Assessment tools for conducting attestation
in discipline « Normal Physiology »
for students of 2025 year of admission
under the educational programme
specialist degree in the specialty 31.05.01 General Medicine
specialisation (profile) General Medicine
form of study full-time
for the 2025-2026 academic year

1. 1. Assessment tools for conducting current attestation in discipline in seminar-type classes

The current attestation in seminar-type classes includes the following types of tasks: ... testing, solving theoretical and practical situational tasks, reports on the topic, and interviews on the control questions of the lesson.

1.1.1. Examples of test tasks

Checking indicators of competence achievement: GPC-5.1.1, GPC-10.1.1, GPC-10.1.2.

1. An irritant of any strength does not cause excitation during the phase of...
a) absolute refractoriness
b) relative refractoriness
c) supranormal excitability
d) subnormal excitability

2. Incomplit tetanus can be obtained by...
a) applying stimuli during the latent period of contraction
b) applying stimuli during the contraction phase
c) applying stimuli during the relaxation phase
d) applying stimuli after the end of a complete cycle of a single contraction

3. The somas of sensory neurons are located:
a) in the spinal ganglia
b) in the cranial ganglia
c) in the spinal cord
d) in the internal organs

4. The endocrine glands do not include...
a) the thyroid and parathyroid glands
b) the pituitary gland and the pineal gland
c) the adrenal glands and the pancreas
d) the Brunner's glands and the Lieberkuhn's glands

5. The following rules for the formation of conditioned reflexes are distinguished:
a) they are developed on the basis of unconditioned reflexes
b) the preceding (for several seconds) of the conditioned stimulus
c) the repetition of a combination of conditional and unconditional stimuli
d) the conditioned stimulus must be stronger than the unconditional

6. When the ciliary muscles contract...
a) the lens becomes more convex
b) the lens becomes less convex
c) the curvature of the lens does not change

7.The respiratory center is located in the...
a) spinal cord
b) medulla oblongata at the bottom of the IV ventricle
c) cerebral cortex
d) lungs

9.The secretion of hydrochloric acid in the intestinal phase of gastric juice secretion is stimulated by...
a) enterogastrin
b) enterogastron
c) histamine
d) secretin

1. The oncotic pressure of blood is normally equal to...
a) 60 mmHg
b) 25-30 mmHg
c) 7.6 atm.
d) 25-30 atm

2. Pulmonary veins flow blood...
a) venous to the left atrium
b) arterial to the lungs
c) arterial to the left atrium
d) venous to the right atrium

1.1.2. Examples of situational tasks
Checking indicators of competence achievement: GPC -5.2.1, GPC -5.3.1, GPC -10.2.2.

Task 1. Evaluate the blood test: red blood cells 4.2 x 10^{12} /L; white blood cells 8.1 x 10^{9} /L; hemoglobin 145 g/L; ESR 8 mm/h

Task 2. Calculate and evaluate the heart rate of an adult based on the ECG, assuming that the average distance between two adjacent R-waves is 18 mm at a tape speed of 25 mm/s.

Task 3. Describe how to conduct a study of maximum muscle force and strength endurance of the hand muscles (dynamometry) and evaluate the results of your fellow students.

Task 4. Long-term fasting causes people to develop so-called hunger edema. What is the reason for this?

Task 5. Can the functioning of blood buffer systems be considered a manifestation of physiological regulation?

Task 6. The patient has a slow atrioventricular conduction. How was this determined?

1.1.3. Examples of practical skills assessment tasks

Checking indicators of competence achievement: GPC -5.2.1, GPC -5.3.1, GPC -10.2.2.

Task 1. A pregnant woman received a blood transfusion for the first time in her life. The blood was of the same group. However, she experienced hemotransfusion shock. What was the doctor's mistake?

Task 2. Why does the presence of an atherosclerotic process in the vessels increase the likelihood of a blood clot forming inside the vessel?

Task 3 Describe the features of determining hemoglobin in blood using the hemoglobin cyanide method.

