

**FEDERAL STATE BUDGET EDUCATIONAL
HIGHER EDUCATION INSTITUTION
"ROSTOV STATE MEDICAL UNIVERSITY"
MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION**

FACULTY OF TREATMENT AND PREVENTION

Appraisal Fund
in the discipline "Histology, embryology, cytology"

Specialty 05/31/01 General Medicine

1. Interim certification form: test, exam in accordance with working program.

2. Type of intermediate certification:

Test- based on the results of current monitoring

Exam- test control, practical skills, interview

Stage 1 - test control from 0 to 30 points

Stage 2 - passing practical skills from 0 to 20 points

Stage 3 - interview from 0 to 50 points.

The final score for the exam is determined by summing up the points received for each stage.

3. List of competencies formed by the discipline or in formation which discipline is involved

general professional (OPK):

Code and name general professional competence	Indicator(s) of achieving general professional competence
OPK-7. Able to prescribe treatment and monitor its effectiveness and safety.	ID 3. OPK-7. knows prescribing patterns for safe drug combinations in accordance with clinical guidelines
OPK-9. Able to implement the principles of the quality management system in professional activities.	ID 1. OPK-9. Able to perform professional activities of appropriate quality. ID 2. OPK-9. Able to analyze and critically evaluate the quality of professional activity according to given indicators. ID 3. OPK-9. Able to develop a plan of organizational and methodological measures to achieve the appropriate level of quality of professional activity.

professional (PC):

Code and name of professional competencies	Indicator(s) of professional achievement competencies
PC-5. Carrying out and monitoring the effectiveness of measures for prevention and promotion of a healthy lifestyle and sanitary and hygienic education of the population	ID PK-5 Labor actions ID 1. Organization and conduct of medical examinations taking into account age, health status, profession in accordance with current regulatory legal acts and other documents ID 4. Prescribing preventive measures to patients, taking into account risk factors in accordance with the current procedures for the provision of medical care, clinical recommendations (treatment protocols) on the provision of medical care, taking into account the standards of medical care. Compliance control preventive measures.

	ID 7. Formation of healthy lifestyle programs, including programs to reduce alcohol and tobacco consumption, preventing and combating non-medical use of narcotic drugs and psychotropic substances. Assessing the effectiveness of preventive work with patients.
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4. Stages of developing competencies in process of mastering the discipline

Sections of the discipline	Codes generated competencies		
	OPK-7	OPK-9	PK-5
Semester 2			
Section 1	+	+	+
Section 2	+	+	+
Section 3	+	+	+
Section 4	+	+	+
Semester 3			
Section 4	+	+	+
Section 5	+	+	+

5. Types of assessment materials in accordance with the competencies being developed

Name achievement indicator (ID) competence	Types of assessment materials	
	Current certification	Interim certification
ID 1 OPK-7, OPK-9, PK-5	Tests Situational tasks Practical skills (light microscopy microslides, analysis of electron diffraction patterns) Questions for control Types of SRS: Microscopy drugs Solving situational tasks Analysis of electron diffraction patterns	Tests Situational tasks Practical skills (light microscopy microslides, analysis of electron diffraction patterns) Final questions for interviews

6. Current control

Types and forms of control from RPD disciplines	number of exemplary (typical) tasks for 1 competency
Tests	20 questions
Situational tasks	2 tasks with standard answers
Practical skills	5 microslides, 2 electronograms
Oral survey, interview	test questions on the topics of the section

OPK-7, OPK-9, PK-5:

Interview

List of questions

1. Signs of epithelial tissues.
2. Basophils (their content, size, shape, structure, main functions).
3. Mast cells, their structure, significance.
4. The structure of articular cartilage.
5. Regeneration of skeletal muscle tissue, the importance of myosatellite cells.
6. Morphofunctional characteristics of working and conducting and secretory cardiomyocytes.
7. Structural components of nervous tissue: neurocytes, neuroglia.

Test control

1. Basophilia of the cytoplasm is characteristic of cells:

- 1) actively secreting mucus
- 2) accumulating lipids
- 3) having eyelashes
- 4) having microvilli
- 5) actively synthesizing proteins**

2. Protein involved in the formation of bordered endocytic vesicles:

- 1) calmodulin
- 2) clathrin**
- 3) tubulin
- 4) dynein
- 5) myosin

3. From the myotomes of the somites of the mesoderm develops:

- 1) smooth muscle tissue
- 2) cardiac muscle tissue
- 3) myoepithelial cells
- 4) skeletal muscle tissue**
- 5) muscles of the iris

4. A large cell of loose fibrous connective tissue, process-shaped, with a large a light nucleus and large (1-2) nucleoli, with basophilic cytoplasm, in which well-developed grEPS and the Golgi complex are detected - this is:

- 1) fibrocyte
- 2) macrophage
- 3) fibroblast**
- 4) myofibroblast
- 5) fibroclast

5. Transitional epithelium lines the mucous membrane:

- 1) bladder**
- 2) stomach
- 3) esophagus
- 4) kidney tubules
- 5) bronchi

Situational tasks

Task 1.

For diseases characterized by a rapid increase in the amount of tissue, drugs that destroy microtubules and microfilaments are used. What effect do doctors achieve by using these drugs and why?

Standard answer.

It has been established that microtubules and microfilaments take part in the formation of the mitotic cell division apparatus. By destroying it with pharmacological drugs, doctors prevent the formation of new cells. This is especially acceptable in the treatment of fast-growing and, often, malignant tumors.

Task 2.

During an X-ray examination of the patient's extremities, the metaepiphyseal plate is absent on the radiograph. What age is this patient?

Standard answer.

approximately 21-25 years old.

Task 3.

A 55-year-old man had a myocardial infarction. After recovery, he lived another 20 years. After death, an autopsy was performed by a pathologist and histological microslides were made. What signs did the pathologist show that this man had had a myocardial infarction many years ago?

