



**МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ  
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ОШСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ  
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Кафедра анатомии, гистологии и нормальной физиологии**

“РАССМОТРЕНО”   
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Зав. кафедрой, к.м.н., доц. Сакибаев К.Ш.

“УТВЕРЖДАЮ”   
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**LIST OF QUESTIONS  
FOR THE 1ST MODUL  
IN HISTOLOGY, CYTOLOGY AND EMBRYOLOGY**

**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. 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
2. 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).
3. 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.
4. 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.
5. Cell division (mitosis, meiosis. amitosis). Structural elements of the chromosome set, sexual chromatin.

6. 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
7. The general organization of the cell, the definition of the cell. Different types of cells.
8. Plasmolemma and its derivatives. Methods of penetration of substances into the cell. Intercellular connections.
9. The concept of the cell as the basis for the formation of the entire organic world. Cell theory.
10. The concept of cytoresceptors. 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
11. 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.
12. 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.

## GENERAL HISTOLOGY

### EPITHELIAL TISSUE

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

### CONNECTIVE TISSUE

1. Morphofunctional characteristics of connective tissue.
2. Principles of classification of connective tissues.
3. Cellular elements of loose fibrous connective tissue and their functional significance.
4. Types of connective tissue fibers and their functional significance.
5. Classification of proper connective tissues.

6. Functions of the proper connective tissues.
7. Cells and non-cellular structures of loose fibrous unformed connective tissue.
8. Loose fibrous connective tissue, its structure, function.
9. Localization of RVST in the body, cellular elements. Own and alien connective tissue cells. Ultrastructure and function.
10. 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.
11. The origin of intercellular matter. Age-related changes in cells and intercellular matter of connective tissue.
12. Collagen and reticular fibers.
13. Elastic fibers.
14. The main substance of loose fibrous neofomlennoy connective tissue.
15. Dense fibrous connective tissue, its classification, structure and functions.
16. Pigmented tissue. Mucosal tissue.
17. Connective tissues with special properties. Localization in the body of all types of connective tissue.
18. Reticular tissue, adipose tissue, mucosal tissue. Their histo-and ultrastructure.
19. A variety of connective tissue fibers
20. Regeneration of the connective tissue proper.

#### BLOOD AND LYMPH. HEMATOPOIESIS.

1. 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
2. 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).
3. Blood development.
4. Blood and its functions.
5. Morphofunctional characteristics of blood.
6. The idea of the hemogram.
7. Understanding of the leukocyte formula
8. Morphofunctional characteristics and functional significance of red blood cells and platelets. Their development, form
9. Morphofunctional characteristics of granulocytes and agranulocytes.
10. What is the white blood cell formula? What is the white blood cell formula of a healthy person?
11. Blood platelets (platelets).
12. What are T-and B-lymphocytes and what is their participation in the immunological reactions of the body?
13. Lymph. Lymph function
14. Age-related blood changes
15. Morphofunctional characteristics of the lymph.
16. Types of hemoglobins and forms of red blood cells.
17. Embryonic hematopoiesis. Hematopoiesis in the wall of the yolk sac, in the liver, thymus, spleen, lymph nodes, bone marrow and their timing.
18. Postembryonic hematopoiesis in humans. Stages of blood cell differentiation: morphologically identifiable cells. Stem, semi-stem, and unipotent cells.
19. Erythrocytopoiesis, granulocytopoiesis, thrombocytopoiesis, lymphocytopoiesis occurring in myeloid tissue.
20. Changes in the nature of the cytoplasm and nuclei of erythropoietic cells as the erythrocyte matures.

21. The main processes of differentiation of granulocyte cells in the red bone marrow.
22. Where and how the formation of T and B lymphocytes occurs.
23. The formation of monocytes and the stages of their origin.
24. Platelet formation.
25. Functions of red bone marrow stromal cells in the process of hematopoiesis
26. The role of specific factors in the regulation of hematopoietic processes

