THE MINISTRY OF EDUCATION AND SCIENCE OF KYRGYZ REPUBLIC
OSH STATE UNIVERSITY
INTERNATIONAL MEDICAL FACULTY
Department of anatomy, histology and normal physiology

«Approved" _____
at faculty meeting, protocol № 1
from "28" 08 2018.
Head of depart, assoc. Sakibaev K. Sh.

«Agreed" _____
The chair of the UMC faculty
Assoc. Sakibaev K. Sh.
from "28" 08 2018.

LIST OF EXAM QUESTIONS
IN HISTOLOGY, EMBRYOLOGY AND CYTOLOGY

MICROSCOPIC TECHNIQUE.

1. The subject and tasks of histology, cytology and embryology, their formation and development.
2. Paint fixing and dewatering liquids. Paraffins and paraffin blocks. Slide and cover glasses. Wiring, pouring, cutting and painting for light microscopy.
3. special methods of light-optical microscopy: comparative, phase-contrast, luminescent and ultraviolet microscopy. Cyto-and histochemical methods.
4. The concept of a histological preparation. The main stages of its preparation.
5. The emergence and development of histology and cytology as independent sciences. The role of cell theory in the development of histology and medicine.
6. Distinctive features and sequence of stages of preparation of the preparation for light microscopy.
7. Microtomes and ultramicrotomes. The thickness of the sections prepared by microtomes and ultramicrotomes.
8. Methods of histological, embryological and cytological studies. Basic principles of manufacturing preparations for light and electron microscopy.

CYTOLOGY

1. Biological membrane: structural and chemical characteristics, functions. General plan of the structure of eukaryotic cells. The relationship between the shape and size of cells and their functional specialization.
2. Definition of the cell. Plasmolemma: structure and chemical composition, functions. Structural and functional characteristics of various types of intercellular connections.
3. The main provisions of the cell theory. Cytoplasmic organelles: definition, classification. Structural and functional characteristics of organelles involved in the biosynthesis of substances in cells.
4. Cytoplasmic organelles: concept and classification. Structural and functional characteristics of organelles involved in intracellular digestion, protective and neutralizing reactions.
5. Cytoplasmic organelles: concept and classification. Structural and functional characteristics of organelles involved in the processes of excretion of substances from cells.
6. Cytoplasmic organelles: concept and classification. Structural and functional characteristics of organelles involved in energy production.
7. Non-membrane organelles: ribosomes, centrioles, microtubules, microfilaments. Structure, chemical composition, value.
8. Cytoplasmic organelles: concept and classification. Structural and functional characteristics of the organelles that make up the cell cytoskeleton. Structure and significance of centrioles, cilia, and flagella.
9. Organelles of special significance. Structure and functions, meaning in cells that perform special functions.
10. Inclusions. Definition. Classification. Importance in the vital activity of cells and the body. Structure and chemical composition of various types of inclusions.

11. The core. Characteristics of the nucleus as the genetic center of the cell. The concept of the nuclear-cytoplasmic ratio. The structure of the non-dividing core.
12. Core: functions, structure, chemical composition. Interaction of structures
13. nuclei and cytoplasm in the processes of protein synthesis in cells.
14. The concept of the cell cycle: its stages and their morpho-functional characteristics. Features of the cell cycle in different types of cells.
15. Reproduction of cells and cell structures: methods of cell reproduction. The mitotic cycle. Structural and functional characteristics of the mitotic cycle. Biological significance of mitosis.
16. Reproduction of cells and cell structures: methods of cell reproduction. Meiosis. Its features and biological significance.
17. The concept of the cell as an elementary living system, the basis of the structure and function of eukaryotic organisms. The concept of non-pulmonary structures (simplast, syntitium, intercellular substance). The importance of cytology for medicine. The main provisions of the cell theory at the present stage of the development of sciences
18. General organization of animal cells: cytoplasm with cell wall, nucleus. The shape and size of cells in connection with their functional specialization. The microenvironment of the cell (extracellular matrix).
19. Structural components of the cell. Cytoplasm. The biological membrane as the structural basis of the vital activity of cells, its molecular organization and basic functions. The cell wall. Cell membrane (cytolemma), supramembrane and submembrane layers, their structural-chemical and functional characteristics.
20. The cell nucleus. Cell division, nuclear envelope, chromatin, nuclear juice, nucleolus. Core functions, the structure of the core in the interphase. Histo-and ultrastructural structure of the nucleus.
21. Cell division (mitosis, meiosis. amitosis). Structural elements of the chromosome set, sexual chromatin.
22. The life (cell) cycle of cells. Definition of the life cycle. Characteristics of its stages (mitotic cycle, growth and differentiation, active functioning, aging and cell death). Features of the life cycle in different types of cells
23. The general organization of the cell, the definition of the cell. Different types of cells.
24. Plasmolemma and its derivatives. Methods of penetration of substances into the cell. Intercellular connections.
25. The concept of the cell as the basis for the formation of the entire organic world. Cell theory.
26. The concept of cytoreceptors. Methods of entering substances into the cell: endo-and exocytosis, pinocytosis, phagocytosis. Mechanisms of transport of substances, adhesion. Cell adhesion molecules. Receptor function of membranes
27. Intercellular connections (contacts). Functional and structural characteristics of various compounds. Simple connections. Complex compounds: dense compounds, crevice compounds (nexuses), intermediate compounds, desmosomes, finger-like compounds.
28. The main components of the cytoplasm - organelles, inclusions, hyaloplasm (matrix). Organelles-definition, classification. Organelles of general significance. Organelles with a membrane structure . Endoplasmic reticulum - the structure and functions of the granular and non-granular endoplasmic reticulum, their importance in the synthesis of substances; structural features in connection with different cell metabolism

