:**

1) plasmin\*

2) thrombin

3) heparin

4) prothrombinase

5) fibrin stabilizing factor

**13–16. The correct sequence of fibrinolysis processes:**

1) transformation of plasminogen in plasmin, fibrin cleavage to peptides and amino acids, plasminogen blood activator formation

2) the formation of plasminogen blood activator, plasminogen conversion to plasmin, fibrin cleavage to peptides and amino acids \*

3) fibrin cleavage to peptides and amino acids, plasminogen transformation in plasmin, plasminogen blood activator formation

4) transformation of plasmin in plasminogen, fibrin cleavage to peptides and amino acids

5) Formation of plasminogen activator, plasmino-gene transformation in plasmin, retraction of fibrin bunch

**13–17. Substances blocking various blood coagulation phases are called:**

1) coagulants

2) antibodies

3) hematopoethines

4) anticoagulants \*

5) antigens

**13–18. In mast cells and basophils, an active anticoagulant is produced:**

1) plasmin

2) heparin\*

3) thrombin

4) thromboplastin

5) girudin

**13–19. In a patient with hemophilia A (deficiency of the VIII factor in blood plasma):**

1) the bleeding time is sharply increased, the blood coagulation time is changed

2) blood coagulation time is sharply increased, the time of bleeding changed little \*

3) is equally elevated both

4) both - and the other - within the normal range

5) the time of bleeding and blood coagulation is reduced

**13–20. Agglutinogens are included in the following component of the blood:**

1) plasma

2) leukocytes

3) red blood cells \*

4) neutrophils

5) thrombocytes

**13–21. Agglutinins are included in the following component of the blood:**

1) erythrocytes

2) leukocytes

3) thrombocytes

4) plasma \*

5) eosinophils

**13–22. The blood of the first group contains:**

1. A-agglutinogen and α- agglutinin
2. B-agglutinogen and β- agglutinin
3. A- and B-agglutinogens
4. α- and β- agglutinins\*

5)A-agglutinogen and beta-agglutinins

**13–23. The blood of the second group contains:**

1. A-agglutinogen and α- agglutinin
2. B-agglutinogen and β- agglutinin
3. А-аgglutinogen and β- agglutinin\*
4. В- agglutinogen and α- agglutinin
5. А and B-agglutinogens

**13–24. The blood of the third group contains:**

1. agglutinogens A and B
2. agglutinogen В and agglutininα\*
3. agglutinogen A and agglutinin β
4. agglutinins α and β
5. агглютиноген А и агглютинин α

**13–25. The blood of the fourth group contains:**

1. agglutinins α and β
2. agglutinogens A and B\*
3. agglutinogen A and agglutinin β
4. agglutinogen B and agglutinin α
5. agglutinogen B and agglutinin β

**13–26. Agglutination does *not* occur when interacting:**

1) А- agglutinogen + α- agglutinin

2) A-agglutinogen + β- agglutinin \*

3) В- agglutinogen + β- agglutinin

4) agglutinogens A and B + agglutinins α and β

5) everything is wrong

**13–27. Rhesus antigen is a part of:**

1) plasma

2) leukocytes

3) platelets

4) erythrocytes\*

5) only reticulocytes

**13–28. In the human body, anti-Rhesus agglutinins are formed during transfusion:**

1) Rh-positive blood to Rh-negative recipient\*

2) Rh-positive blood to Rh-positive recipient

3) Rh-negative blood to an Rh-negative recipient

4) Rh-negative blood to Rh-positive recipient

5) everything is correct

**13–29. A person with the first blood type, according to the current rule, should be transfused:**

1) any blood type

2) blood of the fourth group

3) blood of the second group

4) blood of the first group \*

5) blood of the third group

**13–30. According to the current rule, blood of the first group should be transfused to a recipient with the fourth group:**

1) possible for any indication

2) only for health reasons in the absence of one-type blood

3) not allowed\*

4) it is impossible if a large amount of blood is transfused (more than 1 liter)

5) it is possible if a small amount of blood is transfused (less than 0.2 l)

**13–31. In repeat pregnancies, Rh conflict occurs if:**

1) a Rh-positive woman develops a Rh-negative foetus

2) a Rh-negative woman develops a Rh-negative foetus

3) a Rh-negative woman develops a Rh-positive fetus\*

4) a Rh-positive woman develops a Rh-positive foetus

5) Rh conflict will occur in all of these combinations

**13–32. When transfusing blood from a Rh-negative donor to a Rh-positive recipient, Rh-conflict:**

1) missing

2) may be due to transfusion of large amounts of blood

3) maybe if the recipient is a woman with a history of multiple pregnancies

4) maybe if the donor is a woman with a history of multiple pregnancies\*

5) there is no correct answer

**13–33. When transfusing erythrocyte mass from an Rh-negative donor to an Rh-positive recipient, an Rh-conflict can:**

1) be missing\*

2) can be with the transfusion of large amounts of erythrocyte mass

3) maybe if the recipient is a woman with a history of multiple pregnancies

4) maybe if the donor is a woman with a history of multiple pregnancies

5) there is no correct answer

**14. PHYSIOLOGICAL PROPERTIES OF THE HEART**

**14–1. Common to a typical cardiomyocyte and skeletal muscle fiber is:**

1) cell automation

2) the presence of a large number of intercellular contacts - nexuses

3) resting potential, determined almost entirely by the concentration gradient of potassium ions \*

4) the presence of repolarization phases created by the diffusion of only potassium ions

5) action potential created only by sodium and potassium ions

**14–2. The … has the property of automation:**

1) working myocardium

2) the conductive system of the heart\*

3) heart valves

4) endocardium

5) epicard

**14–3. The sinoatrial node is located:**

1) in the left atrium at the mouth of the pulmonary veins

2) in the right atrium at the mouth of the vena cava \*

3) in the right atrium near the atrioventricular septum

4) in the left atrium near the atrioventricular septum

5) in the interatrial septum

**14–4. The pacemaker of the heart in a healthy person is:**

1) sinoatrial node\*

2) atrioventricular node

3) bundle of His

4) Purkinje fibers

5) right and left legs of the bundle of His

**14–5. Slow diastolic depolarization is characteristic of cells:**

1) typical cardiomyocytes

2) skeletal muscle fibers

3) atypical cardiomyocytes\*

4) everything is correct

5) neurons of the intramural ganglia of the heart

**14–6. Spontaneous impulses in the sinus-atrial node occur at a frequency of:**

1) 20 pulses/minute

2) 40-50 pulses/minute

3) 60-80 pulses/minute\*

4) 1-2 pulses/second

**14–7. Spontaneous impulses in the atrioventricular node occur with a frequency:**

1) 20 pulses/min

2) 60–80 pulses/min

3) 40–50 pulses/min\*

4) 1–2 pulses/sec

5) 60–80 pulses/sec

**14–8. The functional significance of the atrioventricular delay lies directly in the regulation of:**

1) heart rate

2) filling the atria with blood

3) sequence of atrial and ventricular contraction, which contributes to the filling of the ventricles with blood \*

4) myocardial blood supply

5) the force of contractions of the ventricles

**14–9. All phases of the action potential of typical cardiomyocytes are indicated correctly, except for:**

1) depolarization

2) slow repolarization

3) fast repolarization

4) slow diastolic depolarization\*

5) static polarization between action potentials

**14–10. The phase of rapid depolarization of the action potential of a typical cardiomyocyte is determined by ion currents of:**

1) calcium

2) potassium

3) sodium\*

4) sodium and calcium

5) potassium and calcium

**14–11. The proto-diastolic period is the time:**

1) atrial contractions

2) expulsion of blood from the atria

3) expulsion of blood from the ventricles

4) from the beginning to the end of the relaxation of the ventricles

5) from the beginning of relaxation of the ventricles to the slamming of the semilunar valves \*

**14–12. The plateau phase of the action potential of a typical cardiomyocyte is determined by ion currents of:**

1) potassium and chlorine

2) sodium-calcium and chlorine

3) calcium-sodium and potassium\*

4) calcium and chlorine

5) sodium and chlorine

**14–13. To cause excitation of a typical cardiomyocyte in the phase of relative refractoriness, the stimulus must be:**

1) subthreshold

2) threshold

3) superthreshold\*

4) by any strength

5) minimal in strength

**14–14. A subthreshold stimulus can cause an extrasystole in the phase:**

1) absolute refractoriness

2) relative refractoriness

3) supernormal excitability\*

4) natural excitability

5) in none of the phases of excitability

**14–15. Under the influence of a drug that blocks slow calcium channels in atypical cardiomyocytes, the heart rate:**

1) decrease\*

2) rise

3) will not change

4) there will be an extrasystole

5) there is no correct answer

**15. REGULATION OF CARDIAC ACTIVITY.**

**CIRCULATION IN THE MYOCARDIA**

**15–1. The chronotropic effect in the activity of the heart is a change in:**

1) myocardial conduction

2) contraction strength

3) myocardial excitability

4) heart rate\*

5) myocardial tone

**15–2. The inotropic effect in the activity of the heart is a change of:**

1) myocardial conduction

2) contraction forces\*

3) myocardial excitability

4) heart rate

5) myocardial tone

**15–3. The bathmotropic effect in the activity of the heart is a change:**

1) myocardial conduction

2) contraction strength

3) myocardial excitability\*

4) heart rate

5) myocardial tone

**15–4. The dromotropic effect in the activity of the heart is a change of the:**

1) myocardial conduction\*

2) contraction strength

3) myocardial excitability

4) heart rate

5) myocardial tone

**15–5. Starling's Law is:**

1) a decrease in the force of contraction of the heart with a moderate (up to 20%) increase in the length of its myocytes in diastole

2) an increase in the force of contraction of the heart with a moderate (up to 20%) increase in the length of its myocytes in diastole \*

3) an increase in the force of contraction of the heart with an increase in pressure in the aorta

4) an increase in heart rate with an increase in pressure at the opening of the vena cava

5) increase in heart rate with a decrease in pressure in the aorta

**15–6. The physiological meaning of the law of the heart (Starling):**

1) adaptation of the heart to the load of incoming blood volume (preload) \*

2) adaptation of the heart to pressure loading in the aorta and pulmonary artery (afterload)

3) adaptation of the heart to an increase in heart rate

4) adaptation of the heart to lower blood pressure

5) adaptation of the heart to a decrease in heart rate

**15–7. The Anrep effect is:**

1) change in the force of contractions of the heart with a change in the initial length of muscle fibers in diastole

2) decrease in heart rate with pressure on the eyeballs

3) an increase in the force of contraction of the heart with an increase in pressure in the arterial system \*

4) increase in heart rate with pressure on the eyeballs

5) increase in the force of contractions of the heart when hitting the anterior abdominal wall

**15–8. The physiological meaning of the Anrep effect is the adaptation of the heart to:**

1) volume load (inflowing blood)

2) pressure load in the aorta (afterload)\*

3) increase in pressure in the pulmonary circulation

4) decrease in pressure in the pulmonary circulation

5) decrease in venous inflow

**15–9. The transplanted heart is *not* in the recipient:**

1) under the influence of peripheral reflexes of the metasympathetic nervous system

2) under the influence of the endocrine system

3) under the direct efferent influence of the central nervous system \*

4) under the indirect influence of the central nervous system (through the endocrine system)

5) under nervous influence from skeletal muscle proprioceptors

**15–10. The center of parasympathetic innervation of the heart is located in:**

1) upper cervical segments of the spinal cord

2) upper thoracic segments of the spinal cord

3) medulla oblongata\*

4) thalamus

5) lateral horns of the thoraco-lumbar spinal cord

**15–11. The endings of the vagus nerve innervating the heart usually secrete:**

1) adrenaline

2) serotonin

3) acetylcholine\*

4) GABA

5) glycine

**15–12. The vagus nerve has on the heart:**

1) negative chrono-, ino-, batmo- and dromotropic effects\*

2) negative chrono-, ino-, bathmotropic and positive dromotropic effects

3) negative chrono-, inotropic and positive batmo- and dromotropic effects

4) positive chrono-, ino-, batmo- and dromotropic effects

5) has no effect

**15–13. The vagus nerve acts on the heart through:**

1) alpha-adrenergic receptors

2) beta-adrenergic receptors

3) N-cholinergic receptors

4) M-cholinergic receptors\*

5) serotoninoreceptors of the first type

**15–14. The mechanism of the negative chronotropic action of the vagus on the heart is related to:**

1) a decrease in the rate of slow diastolic depolarisation\*

2) an increase in the rate of slow diastolic depolarisation

3) all statements incorrect

4) increase in calcium current

5) potassium current decrease

**15–15. The center of sympathetic innervation of the heart is located in:**

1) upper cervical segments of the spinal cord

2) medulla oblongata

3) upper thoracic segments of the spinal cord (Th1 - 5) \*

4) lateral horns of the thoraco-lumbar spinal cord

5) thalamus

**15–16. The endings of the sympathetic nerve that innervates the heart secrete:**

1) acetylcholine

2) adrenaline

3) norepinephrine\*

4) GABA

5) glycine

**15–17. Sympathetic nerves cause effects in the heart:**

1) negative chrono-, ino-, batmo- and dromotropic effects

2) negative chrono-, inotropic-, batmo- and positive dromotropic effects

3) negative chrono-, inotropic and positive batmo- and dromotropic effects

4) positive chrono-, ino-, batmo- and dromotropic effects

5) do not cause any effects in the heart

**15–18. The mechanism of the positive chronotropic effect of sympathetic innervation on the heart is related to:**

1) an increase in the rate of slow diastolic depolarisation\*

2) decreased rate of slow diastolic depolarisation

3) all statements incorrect

4) increase in potassium current

5) calcium current decrease

**15–19. The Danieney-Aschner reflex consists of:**

1) a change in the force of heart contraction with a change in the baseline length of muscle fibres