## TESTS

1. Specify connective tissue which meets only at a germ.  
a) mesenchyme    b) mucous tissue    c) pigmented tissue    d) brown fatty tissue
2. Cell where organelles are well developed, especially granular endoplasmic network, the nucleolus is located eccentrically, about a nucleolus there is a light zone –  
a) basophil    b) plasmacyte    c) chondrocyte    d) lymphocyte
3. What tissue meets in skin sites in nipples, a scrotum, birthmarks, and also in a vascular cover of an eye?  
a) nervous tissue    b) mucous tissue    c) pigmented tissue    d) cartilagenous tissue
4. Specify what cell has a spherical form, the nucleus is located on the periphery, the center is occupied with a big vacuole of triglycerides.  
a) adipocyte    b) pericyte    c) plasmacyte    d) lymphocyte
5. What blood cells contain the granules having affinity to sour dyes?  
a) platelets    b) eosinophils    c) basophiles    d) erythrocytes    e) lymphocytes
6. What blood cells provide humoral immunity?  
a) erythrocytes    b) monocytes    c) B-lymphocytes  
d) T-lymphocytes    e) neutrophils
7. Form of a nucleus of young granulocytes.  
a) round    b) bean-shaped    c) the segmented    d) rhabdoid    e) the flat
8. In what nucleus of blood cells of women is defined sexual chromatin?  
a) neutrophils    b) monocytes    c) lymphocytes    d) basophiles    e) eosinophils
9. Call the largest blood cell which carry out function of phagocytosis  
a) eosinophil    b) platelet    c) erythrocyte    d) monocyte    e) basophil
10. Which cell provide cellular immunity?  
a) erythrocytes    b) eosinophils    c) B-lymphocytes    d) T-lymphocytes    e) monocytes
11. mature erythrocytes contains  
a) nucleus    b) an endoplasmic network    c) mitochondria    d) hemoglobin    e) lamellar complex
12. Form of nucleus of mature granulocytes  
a) round    b) bean-shaped    c) the segmented    d) rhabdoid    e) the flat
13. Specify indicators with aberrations in the provided analysis of blood of the adult patient  
a) neutrophil of 40%    b) an eosinophil – 12%    c) basophils – 10%  
d) lymphocytes – 35-40%

## Situational tasks

### Introduction

1. In a laboratory class, a student examines a microslide using a microscope with a magnification of 40 times and an eyepiece of 15 times. How many times is the visible image of the structures larger than the true one?
2. When studying a microslide in a light microscope, the structure of interest is located at the edge of the field of view, on the right. In which direction should the micro-product be moved on the microscope table so that it is in the center of the field of view?
3. The researcher will have to study the structures of a cell smaller than 0.2 microns. What research methods should he recommend?
4. You intend to study the structure of the cell wall, which has a thickness of 7-10 nm. What kind of microscope do you use?
5. It is necessary to identify, perhaps, a larger number of histological structures. Which of the two modes of microscopy (lens x 40, eyepiece x 10 or lens x 20, eyepiece x 20)?
6. The doctor must urgently receive an answer about the condition of the organ. What method can be used to quickly prepare a histological section?

## Cytology

1. On the free surface of the cells there are structures in which 9 pairs of peripheral and 2 pairs of central microtubules are visible under an electron microscope. What are these structures called, and what is their role?
2. Under the electron microscope, multiple small indentations of the plasmolemma of the cell are visible, light bubbles.
3. The cells lining the intestine have a brush border. In some diseases (spru), it is destroyed. What cell function is affected? Why?
4. When healing, the wound is filled with cells, and then with fibers. How does the number of cells and fibers increase?
5. Two cells are visible in the preparation. The core of one of them contains many intensely colored lumps of chromatin. In the other cell, the nucleus is light and the chromatin is diffusely distributed. What type of chromatin predominates in a particular cell and how do they differ functionally?
6. In the preparation, the star shapes located in the center of the chromosome are visible. What is the stage of mitosis?
7. In the prophase of mitosis, the nucleolus disappears. What is the mechanism of this phenomenon and what role does the state of the part of the chromosome called the nucleolar organizer play?

## Epithelium

1. Tissues with the following structures were found on the preparation: a) a layer of cells closely adjacent to each other; b) cells separated by intercellular matter. Which of these structures belongs to the epithelial tissues?
2. Two preparations of the human tongue are presented. The first one has 5-10 layers of non-keratinizing epithelium. The second has 25-30 layers of partially keratinized epithelium. Which of the drugs belongs to an adult, which to a newborn?
3. In the transitional epithelium of the bladder, depending on the functional state of the organ, the composition may change. Determine on the drug whether the organ is stretched or shortened.
4. On the human skin preparation, the horny shiny and granular layers of the epidermis are removed. Is it possible to regenerate the epidermis?
5. Two drugs are presented. On the first-a gland with alveolar terminal sections and branched excretory ducts. Which of the glands is simple, which is complex?

## Connective tissue

1. In one part of the connective tissue in the macrophage population there are many monocytoïd cells, in the other there are almost exclusively mature macrophages. In which of the sites is the migration of monocytes from the blood stream to the connective tissue more intense?
2. On the histological preparation, a large number of granules can be seen next to the mast cells. What substances were released from the cells, and what is the name of this process?
3. At the site of the introduction of a foreign body in the body, inflammation occurs with the participation of blood cells and loose fibrous connective tissue. What blood and connective tissue cells will be found in the focus of inflammation. Which cells will be the largest in different phases of inflammation?

## Blood

1. Here is a micrograph of a blood smear at high magnification. White blood cells and red blood cells are useful. What cells do you classify as granulocytes – basophils, lymphocytes, neutrophils, eosinophils?
2. On the drug, you see two white blood cells. One of them has a core consisting of two segments, the other – of five. Which cell is an eosinophil? What additional information do you need to confirm the conclusion?
3. The laboratory assistant reported that the unidentified type of granulocytes was 1% of all white blood cells. With what additional information can you identify these cells?

4. Decide what value corresponds to the content of monocytes in the leukocyte formula-6-8%, 6-7%, 200-400 thousand?