Task 4. Describe how blood type is determined using synthetic coliclones.

Task 5. Describe how blood Rh-factor is practically determined using synthetic coliclones.

Task 6. Explain the diagnostic significance of studying the most important spinal reflexes (knee, Achilles, and elbow reflexes).

Task 7. Explain the sequence of analyzing the recorded electrocardiogram and assess the patient's current condition.

1.1.4. Examples of report topics

Checking indicators of competence achievement: GPC -5.1.1, GPC -10.1.1, GPC -10.1.2.

1) Physiological characteristics of the body's systemic activity. The theory of functional systems, its main principles, and key mechanisms.

2) A systematic approach to studying human purposeful behavior in various life situations.

3) Reflexes and the systemic organization of behavior. Systemogenesis of behavioral acts.

4) Manifestations of human brain activity. Behavior and the psyche.

5) Analytical and synthetic activity of the cerebral cortex. I.P. Pavlov's theory of dynamic stereotypes.

1.1.5. Examples of questions for an interview

Checking indicators of competence achievement: GPC -5.1.1, GPC -10.1.1, GPC -10.1.2.

1) Principles of the functional respiratory system organization.

2) Breathing, its main stages.

3) The mechanism of external respiration. Biomechanics of inhalation and exhalation.

4) Pressure in the pleural cavity and its origin and role in the mechanism of external respiration. Changes in the pressure in the pleural cavity in different phases of the respiratory cycle.

5) VLC and its components. Methods of their determination. Residual volume.

1.1. Assessment tools for students' independent work

Assessment of independent work includes testing and solving situational tasks

1.1.1. Examples of test questions with different answers

Checking indicators of competence achievement: GPC -5.1.1, GPC -5.2.1, GPC -10.1.1.

Sleep Physiology Test Questions (Example)

Часть А (Выбор одного правильного ответа)

1. Какой гормон преимущественно секретируется гипофизом в фазу быстрого сна?

A) Тиреотропин

B) Окситоцин

C) Мелатонин

D) Вазопрессин

Правильный ответ: C) Мелатонин

2. What is the main indicator of the depth of slow-wave sleep?

A) Respiratory rate

B) Electroencephalogram (EEG)

C) Blood pressure

D) Heart rate

Correct answer: B) Electroencephalogram (EEG)

3. What is the average duration of one slow-wave sleep phase in a healthy adult?

A) About 5 minutes

B) Between 70 and 120 minutes

C) About 3 hours

D) Up to 1 hour

Correct answer: B) Between 70 and 120 minutes

4. During which stage of sleep do dreams most often occur?

A) Slow-wave sleep stages I-II

B) Rapid-eye-movement sleep (REM-phase)

C) Transition between wakefulness and sleep

D) Deep slow-wave sleep stages III-IV

Correct answer: B) Rapid-eye-movement sleep (REM-phase)

5. Which brain structures are responsible for regulating the transition between sleep and wakefulness?

A) Hypothalamus and thalamus

B) Amygdala and cerebral cortex

C) Brain stem and reticular formation

D) Cerebellum and basal ganglia

Correct answer: C) Brain stem and reticular formation

6. How many sleep-wake cycles does a healthy adult go through per night?

A) One cycle

B) Two to three cycles

C) Four to five cycles

D) Six to seven cycles

Correct answer: C) Four to five cycles

7. What is the characteristic of REM sleep?

A) Increased muscle tone

B) Activity of the autonomic nervous system

C) Decreased heart rate

D) A drop in body temperature

Right answer: B) Activity of the autonomic nervous system

8. What condition occurs due to the lack of REM sleep?

A) Chronic fatigue

B) Memory and attention disorders

C) Development of insomnia

D) Emotional lability and irritability

Correct answer: D) Emotional lability and irritability

9. What ensures the process of switching between different stages of sleep?

A) Relaxation of skeletal muscles

B) Hormonal regulation of the thyroid gland

C) Activity of the reticular activating system of the brain stem

D) Blood glucose level

Correct answer: C) Activity of the reticular activating system of the brain stem

10. What are the consequences of chronic disruption of the normal sleep-wake cycle?

A) Improved cognitive functions

B) Increased physical endurance

C) Immunodeficiencies and cardiovascular diseases

D) Resistance to stressful situations

Correct answer: C) Immunodeficiencies and cardiovascular diseases

Part B (Select all correct statements)