2) change in heart force with a change in arterial pressure

3) a decrease in heart rate when pressure is applied to the eyeballs\*

4) increase in heart rate when pressure is applied to the eyeballs

5) increase in heart rate when applying pressure to the eyeballs

**15–20. Adrenaline has on the heart:**

1) a positive chrono-, ino-, batmo- and dromotropic effect\*

2) negative chrono-, ino-, negative batmo- and dromotropic action

3) positive chrono-, inotropic action, positive batmo- and dromotropic action

4) negative chrono-, inotropic action, positive batmo- and dromotropic action

5) has no effect

**15–21.** **Thyroxine has on the heart:**

1) positive chrono-, ino-, batmo- and dromotropic action \*

2) negative chrono-, ino-, batmo- and dromotropic action

3) negative chrono-, inotropic effect

4) negative batmo- and dromotropic action

5) positive chrono- and negative inotropic effect

**15–22. The main role of the hypothalamus in the regulation of the heart is:**

1) a conditioned reflex change in heart rate

2) the change in heart rate when holding the breath

3) ensuring the work of the heart, an adequate situation inside the body and behavior \*

4) the change in pressure when holding the breath

5) a conditioned reflex change in blood pressure

**15–23. The blood supply to the myocardium of the left ventricle is carried out:**

1) mainly during systole

2) almost the same during systole and diastole

3) mainly during diastole\*

4) in the proto-diastolic period

5) during the period of isometric tension

**15–24. The main influence on the regulation of coronary blood flow has one of the metabolic factors:**

1) extracellular potassium

2) adenosine\*

3) extracellular fluid pH

4) extracellular calcium

5) intracellular calcium and potassium

**15–25. The introduction of atropine (blocker of M-cholinergic receptors) will lead to a greater increase in heart rate:**

1) for a trained athlete\*

2) in an ordinary person

3) in a detrained person

4) the effect of atropine does not depend on the degree of fitness

5) there is no correct answer

**16. PUMPING function of the heart.**

**External manifestations of the heart activity.**

**Methods of heart DIAGNOSTICS.**

**16–1. At the top of systole, blood pressure in the atria reaches:**

1) 25 – 30 mm Hg.

2) 70 – 80 mm Hg.

3) 5 – 12 mm Hg\*

4) 15 – 20 mm Hg.

5) 100 – 130 mm Hg.

**16–2. At the top of the systole (the phase of rapid expulsion of blood), the pressure in the right ventricle reaches:**

1) 70 – 80 mm Hg.

2) 120 – 130 mm Hg.

3) 25 – 30 mm Hg\*

4) 10 – 15 mm Hg.

5) 5 – 8 mm Hg.

**16–3. At the top of the systole (the phase of rapid expulsion of blood), the pressure in the left ventricle reaches:**

1) 70 – 80 mm Hg.

2) 25 – 30 mm Hg.

3) 120 – 130 mm Hg\*

4) 5 – 8 mm Hg.

5) 10 – 20 mm Hg.

**16–4. The aortic valve opens in the left ventricle with the blood pressure rate:**

1) more than 120-130 mm Hg. st.

2) more than 25 – 30 mm Hg.

3) more than 70–80 mm Hg\*

4) less than 7-10 mm Hg. st.

5) less than 25-30 mm Hg. st.

**16–5. All heart valves are closed in the phases:**

1) fast and slow expulsion of blood

2) atrial systoles

3) isometric contraction and isometric relaxation\*

4) total diastole of the heart

5) fast and slow filling

**16–6. Flap valves during the period of general diastole of the heart are:**

1) closed

2) the left is closed, right is open

3) open\*

4)the right is closed, left is open

5) open, then closed

**16–7. Compensatory pause occurs with extrasystole:**

1) atrial

2) sinus

3) ventricular\*

4) sinus-attrial

5) atrio-ventricular

**16–8. The volume of blood in the left ventricle of the heart (finite diastolic volume) at the beginning of the period of expulsion of blood is:**

1) 60 ml

2) 120 ml\*

3) 150 ml

4) 170 ml

5) 30 ml

**16–9. The volume of blood in the left ventricle of the heart at the end of the period of expulsion of blood (finostolic volume) is:**

1) 60 ml\*

2) 120 ml

3) 150 ml

4) 40 ml

5) 80 ml

**16–10. Residual (finostolic) volume of blood in each of the ventricles is:**

1) 60 ml\*

2) 40 ml

3) 20 ml

4) 10 ml

5) 0 ml

**16–11. With the contraction of the heart, the systolic release of the right and left ventricles of the heart is:**

1) more in the left ventricle

2) same\*

3) more in the right ventricle

4) all answers are correct

5) all answers are incorrect

**16–12. The value of systolic ejection of the left ventricle of the heart is:**

1) 30 ml

2) 70 ml\*

3) 120 ml

4) 100 ml

5) 150 ml

**16–13. The product of two values of indicators of the activity of the heart forms its minute volume is:**

1) heart rate and systolic output\*

2) blood pressure and circulating blood volume

3) heart rate and circulating blood volume

4) blood pressure and heart rate

5) heart rate and finostolic volume

**16–14. The minute volume of cardiac output at rest is:**

1) 1,5 – 2 liters

2) 3.0–3.5 liters

3) 4,5 – 5,0 liters\*

4) 60–70 ml

5) 100–150 ml

**16–15. According to the electrocardiogram (with the classical version of its analysis), it is impossible to judge the indicator of the activity of the heart:**

1) the strength of contractions of the ventricles and atria\*

2) heart rate

3) localization of the lead pacemaker

4) conduction velocity in the atrioventricular node

5) conduction velocities in the bundle of His

**16–16. According to the electrocardiogram in the classical version, you can judge:**

1) the strength of heart contractions

2) cardiac output

3) the nature of the occurrence and spread of excitation through the myocardium\*

4) heart tone

5) circulating blood volume (BCC)

**16–17. The P** **wave** **on the electrocardiogram reflects:**

1) excitation (vector of depolarization) of the ventricles

2) repolarization of the ventricles

3) excitation (depolarization vector) of the atria\*

4) atrial hyperpolarization

5) hyperpolarization of the ventricles

**16–18. On the electrocardiogram, with an increase in the tone of the vagus nerves, there will be**

1) reduction of the amplitude of the teeth

2) increase in the duration of the QRS complex

3) prolongation of the P–Q interval\*

4) increase in the duration of the tooth P

5) increase in the amplitude of the teeth

**16–19. The QRS** **complex** **on the electrocardiogram reflects:**

1) excitation (vector of depolarization) of the atria

2) repolarization of the ventricles

3) excitation (depolarization vector) of the ventricles\*

4) hyperpolarization of the ventricles

5) atrial hyperpolarization

**16–20. The T wave on the electrocardiogram reflects:**

1) excitation (vector of depolarization) of the atria

2) excitation (vector of depolarization) of the ventricles

3) repolarization of the ventricles\*

4) hyperpolarization of the ventricles

5) atrial hyperpolarization

**16–21. The T–P interval** **on the electrocardiogram corresponds to:**

1) diastole of the ventricles

2) atrial systole

3) general diastole of the heart\*

4) ventricular systole and atrial diastole

5) atrial systole and diastole of the ventricles

**16–22. Conducting excitation in the heart is characterized by:**

1) amplitude and polarity of the waves

2) duration of teeth, segments and intervals

3) frequency and regularity of complexes\*

4) all answers are correct

5) there is no correct answer

**16–23. The time of excitation in the atria is characterized by:**

1) duration of the wave P\*

2) P–Q segment duration

3) the duration of the P–Q interval

4) duration of the T–R interval

5) duration of the R–R interval

**16–24. The time of excitation along the atrioventricular conducting system on the electrocardiogram is characterized by:**

1) duration of the P–Q interval

2) P–Q segment duration\*

3) duration of the QRS complex

4) duration of the T–R interval

5) duration of the R–R interval

**16–25. Myocardial automation during the cardiac cycle is characterized by:**

1) amplitude and polarity of the teeth

2) duration of teeth, segments and intervals

3) frequency and regularity of complexes\*

4) segment duration

5) duration of intervals

**16–26. The mitral valve is better heard:**

1) to the right of the sternum at the base of the sword-shaped process

2) in the second intercostal to the right of the sternum

3) in the fifth intercostal to the left by 1.5 cm whip from the midclavicular line\*

4) in the second intercostal to the left of the sternum

5) to the left of the sternum at the base of the sword-shaped process

**16–27. A tricuspid valve is better heard:**

1) in the second intercostal to the right of the sternum

2) in the fifth intercostal to the left by 1.5 cm whip from the middle-beaked line

3) to the right of the sternum at the base of the sword-shaped process\*

4) in the second intercostal to the left of the sternum

5) to the left of the sternum at the base of the sword-shaped process

**16–28. The pulmonary trunk valve is better heard:**

1) to the right of the sternum at the base of the sword-shaped process

2) in the second intercostal to the right of the sternum

3) in the second intercostal to the left of the sternum \*

4) to the left of the sternum at the base of the sword-shaped process

5) in the fifth intercostal on the left by 1.5 cm whip from the middle-beaked line

**16–29. The aortic valve is better heard:**

1) to the right of the sternum at the base of the sword-shaped process

2) in the second intercostal to the left of the sternum

3) in the second intercostal to the right of the sternum \*

4) to the left of the sternum at the base of the sword-shaped process

5) in the fifth intercostal on the left by 1.5 cm whip from the midclavicular line

**16–30. First heart sound occurs:**

1) in the phase of rapid filling of the ventricles

2) in the systole of the atrium

3) into the systole of the ventricles\*

4) in the phase of slow filling of the ventricles

5) in the protodiastolic period

**16–31. Second heart sound occurs:**

1) when opening semilunar valves

2) when the flap valves are slammed shut

3) when semilunar valves are slammed shut\*

4) when slamming both flap and semilunar valves

5) when opening both flap and semilunar valves

**16–32. Third heart sound is recorded on a phonocardiogram:**

1) in diastole of the ventricles

2) in diastole of the atrium

3) in the phase of rapid filling of the ventricles\*

4) in the phase of slow filling of the ventricles

5) in the presystolic period

**16–33. Forth heart sound is recorded on a phonocardiogram:**

1) in the phase of rapid filling of the ventricles

2) in the phase of slow filling of the ventricles

3) with a contraction of the atria and additional blood flow to the ventricles\*

4) in diastole of the atria

5) into the systole of the ventricles

**16–34. An increase in the tone of the vagus nerves on the ECG is manifested in the form of:**

1) reducing the amplitude of the teeth

2) expansion of the QRS complex

3) PQ interval extension \*

4) widening of the tooth P

5) increase in the amplitude of the teeth

**16–35. Minute volume of the right ventricle of the heart:**

1) same as the minute volume of the left one\*

2) twice larger than the left one

3) 5 times larger than the left one

4) 2 times smaller than the left one

5) 5 times smaller than the left one

**17. Regulation of hemodynamics**

**17–1. High-pressure vessels include:**

1) aorta and arteries\*

2) arterioles and precapillaries

3) precapillaries and capillaries

4) Vena cava

5) veins of different caliber

**17–2. The linear velocity of blood flow in the aorta is:**

1) 0.5 cm/s

2) 25 cm/s

3) 50 cm/s\*

4) 50 cm/min

5) 0.5 cm/min

**17–3. Normally, the systolic pressure of an adult in a large circle of blood circulation is:**

1) 20-25 mm Hg. st.

2) 60-90 mm Hg. st.

3) 100–140 mmHg\*

4) 40-10 mm Hg. st.

5) 5-7 mm Hg. st.

**17–4. Normally, the diastolic pressure of an adult in a large circle of blood circulation is:**

1) 20-25 mm Hg. st.

2) 60–90 mmHg\*

3) 100–140 mm Hg.

4) 40-10 mm Hg. st.

5) 5-7 mm Hg. st.

**17–5. Resistive vessels are called:**

1) aorta

2) veins and venules

3) arterioles and precapillaries\*

4) arteriovenous anastomoses

5) large elastic arteries

**17–6. Name the main function of resistance vessels (arterioles):**

1) blood deposit

2) stabilization of systemic blood pressure, redistribution of blood flow between organs and tissues\*

3) metabolism between blood and tissues

4) Everything is wrong

5) stabilization of venous pressure

**17–7. The main exchange link in the microcirculation system is:**

1) veins and venules

2) arterioles and precapillaries

3) large arteries

4) capillaries\*

5) shunt vessels

**17–8. The linear velocity of blood flow in the capillaries is:**

1) 50 cm/s

2) 25 cm/s

3) 0.5 mm/s\*

4) 0.5 cm/min

5) 0.5 mm/min

**17–9. Blood pressure in the capillaries of the organs of the great circle (except for the kidneys) is:**

1) 80-70 mm Hg. st.

