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“УТВЕРЖДАЮ” 
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**LIST OF QUESTIONS
FOR THE 2ND MODULE
IN HISTOLOGY, CYTOLOGY AND EMBRYOLOGY**

SKELETAL TISSUE

1. Skeletal tissue. General morpho-functional characteristics. Classification.
2. Cartilage and bone tissue. General characteristics Cellular elements of cartilage and bone tissues.
3. Morphofunctional features of the structure of the intercellular substance of cartilage and bone tissues.
4. Cartilage as an organ. The structure of hyaline, fibrous and elastic cartilage. Epiglottis. Its importance in nutrition, growth and regeneration of cartilage. The structure of articular cartilage.
5. Bone tissue. Morphofunctional characteristics, classification.
6. Bone cells. Intercellular substance of bone tissue, its physical and chemical properties and structure
7. The structure of tubular and flat bones.
8. The source of the development of cartilage and bone tissue?
9. The process of chondrogenesis and osteogenesis.
10. Functions of the perichondrium and periosteum?
11. General characteristics of the cartilage tissue, it's development, structure, and functional significance.
12. Structural and functional unit of compact bone tissue.
13. Classification and general characteristics of bone tissues, their varieties, development, structure.
14. Reticulofibrous (coarse-fibrous) bone tissue. Lamellar (thin-fiber) bone tissue. Dentine bone tissue. Their localization in the body and morphofunctional features
15. The process of internal restructuring of bone tissue and age-related changes in bone tissue.
16. The mechanism of healing of a simple fracture of the tubular bone
17. Bone rearrangement during the growth of the body.
18. Factors affecting bone growth.
19. Bone tissue regeneration. Ectopic development of bone tissues. Changes with age.

MUSCLE TISSUE

1. Morphofunctional characteristics of muscle tissues.
2. Classification of muscle tissues.
3. Smooth (non-striated) muscle tissue.
4. Histogenesis of smooth muscle tissue, structure, morpho-functional and histochemical characteristics.

5. Smooth myocyte. Organization of the contractile apparatus.
6. Regeneration of smooth muscle tissue. Age-related changes.
7. The peculiarity of the location of smooth muscle cells in the organs.
8. The source of development of striated muscle tissue of skeletal and cardiac type.
9. Features of the structural organization of various muscle tissues – skeletal, cardiac.
10. The structure of skeletal muscle as an organ.
11. Cardiac muscle tissue (striated muscle tissue of the coelomic type). Histogenesis.
Classification: contractile and rhythm-setting (conducting) cardiac muscle tissue.
12. Methods of muscle tissue regeneration
13. Histogenetic classification of muscle tissues.
14. Development of muscle tissue.
15. General characteristics of muscle tissues.
16. A smooth muscle cell is a structural unit of smooth muscle tissue.
17. The supporting apparatus of smooth muscle tissues.
18. Contractile apparatus of smooth muscle tissue.
19. Morphofunctional features of smooth muscle cell contraction.
20. Muscle fiber (simplast) - as a structural unit of somatic muscle tissue.
21. The supporting apparatus of the striated muscle fiber.
22. The contractile apparatus.
23. Sarcomere, sarcoplasmic reticulum of the muscle fiber.
24. Satellite cells.
25. The mechanism of muscle contraction.
26. The relationship between the cells of the cardiac muscle tissue.
27. Insert discs.
28. Organelles of general importance in the cells of the coelomic type of muscle tissue.
29. The contractile apparatus of the coelomic muscle tissue.
30. Morphofunctional features of cardiac muscle tissue contraction.
31. Sarcoplasmic reticulum of the cardiac type.
32. Somatic and coelomic muscle tissues, their differences and similarities.
33. Myoneural muscle tissue.
34. The structure of the muscle as an organ

NERVE TISSUE

1. Nerve tissue.
2. General morphofunctional characteristics of the nervous tissue.
3. Sources of nervous tissue development. Histogenesis..
4. Cytological features of nerve cells and their processes at the microscopic and ultramicroscopic levels.
5. Data on the structure of neurocytes for judging the degree of their functional activity.
6. Microscopic and ultramicroscopic features of myelin and myelin-free nerve fibers, the process of myelination.
7. Structural and functional features of various types of synapses.
8. Nerve endings.
9. The principle of organization of reflex arcs – somatic and vegetative.
10. Sources of development of neurocytes and neuroglia.
11. Characteristic features of the structure of neurocytes.
12. Features of the cell cycle of neurocytes and neuroglia
13. The concept of nerve fibers, their classification and structural features.
14. The concept of interneuronal synapses.
15. Classification of synapses.
16. The principle of organization of two-and multiple reflex arcs
17. Name the sources of development of neurocytes and gliocytes.