11. Select the correct statements regarding sleep:

A) Sleep is divided into two main phases: rapid and slow

B) Rapid sleep is accompanied by a decrease in the activity of the autonomic nervous system

C) Deep slow sleep is important for the body's recovery

D) During the night, the ratio of sleep phase duration remains constant

15. What are the consequences of sleep deprivation?

A) Decreased concentration

B) Impaired short-term memory

C) Slowed reaction time

D) Decreased immunity

Correct answers: A), B), C), D

Part B (Complete the sentence with one word)

16. The stage of deep sleep is called _____.

Correct answer: delta sleep

17. Periodic awakening during the night and difficulty falling asleep are characteristic of _____.

Correct answer: insomnia

18. The main regulator of daily biorhythms is located in the hypothalamus and is called the _____.

Correct answer: suprachiasmatic nucleus

19. The predominance of rapid-eye-movement sleep is characteristic of the early morning period and is called the _____.

Correct answer: paradoxical sleep

20. Lack of proper sleep leads to impaired synthesis of growth hormone, also known as _____.

Correct answer: somatotropin

Part G (Solve the clinical situation)

21. The patient complains of feeling exhausted in the morning, frequent waking up in the middle of the night, and decreased productivity during the day. The most likely sleep disorder in the patient:

A) Insomnia

B) Sleep apnea syndrome

C) Narcolepsy

D) Sleep paralysis

Correct answer: A) Insomnia

22. A 45-year-old man complains of headaches, daytime drowsiness, and episodes of sleep apnea. The doctor suspects the disease:

A) Sleep apnea

B) Nightmares

C) Bruxism

D) Restless legs syndrome

The correct answer: A) Sleep apnea

23. A woman came to the doctor with the problem of sudden onset of sleep during the daytime, accompanied by falling consciousness. Most likely, the doctor will diagnose:

A) Epilepsy

B) Parasomnia

C) Narcolepsy

D) Catalepsy

Correct answer: C) Narcolepsy

24. A young man reported that he often has vivid nightmares before waking up in the morning. This condition is associated with a disruption in the stage of:

A) Light sleep

B) Deep sleep

C) Rapid-eye-movement sleep

1.1.1. Examples of situational tasks

Checking indicators of competence achievement: GPC -5.1.1, GPC -5.2.1, GPC -10.1.1.

Task №1

Condition: The patient complains of constant daytime drowsiness, despite getting enough hours of sleep at night. He is often plagued by nightmares, and feels tired immediately after waking up in the morning. What sleep disorder is most likely?

Solution: The described symptoms indicate the presence of hypersomnia, in which the patient experiences excessive daytime drowsiness even with sufficient nighttime sleep. The cause of this condition may be narcolepsy, sleep apnea syndrome, idiopathic hypersomnia, or circadian rhythm disorder. Nightmare dreams and fatigue after waking up are also common in disorders of the rapid eye movement (REM) phase of sleep, especially in the presence of restless leg syndrome or periodic limb movement during sleep.

Answer: A disorder of the hypersomnia type, possibly associated with a disorder of the REM phase of sleep.

Task №2

Condition: The patient has frequent waking up in the middle of the night, accompanied by anxiety and increased heart rate. At night, there are vivid images of dreams full of fear and anxiety. During the day, there is a feeling of exhaustion and irritability. What changes in the structure of sleep could explain such a clinical picture?

Solution: The symptoms indicate a sleep quality disorder, mainly associated with an increase in the duration of slow-wave sleep (NREM), especially N3 - deep sleep, accompanied by vivid emotionally colored dreams. Frequent awakenings disrupt the sleep cycle, leading to decreased overall rest efficiency and daytime fatigue. This may indicate the presence of parasomnia, a condition characterized by disruptions in the brain's excitation processes that occur between wakefulness and various stages of sleep.