2) 5 – 3 mm Hg.

3) 35 – 10 mm Hg\*

4) 30-50 mm Hg. st.

5) 110–130 mm Hg.

**17–10. The lowest linear velocity of blood flow falls on:**

1) arteries

2) arterioles

3) capillaries\*

4) venules

5) shunt vessels

**17–11. The main mechanism of protein exchange between blood and tissue fluid in capillaries of continuous (somatic) type:**

1) diffusion

2) pinocytosis\*

3) filtration

4) reabsorption

5) free diffusion

**17–12. Filtration at the arterial end of the capillary provides:**

1) hydrodynamic blood pressure\*

2) oncotic blood pressure

3) positive hydrostatic pressure of intercellular fluid

4) osmotic blood pressure

5) negative hydrostatic pressure of intercellular fluid

**17–13. Reabsorption at the venous end of the capillary is carried out due to:**

1) hydrodynamic blood pressure

2) oncotic blood pressure\*

3) oncotic tissue fluid pressure

4) osmotic blood pressure

5) positive hydrostatic pressure of interstitial fluid

**17–14. The phenomenon of reactive (postishemic) hyperemia is:**

1) in increasing blood flow in the organ with an increase in its activity

2) in increasing blood flow in the organ with a decrease in its activity

3) in increasing blood flow in the organ after its temporary restriction\*

4) in increasing blood flow in the veins of the lower extremities in the vertical position

5) in the stabilization of blood flow in organs with changes in blood pressure

**17–15. Sympathetic influences through alpha-adrenergic receptors of vascular tone:**

1) lower

2) do not change

3) increase\*

4) first increase, then lower

5) first lower, then increase

**17–16. The largest part of the circulating blood contains:**

1) aorta and arteries

2) arterioles

3) capillaries

4) veins\*

5) shunt vessels

**17–17. Sympathetic effects through beta-adrenergic receptors of vascular tone:**

1) increase

2) lower\*

3) do not change

4) first increase, then lower

5) first lower, then increase

**17–18. The tone of small peripheral vessels decreases under the influence of local factors:**

1) lowering the concentration of potassium ions

2) increasing in the concentration of adenosine\*

3) lowering the voltage of carbon dioxide

4) lowering the concentration of hydrogen ions

5) increasing the concentration of calcium ions

**17–19. The link of the vascular system, which carries out the deposition of blood, is represented by vessels:**

1) compression chamber

2) resistive

3) exchange

4) capacitive \*

5) shunt

**17–20. Choose the correct statement:**

1) all vessels have only sympathetic innervation

2) all vessels have parasympathetic innervation

3) аll vessels have both sympathetic and parasympathetic innervation

4) all vessels have sympathetic innervation, and the vessels of some regions and - parasympathetic innervation\*

5) all vessels have parasympathetic innervation, and the vessels of some regions and - sympathetic

**17–21. The vasomotor center is located:**

1) in the spinal cord

2) in the varolian bridge

3) in the medulla oblongata\*

4) in the hypothalamus

5) in the cerebral cortex

**17–22. The time of complete blood turnover in the cardiovascular system is:**

1) 1,5 – 2 min

2) 40–45 sec

3) 20–23 sec\*

4) 20–23 min

5) 1.5–2 sec

**17–23. Regional circulation is blood circulation:**

1) in the great vessels of the great circle of blood circulation

2) in the great vessels of the large and small circle of blood circulation

3) in various organs and tissues\*

4) only in the vessels of the pulmonary circulation

5) only cerebral or coronary

**17–24. Terminal (fenestrated) capillaries are located in:**

1) liver, bone marrow, spleen

2) muscles, lungs, fat and connective tissues

3) kidneys, endocrine glands, small intestine\*

4) liver, muscles, kidneys

5) Small intestine and connective tissue

**17–25. Solid capillaries are located in:**

1) liver, bone marrow, spleen

2) kidneys, endocrine glands, small intestine

3) muscles, lungs, fat and connective tissues\*

4) liver, muscles, kidneys

5) small intestine and connective tissue

**17–26. Non-continuous (sinusoidal) capillaries are located in:**

1) kidneys, endocrine glands, small intestine

2) muscles, lungs, fat and connective tissues

3) liver, bone marrow, spleen\*

4) liver, muscles, kidneys

5) Small intestine and connective tissue

**17–27. The lumen of peripheral vessels increases under the action of:**

1) Vasopressin

2) Serotonin

3) Acetylcholine\*

4) Renin

5) Angiotensin II

**17–28. Choose a substance that directly increases vascular tone:**

1) Angiotensin I

2) Renin

3) Angiotensin II\*

4) Adenosine

5) Histamine

**17–29. The phenomenon of working (functional) hyperemia is:**

1) a decrease in blood flow in the organ with a decrease in its activity

2) an increase in blood flow in the organ with an increase in its activity \*

3) increased blood flow in the organ after its temporary limitation

4) in the stabilization of blood flow in organs with changes in blood pressure

5) increased blood flow in the lower extremities in an upright position

**18. EXTERNAL RESPIRATION**

**18–1. Inhalation at rest is carried out by reducing:**

1) aperture\*

2) ladder muscles

3) internal intercostal muscles

4) sternoclavicular mastoid muscles

5) abdominal muscles

**18–2. Calm exhalation is carried out mainly as a result of:**

1) contraction of inspiratory muscles

2) expiratory muscle contractions

3) elastic properties of the lungs\*

4) contraction of internal intercostal muscles

5) contractions of the abdominal muscles

**18–3. Forced exhalation is carried out by:**

1) external intercostal muscles and diaphragm

2) internal intercostal muscles and rectus abdominal muscles\*

3) stair muscles

4) back muscles

5) neck muscles

**18–4. If the lumen of the bronchi has narrowed (for example, with bronchospasm), then to a greater extent the following will decrease:**

1) reserve inhalation volume

2) reserve exhalation volume\*

3) tidal volume at rest

4) total lung capacity

5) residual lung volume

**18–5. The reserve volume of exhalation is carried out:**

1) only due to elastic lung thrust

2) with the obligatory participation of expiratory muscles\*

3) due to the elastic thrust of the chest

4) due to the pressure of the abdominal organs

5) due to the elastic pull of the rib cartilage twisted during inhalation

**18–6. To increase the residual volume of the lungs will lead:**

1) narrowing of the bronchi\*

2) bronchial dilation

3) weakness of the inspiratory muscles

4) air retention in anatomical dead space

5) breath holding

**18–7. The residual volume of the lungs is the volume of air:**

1) remaining in the lungs after a calm exhalation

2) remaining in the lungs after a calm inhalation

3) remaining in the lungs after maximum exhalation\*

4) remaining in the dead space after inhalation

5) filling non-perfused alveoli

**18–8. Residual lung volume will be increased if:**

1) bronchospasm occurs\*

2) bronchial dilation occurs

3) increased the strength of the expiratory muscles

4) developed weakness of the inspiratory muscles

5) the amount of dead space has increased

**18–9. Anatomical dead space is:**

1) air in the airways from the nasal cavity (or mouth) to the respiratory bronchioles\*

2) the last portion of exhaled air

3) air involved in diffusion gas exchange

4) the volume of air contained in the ventilated, but not perfused by the blood alveoli

5) the volume of air remaining in the lungs after maximum exhalation

**18–10. With pneumothorax in an adult, the volume of the chest:**

1) increases, lungs will fall off \*

2) decreases, lungs will fall off

3) will not change, the lungs will fall off

4) will not change, the lungs will not fall off

5) increases, lung volume will increase

**18–11. Alveolar ventilation:**

1) the amount of air inhaled per 1 min participating in pulmonary gas exchange\*

2) includes ventilation of the alveoli and anatomical dead space

3) includes ventilation of the anatomical dead space

4) the volume of air exhaled during the first second

5) the volume of air passing per unit of time through the airways

**18–12. Inelastic resistance to breathing depends mainly on:**

1) the content of surfactant in the alveoli

2) the ratio of elastic and collagen fibers in the lungs

3) the speed of air flow in the respiratory tract and the degree of its turbulence\*

4) blood flow in the lungs

5) development of coarse collagen fibers in the interstitium

**18–13. During exhalation, the main resistance is created in:**

1) nasal cavity

2) larynx

3) trachea and bronchi\*

4) alveoli

5) diaphragm

**18–14. During inhalation, the main resistance is created in:**

1) nasal cavity\*

2) larynx

3) trachea and bronchi

4) alveoli

5) diaphragm

**18–15. Elastic breathing resistance mainly depends on:**

1) the content of surfactant in the alveoli and the ratio of elastic and collagen fibers\*

2) speed and turbulence of air flow in the respiratory tract

3) bronchial tone

4) blood flow in the lungs

5) development of coarse collagen fibers in the interstitium

**18–16. The pressure with simultaneous measurement during the respiratory cycle is:**

1) in the pleural cleft it is more negative than the lungs\*

2) in the lungs it is more negative than the pleural cleft

3) it is identical in the lungs and pleural cleft

4) is permanent in the pleural cleft

5) there is no correct answer

**18–17. The main effect of surfactant is:**

1) a decrease in the surface tension of the aqueous film of the alveoli, which leads to an increase in the extensibility of the lungs during inhalation and prevents the collapse of the alveoli during exhalation\*

2) increased oxygen voltage in the alveolar air

3) increased elastic resistance of the lungs to breathing

4) reduction of inelastic resistance to breathing

5) ensuring the protection of the alveoli from drying out

**18–18. The correct statement is:**

1) sympathetic influences through β 2-adrenergic receptors cause bronchial dilation \*

2) parasympathetic cholinergic influences cause bronchial dilation

3) histamine through h1 receptors causes bronchial dilation

4) a slow-reacting substance (leukotriene d) causes bronchial dilation

5) there is no correct answer

**18–19. The frequency of respiratory movements per minute at rest is:**

1) 6–10

2) 10–12

3) 12–18\*

4) 19–24

5) 25–30

**18–20. The parasympathetic nervous system narrows the lumen of the bronchi, acting through:**

1) α1-adrenergic receptors

2) M-cholinergic receptors\*

3) H-cholinergic receptors

4) VIP receptors

5) β-adrenergic receptors

**18–21. Adrenaline expands the lumen of the bronchi, acting through:**

1) –adrenergic receptors \*

2) M–cholinergic receptors

3) H–cholinergic receptors

4) α1-adrenergic receptors

5) Everything is wrong

**18–22. The normal value of the minute volume of breathing (MOD) at rest is:**

1) 3–4 l

2) 5–12 l\*

3) 13–25 l

4) 25–30 l

5) 0,5–0,7 l

**18–23. The value of the vital capacity of the lungs is:**

1) 6–12 l

2) 3–5.5 l\*

3) 1–1.6 l

4) 12–15 l

5) 15–20 l

**18–24. In a healthy person with voluntary hypoventilation in the alveolar air, the oxygen voltage will:**

1) increase and carbon dioxide decrease

2) decrease and carbon dioxide will increase\*

3) decrease as well as the carbon dioxide

4) increase as well as the carbon dioxide

5) not change as well as the carbon dioxide

**18–25. With the clot embolism of the pulmonary artery (blockage by a thrombus formed in the veins of the great circle), the functional (physiological) dead space:**

1) more anatomical\*

2) less anatomical

3) equal to anatomical

4) does not change

5) increases along with the anatomical

**18–26. The main form of oxygen transport by blood to tissues is:**

1) oxygen physically dissolved in the blood plasma

2) oxygen associated with hemoglobin\*

3) oxygen physically dissolved in the cytoplasm of erythrocytes

4) oxygen adsorbed on the membrane of erythrocytes

5) there is no correct answer

**18–27. Maximum oxygen voltage:**

1) in alveolar air

2) in exhaled air\*

3) in arterial blood

4) in venous blood

5) in the air of the alveolar dead space

**18–28. Blood oxygen capacity (KPC) is:**

1) the maximum amount of oxygen that can be in the blood at full oxygen saturation\*

2) the amount of oxygen in the venous blood

3) the amount of oxygen in arterial blood

4) the amount of oxygen that penetrated through the aerohematic barrier in 1 minute per 1 mm Hg. st. pressure gradient

5) dependence of the conversion of hemoglobin to oxyhemoglobin on the voltage of oxygen dissolved in the blood

**18–29. In a state of functional rest of the body with arbitrary hyperventilation in the alveolar air, the oxygen voltage:**

1) increases and carbon dioxide decreases\*

2) decreases and carbon dioxide increases

3) does not change as well as the carbon dioxide

4) decreases as well as the carbon dioxide

5) increases as well as the carbon dioxide

**18–30. Carbon dioxide is transported by the blood from the tissues to the lungs:**

1) in the physically dissolved form

2) in the bicarbonate structure \*

3) with blood plasma proteins

4) in the carb-hemoglobin form

5) adsorbed on the membrane of erythrocytes

**18–31. The main amount of oxygen in the cell is consumed in:**

1) Cytosole

2) Mitochondria\*

3) Smooth endoplasmic reticulum

4) Golgi apparatus

5) Kernel

**18–32. Total lung capacity is the volume of air:**

1) remaining in the lungs after a calm exhalation

2) exhaled after maximum inhalation

3) inhaled after a calm inhalation

4) located in the lungs at the deepest breath\*

5) remaining in the lungs after maximum exhalation.

