

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

BANK OF ASSESSMENT TOOLS FOR DISCIPLINE

«HISTOLOGY, EMBRYOLOGY, CYTOLOGY»

Training program (specialty): **31.05.01 GENERAL MEDICINE**

Department: **HISTOLOGY WITH CYTOLOGY AND EMBRYOLOGY**

Mode of study **FULL-TIME**

**Nizhniy Novgorod
202_**

1. Bank of assessment tools for the current monitoring of academic performance, mid-term assessment of students in the discipline “Histology, embryology, cytology”

This Bank of Assessment Tools (BAT) for the discipline “Histology, embryology, cytology” is an integral appendix to the working program of the discipline “Histology, embryology, cytology”. All the details of the approval submitted in the WPD for this discipline apply to this BAT.

(Banks of assessment tools allow us to evaluate the achievement of the planned results stated in the educational program.

Assessment tools are a bank of control tasks, as well as a description of forms and procedures designed to determine the quality of mastering study material by students.)

2. List of assessment tools

The following assessment tools are used to determine the quality of mastering the academic material by students in the discipline/ practice:

No.	Assessment tool	Brief description of the assessment tool	Presentation of the assessment tool in the BAT
1	Test № 1 section "Cytology and Human Embryology"	A system of standardized tasks that allows you to automate the procedure of measuring the level of knowledge and skills of a student	Bank of test tasks
	Test № 2 section "General histology"		
	Test № 3 section "Special histology - 1"		
	Test № 4 section "Special histology - 2"		
2	Individual survey	A control tool that allows you to assess the degree of comprehension of the material	List of questions
3	Diagnostics of histological preparations obtained light microscopy	A tool of verifying the ability to present the study material on a topic, section or sections of a discipline, organized as a practice class in the form of an interview between a teacher and students.	Histological preparations on topics/sections of the discipline
4	Electron (protocols) workbook	A didactic complex designed for independent work of the student and allowing to assess the level of mastering study materials	Workbook sample
5	Diagnosis of electron micrographs of histological structures	A tool of verifying the ability to present the study material on a topic, section or sections of a discipline, organized as a practice class in the form of an interview between a teacher and students.	Electron micrographs of histological structures on topics/sections of the discipline
6	Interview	A tool of control organized as a special conversation between the teacher and the student on topics related to the discipline being studied, and designed to clarify the amount of knowledge of the student on a specific section, topic, problem, etc.	Questions on topics/sections of the discipline

3. A list of competencies indicating the stages of their formation in the process of mastering the educational program and the types of evaluation tools

Code and formulation of competence*	Stage of competence formation	Controlled sections of the discipline	Assessment tools
<p>UC-1 Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy</p> <p>GPC-5 Able to assess morphofunctional, physiological conditions and pathological processes in the human body to solve professional problems</p> <p>GPC-10 Able to understand the principles of modern information technologies and use them to solve the tasks of professional activity</p>	Current control	<p>Section 1 "Cytology and Human Embryology"</p>	<p>Computer testing (the variant is formed by the method of random sampling); Individual survey; Diagnostics of histological preparations obtained light microscopy; Diagnosis of electron micrographs of histological structures;</p>
<p>UC-1 Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy</p> <p>GPC-5 Able to assess morphofunctional, physiological conditions and pathological processes in the human body to solve professional problems</p> <p>GPC-10 Able to understand the principles of modern information technologies and use them to solve the tasks of professional activity</p>	Current control	<p>Section 2 "General histology"</p>	<p>Computer testing (the variant is formed by the method of random sampling); Individual survey; Diagnostics of histological preparations obtained light microscopy; Diagnosis of electron micrographs of histological structures;</p>
<p>UC-1 Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy</p> <p>GPC-5 Able to assess morphofunctional, physiological conditions and</p>	Current control	<p>Section 3 "Special histology - 1"</p>	<p>Computer testing (the variant is formed by the method of random sampling); Individual survey; Diagnostics of histological preparations obtained light microscopy; Diagnosis of electron</p>

<p>pathological processes in the human body to solve professional problems</p> <p>GPC-10</p> <p>Able to understand the principles of modern information technologies and use them to solve the tasks of professional activity</p>			<p>micrographs of histological structures;</p>
<p>UC-1</p> <p>Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy</p> <p>GPC-5</p> <p>Able to assess morphofunctional, physiological conditions and pathological processes in the human body to solve professional problems</p> <p>GPC-10</p> <p>Able to understand the principles of modern information technologies and use them to solve the tasks of professional activity</p>	<p>Current control</p>	<p>Section 4</p> <p>"Special histology - 2"</p>	<p>Computer testing (the variant is formed by the method of random sampling);</p> <p>Individual survey;</p> <p>Diagnostics of histological preparations obtained light microscopy;</p> <p>Diagnosis of electron micrographs of histological structures;</p>
<p>UC-1</p> <p>GPC-5</p> <p>GPC-10</p>	<p>Mid-term</p>	<p>Section 1 "Cytology and Human Embryology"</p> <p>Section 2 "General histology"</p> <p>Section 3 "Special histology - 1"</p> <p>Section 4 "Special histology - 2"</p>	<p>Computer testing (the variant is formed by the method of random sampling);</p> <p>Diagnostics of histological preparations obtained light microscopy;</p> <p>Diagnosis of electron micrographs of histological structures;</p> <p>Interview.</p>