Standard answer.

The presence of connective tissue scar after necrosis of cardiomyocytes during infarction.

7. Interim certification

Types of intermediate certification from the RPD disciplines	number of exemplary (typical) tasks for 1 competency
Tests	20 questions
Situational tasks	5 problems with standard answers
Practical skills	5 microslides, 2 electronograms
Interview	all control questions on the discipline

OPK-7, OPK-9, PK-5:

Interview

List of questions

2nd semester

Section 1. Cytology (Cell Biology) .

1.Contents, place of histology, cytology and embryology in the system of doctor training. The role of domestic scientists in the creation of independent departments of histology in Russia in the 19th century. The current stage in the development of histology, cytology and embryology.

2.Methods for making preparations for light microscopy, staining methods, types microslides. Microscopy techniques in light microscopes.

3.Electron microscopy. Methods for studying living cells - tissue cultures outside and inside the body, cloning, formation of cell hybrids, intravital staining.

4.The subject and tasks of cytology, its significance in the system of biological and medical sciences. Basic provisions of cell theory at the present stage of scientific development.

5. General principle of organization of a eukaryotic cell. The structure and function of the cell membrane - plasmalemma.

6.Membrane transport: passive, active, lightweight. Endocytosis, its varieties. The concept of exocytosis and transcytosis.

7.The concept of membrane receptors and the functions they perform.

8.Intercellular connections - mechanical and communication connections.

9 .Cytoplasm. Hyaloplasm. The concept of cell compartmentalization. Physico-chemical properties, chemical composition. Participation in cellular metabolism.

10.Core. Structures and significance of the interphase nucleus (karyolemma, karyoplasm, types of chromatin, nucleolus).

eleven. Organelles. Classifications (organelles of general and special significance). The concept of organelles of general importance.

1) The structure and significance of the agranular and granular endoplasmic reticulum. The structure and significance of ribosomes.

2) The structure and significance of the Golgi complex. The structure and significance of lysosomes, types of lysosomes.

3) The structure and significance of mitochondria.

4) The structure and significance of peroxisomes.

5) Cell cytoskeleton (microtubules, microfilaments, intermediate filaments). Structure and meaning.

12. The structure and significance of special organelles / cilia, microvilli, myofibrils, acrosomes and sperm flagellum /.

13. Cytoplasmic inclusions, their classification, significance.

14. Cell reproduction. Cell cycle. Phases of the cycle: interphase, mitosis (biological the meaning of mitosis and its mechanism, stages of mitosis).

15. Endomitosis, polyploidy (mechanisms of formation, functional significance).

16. Biological features and significance of meiotic division.

17. Regulation of the cell cycle: the importance of proto-oncogenes and antioncogenes, growth factors, Keylons.

18. Cell death: necrosis, degeneration, apoptosis (programmed cell death), characteristics of structural and functional changes in cells. **Section 2 General embryology** .

1. Embryology of mammals as a basis for understanding the characteristics of embryonic human development.

2. Concept of the biological processes underlying the development of the embryo / epigenomic heredity, embryonic induction, determination, division, cell migration, growth, differentiation, cell interaction, cell death/. Violation of determination processes as a cause of anomalies and deformities.

3. The concept of ontogenesis. His periods.

4. Progenesis. Spermatogenesis. Oogenesis. Features of the structure of germ cells (sperm, eggs, types of eggs).

5. The main stages of embryogenesis.

6. Fertilization, biological significance.

7. Splitting up. Types of crushing and dependence on the type of egg. The structure of the embryo at different stages of crushing (morula). The structure of the blastula in different vertebrates.

8. Gastrulation, essence, main methods.

9. Germ layers and their derivatives. Axial complex of organ primordia.

10. Ecto- and endoderm derivatives.

eleven. Formation of mesoderm, its differentiation. Differentiation of somites, segmental legs, leaves of the splanchnotome of the mesoderm.

12. Mesenchyme, sources of development, derivatives. _

Section 3. General histology 1) Tissues.

1. The concept of tissue as a system of cells and their derivatives. Patterns of occurrence and evolution of tissues, A.A. Zavarzin's theory of parallelism and N.G. Khlopin's divergent evolution, their contribution to the current level of development of science.

2. Cells as leading elements of tissue. Non-cellular structures: symplasts, intercellular substance, syncytia.

3. Cell populations (cell type, differon, clone). Static, growing, renewing cell populations. Stem cells and their properties.

4. Determination and differentiation of cells, commitment of potencies. Differentons.

5. Principles of tissue classification.

2) Epithelial tissues

1. Classification of epithelial tissues (morphological, genetic, functional).

2. General characteristics of epithelial tissues.

3. Embryonic sources of development of epithelial tissues.

4. Covering epithelia. Borderline position. The structure of single-layer and multilayer epithelium. Principles of structural organization and function.

5. Basal membrane: structure, functions, origin.

6. Features of intercellular contacts in various types of epithelium.

7. Cytokeratins as markers of various types of epithelial tissues.

8. Physiological and reparative regeneration of the epithelium.

9. Localization, structure and biological features of the mesothelium.

10. Full name and structural features of the intestinal epithelium.

eleven. Full name and structural features of the tracheal epithelium.

12. Localization, structure, functions of stratified squamous keratinizing epithelium.
13. Localization, structure, functions of stratified squamous non-keratinizing epithelium.
14. Localization, structure and significance of the transitional epithelium.
15. Glandular epithelium, its morphofunctional characteristics.
16. Classifications of glands. Features of the structure of endocrine glands, compared to exocrine glands.
17. Secretory cycle, its phases. Types of secretion.
18. Classification of exocrine glands. The principle of the structural organization of their secretory (terminal) sections.

3). Blood and lymph.