**18–33. The vital capacity of the lungs is the volume of air:**

1) remaining in the lungs after a calm exhalation

2) exhaled after a calm inhalation

3) located in the lungs at the height of the deepest breath

4) exhaled after maximum inhalation\*

5) remaining in the lungs after maximum exhalation

**18–34. The reserve volume of exhalation is the amount of air that can:**

1) exhale as much as possible after maximum inhalation

2) exhale calmly after a calm inhalation

3) exhale calmly after maximum inhalation

4) exhale as much as possible after a calm exhalation\*

5) detect in the lungs after maximum exhalation

**18–35. The reserve volume of inhalation is the amount of air that can be additionally inhaled:**

1) after а maximum exhalation

2) after a calm exhalation

3) after a calm breath\*

4) after a maximum inhalation

5) after a hypervetilation

**18–36. The tension of gases in the venous blood is normal:**

1) oxygen - 110 mm Hg, carbon dioxide - 40 mm Hg.

2) oxygen - 96 mm Hg, carbon dioxide - 39 mm Hg.

3) oxygen – 40 mm Hg, carbon dioxide – 46 mm Hg\*

4) oxygen - 20 mm Hg, carbon dioxide - 60 mm Hg.

5) oxygen – 60 mm Hg, carbon dioxide – 20 mm Hg

**18–37. The oxygen capacity of the blood depends on:**

1) partial pressure of O2 in atmospheric air

2) partial pressure of CO2 in atmospheric air

3) hemoglobin content in the blood\*

4) from osmotic blood pressure

5) there is no correct answer

**18–38. The volumes of the nasal cavities and nasopharynx, larynx, trachea and bronchi, unventilated and necrodilated alveoli are:**

1) alveolar dead space

2) physiological dead space\*

3) anatomical dead space

4) respiratory dead space

5) everything is wrong

**18–39. Insufficient oxygen content in arterial blood is called:**

1) hypoxia

2) hypoxemia\*

3) hypercapnia

4) hypocapnia

5) hyperoxia

**18–40. Insufficient oxygen content in the tissues of the body is called:**

1) hypocapnia

2) hypercapnia

3) hypoxia\*

4) hypoxemia

5) hyperoxia

**18–41. What is the functional residual capacity of the lungs, if the total capacity of the lungs = 5000 ml, the vital capacity of the lungs = 3500 ml, the reserve volume of inhalation = 2000 ml, the tidal volume = 500 ml**

1) 1000 ml

2) 1500 ml

3) 2000 ml

4) 2500 ml\*

5) 3000 ml

**19. REGULATION OF BREATHING**

**19–1. Tachypnea is the respiratory rate of:**

1) 12–19 per min

2) 8 –11 per min

3) 20–40 per min\*

4) 2 –4 in min

5) 6–8 per min

**19–2. Bradypnea is the respiratory rate of:**

1) 12–19 per min

2) 8 –11 per min\*

3) 20–40 per min

4) 16–20 per min

5) 40–60 per min

**19–3. The main section of the central nervous system that provides involuntary respiratory periodicity is:**

1) spinal cord

2) medulla oblongata\*

3) diencephalon

4) limbic system

5) cerebral cortex

**19–4. The leading factor in the regulation of breathing is tension of:**

1) carbon dioxide in arterial blood\*

2) nitrogen in arterial blood

3) oxygen in arterial blood

4) oxygen in venous blood

5) carbon dioxide in venous blood

**19–5. Hypercapnia in arterial blood:**

1) does not change the excitability of the respiratory center

2) increases the excitability of the respiratory center \*

3) reduces the excitability of the respiratory center

4) affects the respiratory center only through vascular chemoreceptors

5) acts weaker than the same degree of hypoxemia

**19–6. The human condition with a decrease in oxygen tension in arterial blood below 80 mm Hg. is called:**

1) hypoxemia\*

2) hypocapnia

3) hyperoxia

4) hypercapnia

5) hypoxia

**19–7. Excitability of the respiratory center in hypoxemia:**

1) increases\*

2) decreases

3) remains unchanged

4) changes more than with the same degree of hypercapnia

5) everything is wrong

**19–8. With a decrease in blood pH, the following is observed:**

1) hypoventilation

2) hyperventilation\*

3) ventilation is not changed

4) dyspnea (shortness of breath)

5) eupnea (normal breathing)

**19–9. Arterial chemoreceptors are most sensitive to change:**

1) oxygen voltage in arterial blood\*

2) the voltage of carbon dioxide in arterial blood

3) pH of arterial blood

4) nitrogen tension in arterial blood

5) oxyhemoglobin in arterial blood

**19–10. The most sensitive to changes in the voltage of carbon dioxide are:**

1) arterial chemoreceptors

2) central chemoreceptors\*

3) tissue chemoreceptors

4) venous chemoreceptors

5) intracellular chemoreceptors

**19–11. To rapid changes (increase and decrease) in the volume of the lungs react:**

1) juxtaalveolar receptors

2) irritant and lung stretch receptors\*

3) peripheral chemoreceptors

4) central chemoreceptors

5) thermoreceptors

**19–12. Mechanoreceptors of the respiratory muscles regulate:**

1) strength of contractions depending on the amount of respiration resistance\*

2) time of inhalation and exhalation

3) blood flow to the lungs

4) exchange of water in the lungs

5) metabolism in the lungs

**19–13. The main department of the central nervous system, which provides arbitrary control of breathing and periodic activity of the respiratory center:**

1) Cerebral cortex\*

2) Limbic system

3) Midbrain

4) Cerebellum

5) Medulla oblongata

**19–14. The main department of the central nervous system provides a link between the processes of respiration, metabolism and thermoregulation:**

1) cerebral cortex

2) hypothalamus\*

3) cerebellum

4) medulla oblongata

5) spinal cord

**19–15. Starting factors of stimulation of the respiratory center at the beginning of physical work:**

1) the effect of hypoxemia on arterial chemoreceptors

2) impulse from proprioceptors of muscles to the respiratory center and its conditioned-reflex activation\*

3) the effect of hypercapnia on the central chemoreceptors

4) accumulation of hydrogen ions in the blood

5) the effect of hypercapnia on arterial chemoreceptors

**19–16. Central chemoreceptors involved in the regulation of breathing are localized:**

1) in the spinal cord

2) in the cerebral cortex

3) in the medulla oblongata\*

4) in the midbrain

5) in the limbic system

**19–17. Gas homeostasis in high-altitude conditions is preserved blah-godarya:**

1) reducing the oxygen capacity of the blood

2) reducing the frequency of heart contractions

3) decreased respiratory rate

4) an increase in the number of red blood cells\*

5) reducing the number of red blood cells

**19–18. If the pneumotactic center is damaged, the following will be observed:**

1) apnea

2) eupnea (normal breathing)

3) tachypnea

4) bradypnea\*

5) dyspnea

**19–19. With an increase in the pressure of interstitial fluid in the lung tissue, the excited receptors are:**

1) stretching

2) chemoreceptors

3) irritation

4) juxtaalveolar\*

5) temperature

**19–20. The respiratory cycle completely stops after cutting the spinal cord at the level of:**

1) lower cervical segments

2) lower thoracic segments

3) upper cervical segments\*

4) upper thoracic segments

5) upper lumbar segments

**19–21. A decrease in ventilation of the lungs occurs when:**

1) hypercapnia

2) hypoxia

3) hypoxemia

4) hypocapnia\*

5) there is no correct answer

**19–22. Increased activity of the respiratory center and an increase in lung ventilation causes:**

1) hypocapnia

2) normocapnia

3) hyperoxemia

4) hypercapnia\*

5) hyperoxia

**19–23. The receptor apparatus of the carotid sinus controls the gas composition:**

1) cerebrospinal fluid

2) arterial blood flowing to all organs except the brain

3) arterial blood entering the brain\*

4) venous blood of the great circle of blood circulation

5) venous blood of the pulmonary circulation

**19–24. The gas composition of the blood entering the brain is controlled by receptors:**

1) carotid corpuscle\*

2) aortic

3) irritation

4) midbrain

5) spinal cord

**19–25. The gas composition of blood entering the large circulatory system is controlled by receptors:**

1) bulbar

2) carotid sinuses

3) aortic\*

4) atria

5) juxtaglomerular complex

**19–26. The gas composition of the cerebrospinal fluid is controlled by receptors:**

1) carotid sinuses

2) aortic

3) bulbar\*

4) atria

5) juxtaglomerular complex

**20. PHYSIOLOGY OF**

**ACID-BASE STATE**

**20–1. The pH value of arterial and venous blood is:**

arterial blood venous blood

1. 7,32 +/– 0,04 7,40 +/– 0,04
2. 7,50 +/– 0,04 7,00 +/– 0,04
3. 7,40 +/– 0,04 \* 7,36 +/– 0,04
4. 7,0 +/– 0,04 7,2 +/– 0,04
5. 7,8 +/– 0,04 7,0 +/– 0,04

**20–2. The result of the functional system action for maintaining the acid-base state is to stabilize:**

1. рН blood in the form of a rigid biological constant in the weakly acidic range
2. рН blood in the form of a rigid biological constant in the weakly alkaline range \*
3. рН blood in the form of a rigid biological constant in the neutral range
4. the amount of proteins in the blood
5. osmotic blood pressure

**20–3. The most powerful buffers in the blood:**

1. hemoglobin and protein
2. hemoglobin and bicarbonate \*
3. bicarbonate and phosphate
4. protein and phosphate
5. hemoglobin and phosphate

**20–4. The skeletal system is involved in compensating for blood acidification (acidosis):**

1. donating hydrogen ions to the blood in exchange for natrium, potassium, calcium ions
2. binding hydrogen ions in exchange for natrium, potassium, calcium ions \*
3. giving OH ions in exchange for natrium, potassium, calcium ions
4. binding OH ions in exchange for natrium, potassium, calcium ions
5. exchanging calcium ions

**20–5.**  **The skeletal system is involved in the compensation of the blood alkalization (alkalosis):**

1. giving hydrogen ions into the blood in exchange for natrium, potassium, calcium ions \*
2. binding hydrogen ions in exchange for natrium, potassium, calcium ions
3. giving OH ions in exchange for natrium, potassium, calcium ions,
4. binding OH ions in exchange for natrium, potassium, calcium ions
5. exchanging calcium ions

**20–6. When stimulated secretion of gastric juice from the stomach into the blood will flow:**

1. more bicarbonate\*
2. more hydrogen ions
3. these ions will come in equal amounts
4. there is no correct answer
5. Cl ions

**20–7.**  **When stimulating the intestinal juice secretion from the intestines in the the blood will flow:**

1. more bicarbonate
2. more hydrogen ions\*
3. these ions will come in equal amounts
4. there is no correct answer
5. Cl ions

**20–8.**  **With a decrease in blood pH, as a compensatory reaction, the body develops:**

1. pulmonary hyperventilation\*
2. pulmonary hypoventilation
3. pulmonary ventilation does not change
4. apnea
5. dyspnea

**20–9. With a increase in blood pH, as a compensatory reaction, the body develops:**

1. pulmonary hyperventilation
2. pulmonary hypoventilation\*
3. pulmonary ventilation does not change
4. apnea
5. dyspnea

**20–10. The processes in the kidneys have the greatest potential for compensating for the "acidification" of the body:**

1) "reabsorption" of bicarbonates

2) formation of titratable acids

3) ammoniogenesis\*

4) water reabsorption

5) reabsorption of natrium ions

**20–11.**  **The normal value of standard bicarbonate (SB) in blood plasma is:**

1. +/– 2,4 mmol/l
2. 22–26 mmol/l \*
3. 46–52 mmol/l
4. 100–200 mmol/l
5. 500–600 mmol/l

**20–12. The normal value of buffer bases (BB) in blood is :**

1. 20–24 mmol/l
2. 23–27 mmol/l
3. 46–52 mmol/l \*
4. 100–200 mmol/l
5. 500–600 mmol/l

**20–13. The normal value of the deficiency (excess) of buffer bases (BE) in blood is:**

1. +/– 0,5 mmol/l
2. +/– 10 mmol/l
3. +/– 2,4 mmol/l \*
4. +/– 1000 mmol/l
5. +/– 5000 mmol/l