TISSUES

1. Levels of organization of the living. Definition of the tissue. Classification of the tissues. The concept of stem cells, cell populations, differons.

EPITHELIAL TISSUE

1. Morpho-functional characteristics of epithelial tissues. Sources of their development. Contribution of N. G. Khlopin to the study of epithelial tissues. Features of the structure of epithelial cells, polarization, special organelles, intercellular connections.

2. Morpho-functional characteristics of the integumentary epithelium. Classification. Stratified epithelium: different types, sources of their development, structure. Physiological regeneration, localization of cambial cells.
3. Morpho-functional characteristics of the integumentary epithelium. Classification. Simple epithelium: different types, sources of their development, structure, Physiological regeneration, localization of cambial cells.
4. Morpho-functional characteristics of the glandular epithelium. Sources of development. Cytophysiological characteristics of the secretory process. Types of Exocrine gland secretion: classification, structure, regeneration.
5. General principles of tissue organization.
6. Tissue as a system.
7. Tissue development in phylogeny and ontogenesis. Theory of tissue evolution. Types of tissues in the body.
8. Definition of fabric
9. General patterns of the structure of the integumentary epithelium. Classification of the integumentary epithelium by structure.
10. Epithelial tissue. General characteristics of epithelial cells, their prevalence in the body.
11. General patterns and distinctive features of the structure of various types of epithelium.
12. Morphofunctional characteristics of epithelial tissues.
13. Morphological classification of epithelium.
14. Histogenetic classification of epithelial tissue.
15. Features of epithelial tissues in connection with their position in the body.
16. Single-layer and multi-layer epithelium.
17. Types of epithelial cell connections.
18. Special epithelial organelles
19. Physiological and reparative regeneration of epithelial tissues.
20. Glands. Structure, function, and classification of the endocrine and exocrine glands.
21. Principles of classification of exocrine glands by structure, by type of secretion and the nature of the secreted secret.
22. Features of the structure of secretory cells depending on the phases of the secretory cycle.
23. Types of secretion: holocrine, apocrine and merocrine.
24. Phases of secretion: absorption, synthesis and accumulation, isolation and recovery.
25. Features of the structure of the cells of the glandular epithelium.
26. Histophysiology of the secretory process.
27.

BLOOD.

1. The concept of the blood system. Blood as a kind of tissue of the internal environment. Shaped elements of blood and their quantity. Red blood cells: size, shape, structure, chemical composition, function, life span. Features of the structure and chemical composition of reticulocytes, their percentage.
2. The concept of the blood system. Formed elements of blood and their quantity. Blood platelets (platelets): size, structure, function, life span.
3. The concept of the blood system. Formed elements of blood and their quantity. Classification of white blood cells. The leukocyte formula. Granular white blood cells (granulocytes): varieties, sizes, structure, functions, and life span.
4. The concept of the blood system. Formed elements of blood and their quantity. Classification of white blood cells. White blood cell formula. Non-granular white blood cells (agranulocytes): varieties, sizes, structure, functions, life span.
5. Tissues of the internal environment. General morphofunctional characteristics in connection with the provision of homeostasis of the body. Source of development. Classification. Blood and lymph. The composition of blood and lymph, their main functions