1. The main components of blood as tissue (plasma and formed elements). Blood functions.
2. The content of formed elements in the blood of an adult. Blood formula. Age and gender characteristics of blood.
3. Red blood cells (size, shape, structure and functions, classification of red blood cells by shape, size and degree of maturity).
4. Leukocytes (classification, general characteristics, leukocyte formula).
5. Granulocytes (neutrophils, eosinophils, basophils, their content, size, shape, structure, main functions).
6. Agranulocytes (monocytes, lymphocytes, number, size, structure and function).
7. Blood platelets (platelets): Dimensions, structure, function.
8. Lymph. Lymphoplasm and formed elements. Connection with blood, concept of recycling lymphocytes.
9. Embryonic hematopoiesis and lymphopoiesis. Postembryonic hematopoiesis (physiological blood regeneration, blood stem cells (BSCs) and colony forming units (CFU)).
10. Regulation of hemo- and lymphopoiesis, the role of the microenvironment.

4). Connective tissues.

1. General characteristics of connective tissues. Classification. Histogenesis.
2. Classification of connective tissues themselves. Their morpho-functional characteristics.
3. Cellular composition of connective tissues themselves. The concept of fibroblast differentiation, structural features, significance of each different cell.
4. Macrophages, their origin, types, structure, role in the body's defense reactions. Concept about the mononuclear phagocyte system.
5. Mast cells, their structure, significance.
6. Plasma cells, their origin, structure, significance.
7. Adventitial cells, their origin, structure and functional characteristics.
8. Pigment cells, their origin, structure, function.
9. Adipocytes (fat cells) of white and brown adipose tissue, their origin, structure and meaning.

10. Intercellular substance of connective tissue (fibers and basic amorphous substance).

Morphological and histochemical characteristics of the main (amorphous) substance.

eleven. Structure, chemical composition, significance of collagen and elastic fibers. The structure and significance of the variety of collagen fibers - reticular fibers.

12. Participation of connective tissue cells in the formation of its intercellular substance and maintenance of its condition.

13. Interaction of PBCT cells in immune and inflammatory reactions.

14. Dense fibrous connective tissue, its types, structure and functions. Tendon as an organ, structure and function.

15. The structure and significance of connective tissues with special properties (reticular tissue, adipose tissue, pigment tissue, mucous tissue).

5). Skeletal tissues.

1. General characteristics of skeletal tissues. Classification.
2. Types of cartilage tissue (hyaline, elastic, fibrous).
3. Features of the structure of various types of cartilaginous tissues, their localization. Age changes, mineralization of hyaline cartilage as a protective reaction of the body.
4. Morphofunctional characteristics of cartilage tissue cells (osteochondrogenic, chondroblasts, chondrocytes).
5. Morphobiochemical characteristics of the intercellular substance of cartilage.

6. The structure of articular cartilage.
7. Regeneration and transplantation of cartilage tissue (cartilage).
8. Bone tissue. General principle of bone tissue organization. Classification of bone tissue their localization.
9. Definition of the concepts "bone tissue" and "bone as an organ".
10. The structure and significance of bone tissue cells (osteochondrogenic, osteoblasts, osteocytes, osteoclasts).
- eleven.** Features of the structure of the intercellular substance (matrix) of bone tissue.
12. Embryonic osteogenesis (bone development from mesenchyme (direct osteogenesis) and development of bone in place of cartilage (indirect osteogenesis).
13. Regeneration of bone tissue. Factors influencing the structure of bone tissue. Hormonal regulation of bone metabolism. Restructuring of bone in the postnatal period of development. Age-related changes.
14. Methods of connecting bones.

6). Muscle tissue.

1. General characteristics and histogenetic classification of muscle tissue (transverse striated muscle and smooth muscle tissue). The concept of a structural and functional unit.
2. Development, morphological and functional characteristics, microscopic and electron microscopic structure of striated (striated) skeletal muscle tissue. The mechanism of muscle contraction. Types of muscle fibers and their innervation.
3. Regeneration of skeletal muscle tissue, the importance of myosatellite cells.
4. Muscle as an organ. Connection with tendon.
5. Cardiac striated (striated) muscle tissue. Source of development, stages histogenesis.

6. Morphofunctional characteristics of working, conducting and secretory cardiomyocytes.
7. Smooth (unstriated) muscle tissue. Source of development. Morphological and functional characteristics, structural features and contractions. Regeneration.
8. Myoneural tissue. Myoid cells and mesothelial cells. Source of development, structure and function.

7). Nervous tissue .

1. General characteristics of nervous tissue. Embryonic sources of development and histogenesis nervous tissue.
2. Structural components of nervous tissue: neurocytes, neuroglia.
3. Features of the structure of a neuron (neurocyte). Structure of the neuron body (perikaryon).
4. The cytolemma of a neuron, its role in the generation and conduction of excitation. Morphofunctional characteristics of the neuron nucleus and its organelles. Cytoskeleton of a neuron, its characteristics, significance.
5. Transport processes in the cytoplasm of neurons. Axonal transport - anterograde and retrograde. Fast and slow transport, the role of microtubules.
6. The concept of neurotransmitters
7. Secretory neurocytes (neurosecretory cells), their structure, function, localization.
8. Physiological death of neurons. Neuronal regeneration.
9. Neuroglia. General characteristics. Sources of gliocyte development. Classification. Macroglia (oligodendroglia, astroglia and ependymal glia). Microglia (glial macrophages).
10. Nerve fibers (myelinated and unmyelinated). General characteristics. Peculiarities formation, structure and function of nerve fibers in the central nervous system and PNS. Degeneration and regeneration of nerve fibers.
- eleven.** Nerve endings. General characteristics. Classification. Receptor (sensitive) endings or receptors, their morphological types, function.
12. Effector endings are motor and secretory. Neuromuscular ending (motor plaque) in skeletal muscles and smooth muscle tissue. Secretory nerve endings.