18. What types of cells do nerve tissue consist of, and what function do they perform?
19. What morphological and functional features do the axon and dendrites of nerve cells differ from each other?
20. Classification of nerve cells (neurocytes)?
21. Changes in the granular endoplasmic network of a neurocyte depending on its functional state.
22. Classification of glia (gliocytes)?
23. Participation in the construction of nerve fibers of nerve cells and glia.
24. Types of nerve fibers, "fast" and "slow" impulses.
25. Nerve endings
26. General morpho-functional characteristics of nerve endings. Receptor and efferent endings, their classification and structure.
27. The concept of synapse. Interneuronal synapses. Classification, structure. Mediators. Mechanism of excitation transmission in synapses
28. Reflex and reflex arc

NERVOUS SYSTEM

1. What are the morphofunctional features of neurons and gliocytes in spinal nodes?
2. Where do the axons of the pseudonipolar neurons of the spinal nodes go and what do they form?
3. Describe the topography and function of the gray matter nuclei of the spinal cord.
4. What types of neuroglia are found in the spinal cord?
5. What is the structure of the peripheral nerve?
6. In which layers of the cerebral cortex do afferent pathways end and efferent pathways begin?
7. What types of glia are found in the cortex of the cerebellum and the cortex of the large hemispheres of the brain?
8. What layers does the cerebellar cortex consist of?
9. What is the formation of the hemato-encephalic barrier and what function does it perform

THE ORGAN OF SIGHT AND SMELL

1. Name the morphofunctional features that characterize the sensory organs with primary sensory receptor cells.
2. What shells are part of the eyeball, and what are their derivatives?
3. What are the ultramicroscopic features of retinal photoreceptor cells?
4. What changes occur in the receptor and accommodation apparatus of the eye during light and dark adaptation?
5. What structures are included in the olfactory analyzer?
6. What morphofunctional features

THE ORGAN OF HEARING, BALANCE, AND TASTE

1. Where are the receptor cells of the organ of hearing and balance located?
2. Name the walls of the snail's membranous labyrinth, their structural features and functional significance.
3. Where are the taste organ receptor cells located? What are their morphofunctional features?
4. Name the main neurosecretory nuclei of the anterior and mediobasal hypothalamus. What hormones and mediators do they produce?
5. What are the features of the micro-and ultrastructure of the cells of the anterior pituitary gland? What hormones do they produce?
6. Where are the hormones that accumulate and are released in the posterior pituitary gland synthesized?
7. What is the origin, structure, and histophysiology of the epiphysis?
8. From what sources do the structural components of the thyroid gland develop?
9. Tell us about the development, structure, function and age-related changes of the parathyroid glands.

10. From what sources does the cortical and medullary matter of the adrenal glands develop?

Например:

1. When the child was vaccinated in response to the introduction of foreign antigens, the reaction of humoral immunity developed. Indicate the basic cells of the spleen involved in the immune response.

- a) T-lymphocytes-killers, T-helpers; b) T-lymphocytes-suppressors and helpers, macrophages;
c) macrophages, T-helpers, B-lymphocytes; d) B-lymphocytes

2. In the histopreparation, which is impregnated with silver salts, the cerebellar cortex is determined, containing pear-shaped, basket-shaped, star-shaped neurons and grain cells. Name the neurocytes that make up the molecular layer

- a) pear-shaped; b) basket cell, small and large stellate cells; c) grain-cells, large stellate cell;
d) stellate, pyramidal; e) large stellate and fusiform;

3. In the histological preparation of the organ of the nervous system impregnated with silver salts, neurons of pear-shaped, stellate, spindle-shaped, cell-grain are determined. Which of these cells is the efferent neuron of the cerebellum?