Answer: Parasomnia with a predominance of deep sleep phases and disruptions in the transition between phases.

Task №3

Condition: A young man regularly goes to bed late at night, but only falls asleep after a long time, often closer to morning. In the morning, he feels rested, but has to get up early for work, experiencing a chronic lack of sleep. What is the reason for this behavior, and how does it affect his health?

Solution: This is a classic case of circadian rhythm disorder ("delayed sleep phase syndrome"). The patient's body has become accustomed to falling asleep later than usual, and his internal clock is out of sync with the conventional sleep schedule. The constant discrepancy between the desired sleep pattern and the actual need to wake up early causes a constant lack of sleep, leading to chronic fatigue, reduced concentration, and an increased risk of cardiovascular diseases.

Answer: Delayed sleep phase syndrome caused by a disruption in biorhythms.

Task №4

Condition: A middle-aged woman notices that it is difficult for her to fall asleep, as her thoughts constantly distract her. She tosses and turns for a long time before going to sleep, periodically checking her alarm clock for fear of oversleeping important tasks. What exactly is preventing her from falling asleep normally, and what is the role of cortisol in this process?

Solution: Stressful situations activate the sympathetic nervous system, increasing the level of the stress hormone cortisol. High levels of cortisol block the production of melatonin, the primary regulator of the sleep-wake cycle. Prolonged anxiety and worry lead to the development of chronic sleep disorders, such as insomnia. These patients experience difficulties in initiating sleep, often have problems maintaining continuous sleep, and suffer from insomnia and general daytime fatigue.

Answer: Insomnia is caused by elevated levels of cortisol and the activation of the sympathetic nervous system.

Task №5

Condition: A middle-aged man suffers from snoring, and he sometimes stops breathing during sleep. After waking up, he experiences headaches, dry mouth, and intense thirst. Sometimes, he feels sudden weakness and dizziness during the day. What is the underlying condition causing these symptoms?

Solution: These symptoms are typical of obstructive sleep apnea (OSA). During sleep, the muscles in the throat relax, leading to a narrowing of the airways, which results in loud snoring and occasional breathing pauses. Insufficient oxygen supply leads to tissue hypoxia, increased blood pressure, headaches, and other symptoms. The presence of a dry mouth is associated with mouth breathing during sleep, which exacerbates dehydration.

Answer: Obstructive sleep apnea.

1. Assessment tools for intermediate certification in the discipline

Intermediate certification is conducted in the form of an exam.

Intermediate certification - interview on exam questions

List of interview questions

№	Exam Questions	Checking indicators of competence achievement
1.	The concept of homeostasis and homeokinesis. Self-regulatory principles for maintaining the internal environment of the body.	GPC -5.1.1, GPC-5.2.1, GPC-5.3.1
2.	The main forms of regulation of physiological functions. The relationship between nervous and humoral mechanisms of regulation.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
3.	General and specific properties of excitable tissues. Stimuli and their classification. Measure of excitability.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
4.	Biological membranes, their structure and functional features. Ion channels, their classification and role. Types of transport of substances through biological membranes.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
5.	Resting membrane potential. Modern ideas about its origin mechanism. Method of its registration.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
6.	The action potential and its phases. Modern consept of the generation mechanism.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
7.	Types of electrical responses of excitable tissues (electrotone potential, local response, action potential). The mechanism of their occurrence.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
8.	Excitability. Changes in excitability during excitation.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
9.	The law of the forse. The "all or none" law, its relative nature	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
10.	The strength-duration law. The relativity of the law. The concept of utilization time, reobase, chronaxy. Chronaxia as a measure of excitability. Chronaximetry	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
11.	The polar law of irritation. Features of electrotonic and local potentials. Cathodic depression	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
12.	The gradient law. Accommodation. The speed of accommodation, its measure	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
13.	Ultramicroscopic structure of myofibrils at rest and during contraction. Contractile and regulatory proteins. Modern	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1