13. Interneuronal synapses, their structure, significance. Classification of synapses.

14. The principle of organization of the reflex arc.

Section 4. Particular histology 1). Nervous system.

1. Embryonic sources of development of the central and peripheral parts of the nervous system systems.
2. The structure of the peripheral nerve and its sheaths. Peripheral nerve regeneration.
3. The structure of the spinal ganglia (types, location and functional significance of neurons).
4. Composition of gray and white matter of the spinal cord.
5. Nuclei of the posterior, lateral and anterior horns of the gray matter of the spinal cord (morphological, functional characteristics, tracts starting from them).
6. Neuroglia of the spinal cord, structure, significance.
7. Distribution of B. Rexed plates in the gray matter of the spinal cord.
8. Cords of white matter of the spinal cord (posterior, lateral, anterior). Their morphological and functional characteristic.
9. Reflex arc of a simple somatic reflex.
10. Brain. Development (ontogenesis) of the brain.
11. Brainstem (medulla oblongata, pons, midbrain, diencephalon, hypothalamus), histological structure, significance.
12. Reticular formation, localization, structure and significance.
13. General plan of the structure of the cerebellum and its significance.
14. Morphofunctional characteristics of the cerebellar cortex.
15. Neurons of the molecular layer of the cerebellar cortex, their structure and function. Neurons of the granular layer of the cerebellar cortex, their structure and function. Cerebellar gliocytes.
16. Afferent and efferent pathways of the cerebellum. How are they organized?
17. Connections between neurons of the cerebellar cortex. Modern ideas about stimulating and inhibitory neurons.
18. Cerebellar nuclei, their localization, significance.
19. Cerebral cortex. Embryonic and postembryonic histogenesis.
20. Neuronal composition of the cerebral cortex (pyramidal and non-pyramidal cells). Structure and classification of pyramidal cells of the gray matter of the cerebral cortex. Betz cells of the motor cortex, localization, significance.
21. Blood-brain barrier, its structure and function.
22. Cytoarchitecture of the cerebral cortex. The role of V.A. Betz in the development of the theory of cortical fields brain.
23. Myeloarchitecture of the cerebral cortex: associative, commissural and projection fibers.
24. Modular principle of organization of the nervous system.
25. Autonomic nervous system (ANS): sympathetic, parasympathetic and metasympathetic divisions. General characteristics of the structure.
26. Structure and neural composition of ganglia (extramural and intramural). Pre- and postganglionic nerve fibers.
- 2). Sensory system (sense organs).**
 1. Classification. General principle of cellular organization of receptor compartments. Neurosensory and sensoroepithelial receptor cells.
 2. Organ of vision. Sources and course of embryonic development of the organ of vision. Principle of structure and tissue composition of the membranes of the eyeball wall.
 3. Dioptric apparatus of the eye, its composition. Accommodative apparatus of the eye, its composition. The receptor apparatus of the eye, its tissue composition. Accessory apparatus of the eye, its composition.
 4. The structure of the sclera - the white membrane of the eye, its significance.
 5. Morphofunctional and biochemical characteristics of the cornea.
 6. The choroid of the eye and its components. Structure and meaning.
 7. Ciliary body and its processes, structure, significance. **8.** Morphofunctional characteristics of the iris.
 9. The structure and significance of the lens, ligament of cinnamon.
 10. Drainage system of the eye and its components, significance.
 11. Retina of the eye, structure, tissue composition. The concept of the blood-retinal barrier. Neuronal composition of the retina.

12. Accessory organs of the eye (eyelids, lacrimal apparatus).
13. Olfactory organ. Embryonic source of development. Structure and cellular composition of the olfactory lining.
14. Histophysiology of the olfactory organ. Age-related changes.
15. Vomeronasal organ.
16. Organ of taste. Embryonic development. Structure and cellular composition of taste buds.
17. Innervation of taste buds. Histophysiology of the taste organ. Age-related changes.
18. Organs of hearing and balance. Embryonic development. Outer ear: structure of the outer ear ear canal and eardrum.
19. Middle ear: auditory ossicles, characteristics of the epithelium of the tympanic cavity and auditory pipes.
20. Inner ear: bony and membranous labyrinths. Vestibular part of the membranous labyrinth (elliptical and spherical sacs and semicircular canals, structure and cellular composition of the receptor section of the spots and ampullar ridges). Innervation.
21. Histophysiology of the vestibular labyrinth. Cochlear part of the membranous labyrinth: structure of the cochlear canal, structure and cellular composition of the spiral organ, its innervation.
22. Histophysiology of sound perception. Age-related changes.

3). The cardiovascular system.

1. Structure and embryonic development of the cardiovascular system.
2. General principles of the structure of blood vessels. Classification. Addition the structure of blood vessels on hemodynamic conditions. Angiogenesis, vascular regeneration. Age-related changes in the vascular wall.
3. Classification, structural features and functions of arteries of various types. Organ features of arteries.
4. Microcirculatory bed. Arterioles, their types and role in blood circulation. Structure. The importance of endothelial myocyte contacts in the histophysiology of arterioles.
5. Classification, structure and function of hemocapillaries. Morphological basis the process of capillary permeability and regulation of their functions. Organ features of capillaries.
6. Venules (their types, structure and functional significance).
7. Arteriovenular anastomoses (importance for blood circulation, classification, structure of various types).
8. Classification of veins (muscular and non-muscular type), structure of the vein wall of various types due to hemodynamic conditions. The structure of venous valves. Organ features of veins.
9. Classification of lymphatic vessels. The structure of lymphatic capillaries and various types of lymphatic vessels. The concept of lymphangion. Participation of lymphatic capillaries in the microcirculation system.
10. Embryonic development of the heart. The structure of the heart wall, its membranes, their tissue compound. Features of blood supply, innervation, regeneration of the heart.
- eleven. Conducting system of the heart, its morphofunctional characteristics.
12. The heart of a newborn. Restructuring and development of the heart after birth. Age heart changes.