**21. GENERAL CHARACTERISTICS OF**

**FUNCTIONAL FEEDING SYSTEM**

**AND PHYSIOLOGICAL DIGESTIVE SYSTEM.**

**DIGESTION IN THE MOUTH AND GASTRIC CAVITIES**

**21–1. Automated digestion is the digestion:**

1) by means of enzymes produced by the macroorganism\* itself

2) by means of enzymes that are part of food products

3) by means of lysosomal enzymes

4) by means of enzymes produced by intestinal microbes

5) that is parietal

**21–2. Symbiotic digestion is the digestion:**

1) by means of enzymes that are part of food products

2) by means of enzymes produced by the macroorganism itself

3) by means of enzymes produced by intestinal microbes \*

4) that is parietal

5) that is intracellular by means of lysosomal enzymes

**21–3. The main type of digestion in humans is:**

1) autolytic

2) symbiotic

3) automated\*

4) parietal

5) lysosomal

**21–4. The main humoral factors regulating the activity of gastrointestinal tract are:**

1) electrolytes and metabolites

2) mediators and modulators

3) gastrointestinal hormones\*

4) growth hormone

5) prostaglandins

**21–5. The Hunger Center is located in:**

1) nuclei of the vagus nerve of the medulla

2) red nucleus of the midbrain

3) relay nuclei of the thalamus

4) lateral nuclei of the hypothalamus\*

5) ventromedial nuclei of the hypothalamus

**21–6. The satiation center is located in:**

1) ventromedial nuclei of the hypothalamus\*

2) reticular formation of the medulla

3) red nucleus of the midbrain

4) associative nuclei of the thalamus

5) lateral nuclei of the hypothalamus

**21–7. Satiation stage caused by afferent impulses from the receptors of the oral cavity and stomach that reach hypothalamus, is called:**

1) metabolic

2) veriatable

3) humoral

4) sensory \*

5) exchange

**21–8. Satiation stage caused by the entry of food hydrolysis products into the blood is called:**

1) sensory

2) primary

3) exchange \*

4) secretory

5) regulatory

**21–9. What is not the function of the digestive system:**

1) motor

2) chemical processing of food

3) endocrine\*

4) secretory

5) sucting

**21–10. Which function does not belong to non-digestive ones:**

1) excretory

2) immune

3) endocrine

4) chemical processing (hydrolysis) of food \*

5) regulation of erythropoiesis

**21–11. The salivation center is located in:**

1) hypothalamus (in the ventromedial nuclei)

2) midbrain (in the red nuclei)

3) medulla (in the nuclei of the VII and IX cranial nerves) \*

4) thalamus

5) occipital brain lobe

**21–12. Saliva enzymes mainly effect on:**

1) proteins

2) fats

3) carbohydrates\*

4) nucleic acids

5) polypeptides

**21–13. Which of the following has bactericidal properties in saliva:**

1) lysozyme\*

2) alpha-amylase

3) alpha-glucosidase

4) mucin

5) lipase

**21–14. The saliva reaction is:**

1) acidic (pH ~ 4)

2) close to neutral (рН = 5.8–7.8)\*

3) alkaline (pH ~ 8.5)

4) acidic (pH = 1)

5) alkaline (pH = 12)

**21–15. Receptors irritation triggers the swallowing reflex of which are located:**

1) on the lateral surface of the tongue

2) on the front third of the tongue

3) at the root of the tongue\*

4) in the middle third of the tongue

5) on the tip of the tongue

**21–16. The chewing center is located:**

1) in the ventromedial nuclei of the hypothalamus

2) in the lateral nuclei of the hypothalamus

3) in the anterior horns of the spinal cord

4) at the bottom of the rhomboid fossa of the medulla\*

5) in the lower tubercles of the quadrigeminal bodies

**21–17. The swallowing center is located:**

1) in the anterior horns of the spinal cord at the level of C3-5

2) in the medulla\*

3) in the ventromedial nuclei of the hypothalamus

4) in the lower tubercles of the quadrigemina bodies of the midbrain

5) in the lateral nuclei of the hypothalamus

**21–18. Parietal (accessory) cells of the stomach secrete:**

1) slime

2) hydrochloric acid\*

3) pepsinogen

4) gastrin

5) lipase

**21–19. The chief cells of the stomach synthesize:**

1) slime

2) hydrochloric acid

3) pepsinogen\*

4) gastrin

5) lipase

**21–20. Additional cells of the stomach secrete:**

1) slime\*

2) pepsinogen

3) gastrin

4) hydrochloric acid

5) lipase

**21–21. Hydrochloric acid in the stomach participates in all the processes except:**

1) proteins acid hydrolysis

2) prevention of vitamin B12/ destruction \*

3) bacteria killing

4) conversion of pepsinogen to pepsin

5) establishing the optimal pH for the proteolytic effect of pepsin

**21–22. Pepsin of gastric juice hydrolyzes:**

1) fats

2) carbohydrates

3) proteins\*

4) mucopolysaccharides

5) histamine

**21–23. Increased secretion of gastrin is characterized by:**

1) decreased acidity of gastric contents

2) increased acidity of gastric contents \*

3) hyperglycemia

4) hypoglycemia

5) iron-deficiency anemia

**21–24. Secretion of hydrochloric acid in the stomach is inhibited by:**

1) gastrin

2) somatostatin\*

3) histamine

4) parasympathetic influences

5) taking a meat broth

**21–25. Sympathetic influences in the stomach:**

1) inhibit the secretion of hydrochloric acid \*

2) are realized by M-cholinergic receptors

3) activate peristalsis

4) activate the secretion of hydrochloric acid

5) regulate the formation of acetylcholine

**21–26. The patient has an increased stomach acidity. A medication of the following group should be prescribed:**

1) blocker of α-adrenergic receptors

2) stimulator of M-cholinergic receptors

3) blocker of H2-histamine receptors \*

4) stimulator of H2-histamine receptors

5) blocker of β-adrenergic receptors

**21–27. Functions of saliva is:**

1) protective

2) digestive

3) mineralizing

4) everything is correct\*

5) there is no correct answer

**22. DIGESTION IN SMALL AND LARGE INTESTINE**

**22–1. Trypsinogen changes to trypsin being influenced by:**

1) chymotrypsin

2) enterokinase and trypsin\*

3) lipases

4) amylase

5) aminopeptidases

**22–2. The pancreas secretes the following into the lumen of the duodenum:**

1) glucagon

2) insulin

3) somatostatin

4) trypsinogen\*

5) bombesin

**22–3. The flowing pancreatic enzymes are produced as proenzymes:**

1) amylase

2) lipase

3) trypsinogen, chymotrypsinogen\*

4) nuclease

5) lactase

**22–4. The most concentrated in its composition is the following bile:**

1) hepatic and cystic

2) cystic\*

3) hepatic

4) mixed

5) hepatic and mixed

**22–5. Bile formation (choleresis) occurs:**

1) constantly\*

2) periodically

3) along with stomach contractions

4) depending on the content of sugar in the blood

5) depending on the oxygen content in the air

**22–6. Bile secretion (cholekinesis) occurs:**

1) constantly

2) periodically\*

3) along with stomach contractions

4) depending on the content of sugar in the blood

5) depending on the oxygen content in the air

**22–7. Bile in its composition almost has no:**

1) bile acids

2) fatty acids\*

3) bilirubin

4) cholesterol

5) bicarbonate

**22–8. Bile pigments are formed from:**

1) cholesterol

2) hemoglobin\*

3) bile acids

4) lecithin

5) mucin

**22–9. In case of liver diseases, proteins and their fractions are found in blood, because of the following that happens in the liver:**

1) there is a utilization of blood proteins

2) the extraction of proteins by hepatocytes is enhanced

3) protein synthesis occurs \*

4) protein deposition

5) deamination of amino acids

**22–10. Under the influence of bile, the following are absorbed:**

1) monosaccharides

2) products of protein hydrolysis

3) lipids and fat-soluble vitamins\*

4) mineral salts

5) sugar

**22–11. Chylomicrons and lipoproteins from enterocytes are absorbed:**

1) into the blood

2) into the lymph\*

3) in the liquor

4) into the synovial fluid

5) into the pleural fluid

**22–12. Products of carbohydrates and proteins hydrolysis are practically absorbed:**

1) into the lymph

2) in the liquor

3) into the blood\*

4) into the synovial fluid

5) into the pleural fluid

**22–13. The main type of motor activity affecting chyme movement is:**

1) rhythmic segmentation

2) villus contractions

3) peristalsis\*

4) pendulum movements

5) tonic contractions

**22–14. To study bile secretion and bile composition, the following method is used:**

1) pH-meters

2) mastication

3) probing and cholecystography\*

4) gastroscopy

5) duodenoscopy

**22–15. Digestion of carbohydrates occurs in small intestine under the influence of:**

1) trypsin

2) lipases

3) 1,6-glucosidases\*

4) enterokinase

5) carboxypeptidase

**22–16. Dietary fiber hydrolysis in the colon goes on under the influence of enzymes in:**

1) intestinal juice

2) pancreas

3) enterocytes

4) intestinal microflora\*

5) colonic juice

**22–17. Duodenal probing revealed increased leukocytes in the most concentrated portion of bile; the problem of the following organ is most likely to exist:**

1) intrahepatic biliary tract

2) gallbladder\*

3) duodenum

4) pancreas

5) liver

**22–18. When introducing hydrochloric acid into the duodenum, the level of the following in blood increases:**

1) pepsin

2) amylase

3) lipases

4) secretin\*

5) cholecystokinin

**22–19. During breastfeeding, the predominant intestinal flora is:**

1) bifidum bacteria\*

2) there is no correct answer

3) Coli bacilli

4) enterococci

5) klebsiella

**23. METABOLISM AND ENERGY**

**23–1. Energy consumption of the body during physiological rest, lying position, on an empty stomach, at a comfortable temperature, means the following exchange:**

1) working

2) of substances

3) of energy

4) main\*

5) specific-dynamic

**23–2. The energy of the main metabolism is not spent on:**

1) blood circulation

2) cell metabolism

3) breathing

4) specific and dynamic action of food\*

5) maintenance of membrane potential

**23–3. The ratio of carbon dioxide released volume to oxygen absorbed volume is called:**

1) the caloric value of the food substance

2) caloric equivalent of oxygen

3) respiratory coefficient\*

4) gas constant

5) respiratory volume

**23–4. The daily requirement of a middle-aged person for carbohydrates is:**

1) 70–100 g

2) 150–200 g

3) 400–450 g\*

4) 40–60 g

5) 10–30 g

**23–5. The daily need of a middle-aged person for proteins is:**

1) 150–200 g

2) 400–450 g

3) 80–130 g\*

4) 40–70 g

5) 10–30 g

**23–6. The daily need of a middle-aged person for fats is:**

1) 100–150 g

2) 400–450 g

3) 70–100 g\*

4) 40–70 g

5) 10–40 g

**23–7. The following hormone has predominant effect on carbohydrate metabolism:**

1) testosterone

2) aldosterone

3) antidiuretic

4) glucagon\*

5) parathormone

**23–8. The following one has predominant effect on protein metabolism:**

1) insulin

2) adrenaline

3) antidiuretic hormone

4) growth hormone (GH)\*

5) oxytocin

**23–9. The following hormone stimulates protein synthesis in tissues:**

1) hydrocortisone

2) adrenaline

3) growth hormone\*

4) vasopressin

5) insulin

**23–10. The formation of complex organic compounds from simple ones with energy consumption is called:**

1) main exchange

2) working exchange

3) dissimilation

4) assimilation\*

5) specific dynamic action of food

**23–11. The decay of complex organic compounds to simple ones with the release of energy is called:**

1) assimilation

2) energy balance

3) main exchange

4) dissimilation\*

5) specific dynamic action of food

**23–12. Dietary proteins do not perform the following function:**

1) of a supplier of essential amino acids to the body

2) plastic

3) energetic

4) of the main source of glucose\*

5) of the suppliers of complex proteins

**23–13. The state of “nitrogen balance” is mainly affected by the amount of the following intake:**

1) proteins\*

2) carbohydrates

3) lipids

4) minerals

5) vitamins

**23–14. Dietary lipids do not perform the following function:**

1) of suppliers of essential amino acids to the body \*

2) of suppliers of essential unsaturated fatty acids to the body

3) plastic

4) energetic

5) metabolic

**23–15. Prolonged hyperfunction of thyroid gland is accompanied by:**

1) weight gain

2) weight loss\*

3) no change in body weight

4) decrease in the volume of fluid in the body

5) increase in the volume of fluid in the body

**23–16. The leading role in the regulation of energy exchange belongs to:**

1) thalamus

2) hypothalamus\*

3) reticular formation

4) medulla

5) spinal cord

**23–17. Carbohydrates in the body do not perform the following function:**

1) plastic

2) energetic

3) source of essential amino acids\*

4) fat source

5) metabolic

**23–18. The main glycogen depot in the body is:**

1) liver\*

2) heart

3) kidneys

4) lungs

5) muscles

**23–19. Normal blood glucose concentration (mmol/l):**

1) 6.6–7.7

2) 3.3–5.5\*

3) 2.1–4.4

4) 0.5–2.1

5) 8.2–10.3

**23–20. The largest amount of body water is in:**

1) intracellular fluid\*

2) tissue fluid

3) blood plasma

4) muscles

5) central nervous system

**23–21. The main route of fluid excretion from the body is:**

1) through the kidneys\*

2) through the gastrointestinal tract

3) evaporation from the surface of skin

4) evaporation when talking

5) evaporation during breathing

**23–22. The following one is not vitamin:**

1) retinol

2) histamine\*

3) calciferol

4) tocopherol

5) nicotinic acid

**23–23. The main exchange value cannot be determined:**

1) at rest

2) on an empty stomach

3) two days after exercise

4) immediately after the exam\*

5) at comfort temperature

**23–24. The main exchange value does not change:**

1) at light physical activity

2) during exams

3) at air temperature +15°С

4) on an empty stomach\*

5) after eating protein food

**23–25. Thyroid hormones do the following with the metabolic rate:**

1) increase\*

2) reduce

3) do not change

4) increase only during emotional stress

5) increase only during physical stress

**23–26. The main structure (core) of the food center responsible for the formation of hunger is located in:**

1) frontal cortex

2) hypothalamus\*

3) medulla

4) midbrain

5) caudate nucleus

**23–27. The influence of food intake, which increases metabolism and energy consumption, is called:**

1) nutrient isodynamics

2) digestibility of food

3) main exchange

4) specific dynamic action of food\*

5) caloric value of nutrients

**23–28. The composition and quantity of food products sufficient for the processes of adaptation and labor activity of a person per day is called:**