	consept of the mechanism of muscle contraction and relaxation.	
14.	Summation of muscle contraction, types of summation. Tetanus, its types.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
15.	Modes of skeletal muscle contractions (isotonic, isometric, auxotonic. Muscle strength and work. The rule of average loads.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
16.	Morphofunctional features of smooth muscles.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
17.	Myoneural synapse, structure. Mechanism of excitation transmission in it. Motor end plate potential.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
18.	Classification of nerve fibers. Propagation of excitation along unmyelinated and myelinated nerve fibers. Characteristics of their excitability and lability. Laws of nerve conduction.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
19.	Principles of CNS coordination (convergence, common final pathway, divergence, irradiation, reciprocity, and dominance).	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
20.	The neuron as a structural and functional unit of the central nervous system. Physiological properties of the neuron. Structure and classification of neurons.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
21.	The doctrine of reflexes (R. Descartes, G. Prochazka), its development in the works of I.M. Sechenov, I.P. Pavlov, and P.K. Anokhin. Classification of reflexes. Reflex pathway, feedback, and its significance. Reflex time. Reflex receptive field.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
22.	P.K. Anokhin's teachings on functional systems and self-regulation of physiological functions. Key mechanisms of the functional system. Regional component. P.K. Anokhin's contribution to the development of Russian physiological science.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
23.	Structure, classification, and functional properties of synapses. Morpho-functional features of electrical and chemical synapses.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
24.	Excitatory synapses, their neurotransmitters, and their receptors. Features of excitation transmission. Mechanisms of development of excitatory postsynaptic potential (EPSP). Properties of synapses.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
25.	Inhibitory synapses and their neurotransmitters. Mechanism of development of inhibitory postsynaptic potential (IPSP). Interaction of inhibitory and excitatory synapses.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
26.	The nerve center. The anatomical and physiological concept of the nerve center. Properties of nerve centers.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
27.	Inhibition in the central nervous system. The role of I.M. Sechenov in its discovery. Types of inhibition.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
28.	Primary inhibition. Its types. The mechanism of occurrence.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
29.	Secondary inhibition. Its types. The mechanism of occurrence.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
30.	Structural and functional features of the somatic and autonomic nervous systems.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
31.	The autonomic nervous system. Structural and functional	GPC-5.1.1, GPC-5.2.1,

	features. Synapses, neurotransmitters, and receptors of the ANS.	GPC-5.3.1
32.	The sympathetic, parasympathetic, and metasympathetic divisions of the ANS, and their morpho-functional characteristics.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
33.	Autonomic reflexes. Features of the reflex arc, classification, and clinical significance. Examples of autonomic segmental and suprasegmental reflexes	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
34.	Levels of regulation of autonomic functions. The hypothalamus as the highest subcortical center of regulation of autonomic functions.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
35.	A conditioned reflex as a form of human adaptation to changing conditions of existence. Differences between conditioned and unconditioned reflexes. Patterns of formation and manifestation of conditioned reflexes.	GPC-5.1.1, GPC-5.2.1, GPC-5.3.1
36.	The structural and functional basis of the conditioned reflex. Modern ideas about the mechanisms of temporary connections formation.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
37.	Inhibition of conditioned reflexes and its types. Modern ideas about the mechanisms of inhibition.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
38.	Features of human higher nervous activity. I.P. Pavlov's theory of types of higher nervous activity and the first and second signal systems.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
39.	Emotions, their genesis, classification, and significance in human purposeful activity. Emotional stress and its role in the formation of psychosomatic diseases.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
40.	Sleep, its electrophysiological characteristics, and its significance for the body. Sleep phases. Sleep theories.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
41.	Bioenergetics of the body. Methods for determining energy metabolism. Basal metabolic rate and factors affecting its value. Clinical significance of basal metabolic rate.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
42.	Energy exchange during physical and mental work. Distribution of the population by groups depending on the nature of work. The specific dynamic effect of food	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1;