3rd semester.

Section 4. Particular histology

4). System of hematopoietic organs and immune defense.

1. General characteristics of the hematopoietic system and immune defense. Basic sources and stages of formation of hematopoietic organs in human ontogenesis.

Central and peripheral hematopoietic organs.

2.Red bone marrow (structure, tissue composition, function, features blood supply).

3.Yellow bone marrow (development in utero, age-related changes, regeneration).

4.Thymus. Embryonic development. Structure and tissue composition of the cortex and medulla lobule substances. Vascularization. The structure and significance of the blood-thymus barrier.

Temporary (accidental) and age-related involution of the thymus.

5.Spleen. Embryonic development. Structure and tissue composition (white and red pulp, T- and B-dependent zones). Blood supply to the spleen.

6.The lymph nodes. Embryonic development. Structure and tissue composition of the cortex and medulla. Vascularization. Age-related changes.

7.Structure, cellular composition and significance of lymphoid formations in the mucous membranes (lymphoid nodules and diffuse accumulations in the wall of the airways, digestive tract and other organs).

8.Morphological basis of the body's defense reactions.

9.Type of immunity (humoral and cellular), characteristics of the main cells, carrying out immune reactions (macrophages, antigen-presenting cells, T-lymphocytes, B-lymphocytes, plasma cells).

10.Concept of antigens and antibodies. Antigen-independent and antigen-dependent lymphocyte differentiation. Effector cells and memory cells. Regulation of immune reactions: cytokines, hormones.

5). Endocrine system.

1.General characteristics and classification of the endocrine system (central and peripheral endocrine glands). The concept of hormones, target cells and their hormone receptors. Mechanisms of regulation in the endocrine system.

2.Hypothalamus, its structure, significance. Hypothalamic-adenopituitary and hypothalamic neurohypophyseal system. Regulation of the functions of the hypothalamus by the central nervous system.

3.Pituitary. Embryonic development. Structure and functions of the adeno- and neurohypophysis. The middle (intermediate) lobe of the pituitary gland and its features in humans. Vascularization and innervation of the pituitary gland. Age-related changes.

4.Structure, cellular composition, function of the pineal gland. Age-related changes.

5.Sources of development, structure, cellular composition, functions of the thyroid gland. Role hormones. Restructuring of follicles due to different functional activities. Vascularization and innervation of the thyroid gland.

6.Sources of development, structure and cellular composition of the parathyroid glands. Role in regulation of mineral metabolism. Vascularization, innervation and regulatory mechanisms of the parathyroid glands. Age-related changes.

7.Sources of development of the adrenal glands (fetal and definitive adrenal cortex). Structure, cellular composition of the adrenal cortex zone, synthesis and secretion of hormones, regulation of hormone synthesis.

8.Structure, cellular composition, hormones and role of brain endocrinocytes (epinephrocytes) adrenal medulla. Age-related changes in the adrenal gland.

9.Endocrine structures of mixed secretion glands.

10.Endocrine islets of the pancreas. Endocrine function of the gonads (testes, ovaries), placenta.

eleven.Single hormone-producing cells. Concept of the diffuse endocrine system (DES), localization, cellular composition of endocrinocytes, structure, hormones. Ideas about the APUD system (neuroendocrine cells).

6). Digestive system.

1. The main sources of development of tissues of the digestive system in embryogenesis. The general principle of the structure of the wall of the digestive canal (mucosa, submucosa, muscularis, outer membrane (serous or adventitial), their tissue and cellular composition.
2. Innervation and vascularization of the wall of the digestive tube. Endocrine apparatus digestive system. Lymphoid structures of the digestive tract.
3. Anterior section of the digestive system. Oral cavity. Structure of the mucosa membranes in connection with the function and characteristics of digestion in the oral cavity.
4. The structure of the lip, cheek, hard and soft palate, tongue, gums, tonsils.
5. Large salivary glands. Classification, sources of development, structure and functions. The structure of the secretory sections and excretory ducts.
6. Features of the structure of the tongue, the mucous membrane on its upper and lower surfaces, types of tongue papillae, their structure and functions.
7. The structure of enamel, dentin and cementum of the tooth, their function and chemical composition.
8. The structure and significance of the dental pulp. The structure and significance of the periodontium.
9. Blood supply and innervation of the tooth. Development and change of teeth. Age-related changes.
10. Pharynx and esophagus. The structure and tissue composition of the wall of the pharynx and esophagus in various its departments. Glands of the esophagus, their histophysiology.
- eleven.** Middle and posterior sections of the digestive system. Stomach. The structure of the mucous membrane in various parts of the organ. Localization, structure and cellular composition of glands in various parts of the stomach. Blood supply and innervation of the stomach. Age-related features of the structure of the stomach.
 1. Structure, tissue composition of the wall of the small intestine, the "villus - crypt" system as a structural and functional unit. Histophysiology of the process of parietal digestion and absorption. Cytophysiology of exo- and endocrine cells. Regeneration of the epithelium of the small intestine. Blood supply and innervation. Age-related changes in the wall. Lymphoid formations in the intestinal wall.
 2. The structure of the colon wall, tissue composition. Lymphoid formations in large intestine. Blood supply.
 3. Features of the structure and function of the vermiform appendix.
 4. Rectum. Wall structure.
 5. Structure and function of the exocrine and endocrine parts of the pancreas.
 6. Blood supply. Innervation. Regeneration. Features of histophysiology in different periods of childhood. Changes in the pancreas during aging.
 7. Features of blood supply to the liver, structure and function of classical hepatocytes lobules as a structural and functional unit of the liver. Concepts of the portal lobule and acini.
 8. The structure of bile canaliculi (cholangioles) and interlobular bile ducts of the liver. Mechanisms of bile circulation through them. Innervation. Regeneration. Features of the structure of the liver of newborns. Age characteristics.
 9. Structure and function of the gallbladder and bile ducts.
- 7). Respiratory system.**
 1. Airways and respiratory section of the respiratory system. Development. Age characteristics. Regeneration.
 2. Structures of the wall of the extrapulmonary airways (nasal cavity, larynx, trachea and main bronchi), tissue composition, histophysiology of their membranes.
 3. Lungs. Intrapulmonary airways (bronchi and bronchioles), their structure walls depending on their caliber.
 4. Structural components of the acinus; structure of the alveolar wall, structural and chemical organization and function of the surfactant-alveolar complex. The structure of the interalveolar septa.