1) nutrient isodynamics

2) specific dynamic action of food

3) diet\*

4) working increase

5) main exchange

**23–29. In case of daily energy consumption of 2500 kcal and the content of proteins in the daily diet - 150 g, carbohydrates - 600 g, fat - 200 g, the patient’s body weight:**

1) will decrease

2) will increase\*

3) remains unchanged, because daily energy consumption is approximately equal to the daily energy intake

4) decrease below normal

5) there is no correct answer

**23-30. To determine the value of the main exchange, it is necessary to measure:**

1) oxygen uptake\*

2) calorie content of the food consumed

3) digestibility of food consumed

4) heat of combustion of proteins, fats and carbohydrates

5) there is no correct answer

**24. PHYSIOLOGY OF EXCRETION.**

**UROPOIESIS AND URINATION.**

**EXCRETORY FUNCTION OF SKIN, LUNGS,**

**DIGESTIVE TRACT**

**24–1. The feature of the vascular bed of the kidney’s nephron is:**

1) large diameter of efferent arterioles

2) short capillaries

3) double network of capillaries\*

4) lack of venules

5) a sharp decrease in blood pressure in the afferent arterioles

**24–2. Renal blood flow can be measured using the following substances:**

1) paraaminohippuric acid\*

2) water

3) glucose

4) amino acids

5) renin

**24–3. Maintaining of the following does not belong to homeostatic function of the kidney:**

1) ionic composition of blood

2) osmotic pressure of blood

3) oncotic pressure of blood plasma\*

4) blood pressure

5) acid-base state

**24–4. Filtration in the nephron can be characterized as the following process:**

1) active

2) passive\*

3) related to energy consumption

4) hormone-dependent

5) dependent only on blood mass

**24–5. Primary urine formation from blood plasma is a function of:**

1) proximal tubules of the nephron

2) distal tubules

3) collecting ducts

4) capillaries of the glomeruli of the renal corpuscle \*

5) loop of Henle knee

**24–6. The process of primary urine formation in the nephron capsule is called:**

1) tubular excretion

2) tubular reabsorption

3) tubular secretion

4) glomerular filtration\*

5) urination

**24–7. The nephrons of a healthy person filtrates:**

1) amino acids\*

2) hemoglobin

3) erythrocytes

4) globulins

5) leukocytes

**24–8. Glucosuria in a healthy person can be observed after:**

1) sleep

2) diseases

3) exams

4) physical work

5) taking a lot of carbohydrates\*

**24–9. Kidney’s filtration pressure value is affected by:**

1) changes in systemic blood pressure in the range of 90 - 170 mm Hg. Art.

2) hydrodynamic, oncotic blood pressure in the capillaries of the glomerulus, hydrostatic pressure of the ultrafiltrate in the capsule\*

3) osmotic pressure of blood

4) oncotic pressure of the filtrate

5) condition of podocytes

**24–10. When plasma oncotic pressure decreases, filtration in kidneys:**

1) decreases

2) does not change

3) increases\*

4) decreases proportionally to reabsorption

5) increases in proportionally to reabsorption

**24–11. The amount of glomerular filtration is reduced by:**

1) decrease in systemic arterial pressure below 90 mm Hg. Art.\*

2) decrease in oncotic blood pressure

3) loading with a large volume of liquid

4) decreased number of salts in the blood plasma

5) spasm of the efferent arterioles of the glomerulus

**24–12. The second (along the blood) network of capillaries in the kidneys is located:**

1) in the renal corpuscle, and has high blood pressure

2) in the renal corpuscle, and has low blood pressure

3) along tubules, and has low blood pressure\*-

4) along the tubules, and has high blood pressure

5) on the border of the cortical and medulla

**24–13. The difference in the diameters of the afferent and efferent arterioles of the renal glomerulus influence the value of:**

1) oncotic pressure

2) secretions

3) reabsorption

4) filteration\*

5) final urine volume

**24–14. Reabsorption is:**

1) process of passage of the cell-free and protein-free part of the plasma from the capillaries of the glomerulus through the barrier into the cavity of the capsule

2) back absorption of water, organic and mineral substances from the renal tubules into the blood \*

3) transport of substances contained in the blood and (or) formed in the tubular epithelial cells into the urine

4) appearance of threshold substances in primary urine

5) appearance of large molecular substances in primary urine

**24–15. Obligatory reabsorption of water, glucose, amino acids, urea is a function of:**

1) capillaries of renal corpuscle glomerulus

2) nephron collecting ducts

3) distal tubules

4) proximal tubule\*

5) loops of Henle

**24–16. Glucose reabsorption occurs almost entirely in:**

1) loop of Henle

2) distal convoluted tubule

3) collecting duct

4) proximal convoluted tubule\*

5) loop of Henle knee

**24–17. Obligatory reabsorption of water in the kidneys is carried out in:**

1) capillaries of the glomerulus

2) collecting ducts

3) distal tubules

4) proximal tubules and descending loop of Henle\*

5) ureters

**24–18. Sodium reabsorption occurs predominantly in:**

1) proximal tubule, thick ascending loop of Henle \*

2) juxtaglomerular apparatus

3) nephron capsule

4) ureters

5) pelvis

**24–19. Facultative water reabsorption mainly occurs in:**

1) proximal convoluted tubule

2) loop of Henle

3) collecting ducts\*

4) ureters

5) nephron capsule

**24–20. Glucose is reabsorbed almost completely in:**

1) loops of Henle

2) distal tubules

3) proximal tubules\*

4) ureters

5) collecting ducts

**24–21. The threshold substance is:**

1) glucose\*

2) sulfates

3) water

4) inulin

5) proteins

**24–22. The secretion process is:**

1) transport of substances from tubular urine into the blood

2) filtration of blood plasma into the lumen of tubules

3) active excretion of substances from the blood or from the cells of the tubules into the urine \*

4) urea circulation

5) urine excretion

**24–23. The formation of final urine is the result of:**

1) filtration, reabsorption, active transport

2) filtration, reabsorption

3) filtration, reabsorption, tubular secretion\*

4) active excretion of substances from the blood or from the cells of the tubules into the urine

5) urine excretion from collecting ducts into the pelvis of the kidney

**24–24. The main function of the collecting ducts is:**

1) renin formation

2) glucose reabsorption

3) filtration

4) secretion of sodium ions

5) urine concentration\*

**24–25. Daily diuresis is normally equal to:**

1) 2.5–5 l

2) 150–180 l

3) 1.5–2 l\*

4) 0.5–0.8 l

5) 15–20 l

**24–26. Antidiuretic hormone increases reabsorption of the following in kidneys collecting ducts:**

1) sodium

2) potassium

3) water\*

4) proteins

5) vitamin D3

**24–27. The following hormone regulates sodium reabsorption and potassium secretion in the kidneys:**

1) thyroxine

2) adrenaline

3) antidiuretic hormone

4) aldosterone\*

5) cortisone

**24–28. Antidiuretic hormone increases water reabsorption in:**

1) proximal tubule

2) loop of Henle

3) collecting duct\*

4) ureter

5) nephron capsule

**24–29. Activation of antidiuretic mechanism occurs:**

1) in case of water load

2) while eating sour food

3) while eating sweet food

4) in case of salty food intake, fluid loss\*

5) during emotional stress

**24-30. The introduction of a protein-peptide extract of the posterior pituitary gland into the body will lead to:**

1) decrease in diuresis and urine osmotic pressure

2) t increase in diuresis, decrease in urine osmotic pressure

3) decrease in diuresis, increase in urine osmotic pressure\*

4) increase in diuresis and urine osmotic pressure

5) there is no correct answer

**24–31 Secretion by the following cells of the renal epithelium ensures stabilization of the acid-base blood state:**

1) sodium, potassium

2) calcium, magnesium

3) potassium, calcium

4) hydrogen, ammonium\*

5) chlorine, hydrogen

**24–32. Angiotensin-II causes:**

1) inhibition of aldosterone production, decrease in vascular tone

2) activation of protein reabsorption in kidneys

3) synthesis of plasminogen activator - urokinase

4) activation of aldosterone production, vasoconstriction \*

5) inhibition of antidiuretic hormone activity

**24–33. Renin is formed in:**

1) liver

2) collecting ducts of kidneys

3) juxtaglomerular apparatus of nephron \*

4) loop of Henle

5) ureters

**24–34. A sharply increased diuresis with a reduced density of daily urine is a feature of the following lesion:**

1) cerebral cortex

2) cerebellum

3) hippocampus

4) pituitary\*

5) brain stem

**24–35. In case of posterior pituitary gland destruction, there might be:**

1) increase in diuresis, decrease in urine osmolarity\*

2) increase in diuresis, increase in urine osmolarity

3) decrease in diuresis, decrease in urine osmolarity

4) decrease in diuresis, increase in urine osmolarity

5) there is no correct answer

**24–36. In case of some poisonings, glucose appears in the urine despite its normal levels in blood. This means that the point of toxic substance application is:**

1) glomeruli

2) proximal tubules\*

3) loops of Henle

4) distal tubules

5) collecting tubes

**25. THERMOREGULATION**

**25–1. Chemical thermoregulation (heat production) does not include:**

1) heat transfer during skin vasodilation\*

2) effect of adrenaline on the mobilization and utilization of glucose and fatty acids

3) effect of thyroid hormones on metabolism

4) effect of glucocorticoids on carbohydrate metabolism

5) contractile thermogenesis

**25–2. The following processes are not hormone-dependent:**

1) metabolism

2) mobilization of fatty acids

3) utilization of fatty acids

4) sweating

5) contractile thermogenesis in skeletal muscles\*

**25–3. Physical thermoregulation (thermolysis) is:**

1) change in the intensity of metabolic processes

2) change in heat transfer from internal organs to the surface of the body

3) regulation of heat transfer rate from the surface of the body \*

4) change in the transfer of heat from internal organs to the surface of the body and regulation of the rate of heat transfer from the surface

5) heat radiation from the surface of the body

**25–4. The main sources of heat production at rest are:**

1) kidneys

2) heart

3) brain

4) muscles

5) liver, stomach, intestines\*

**25–5. Homothermy is:**

1) change in body temperature along with change in ambient temperature

2) constancy of body “core” temperature with significant fluctuations in environment temperature\*

3) deviation of body temperature from the normal value

4) increase in body temperature during emotional stress

5) increase in body temperature during physical work

**25–6. Heat production in case of environment temperature decrease in warm-blooded organisms:**

1) goes down

2) rises\*

3) stays the same

4) there is no correct answer

5) decreases with a decrease of environment temperature, but at normal temperature of the “core” and “shell’ of the body

**25–7. Contractile thermogenesis is predominantly associated with:**

1) changes in tone and phasic contractions of skeletal muscles\*

2) change in the activity of smooth muscles of gastrointestinal tract

3) skin blood flow

4) work of respiratory muscles

5) work of internal organs

**25–8. When the environment temperatures are higher than skin temperature, the main way of heat transfer is:**

1) convection

2) evaporation\*

3) radiation

4) holding

5) redistribution of heat in the body

**25–9. The main route of heat transfer at rest is:**

1) convection

2) holding

3) evaporation

4) radiation\*

5) redistribution of heat in the body

**25–10. The greatest amount of heat during physical activity is produced in:**

1) lungs

2) kidneys

3) skeletal muscles\*

4) connective tissues

5) brain

**25–11. Thermoregulation center is located in:**

1) basal nuclei

2) hypothalamus\*

3) medulla

4) spinal cord

5) midbrain

**25–12. Conditioned reflex thermoregulation is primarily provided by the following areas of the brain:**

1) hypothalamus

2) cerebral cortex \*

3) spinal cord

4) basal nuclei

5) cerebellum

**25–13. Heat evaporative at 100% of relative humidity:**

1) is high

2) stops\*

3) there is no correct answer

4) decreases, then increases

5) increases, then decreases

**25–14. In case of artificial (medical) hypothermia, body temperature is reduced to 30 ° C. The following things happen in the body during such state:**

1) oxygen consumption increases to compensate hypothermia

2) oxygen consumption decreases and tissue resistance to oxygen deficiency increases \*