**- not provided for postgraduate programs*

4. THE CONTENT OF THE ASSESSMENT TOOLS OF ENTRY, CURRENT CONTROL

Current control is carried out by the discipline teacher when conducting classes in the form of: assessment tool 1, assessment tool 2, assessment tool 3, assessment tool 4, assessment tool 5.

Assessment tool 1 "Cytology and Human Embryology"

- 1) Test tasks
- 2) Individual survey
- 3) Histological preparations on topics/sections of the discipline
- 4) Workbook sample
- 5) Electron microphotographs of histological structures by topics/sections of the discipline

Assessment tool 2 "General histology"

- 1) Test tasks

- 2) Individual survey
- 3) Histological preparations on topics/sections of the discipline
- 4) Workbook sample
- 5) Electron microphotographs of histological structures by topics/sections of the discipline
Assessment tool 3 "Special histology - 1"
 - 1) Test tasks
 - 2) Individual survey
 - 3) Histological preparations on topics/sections of the discipline
 - 4) Workbook sample
 - 5) Electron microphotographs of histological structures by topics/sections of the discipline
Assessment tool 4 "Special histology - 2"
 - 1) Test tasks
 - 2) Individual survey
 - 3) Histological preparations on topics/sections of the discipline
 - 4) Workbook sample
 - 5) Electron microphotographs of histological structures by topics/sections of the discipline

4.1. Tasks for the assessment of competence: UC-1, GPC-5, GPC-10

The bank of assessment tools for conducting current control of students is presented on the Educational Portal of the PRIMUM:

Test № 1	https://sdo.pimunn.net/mod/quiz/view.php?id=154635
Test № 2	https://sdo.pimunn.net/mod/quiz/view.php?id=154729
Test № 3	https://sdo.pimunn.net/mod/quiz/view.php?id=156751
Test № 4	https://sdo.pimunn.net/mod/quiz/view.php?id=157077

4.2. Individual survey for the assessment of competence: UC-1, GPC-5, GPC-10

Section 1 "Cytology and Human Embryology"

- 1) Subject and objectives of the course of histology with cytology and embryology. Significance for medicine. Levels of organization of the human body. Methods of histological examination.
- 2) Protoplasm. Cell. Intercellular substance. Cytoplasm. Organelles, inclusions, hyaloplasm.
- 3) Biological membrane. Cell membrane, structure and significance. Microvilli. Cilia. Intercellular connections. Organelles, classification, structure, meaning. Inclusions, classification, structure, meaning.
- 4) Cell nucleus compartments. Chromatin: euchromatin, heterochromatin, differences in appearance and function, chromosomes. Nuclear envelope: structural and functional characteristics. Nuclear skeleton. Nuclear pores. Nucleolus: composition and function
- 5) Cell cycle: sequence and significance. Mitosis: phases and results.
- 6) Fertilization and its results. Cleavage and its results. Gastrulation: phases and results.
- 7) The basic germs of embryo and their derivatives
- 8) Histogenesis and organogenesis and their results

Section 2 "General histology"

- 1) Classification of epithelia. The basement membrane. Intercellular junctions of epithelial cells.
- 2) Classification of connective tissues, criteria for differentiation. Cell composition of the connective tissues proper. Fibroblasts, macrophages, adipose cells, mast cells, plasma cells, adventitial cells - structural and functional characteristics
- 3) Red blood cells: morphological and functional characteristics, structural variants, life span. Platelets: morphological and functional characteristics, life span. White blood cells: classification, morphological and functional characteristics of varieties, life span. A complete blood count (CBC).
- 4) Reticular tissue: morphological and functional characteristics, localization in the human body.
- 5) Types of adipose tissue, especially their structure, function, localization.
- 6) General characteristics and features of hyaline, elastic and fibrous cartilage. Origin, composition and role of intercellular substance of cartilage tissue. Features of the structure of mature and young cartilage tissue. Structure and function of the perichondrium. Growth and regeneration of cartilage.

- 7) General characteristics and features of lamellar and nonlamellar bone tissue. Bone cells, their varieties and origin. The structure and functions of osteoblasts and osteocytes. Features of the structure and function of osteoclast. The concept of osteon. Structure and function of the periosteum.
- 8) Classification of muscle tissue. The structure of striated muscle fiber. The concept of symplast. Structural organization of the sarcomere. The structure of cardiac muscle tissue. Structural features of a typical cardiomyocyte. Features of the structure and function of smooth muscle tissue. Structural features of a smooth myocyte.
- 9) Structural elements of nervous tissue. Fundamental features of the structure and function of nerve cells. Classification of neurons. Neuroglia cells, their classification and functions.