6. Shaped elements of blood and lymph - white blood cells, post-cellular (non-cellular) structures of human blood-red blood cells and blood platelets (platelets). Morphological classification of white blood cells (granulocytes and agranulocytes).
7. Blood development.
8. Blood and its functions.
9. Morphofunctional characteristics of blood.
10. The idea of the hemogram.
11. Understanding of the leukocyte formula
12. Morphofunctional characteristics and functional significance of red blood cells and platelets. Their development, form
13. Morphofunctional characteristics of granulocytes and agranulocytes.
14. What is the white blood cell formula? What is the white blood cell formula of a healthy person?
15. Blood platelets (platelets).
16. What are T-and B-lymphocytes and what is their participation in the immunological reactions of the body?
17. Lymph. Lymph function
18. Age-related blood changes
19. Morphofunctional characteristics of the lymph.
20. Types of hemoglobins and forms of red blood cells.
21. Embryonic hematopoiesis. Hematopoiesis in the wall of the yolk sac, in the liver, thymus, spleen, lymph nodes, bone marrow and their timing.
22. Postembryonic hematopoiesis in humans. Stages of blood cell differentiation: morphologically identifiable cells.Stem, semi-stem, and unipotent cells.
23. Erythrocytopoiesis, granulocytopoiesis, thrombocytopoiesis, lymphocytopoiesis occurring in myeloid tissue.
24. Changes in the nature of the cytoplasm and nuclei of erythropoietic cells as the erythrocyte matures.
25. The main processes of differentiation of granulocyte cells in the red bone marrow.
26. Where and how the formation of T and B lymphocytes occurs.
27. The formation of monocytes and the stages of their origin.
28. Platelet formation.
29. Functions of red bone marrow stromal cells in the process of hematopoiesis
30. The role of specific factors in the regulation of hematopoietic processes
31.

CONNECTIVE TISSUES

1. Morpho-fuctional characteristics of connective tissues. Cellular elements of fibrous connective tissue: origin, structure, functions.
2. Morpho-fuctional characteristics and classification of connective tissue. Intercellular substance of fibrous connective tissue: structure, meaning. Fibroblasts and their role in the formation of intercellular matter.
3. Morpho-fuctional characteristics and classification of connective tissue. Macrophages: structure, functions, source of development. The concept of the macrophage system.
4. Morpho-fuctional characteristics and classification of connective tissue. Connective tissues with special properties: classification, structure, functions.
5. Morpho-fuctional characteristics and classification of cartilage tissues. Their development, structure, and functions. Cartilage growth and regeneration. Age-related changes.
6. Morpho-fuctional characteristics and classification of bone tissues. Their development, structure, and role of cellular elements and intercellular matter. Age-related changes.
7. Morpho-fuctional characteristics and classification of bone tissues. The structure of flat and tubular bones. Direct and indirect osteogenesis. Bone regeneration.
8. Morphofunctional characteristics of connective tissue.

9. Principles of classification of connective tissues.
10. Cellular elements of loose fibrous connective tissue and their functional significance.
11. Types of connective tissue fibers and their functional significance.
12. Classification of proper connective tissues.
13. Functions of the proper connective tissues.
14. Cells and non-cellular structures of loose fibrous unformed connective tissue.
15. Loose fibrous connective tissue, its structure, function.
16. Localization of RVST in the body, cellular elements. Own and alien connective tissue cells. Ultrastructure and function.
17. Intercellular substance. General characteristics and structure. The main substance, its physical and chemical properties and value. Collagen and elastic fibers, their role, structure and chemical composition.
18. The origin of intercellular matter. Age-related changes in cells and intercellular matter of connective tissue.
19. Collagen and reticular fibers.
20. Elastic fibers.
21. The main substance of loose fibrous neofomlennoy connective tissue.
22. Dense fibrous connective tissue, its classification, structure and functions.
23. Pigmented tissue. Mucosal tissue.
24. Connective tissues with special properties. Localization in the body of all types of connective tissue.
25. Reticular tissue, adipose tissue, mucosal tissue. Their histo-and ultrastructure.
26. A variety of connective tissue fibers
27. Regeneration of the connective tissue proper

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

NERVOUS TISSUE

1. Morpho-fuctional characteristics of nervous tissue. Sources of development. Neurocytes: functions, structure, morphological and functional classifications.
2. Morpho-fuctional characteristics of the nervous tissue. Sources of development. Nerve fibers: definition, structure and functional features of myelin and myelin-free nerve fibers. Regeneration of nerve fibers.