5. The airborne barrier and its importance in gas exchange. Lung macrophages.

Blood supply to the lung.

6. Morpho-functional characteristics of the pleura.

8). Leather and its derivatives.

1. Tissue composition, skin development. Regeneration.

2. The main cell differentials in the epidermis, layers of the epidermis, their cellular composition.

Features of the structure of the epidermis of "thick" and "thin" skin.

3. The concept of the keratinization process, its significance. Cellular renewal of the epidermis and an idea of its proliferative units and core organization.

4. Local immune surveillance system of the epidermis (Langerhans cells and lymphocytes, their histofunctional characteristics). Pigment cells of the epidermis, their origin, structure and role. Tactile cells. Basement membrane, dermal-epidermal junction.

5. Dermis, papillary and reticular layers, their tissue composition. Features of the structure of the dermis in the skin of various parts of the body - feet, palms, face, joints, etc.

6. Histofunctional characteristics of the immune system in the dermis. Vascularization skin. Hypodermis.

7. Skin glands (sebaceous, sweat), their development, structure, histophysiology.

8. Mammary glands - see section "Female reproductive system". Age characteristics skin and its glands.

9. Leather derivatives. Hair, its development, structure, growth, change, innervation.

10. Nails. Development, structure and growth of nails.

9). System of urinary and urinary organs.

1. General characteristics of the urinary organ system. Development.

2. Cortical and medulla of the kidney, nephron, as a morphofunctional unit kidneys, its structure. Types of nephrons, their topography in the cortex and medulla.

3. Vascularization of the kidney (cortical and juxtamedullary blood supply systems). Renal corpuscles, their main components, structure of vascular glomeruli. Mesangium, its structure and function. Structural organization of the renal filter and role in urine formation.

4. Juxtaglomerular apparatus (endocrine apparatus of the kidney), structure and function.

5. Histophysiology of nephron tubules and collecting ducts in connection with their participation in the formation of final urine. The concept of the countercurrent system of the kidney. Kidney stroma, its histofunctional characteristics.

6. Innervation of the kidney. Regenerative potencies. Features of the kidney in a newborn. Subsequent age-related changes in the kidney.

7. Urinary tract. The structure of the wall of the renal calyces and pelvis. Structure ureters. Structure of the bladder. Concept of cystoids. Features of the structure of the male and female urethra.

10). Reproductive systems.

1. Development. Primary gonocytes, initial localization, migration paths to the primordium (indifferent) gonad. Sexual differentiation.

2. Male genital organs. Histogenetic processes in the gonad primordium leading to testicular development. Development of the vas deferens.

3. The general principle of the structure of the testis, the structure of the wall of the convoluted testes tubules, straight tubules. Spermatogenesis. Blood-testis barrier. Endocrine function. Regulation of generative and endocrine functions of the testicle. Age characteristics.

4. Vas deferens. Epididymis. Vas deferens. Seminal glands. Ejaculatory duct. Bulbo-urethral glands. Prostate. Their structure and functions. Age-related changes. Penis. Their structure, meaning.

5. Female genital organs. Development, general characteristics of the structure of the ovary. Oogenesis. Differences between oogenesis and spermatogenesis.
6. The concept of the ovarian cycle and its regulation. Development, structure and functions of yellow bodies during the ovarian cycle and during pregnancy. Follicular atresia.
7. Endocrine function of the ovary (female sex hormones and the ones that produce them endocrinocytes). Age characteristics.
8. The structure of the uterine wall (endometrium, myometrium, perimetrium) in its different parts. Menstrual cycle and its phases. Relationship between cyclic changes in the endometrium and ovary. Restructuring of the uterus during pregnancy and after childbirth. Vascularization and innervation of the uterus. Age-related changes.
9. Development, structure and functions of the fallopian tubes.
10. Vagina. Development. The structure of its walls. Change due to menstruation cycle.
- eleven. Mammary (breast) gland. Origin. Development. Structure. Postnatal changes. The structure of lactating and non-lactating (non-functioning and after lactation) mammary glands. Neuroendocrine regulation of mammary gland functions. Changes in the mammary glands during the ovarian-menstrual cycle and during pregnancy.

Section 5. Human embryology (Early embryogenesis).