3) excitability of nervous and muscular tissues increases

4) heart rate increases

5) sympathetic nervous system tonus increases

**26. SENSOR SYSTEMS**

**26–1. A number of formations, including receptors, afferent neurons, conducting ways and projection zones of cerebral cortex, is called:**

1) sense organ

2) functional system

3) analyzer (sensor system)\*

4) afferent system

5) effector

**26–2. The final result of analyzers’ activity is the formation of:**

1) emotions

2) motivations

3) sensations\*

4) consciousness

5) memory

**26–3. Specialized nervous structures that directly perceive the action of stimuli are called:**

1) analyzers

2) sensory systems

3) receptors\*

4) polymodal neurons

5) pseudounipolar neurons

**26–4. The stimulus that is adapted to by receptor during evolution is called:**

1) physical

2) biological

3) physiological

4) adequate\*

5) monomodal

**26–5. An upward change in receptor sensitivity is called:**

1) desensitization

2) excitability

3) specificity

4) sensitization\*

5) demobilization

**26–6. The smallest stimulus strength that can cause a response is called:**

1) minimum

2) adequate

3) liminal\*

4) exciting

5) annoying

**26–7. Stimulus strength in the receptor is encoded by:**

1) frequency of receptor potential occurrence

2) amplitude of the receptor potential\*

3) amplitude of the action potential

4) duration of the action potential

5) generator potential frequency

**26–8. Stimulus strength “at the output” of the afferent neuron (in its axon hillock and axon) is encoded by:**

1) amplitude of action potentials

2) frequency of action potentials\*

3) duration of action potentials

4) frequency of receptor potential occurrence

5) amplitude of receptor potential

**26–9. The differential threshold allows:**

1) detecting the difference in some property of the acting stimulus \*

2) detecting the action of a liminal stimulus strength

3) feeling pain

4) determining maximum stimulus strength

5) determining thresholds of various stimuli

**26–10. Conduction of irritability in sensory systems along a specific (lemniscal) path is characterized by:**

1) slow conduction of irritability

2) through the nuclei of the reticular formation of the brain stem and the absence of a topographic projection of receptive fields

3) switching in intralaminar and reticular nuclei of the thalamus

4) fast conduction of irritability, switching in specific nuclei of the thalamus, good topographic projection of receptive fields in the centers\*

5) slow conduction of irritability through the nuclei of the reticular formation and specific nuclei of the thalamus

**26–11. Pain receptors have the following features:**

1) low threshold of irritability

2) high threshold of irritability \*

3) rapid adaptation to current stimulus

4) absence of irritability threshold

5) lack of specificity

**26–12. The main antinociceptive substances produced in the brain and spinal cord, pituitary gland and some organs are:**

1) serotonin, angiotensin

2) enkephalins, endorphins and dynorphins\*

3) prostaglandins and prostacyclin

4) adrenaline and histamine

5) oxytocin and vasopressin

**26–13. The physiological significance of interoreceptors is signaling:**

1) about changes in the external environment of the body

2) about changes in the internal environment of the body \*

3) about changes in the external and internal environment of the body

4) only about the pain effect

5) about the damaging effect

**27. VISUAL SENSORY SYSTEM**

**27–1. Accommodation is an adaptive reaction of the eye associated with:**

1) change in the curvature of the lens \*

2) change in the illumination of the retina

3) corneal irritation

4) change in intraocular pressure

5) there is no correct answer

**27–2. The main mechanism of accommodation of the eye is to change:**

1) pupil diameter

2) number of active retinal receptors

3) curvature of the lens\*

4) field of view

5) irritability of receptors

**27–3. The non-accommodating eye is tuned to see:**

1) nearby items

2) distant objects\*

3) both distant and nearby objects

4) objects located at a distance of 10 cm

5) objects located at a distance of 30 cm

**27–4. The accommodation reflex of the eye, which manifests itself in an increase of lens curvature, is triggered by:**

1) increase in illumination of the retina

2) decrease in illumination of the retina

3) fuzzy image on the retina\*

4) fuzzy image in front of the retina

5) there is no correct answer

**27–5. The ability of the eye to distinguish two luminous points, the projections of which fall on the retina at an angle of one minute with a minimum distance between them, is called:**

1) astigmatism

2) accommodation\*

3) visual acuity

4) presbyopia

5) refraction of the eye

**27–6. Visual acuity is maximum when focusing the image:**

1) in the yellow spot (its central fossa) \*

2) in the blind spot

3) on the periphery of the retina

4) at any point of the retina

5) there is no correct answer

**27–7. Visual impairment associated with loss of lens elasticity in old age is called:**

1) spherical aberration

2) presbyopia\*

3) hypermetropia

4) astigmatism

5) myopia

**27–8. What is located in the yellow spot of the retina?**

1) sticks

2) cones\*

3) equal number of rods and cones

4) there are no rods or cones

5) there is no correct answer

**27–9. When the retina is illuminated, an action potential is formed in:**

1) sticks and cones

2) bipolar cells

3) amacrine cells

4) ganglion cells\*

5) horizontal cages

**27–10. A disorder of twilight vision occurs when there is a lack of a vitamin:**

1) A\*

2) D

3) C

4) K

5) B6

**27–11. The disorder of twilight vision is associated with a violation of the function of the following retinal cells:**

1) cones

2) sticks\*

3) horizontal

4) bipolar

5) amacrine

**27–12. The value of the achromatic field of view compared to the chromatic one is:**

1) more\*

2) less

3) the same

4) more than 1000 times

5) there is no correct answer

**27–13. The ability of the eye to adjust to a clear vision of objects depending on their distance is called:**

1) accommodation\*

2) functional mobility

3) visual acuity

4) refraction

5) astigmatism

**27–14. Right and left optic nerves in the chiasm:**

1) form a complete cross

2) are crossed by the medial parts \*

3) do not cross

4) intersect with lateral parts

5) form axoaxonal synapses

**27–15. The cortical region of the visual sensory system is located in:**

1) cortex of the occipital lobe \*

2) cortex of the temporal lobe

3) posterior central gyrus

4) anterior central gyrus

5) cortex of the parietal lobe

**27–16. If the mechanism of photoreception of rods is disturbed, the patient has:**

1) violation in precepting red

2) violation in precepting blue

3) violation in precepting green

4) impaired twilight vision\*

5) impaired perception of objects at different distances

**27–17. To dilate the pupil for fundus examination, they use the following drops:**

1) stimulator of M-cholinergic receptors

2) stimulator of H-cholinergic receptors

3) blocker of M-cholinergic receptors \*

4) blocker of H-cholinergic receptors

5) alpha-adrenergic blocker

**27–18. Achromatic vision is determined by:**

1) cones

2) pigment cells

3) chopsticks\*

4) amacrine cells

5) horizontal cells

**27–19. The space visible with one eye when fixing the gaze is called:**

1) visual acuity

2) receptive field

3) spatial threshold

4) field of view\*

5) zone of the best vision

**27–20. Mechanically, the weakest point of eye sclera (for example, in glaucoma) is the area corresponding to:**

1) beginning of the cornea

2) yellow spot

3) blind spot\*

4) neither yellow nor blind spot

5) yellow and blind spot

**27–21. The reaction of the pupil to light, manifested in its narrowing, is called:**

1) accommodation

2) astigmatism

3) refraction of vision

4) pupillary reflex\*

5) functional mobility

**27–22. The patient’s cortex of the occipital lobe of the brain is affected (field 17). To assess the degree of functional damage, it is necessary to apply the following method:**

1) audiometry

2) determination of the field of view\*

3) olfactometry

4) assessment of speech functions

5) study of coordination of movements

**28. AUDIO AND VESTIBULAR**

**SENSOR SYSTEMS**

**28–1. Sound vibrations are transmitted from the tympanic membrane to the oval window:**

1) with increasing sound pressure\*

2) with sound pressure attenuation

3) no change in sound pressure

4) with an increase in the frequency of sound waves

5) with a decrease in the frequency of sound waves

**28–2. The main function of the Eustachian tube is:**

1) perception of sound vibrations

2) pressure equalization on both sides of the eardrum\*

3) resonant amplification of sound pressure

4) decrease in the frequency of sound waves

5) reduction of sound pressure

**28–3. The organ of Corti is:**

1) cochlear receptor apparatus on the main membrane \*

2) spiral ganglion of the cochlea

3) accumulation of receptors in the ampullae of the semicircular canals

4) part of the Eustachian tube

5) neurons of cochlear nuclei

**28–4. The coding of the sound frequency in accordance with the theory of “traveling wave” is carried out as follows:**

1) each sound frequency corresponds to its own section of the maximum vibration of the membrane of the organ of Corti \*

2) each sound frequency in the auditory range has its own receptor potential amplitude in any receptor cell of Corti’s organ

3) everything is correct

4) amplitude of the maximum oscillation of the membrane of the organ of Corti is located in the same place under the action of sounds in the range of 20 - 5000 Hz

5) all neurons of the spiral ganglion respond to any frequency of sound (in the range of 16 - 20,000 Hz)

**28–5. The cortical part of the auditory sensory system is located in:**

1) occipital cortex

2) frontal cortex

3) temporal cortex\*

4) posterior central gyrus

5) anterior central gyrus

**28–6. The speech zone is in the following range of sound vibrations:**

1) 16-750Hz

2) 5000 - 10000 Hz

3) 1000 - 16000 Hz

4) 1000 – 4000 Hz\*

5) 4000 - 20000 Hz

**28–7. The human auditory sensory system perceives sounds ranging:**

1) 10 to 30000 Hz

2) 16 to 20000 Hz\*

3) 30 to 15000 Hz

4) 0 to 20000Hz

5) 6 to 10000Hz

**28–8. Binaural hearing allows one to:**

1) hear high tones

2) hear low tones

3) localize the sound source in space\*

4) understand the melody of sound

5) distinguish between low and high tones

**28–9. The main function of the vestibular sensory system is information about:**

1) position of the head in space, uneven movement and rotation of the body \*

2) uniform rectilinear motion

3) environmental sounds

4) orientation of the limbs in space

5) the rotation of the limbs

**28–10. Hair receptor cells of the otolithic apparatus are located:**

1) in the maculae of the sac and uterus\*

2) in the organ of Corti

3) in the ampoules of semicircular canals

4) on the main membrane of cochlea

5) in the spiral ganglion

**28–11. Ampullae receptors of semicircular canals perform the following functions:**

1) perception of linear acceleration

2) perception of uniform rectilinear motion

3) perception of body rotation (angular acceleration)\*

4) perception of head position in space

5) perception of gravity force

**28–12. The otolith apparatus does not provide information about:**

1) head position in space

2) changing the head position in space

3) uniform rectilinear motion \*

4) uneven movement of the body (linear acceleration)

5) body movement in a vertical plane

**28–13. A sharp increase in the threshold of sounds perception in the range of 15,000 - 20,000 Hz was found in a patient by tone audiometry. The most likely diagnosis is violation of:**

1) whole cochlea

2) lower part of cochlea (closer to foramen ovale)\*

3) upper part of cochlea (closer to helicotreme)

4) one of the semicircular canals

5) vestibule

**28–14. If air sound conduction is impaired, but bone conduction is not, the lesion can be localized in:**

1) middle ear\*

2) cochlea

3) vestibule

4) auditory nerves

5) cortex of the temporal lobe

**29. PHYSIOLOGY OF THE HIGHER NERVOUS**

**ACTIVITIES**

**29–1. Conditioned reflex is:**

1) response to irritation, carried out with the mandatory participation of central nervous system

2) individual acquired reflex reaction of the body to a previously indifferent stimulus, providing adequate adaptation to the environment \*

3) innate reaction of the body to the stimulus, providing adequate adaptation to the environment

4) response to the presentation of a new stimulus

5) sequential chain of reflexes that occurs when there is a need and key environmental stimuli

**29–2. The following is not typical for a conditioned reflex, in contrast to the unconditioned one:**

1) hereditary nature, rigidity of reflex arc organization \*-

2) acquisition, individual character

3) flexibility, temporality of neural connections

4) closure of nerve connections mainly at the level of cortex

5) closure of temporary connections at the level of subcortical structures

**29–3. To develop a conditioned reflex, it is necessary for physiological strength (significance) of the conditioned stimulus to be:**

1) more than the power of unconditional reinforcement

2) less than the force of unconditional reinforcement\*

3) equal to the strength of unconditional reinforcement

4) everything is correct

5) there is no correct answer

**29–4. For the successful formation of a conditioned reflex, the activity of brain structures must be:**

1) minimal (sleep, anesthesia)

2) maximum (stress)

3) optimal\*

4) everything is wrong

5) uniformly the same

**29–5. Extraneous stimuli during the formation of a conditioned reflex:**

1) do not affect its production

2) slow down the production \*

3) accelerate the process of formation of a conditioned reflex

4) reinforce the unconditioned stimulus

5) there is no correct answer

**29–6. Natural conditioned reflexes react to:**

1) biologically adequate signals, natural signs of an irritant, for example, the smell of food \*