- a) stellate neurons; b) fusiform horizontal neurons; c) cell-grain
d) pyramidal neurocytes; e) pear-shaped neuron;

4. In the histopreparation an organ consisting of gray and white matter is determined. The gray matter is located on the periphery and has 6 layers: molecular, external granular, pyramidal, internal granular, ganglionic and a layer of polymorphic cells. Identify the formation to which these morphological features belong: a) spinal cord;

- b) the cortex of the cerebral hemispheres; c) cerebellum;
d) medulla; e) the spinal cord;

5. In the histopreparation an organ consisting of gray and white matter is determined. The gray matter is located in the center and consists of bundles, radicular and associative neurons. Name the organ for which these morphological features are characteristic: a) large hemispheres; b) spinal cord; c)

- cerebellum; d) medulla; e) the spinal ganglion

6. In the histological specimen, the parenchyma of the organ is represented by a neural tissue, in which pseudo-unipolar neurons are determined. The bodies of the neurons are covered with glial and connective tissue membranes are arranged in groups. Name the body to which these morphological features belong

- a) swollen plexus; b) the spinal ganglion; c) spinal cord; d) cerebellum;

7. The histopreparation determines the central nervous system organ consisting of gray and white matter. The gray matter is in the center and forms a butterfly. Neurocytes in the gray matter are arranged in groups, forming nuclei. Indicate which nucleus belongs to the central part of the autonomic nervous system.

- a) intermediate medial nucleus; b) intermediate lateral nucleus; c) own horn of the rear horn;
d) own horn of the anterior horn; e) thoracic nucleus;

8. With a lack of vitamin A, a person's vision is impaired. Indicate the cells to which this receptor function belongs

- a) ganglionic nerve cells; b) rod-shaped cells; c) bipolar neurons; d) the cone cells;

10. The main property of smooth muscular tissue is:

- a) a variety of cell forms b) well developed intercellular substance
c) ability to long (without noticeable exhaustion) to reduction
d) existence of satellite cells

e) ability to carry out exchange reactions and to support a homeostasis

11. The sensitive nervous terminations in muscles come to an end:

- a) in neuromuscular spindles b) on sarcomere cross-striped fiber
c) in motor plaques c) in tactile little bodies e) in lamellar little bodies

12. Smooth muscular cells are capable to synthesize:

- a) collagen b) elastin c) proteoglycan d) phospholipid

13. It is necessary to consider as a specific sign of beginning of specialization of nervous cells:

- a) emergence in cytoplasm of bunches of neurofilament and neurotubules
b) development of lysosomes c) hypertrophy of the Golgi
d) development of a granular endoplasmic network

14. Muscular spindles on functional type belong to:

- a) to neuro-secretory b) to the motive c) to associative d) to the sensitive

15. At the heart, regeneration of nervous tissue the main role is played by :

- a) ependymal cells b) astrocytes c) neuro-lemmal cells d) microglia

16. Neurons vegetative ganglia develop from:

- a) mesoderms b) nervous tube c) ganglionic plate d) endoderm

17. Structures of a myelin cover of nervous tissue are formed by:
 a) ependymal cells b) astrocytes c) oligodendrocytes d) microglia
18. nervous excitement on nervous cells, which component takes part:
 a) neurofibrills) lysosomes c) mitochondrions d) synaptic bubbles
19. In experiment at a germ the ganglionic plate is removed. In what body there will be violations?
 a) spinal cord b) adrenal gland c) kidney d) lung
20. How regeneration of nervous fiber will go?
 a) regeneration wouldn't be b) regeneration is slowed down
 c) regeneration is accelerated d) normal restoration