1. An idea of the biological processes underlying the development of the embryo (induction, determination, division, cell migration, growth, differentiation, cell interaction, cell death). Features of human embryonic development. Critical periods in development. Violation of determination processes as a cause of anomalies and deformities.
2. Progenesis. Spermatogenesis, oogenesis. Features of the structure of germ cells.
3. Fertilization. The biological significance of fertilization, features and chronology of this process. Male and female pronuclei, disintegration of their shells, establishment of the connection of the chromosomes of the pronuclei with the centriole of the sperm.
4. First week of development. Zygote is a one-celled embryo, its genome, activation intracellular processes.
5. Splitting up. Peculiarities of crushing in humans. The structure of the embryo at different stages crushing. The role of the transparent zone. Morula. Blastocyst. Inner cell mass (embryoblast) and trophoblast. Free blastocyst stage. Condition of the uterus at the beginning of implantation. Beginning of the 1st phase of gastrulation.
6. Implantation. Differentiation of trophoblast into cytotrophoblast and syncytiotrophoblast. Activation of syncytiotrophoblast. Formation of lacunae and their connection with endometrial blood vessels. Histiotrophic type of nutrition. Formation of primary and secondary chorionic villi.
7. Second week of development. Gastrulation. Division of embryoblast into epiblast and hypoblast. Transformation of the hypoblast, formation of the primary yolk sac.
8. Transformation of the epiblast (formation of the amniotic cavity and secretion amniotic ectoderm, formation of the amniotic bladder), the beginning of the 2nd phase of gastrulation by emigration with the formation of the primary streak and primary nodule, germinal mesoderm, head process, endoderm, prechordal plasticity. Formation of extraembryonic mesoderm.
9. Third week of development. Differentiation of germinal mesoderm (somites, nephrogonotomy, visceral and parietal layers of splanchnotome, embryonic coelom). Growth of the head process, formation of the notochord. Formation of the neural tube and neural crests, asynchronous development of the cerebral and caudal regions. Trunk fold, formation of the primary intestine.
10. Differentiation of the extraembryonic mesoderm of the allantois, amniotic bladder, vitelline stalk, connecting stalk, layer underlying the trophoblast.

eleven.Formation of primary blood vessels and primary blood cells in the mesoderm of the yolk sac, connecting stalk. Formation of the first blood vessels in the mesoderm of the embryo. The rudiment of the primary heart, the beginning of function. Layer of the kidney, lung.

12.Formation of tertiary chorionic villi. Hematotrophic type of nutrition.

13.Fourth week of development. Change in the shape of the embryo (formation of transverse and longitudinal folds). Completion of the processes of neurulation and segmentation of mesoderm. Auricular and lens placodes. Development of mesonephros. Migration of gonocytes from the vitelline endoderm of the caudal end of the embryo. Formation of the mouth (breakthrough of the oropharyngeal membrane), formation of the spinal column. Layer of the adenohypophysis, thyroid and parathyroid glands, stomach, liver, dorsal part of the pancreas.

10.Embryonic organogenesis.

eleven.Extraembryonic organs. Placenta, formation, structural features of the maternal and fetal components during pregnancy. Accelerated development of connective tissue of the placenta and other extra-embryonic organs. Structural differences between terminal and difenitive villi in different trimesters of pregnancy, placental functions.

12.Amnion, its structure and significance.

13.The umbilical cord, its formation and structural components: gelatinous (mucous) tissue, vessels, rudiments of the yolk sac and allantois. The mother-placenta-fetus system and factors influencing its physiology.

14.Features of the newborn's body. General characteristics and periodization of postnatal development.

15.Factors influencing development: genetic, maternal, external (radiation, alcohol, smoking, drugs, infection, chemicals and drugs, pesticides, etc.).

Test control

List of test tasks for ongoing monitoring with standard answers.

1. Macrophages are formed from:

- 1) basophils
- 2) fibroblasts
- 3) B lymphocytes
- 4) monocytes**
- 5) T-lymphocytes

2. The function of effectors of humoral immunity is performed by:

- 1) fibroblasts
- 2) macrophages
- 3) mast cells
- 4) pigmentocytes
- 5) plasma cells**

3. The optic nerve consists of axons:

- 1) photoreceptors
- 2) bipolar nerve cells
- 3) horizontal nerve cells
- 4) amacrine nerve cells
- 5) ganglion nerve cells**

4. The following take part in the formation of surfactant components:

- 1) goblet cells
- 2) respiratory alveolocytes
- 3) endocrinocytes
- 4) large secretory alveolocytes**
- 5) endothelial cells

5. The uterine glands are the glands:

- 1) simple alveolar
- 2) complex alveolar-tubular
- 3) simple tubular, opening into the lumen of the uterus**
- 4) simple tubular, opening into the endometrial vessels
- 5) mixed exo- and endocrine

Situational tasks

Task 1.

Brown fatty tissue is found in newborns around the shoulder blades, behind the breastbone, along the spine, on the neck, under the skin and between muscles. During fasting, brown adipose tissue changes less than white adipose tissue. Why is this tissue more common in newborn babies?

Standard answer.

Thermogenesis is the main function of brown adipose tissue; in newborns, thermoregulation centers are not yet developed.

Task 2.

Protein and red blood cells were found in the patient's urine. What kidney structures are damaged is this possible?

Standard answer.

This is possible if the filtration barrier in the renal corpuscle is disrupted /with glomerulonephritis/

Task 3.

A child suffering from rickets experiences curvature and softening of the bones of the limbs. Which stage of osteogenesis is disrupted and why?

Standard answer.

Bone mineralization is impaired due to lack of vitamin D, liver pathology or kidneys, because hydroxylation of provitamin D occurs in these organs.

Practical skills and abilities:

- microscopy of micropreparations

1. two-day chicken embryo
2. fibroblasts and macrophages
3. elastic cartilage
4. heart muscle
5. myelinated nerve fibers

- analysis of electron diffraction patterns

1. intercellular contacts
2. wall of the aero-blood barrier

8. Description of indicators and criteria for assessing competencies at the stages of their formation, description of assessment scales

	Levels of competency development		
	<i>Threshold</i>	<i>Sufficient</i>	<i>High</i>

Criteria	Competence formed. Demonstrated threshold, satisfactory sustainable level practical skill	Competence formed. Demonstrated enough level independence, sustainable practical skill	Competence formed. Demonstrated high level independence, high adaptability practical skill
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Competency assessment indicators and rating scales