2) indifferent signals, for example, a call

3) appearance of a new stimulus

4) irritants of internal environment

5) damaging effects

**29–7. Conditioned reflexes are formed quicker being supported by the following signals:**

1) pain \*

2) food

3) sound

4) light

5) thermal

**29–8. The most important mechanism that ensures the formation of a conditioned reflex is:**

1) synaptic facilitation, long-term potentiation\*

2) depression of synaptic transmission

3) reciprocal inhibition

4) return braking

5) lateral inhibition

**29–9. Conditioned reflexes, in comparison with unconditioned ones, provide adaptation:**

1) in a wide range of environmental changes\*

2) in a relatively constant environment

3) in a narrow range of environmental changes

4) under extreme conditions

5) under the action of certain factors

**29–10. To study the cerebral cortex functions in a healthy person, all methods are applicable, except:**

1) destruction and removal method, stereotaxic method \*

2) method of conditioned reflexes

3) electroencephalography and evoked potentials

4) psychological testing

5) tomographic examination

**29–11. The neurophysiological basis for the formation of conditioned reflexes is all except:**

1) axon endings myelination, an increase in the number of spines \*

2) reverberation of irritation along the circuits of neurons

3) transmission facilitation in synapses

4) synchronization of neurons activity in different brain areas

5) changes in the number of receptors on postsynaptic membrane

**29–12. The morphophysiological prerequisites for the formation of conditioned reflexes are:**

1) irritation reverberation

2) exchange activation

3) axons myelination, an increase in the number of spines, an increase in the synaptic surface of neurons \*

4) synchronization of neuron activity

5) everything is wrong

**29–13. The stage of firmly developed differential inhibition during the formation of a conditioned reflex is based on the following processes:**

1) irradiation

2) irritation concentrations and lateral inhibition\*

3) extreme braking

4) reverse braking

5) depression of synaptic transmission

**29–14. When developing a conditioned reflex, as a rule, it is necessary:**

1) for the conditioned stimulus to precede the action of the unconditioned stimulus \*

2) for the conditioned stimulus to act after the unconditioned stimulus

3) order of action of the conditioned and unconditioned stimuli does not matter

4) for the physiological significance of the conditioned stimulus to be greater than that of the unconditioned

5) there is no correct answer

**29–15. The speed of dynamic stereotype alteration is the lowest in:**

1) sanguine

2) choleric

3) phlegmatic \*

4) melancholic

5) everything is wrong

**29–16. The choleric temperament is characterized by:**

1) balance, mobility and strength of nervous processes

2) imbalance, mobility, strength of nervous processes \*

3) weakness of nervous processes

4) strength of nervous processes, inertia and balance

5) force of the braking process

**29–17. The melancholic temperament is characterized by:**

1) balance, mobility, inertness of nervous processes

2) imbalance of nervous processes

3) weakness of nervous processes \*

4) strength, balance, mobility of nervous processes

5) force of the braking process

**29–18. The sanguine temperament is characterized by:**

1) balance, mobility, weakness of nervous processes

2) strength of nervous processes, inertia and balance

3) strength of nervous processes, mobility and balance \*

4) weakness of nervous processes

5) strength of braking processes

**29–19. Phlegmatic temperament is characterized by:**

1) great strength of nervous processes, mobility and balance

2) weakness of nervous processes

3) strength of nervous processes, inertia and balance \*

4) strength of nervous processes, mobility and imbalance

5) everything is wrong

**29–20. Physiological classification of particular types of higher nervous activity (HNA) characteristic of a person according to I.P. Pavlov, is based on defining:**

1) strength of nervous processes

2) ratios of 1 and 2 signal systems \*

3) mobility of nervous processes

4) balance of nervous processes

5) extraversion-introversion

**29–21. The mental type of HNA according to I.P. Pavlov is a man with:**

1) predominance of right hemisphere activity and I signaling system

2) predominance of II signaling system and left hemisphere \*

3) same activity of the first and second signal systems

4) high mobility of nervous processes

5) high balance of nervous processes

**29–22. Artistic type according to I.P. Pavlov is a man with:**

1) predominance of the activity of the right hemisphere and the I signaling system \*

2) predominance of the II signaling system and the left hemisphere

3) low mobility of nervous processes

4) same activity of the right and left hemispheres

5) high balance of nervous processes

**29–23. Development of the I signaling system in a child is:**

1) possible without human society \*

2) impossible without human society

3) impossible in human society

4) possible only with high activity of the left hemisphere

5) only possible in sanguine people

**29–24. Development of the II signaling system in a child is:**

1) possible without human society

2) impossible without human society \*

3) impossible in human society

4) does not require motor control over speech production

5) possible only in choleric people

**29–25. In case of emotional stress, noise immunity and workability are higher in:**

1) strong, mobile, balanced type of HNA in sanguine \*

2) strong, unbalanced, excitable choleric

3) strong, inert phlegmatic

4) weak type of melancholic

5) everything is wrong

**29–26. In the case of super-strong stimuli, out-of-limit inhibition will be firstly seen in:**

1) sanguine

2) phlegmatic

3) choleric

4) melancholic\*

5) everything is wrong

**30. PHYSIOLOGICAL BASIS OF**

**MENTAL FUNCTIONS**

**30–1. In current activity, moderately expressed emotions:**

1) mobilize activity\*

2) disorganize activities

3) do not affect the course of physiological processes

4) there is no correct answer

5) distract from current activities

**30–2. Reactions that reflect a pronounced subjective attitude to stimuli are called:**

1) views

2) judgments

3) consciousness

4) emotions\*

5) impressions

**30–3. Negative emotions in a person occur when:**

1) there are enough funds and time to achieve the goal, but there is no motivation

2) parameters of the programmed and the received results of the action match

3) attitude to the action of the stimulus is indifferent

4) there is motivation, but there is not enough information, time and effort to achieve the goal \*

5) everything is wrong

**30–4. All brain structures play an important role in triggering emotions, except:**

1) spinal cord - its motor neurons and autonomic centers \*

2) hypothalamus

3) limbic system

4) frontal cortex

5) tonsils

**30–5. Electroencephalogram of a person has registered delta rhythm in all the leads. This is typical for:**

1) convulsive syndrome

2) deep sleep \*

3) physical activity during EEG registration

4) solving a mental problem during registration

5) everything is wrong

**30–6. The share of REM phase in an adult for the entire night is usually on average:**

1) 20%, it plays an important role in the transition of short-term and intermediate memory to long-term \*

2) 50%, it does not participate in the formation of long-term memory

3) 80%, and there are no dreams

4) 70%, and there are dreams

5) everything is wrong

**30–7. The maximum duration of REM phase is observed:**

1) in the elderly

2) in persons of mature age

3) in children of the first year of life \*

4) in adolescents

5) centenarians

**30–8. When transected at the level between the midbrain and interbrain or when the reticular formation of the midbrain is damaged in the sleep-wake cycle:**

1) duration of sleep will be drastically reduced

2) there will be no significant changes

3) duration of wakefulness will be sharply reduced \*

4) duration of sleep and wakefulness will become the same

5) everything is wrong

**30–9. In the activity of the organism, dreams are carried out (all are true, except):**

1) for the protection of the individual from emotional conflicts

2) mainly in the of REM phase

3) to reflect the activity of the unconscious sphere

4) predominantly in the non-REM phase, and are not associated with events during wakefulness \*

5) there is no correct answer

**30–10. The most important role in the transition of short-term memory to long-term memory (memory consolidation) is played by:**

1) basal nuclei

2) quadrigemina

3) complex hippocampus - amygdala \*

4) black substance

5) orbitofrontal cortex

**30–11. The main processes that ensure the formation of short-term and long-term memory occur in:**

1) neuron soma

2) axon

3) synapses \*

4) receptors

5) in the nerve terminal

**30–12. Long-term memory is stored in the brain mainly:**

1) in limited areas of the cerebral cortex

2) in most of the neurons of the cerebral cortex \*

3) in the quadruples

4) in the basal nuclei

5) in the hippocampus

**30–13. In case of protein biosynthesis violations (aging, cytostatics, alcoholism), the greatest problems are observed:**

1) in the formation of short-term memory

2) in the process of consolidation (transition of short-term memory into long-term) \*

3) when using information previously available in long-term memory

4) in the process of iconic memory formation

5) in the process of forgetting

**30–14. Perception is a form of reflection:**

1) of individual properties of the subject

2) of the subject as a whole \*

3) of different items at the same time

4) of the relationship of individual properties of different objects

5) by inference

**30–15. Concrete sensory reflection manifests itself in all forms except:**

1) sensations

2) concepts, judgments, conclusions \*

3) perceptions

4) submissions

5) short term memory

**30–16. The physiological basis of concrete sensory reflection is predominantly of the following activity:**

1) first signaling system and the right hemisphere \*

2) second signaling system and the left hemisphere

3) somatosensory cortex of the right hemisphere

4) orbito-frontal cortex of the left hemisphere

5) hippocampus

**30–17. All physiological mechanisms are involved in maintaining consciousness, except:**

1) activation of the cortex through the reticular formation

2) direct effect of activation of motor neurons of skeletal muscles \*

3) functional connection of sensory and motor speech areas of the cortex

4) activity of the dominant (speech) hemisphere

5) there is no correct answer

**30–18. The physical basis of the phonation mechanism is:**

1) vibrations of the vocal cords of the larynx \*

2) resonance of the cavities of the vocal tract, especially the oral cavity and pharynx

3) vibrations of the soft palate

4) resonance of the sinus cavities

5) everything is wrong

**30–19. The cortical center for oral speech perception (Wernicke’s center) is located in:**

1) occipital cortex (field 39)

2) superior temporal gyrus (field 22)\*

3) inferior frontal gyrus (field 44)

4) precentral gyrus (field 4)

5) postcentral gyrus (fields 1 - 3)

**30–20. The motor speech center (Broca’s center) is located in:**

1) lower frontal gyrus of the left hemisphere (field 44) ​​\*

2) superior temporal gyrus (field 22)

3) angular gyrus of the occipital cortex (field 39)

4) precentral gyrus (field 4)

5) postcentral gyrus (fields 1 - 3)

**30–21. The left hemisphere during speech perception analyzes mainly:**

1) age and gender differences in voices

2) meaning of words and phrases \*

3) strength and tonal coloring of speech

4) heights of perceived sounds

5) duration of speech signals

**30–22. The right hemisphere, during speech perception, analyzes mainly:**

1) intonations, age and gender differences in voices\*

2) meaning of words and phrases

3) heights of perceived sounds

4) infrasonic components of perceived sounds

5) duration of speech signals

**30–23. Consciousness is a form of reality reflection with the help of:**

1) dreams

2) speech, in which communication and transmission of information is possible \*

3) I signaling system

4) expression of emotions

5) changes in muscle tone and posture

**31. PHYSIOLOGICAL BASIS OF BEHAVIOR**

**31–1. Biological needs do not include:**

1) feeding

2) need for sleep and rest

3) defensive

4) having a profession \*

5) sexual

**31–2 Social needs do not include:**

1) having a house

2) having education

3) researching (cognition) \*

4) holding a certain position

5) feeding

**31–3. Ideal needs do not include:**

1) game

2) knowledge

3) creativity

4) having a profession, holding a certain position \*

5) sexual

**31–4. The subjective state, which is formed on the basis of the needs of the body, is:**

1) motivation and emotion \*

2) orienting reflex

3) memory

4) dominant

5) conditioned reflex

**31–5. The decisive role in the launch of motivations and emotions in a healthy person under physiological conditions, belongs to all brain structures, except for:**

1) frontal cortex

2) spinal cord \*

3) hypothalamus

4) hippocampus

5) cingulate gyrus

**31–6. Motivational states are characterized by:**

1) targeted search activity based on genetic and individual experience \*

2) lack of emotional experiences and search activity

3) presence of inhibitory phase of parabiosis

4) lack of needs

5) there is no correct answer

**31–7. The role of memory in a functional system, afferent synthesis stage, is:**

1) consolidation of positive experience

2) stimulation of the starting stimulus

3) getting information related to the satisfaction of dominant motivation \*

4) in the activation of situational afferentation

5) in inhibition of the dominant motivation

**31–8. Afferent synthesis stage of a functional system includes everything except:**

1) memory

2) implementation of fferent program of action \*

3) situational afferentation

4) dominant motivation

5) starting afferentation

**31–9. The process involved in functional system, afferent synthesis stage answering the question “What to do?” - is:**

1) situational afferentation

2) starting afferentation

3) memory

4) dominant motivation \*

5) everything is wrong

**31–10. In functional system, afferent synthesis stage, the following respond to “How to do it?”:**

1) dominant motivation

2) memory \*

3) situational afferentation

4) starting afferentation

5) everything is wrong

**31–11. In functional system, afferent synthesis stage, the following respond to “Can I do it?”:**

1) dominant motivation

2) memory

3) situational afferentation \*

4) starting afferentation

5) everything is wrong

**31–12. In functional system, afferent synthesis stage, the following respond to “When to do it?”:**

1) dominant motivation

2) memory

3) situational afferentation

4) starting afferentation \*

5) everything is wrong

**31–13. In a functional system, reverse afferentation performs:**

1) phased correction of the behavioral act

2) alteration of acceptor of the result of the action and the program of action

3) termination of behavioral act when a useful result is achieved

4) everything is right\*

5) triggering emotional reactions