SITUATIONAL TASKS

- Two preparations are presented: on one is hyaline, on the other elastic cartilage. By what signs can they be distinguished?
- Numerous thick bundles of collagen fibers are visible on the histological preparation of cartilage tissue.
3. The bone tissue contains multinucleated cells containing numerous lysosomes. What are these cells called?
- Electronic micrographs of two bone cells are proposed. The cytoplasm of one is well expressed. It has a well-developed endoplasmic network and Golgi complex, as well as numerous mitochondria. The volume of the cytoplasm of another cell is small and the organelles in it are few. Which of these cells is an osteoblast and which is an osteocyte?
- Electronic micrographs of two osteocytes are proposed. One has very little cytoplasm and almost no organelles. The other has a larger volume of cytoplasm and has a fairly well-developed synthesis and secretion apparatus. Which of the osteocytes was formed later?
- A section of muscle tissue is given. Under the microscope, the spindle-shaped cells are visible. In the center of the cell is an elongated elongated, rod-shaped, elongated nucleus.
- An electronic micrograph of the peripheral part of the muscle fiber is given, in which a small cell is found located between the plasmolemma and the basement membrane of the muscle fiber. What is the name of this cell, and what is its function?
- The preparation shows muscle fibers containing many nuclei located on the periphery. Transverse striation is visible. What kind of muscle tissue is it?
- A section of muscle tissue is given. Under the microscope, the spindle-shaped cells are visible. In the center of the cell is an elongated elongated, rod-shaped, elongated nucleus. What kind of muscle tissue is it?
- The preparation of skeletal and cardiac muscle tissues is given. What structural features can distinguish the first from the second?
- In the experiment, the T-system was destroyed in the striated muscle fiber. Will the ability of the muscle fiber to contract change?
- An electronic micrograph of the peripheral part of the muscle fiber is given, in which a small cell is found located between the plasmolemma and the basement membrane of the muscle fiber. What is the name of this cell, and what is its function?
- Two Nyssl-stained nerve tissue micro-preparations are proposed. At the first stage, large lumps of chromatophilic substance are isolated in the neurocytes; at the second stage, they are small, in the form of a dust-like grain. What are the functional types of neurocytes on both micro-preparations?
- Two micro-preparations of the brain of conditionally healthy people are given : on the first - in the cytoplasm of neurons a large number of grains – inclusions of lipofuscin, on the second-lipofuscin is absent. Representatives of which age groups do micro-medicines belong to?
- It was found that the nerve impulse is transmitted along one nerve fibers at a speed of 1-2 m / s, along the other 5-120 m / s. What are these fibers?
- One of the preparations shows the final branch of the axial cylinder. What are the morphological types of the first and second nerve endings?
- On 2 preparations, sections of different parts of the brain are presented. On one, in the thickness of the cortex, pear-shaped cells with 2-3 dendrites are well distinguished, on the other, cells whose bodies have the shape of a pyramid, measuring 80-120 microns. Is it possible to find out what these sections of the brain are.
- The defeat of one type of cerebellar cells caused an irreversible violation of the function of balance and coordination of movement. Name these cells.
- In the early stages of embryonic development in the experiment, the embryo destroyed the trunk of the neural tube.
- In the experiment, the cranial part of the neural tube of a 4-week-old embryo was damaged. Differentiation of which organs will be disrupted?

21. The reflex arc consists of 3 neurons, which are divided into pre - and postganglionic. Moreover, the cells of postganglionic neurons in the muscle tissue of the organ form terminal plexuses. What arc is it?
22. 2 histological preparations of the posterior wall of the eye are presented. On the first preparation, melanin granules are contained in the cytoplasm near the nuclear zone of the cells of the pigment layer, on the second their processes. What were the lighting conditions of the animal?
23. The electronogram shows the retina with a large cellular composition, among which there is a support cell. What is the name of the supporting cell of the retina?
24. A person began to see poorly at dusk, and in the light of vision almost did not change. What retinal receptor elements are impaired?
25. At an appointment with an eye doctor, the patient began to confuse the color of colored objects. "He must be colorblind," the doctor thought. Damage to which cells of the retina of the eye leads to this disease?
26. Dogs detect objects by smell, the range of which is very large. What do you think is the reason for this?
27. The child's perception of taste stimuli is enhanced. Why?
28. Spinal ganglion cells are affected. Will sound stimuli be perceived and will they be conducted to the hearing center of the cortex?
29. The principle of operation of the hearing aid is based on the amplification of vibrations of the endolymph of the membranous labyrinth. In what cases is the use of a hearing aid effective?
30. When entering the aviation school, 2 applicants after rotating them in a chair could not walk well on the track. The function of which cells of the vestibular apparatus is impaired?
31. The patient has broken the integrity of the tympanic membrane. Can you explain why your hearing has deteriorated?
32. The mesenchymal lining formed under the myoepicardial plate is disturbed. What kind of heart development defect will there be?
33. On the preparation, a vein with a protruding fold of intima into the lumen of the vessel. Is this normal or pathological?
34. The preparation shows a capillary with a diameter of 3 microns. How functionally active is it?
35. In the wall of the artery, the endothelium with the basement membrane lining the lumen of the intima is destroyed. What are the possible consequences?