3. Morpho-fuctional characteristics of the nervous tissue. Sources of development. Neuroglia: classification, structure, and significance of various types of gliocytes.
4. Morpho-fuctional characteristics of the nervous tissue. Sources of development. Nerve endings: concept, classification, structure of receptor and effector endings.
5. Nerve tissue.
6. General morphofunctional characteristics of the nervous tissue.
7. Sources of nervous tissue development. Histogenesis..
8. Cytological features of nerve cells and their processes at the microscopic and ultramicroscopic levels.
9. Data on the structure of neurocytes for judging the degree of their functional activity.
10. Microscopic and ultramicroscopic features of myelin and myelin-free nerve fibers, the process of myelination.
11. Nerve endings.
12. The principle of organization of reflex arcs – somatic and vegetative.
13. Sources of development of neurocytes and neuroglia.
14. Characteristic features of the structure of neurocytes.
15. Features of the cell cycle of neurocytes and neuroglia
16. The concept of nerve fibers, their classification and structural features.
17. The concept of interneuronal synapses.
18. Classification of synapses.
19. The principle of organization of two-and multiple reflex arcs
20. Name the sources of development of neurocytes and gliocytes.
21. What types of cells do nerve tissue consist of, and what function do they perform?
22. What morphological and functional features do the axon and dendrites of nerve cells differ from each other?
23. Classification of nerve cells (neurocytes)?
24. Changes in the granular endoplasmic network of a neurocyte depending on its functional state.
25. Classification of glia (gliocytes)?
26. Participation in the construction of nerve fibers of nerve cells and glia.
27. Types of nerve fibers, "fast" and "slow" impulses.
28. General morpho-functional characteristics of nerve endings. Receptor and efferent endings, their classification and structure.
29. The concept of synapse. Interneuronal synapses. Classification, structure. Mediators. Mechanism of excitation transmission in synapses
30. Reflex and reflex arc

THE NERVOUS SYSTEM.

1. Morphofuctional characteristics of the nervous system. Nerves and spinal ganglia: development, function, structure. Nerve regeneration.
2. Morphofuctional characteristics of the nervous system. Spinal cord: development, functions, structure of gray and white matter, their functional significance.
3. The brain. General morpho-functional characteristics of the large hemispheres, structural features in the motor and sensitive areas. Myeloarchitectonics. The hemato-encephalic barrier, its structure and significance.
4. The cerebellum. Structure and functional characteristics. Neural composition of the cerebellar cortex. Interneuronal connections. Afferent and efferent nerve fibers.

THE SENSES.

1. The senses. General morpho-functional characteristics. The concept of analyzers. Classification of the senses. The organ of smell and taste: structure, development, cytophysiology.
2. The organ of vision. Morpho-functional characteristics. Development. The structure of the receptor apparatus of the eye. Changes in it under the influence of light and in the dark. Introduction to the visual analyzer.

3. The organ of vision. Morpho-functional characteristics. Development. The structure of the structures that make up the dioptric and accommodative apparatus of the eye.
4. The organ of hearing. Morpho-functional characteristics, development. Structure of the inner ear, cytophysiology of the inner ear receptor cells. Introduction to the auditory analyzer.
5. The organ of balance. Structure, development, and functions. Morpho-functional characteristics of sensoepithelial (hair) cells.

1. Explain, in a cell under what circumstances the amount of autophagosomes increases
1) metabolic stresses 2) growth and differentiation 3) various cell damage
4) increased secretion of steroids
a) 1,2,3 **b) 1 and 3** c) 2 and 4 d) 4 e) 1, 2, 3 and 4

2. In situ hybridization is a histological technique used to visualize what type of macromolecule?
a. Proteins
b. Carbohydrates
c. Certain enzymes
d. Nucleic acids
e. Lipids

3. If the cell, have a villa, performs the following function:
a) provides passive diffusion of water; b) promotes the movement of substances near its surface
c) transmits a nerve impulse; d) participates in phagocytosis; **e) absorbs substances**
4. Certain antibiotic therapies slow the replacement of the cells lining the small intestine. This may cause the loss of what tissue type?
a) Ciliated pseudostratified columnar epithelium
b) Simple cuboidal epithelium
c) **Simple columnar epithelium**
d) Pseudostratified columnar epithelium with stereocilia
e) Stratified aquamous, nonkeratinized tract wall
5. A smear of blood from 70-year-old leukemia patient a larger that normal population of cells that have large, round nuclei with 1 or 2 nucleoli. The cytoplasm of these cells shows azurophilic granules. Which of the following forms of leukemia would you suspect?
a. **Promyelocytic leukemia**
b. Basophilic leukemia
c. Lymphoblastic leukemia
d. Stem cell leukemia
e. Eosinophilic leukemia
6. Which of the following cellular features is used is naming types of epithelia?
a. Shape of cells in the basal layer
b. Number of cell layers
c. Presence of a basal lamina
d. Size of the nuclei
e. Nature of the cell junctions that are present.