		GPC-10.1.1; GPC-10.2.1
43.	Human body temperature. Skin and internal organ temperatures. Heat production and heat loss and their mechanisms. Isothermia and its regulation.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
44.	Digestion in the oral cavity. Composition and physiological role of saliva. Regulation of the secretory activity of the salivary glands. Adaptive nature of salivation.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
45.	Digestion in the stomach. Composition and properties of gastric juice. Regulation of gastric secretion. Phases of gastric juice secretion. Adaptive nature of gastric secretory activity.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
46.	Digestion in the duodenum. Composition and properties of pancreatic secretion. Regulation of pancreatic secretion.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
47.	The role of the liver in digestion. Composition and properties of bile. Regulation of bile formation and secretion into the duodenum.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
48.	Cavitary and parietal digestion. Absorption of nutrients. Motor activity of the small intestine and its regulation.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
49.	Functional features of neurohumoral regulation of digestion. Gastrointestinal hormones.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
50.	Blood, its functions, quantity, and composition. Hematocrit. Blood plasma and its physical and chemical properties. Blood osmotic pressure and its functional role. Regulation of blood osmotic pressure homeostasis.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
51.	Plasma proteins and their physiological significance. Blood	GPC-5.1.1;

	oncotic pressure and its role. Red blood cell sedimentation rate and the factors that affect it. Clinical significance of the ESR.	GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
52.	Red blood cells, structure, quantity, and functions. Hemoglobin, quantity, types, compounds, and their physiological significance.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
53.	Leukocytes, structure, quantity, types, and functions. Leukocyte formula and its clinical significance.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
54.	The concept of hemostasis. Vascular-Platelet hemostasis. Platelets and their role in hemostasis. The concept of the coagulation and anticoagulation systems of the blood.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
55.	The concept of hemostasis. Coagulation hemostasis. Factors and phases of blood clotting.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
56.	Blood types. System AB0. Determination of a person's blood type. Blood transfusion rules.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
57.	Rh factor. Blood Rh factor registration at the clinic. Rh conflict between the mother and the fetus.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
58.	Breathing, its main stages. Mechanisms of external respiration. Biomechanics of inhalation and exhalation. Respiratory muscles. The role of the pleural cavity in the act of breathing.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
59.	Modern concepts of the structure and localization of the respiratory center. Automatism of the respiratory center.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1

60.	Gas exchange in the lungs. Partial pressure and tension of gases. Physiological basis of gas exchange in the lungs. Basic patterns of gas transfer through the membrane..	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
61.	Transport of O2 by blood. Oxyhemoglobin dissociation curve of, its characteristics. Oxygen capacity of blood. Transport of CO2 by blood	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
62.	Reflex-humoral mechanisms of respiratory regulation. Mechanism of the first breath of a newborn.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
63.	Gas exchange between blood and tissues. Causes of tissue hypoxia. Breathing under conditions of low and high barometric pressure	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
64.	Fundamentals of hemodynamics. Factors that ensure the forward movement of blood.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
65.	Basic properties of the heart muscle. Heart automatism. Anatomical substrate and nature of automatism. The conduction system of the heart. Gradient of automatism. The leading role of the sinoatrial node in automatism.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
66.	Changes in cardiac muscle excitability during excitation (the ratio of excitability, excitation, and muscle contraction phases). Features of the refractory period. Extrasystole.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
67.	Features of cardiac muscle excitation. Action potential of typical cardiomyocytes and cells of the cardiac conduction system.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
68.	The cardiac cycle and its phases. Blood pressure in the heart cavities during different phases of the cardiac cycle. The work of the heart valves.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1;