Grade "unsatisfactory" (not accepted) or lack of maturity competencies	Grade "satisfactorily" (passed) or satisfactory (threshold) level of development competencies	Rated "good" (passed) or sufficient level mastering competence	Excellent rating (passed) or high level development competencies
failure to student on one's own demonstrate knowledge when solving assignments, lack independence in application of skills. Absence availability confirmation formation competencies indicates negative development results academic discipline	student demonstrates independence in application of knowledge skills and abilities to solve educational tasks in full According to sample given teacher, by tasks, solution of which there were shown teacher, it should be considered that competence formed on satisfactory level.	student demonstrates independent application of knowledge, skills and abilities when deciding tasks, tasks similar samples that confirms Availability formed competencies for higher level. Availability such competence on sufficient level indicates sustainable fixed practical skill	student demonstrates ability to full independence in choosing a method solutions non-standard assignments within disciplines with using knowledge, skills and skills, received as in development progress of this discipline, and adjacent disciplines should count competence formed on high level.

Evaluation criteria for the test

Mark	Descriptors		
	strength of knowledge	ability to explain the essence of phenomena, processes, do conclusions	logic and subsequence answer
passed	solid knowledge of the basic processes of the studied subject area, the answer differs in depth and completeness of the topic; possession terminological apparatus	ability to explain essence, phenomena, processes, events, draw conclusions and generalizations, give reasoned answers, give examples	logic and subsequence answer

not accepted	insufficient knowledge subject matter being studied areas, unsatisfactory disclosure of the topic; weak knowledge of the basic issues of theory. Allowed serious mistakes in content of the answer	weak analysis skills phenomena, processes, events, inability give reasoned answers given the examples are wrong	lack of logic and consistency answer
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Criteria for evaluating forms of control:

Interviews:

Mark	Descriptors		
	strength of knowledge	ability to explain the essence of phenomena, processes, do conclusions	logic and subsequence answer
Great	strength of knowledge, knowledge of basic processes subject matter being studied areas, the answer differs in depth and completeness disclosure of the topic; possession terminological apparatus; logic and consistency answer	high skill explain the essence phenomena, processes, events, draw conclusions and generalizations, give reasoned answers, give examples	high logic and subsequence answer
Fine	solid knowledge of the basic processes of the studied subject area, differs in depth and completeness of the topic; possession terminological apparatus; free mastery of monologue speech, but one or two inaccuracies in the answer are allowed	ability to explain essence, phenomena, processes, events, draw conclusions and generalizations, give reasoned answers, give examples; however one or two inaccuracies in the answer are allowed	logic and subsequence answer
satisfactory strictly	satisfactory process knowledge subject matter being studied areas, answer, different insufficient depth and completeness of the topic; knowledge of basic theoretical issues. Several are allowed errors in content answer	satisfactory ability to give reasoned answers and provide examples; satisfactorily formed analysis skills phenomena, processes. Several are allowed errors in content answer	satisfactory logic and subsequence answer
unsatisfactory strictly	poor knowledge of the subject area being studied,	inability to give reasoned	lack of logic and consistency

	shallow opening Topics; poor knowledge basic theoretical issues, poor analysis skills phenomena, processes. Serious errors in content answer	answers	answer
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Test control grading scale:

Percentage of correct answers	Marks
91-100	Great
81-90	Fine
71-80	satisfactorily
Less than 71	unsatisfactory

Situational tasks:

Mark	Descriptors			
	understanding Problems	analysis situations	skills solutions situations	professional thinking
Great	complete implication problems. All requirements, submitted to adania, completed	high benefit analyze situation, draw conclusions	high benefit select method solutions problems faithful solution skills situation	high level professional thoughts
Fine	complete implication problems. All requirements, submitted to adania, completed	benefit analyze situation, draw conclusions	benefit select method solutions problems faithful solution skills situation	residual level professional thoughts. drops one or two precision in the answer
satisfactory strictly	astastic implication problems. majority requirements declared to adania, completed	satisfactory 1st ability analyze situation, draw conclusions	satisfactory e skills solutions situation	residual level professional thoughts. falls more a bunch of inaccuracies in reply
unsatisfactory strictly	misunderstanding problems. legs requirements, submitted to I hope not completed. No Tveta. Did not have experiments to solve	izkaya benefit analyze situation	insufficient solution skills situation	missing

	hello			
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Skills:

Mark	Descriptors		
	consistency theoretical knowledge	knowledge of the methodology execution practical skills	performance practical skills
Great	system stable theoretical knowledge about services and contraindications, possible complications, regulations, etc.	stable knowledge implementation methods practical skills	independence and correctness fulfillment practical skills skills
Fine	system stable theoretical knowledge about services and contraindications, possible complications, regulations, etc., some are omitted preciseness that independently are detected quickly cope	stable knowledge implementation methods practical skills; some are omitted preciseness that independently are detected quickly cope	independence and correctness fulfillment practical skills skills
satisfactory strictly	satisfactory theoretical knowledge about services and contraindications, possible complications, regulations, etc.	knowledge of the basic principles of implementation methodology practical skills	independence fulfillment practical skills skills, but go down some mistakes, which are being corrected with help tutor
dissatisfy strictly	low level of knowledge about services contraindications, possible complications, regulations, etc. and/or can't do it on its own demonstrate tactical skills or fulfills them, allowing common mistakes	low level knowledge execution practical skills	possibility independent performing the skill whether skills

CHECKLIST FOR EXAMINATION PROCEDURE

(checklist for the second (commission) retake in case
if the study of the discipline ends with a test, a differentiated test,
exam)

No.	Examination event*	Score/points
1	Testing (text)	thirty
2	Practical skills (micropreparations, electronograms)	20

3	Interview (solving situational problems)	50
Total average arithmetic score /maximum number of points for the examination event/		100

* Specific activities of the examination procedure are indicated (interview, test control (computer or text), solving situational problems, passing practical skills, etc.).