		GPC-10.1.1; GPC-10.2.1
69.	Classification of mechanisms of circulation regulation. Intracardial regulation of heart activity. Intracellular, intercellular and intracardial nervous regulation. Endocrine function of the heart. Physiological effects of atriopeptida	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
70.	Extracardiac neurohumoral regulation of cardiac activity. Innervation of the heart. Influence of sympathetic and parasympathetic nerves on cardiac activity. Influence of hormones, mediators, and electrolytes on the heart	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
71.	Morpho-functional classification of vessels. Vascular tone and its components. Vascular innervation. Mechanisms of vasoconstriction and vasodilation. Humoral regulation of vascular tone.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
72.	Basic hemodynamic indicators of blood flow in vessels (volume and linear blood flow rates). Blood pressure in various parts of the vascular system. Arterial pressure and factors that determine its value. Basic indicators of arterial pressure.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
73.	Vascular motor center. Reflex regulation of systemic blood pressure. The importance of vascular reflexogenic zones. Vascular reflexes (intrinsic and coupled).	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
74.	Microcirculation, its components, and characteristics. Classification of capillaries. Mechanisms of transcapillary exchange. Capillary blood flow, its functional characteristics, and parameters.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
75.	Arterial pulse: origin, characteristics, and methods of registration.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
76.	I.P. Pavlov's theory of analyzers. Structure and functions of analyzers. Mechanism of excitation in receptors. Receptor and generator potentials.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
77.	Physiology of the visual analyzer. The receptor apparatus.	GPC-5.1.1;

	Photochemical processes in the retina under the influence of light. Theories of color vision (M. Lomonosov, G. Helmholtz, P. Lazarev).	GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
78.	Physiology of the pain analyzer. Antinociceptive system.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
79.	Physiology of the auditory analyzer. The sound-receiving and sound-conducting apparatus of the organ of hearing. Electrophysiological characteristics of the receptor section. Theories of sound perception (H. Helmholtz, G. Bekesy).	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
80.	Physiology of the vestibular analyzer. Static and statokinetic reflexes.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
81.	Organs and excretion processes Kidney functions. Nephron as a structural and functional unit of the kidney. Mechanisms of urine formation. Glomerular ultrafiltration. Tubular reabsorption. Tubular secretion. Regulation of urine formation.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
82.	Organs and excretion processes Kidney functions. Nephron as a structural and functional unit of the kidney. Mechanisms of urine formation. Glomerular ultrafiltration. Tubular reabsorption. Tubular secretion. Regulation of urine formation	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
83.	Reobase, chronaxia, and their significance in clinical practice. Chronaximetry.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
84.	Receptors: concepts, classification, basic properties, and excitation features.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
85.	Fatigue. Fatigue of an isolated muscle, a neuromuscular preparation, and a neuro-motor unit in a whole-body context. Theories of fatigue.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1

86.	Features of mental work. Overwork. Prevention of fatigue. Active and passive rest.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
87.	Human skin and tendon reflexes and their clinical significance.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
88.	Sensory and motor impairments caused by complete or partial spinal cord transection (spinal shock, Brown-Séquard syndrome).	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
89.	Electroencephalography. EEG rhythms and their characteristics.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
90.	Sleep, its physiological significance. Sleep phases, sleep theories. Characteristics of human electroencephalograms during natural sleep and wakefulness.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
91.	Protein metabolism. Protein minimum and optimum. Nitrogen balance and its types. Protein starvation.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
92.	Physiological norms of nutrients in the daily diet. Dietary regimens. Modern approaches to rational nutrition.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
93.	Physiological basis of hunger and satiety.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
94.	Analysis of typical gastric secretion curves for bread, meat, and milk. Adaptive nature of gastric secretion to different types of food.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1;

		GPC-10.1.1; GPC-10.2.1
95.	Methods of studying the secretory and motor functions of the human stomach. Appetizing juice and its significance.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
96.	Carbohydrate metabolism. Normo-, hypo-, and hyperglycemia. Mechanism of maintaining constant blood glucose levels.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
97.	The endocrine function of the pancreas and its role in regulating metabolism.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
98.	The endocrine role of the thyroid gland and its role in metabolism.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
99.	Endocrine function of the adrenal glands and sex glands. Human reproductive system.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
100.	The hypothalamic-pituitary system and its role in regulating body functions.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
101.	Regulation of blood calcium levels. The role of thyroid and parathyroid hormones.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
102.	Minute volume of respiration, its definition. "Dead space" and alveolar ventilation, its effectiveness depending on the frequency and depth of breathing. Restrictive and obstructive types of ventilation disorders.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
103.	Pressure in the pleural cavity, its changes during different	GPC-5.1.1;

	phases of the respiratory cycle, and its role in the mechanism of external respiration. Pneumothora.	GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
104.	Partial pressure of O2 and CO2 gases in the alveolar air and their tension in the blood. Gas exchange in the lungs.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
105.	Physiological basis of artificial respiration. Effect of a mixture of 96% O2 and 4% CO2. External respiration response to hypoxia.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
106.	Physiological mechanisms of diving and decompression sickness. Breathing during muscular work. Artificial respiration.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
107.	Breathing in altered environmental conditions. Mountain (altitude) sickness, diving and decompression sickness, and their physiological mechanisms. Predisposing factors. Measures to eliminate the consequences.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
108.	Functions of the respiratory tract. Protective respiratory reflexes. The role of irritant and juxtacapillary receptors in the regulation of breathing. Pathological types of breathing.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
109.	Blood acid-base balance and the mechanisms that ensure its constancy.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
110.	The rate of erythrocyte sedimentation, and the factors that affect it. The clinical significance of ESR (interpretation of ESR values).	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
111.	Blood substitutes. Classification and indications for use.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1

112.	Physiological basis of immunity. T- and B-lymphocytes.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
113.	Nervous and humoral regulation of hematopoiesis. The concept of hematopoietins.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
114.	Changes in cardiac muscle excitability during different phases of the cardiac cycle. Extrasystole.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
115.	Biophysical basis of electrocardiography. Basic ECG leads. Clinical significance.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
116.	Heart sounds and their origin. Components of the first and second heart sounds. Phonocardiography.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
117.	Physiological mechanisms of regulation of the transplanted heart activity. Arterial pulse, its main indicators. Sphygmogram.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
118.	Physiological basis of hypertension. Features of pulmonary circulation.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
119.	Features of coronary circulation. Features of cerebral circulation.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
120.	Features of renal blood flow. The role of blood hydrostatic pressure in ultrafiltration.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1;

		GPC-10.1.1; GPC-10.2.1
121.	The renin-angiotensin-aldosterone system and its role in regulating blood pressure.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1
122.	The biological significance of pain. Types of pain. Modern concepts of pain perception. Physiological foundations of pain relief and anesthesia.	GPC-5.1.1; GPC-5.2.1; GPC-5.3.1; GPC-10.1.1; GPC-10.2.1

1.2.4. Example of the exam card

Federal State Budgetary Educational Institution of Higher Education "Volgograd State Medical University" of the Ministry of Health of the Russian Federation

Department: Normal physiology
Discipline: «Normal Physiology»
Specialist degree in the specialty 31.05.01 General Medicine
specialisation (profile) General Medicine
Academic year: 2025-2026

Exam card №. 1

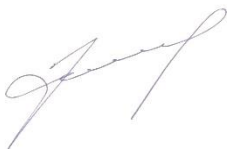
Exam questions:
1. The concept of homeostasis and homeokinesis. Self-regulatory principles of maintaining the constancy of the internal environment of the body.
2. Bioenergetics of the body. Methods of determining energy metabolism. Basal metabolic rate and factors affecting its value. Clinical significance of basal metabolic rate.
3. Minute volume of ventilation and its determination. "Dead space" and alveolar ventilation, its effectiveness depending on the frequency and depth of breathing. Restrictive and obstructive types of ventilation disorders.

P.S. Head of the Department _____ S.V.Klauchek

The full set of assessment tools for the discipline is available in the EIES of the Volgograd State Medical University of the Russian Ministry of Health at the following link:

https://elearning.volgmed.ru/course/view.php?id=6887

Considered at the meeting of the department of Normal physiology "20" May 2025, protocol N 10

Head of the Department  S.V.Klauchek