Section 3 "Special histology - 1"

- 1) General classification of vessels. Features of the structure and functioning of different types of blood vessels. Features of the structure of the lymphatic vessels. Vessels of the microcirculatory bed, their role in the blood supply to organs.
- 2) Arteries and veins. The main types and features of their structure. Tissue and cellular composition of different types of vessels.
- 3) A heart. Sources of development. Endocardial and epicardial layers. Membranes, tissue and cellular composition, fibrous skeleton of the heart. Valves. Types of cardiomyocytes. Conductive (generating) system.
- 4) Red bone marrow. Source of development and General morphofunctional characteristics. Localization. The composition of the tissue, stroma, blood vessels. Structure of the red bone marrow and characteristics of postembryonic hematopoiesis in it. Compartments of myeloid hematopoiesis. CFU.
- 5) Thymus. Structure and functional significance. Differentiation of T-lymphocytes and thymus barrier. Thymic corpuscles. Endocrine function of the thymus.
- 6) The lymph node. Structure and functional significance. Participation in the formation of T- and B-lymphocytes. Sinuses of the lymph node. Main structural and functional parts and types of lymph nodes.
- 7) The spleen. Structure and functional significance. T- and B-zones. Blood supply: features and role in ensuring the function of the spleen.
- 8) Classification of lymphocytes. Participation in the formation of T- and B-lymphocytes. Sinuses of the lymph node.
- 9) Tooth tissues. Development of dentin. Histogenesis of enamel. Tongue: layers, papillae, organ of taste, minor salivary glands.
- 10) A ring of lymphatic tissue at the entrance of the oropharynx. The structure of the palatine tonsil.
- 11) The esophagus: the structure of the wall, its features throughout the organ and in the terminal part of the esophagus transition to the stomach.
- 12) The stomach. General morpho-functional characteristics. Features of the structure of different portions. Gastric epithelium: structure and function. Cancer of the stomach: types, structure, cellular composition, function.
- 13) Small intestine wall: layers, intestinal villi and crypts. Cell composition and histophysiology of the intestinal epithelium. The digestion and absorption of nutrients. Tissue and cellular composition. Peyer's patches.
- 14) Large intestine: layers, their tissue and cells. The structure of the colon.
- 15) Appendix. Layers, tissues and cellular compositions. The features and function of the organ
- 16) Salivary glands. Major salivary glands. The principles of the structure. The similarity and structural features of various salivary glands. Histophysiological characteristics of the cellular composition of acini and excretory ducts.
- 17) Pancreas. General plan of the structure. Exocrine part: acinus, excretory ducts, enzymes. Endocrine part: histo-physiological characteristics of the islets of Langerhans, hormones.
- 18) Liver. The principles of the structure. The similarity and structural features of various liver.
- 19) Gallbladder. General plan of the structure. The functions and importance of the organ.
- 20) Pituitary gland: structure. Role in the endocrine system. The connection of the pituitary gland with the hypothalamus.

- 21) The thyroid gland. Structure: tissue and cellular composition, follicular and parafollicular cells.
- 22) The adrenal glands. Structural and functional features of the parts and zones distinguished in the organ. The cellular structure of the cortex and medulla.
- 23) General characteristics of the urinary system. Kidney. Nephron and urine formation. Juxtaglomerular apparatus. Excretory passages of the urinary system: ureter, urinary bladder, urethra.
- 24) Testes: structure and functions. Genital ducts and accessory glands of the male reproductive system. Epididymis, seminal vesicles, prostate.
- 25) Ovary. Oogenesis and endocrine function. Follicles, their varieties and derivatives. The structure of a mature follicle. Follicle atresia, atretic body, structure and importance. Ovulation.
- 26) Uterus: the structure of the wall. Tissue and cellular composition. Features of the structure and function of the cervix. Intra-organ vessels.
- 27) The mammary gland. Tissue and cellular composition. Morphological features of “active” and “resting” mammary glands.
- 28) Placenta. The sources of its formation and the main parts and functions. Tissue and cell composition. The placental barrier. Decidual cells. Fibrinoid.

4.3. Histological preparations by topics/sections of the discipline “Histology, embryology, cytology”: UC-1, GPC-5, GPC-10

Section 1 "Cytology and Human Embryology"

1. Preparation 18. Multipolar nerve cell (cross section of the spinal cord)
2. Preparation 7. Multinucleated protoplasm (striated muscle fibers of the tongue)
3. Preparation 8. Intercellular substance of elastic cartilage (cross section of the auricle)
4. Preparation 14. Lipid inclusions in hepatocytes
5. Preparation 15. Glycogen particles in hepatocytes
6. Preparation 16. Secretory granules in skin cells
7. Preparation 17. Pigment granules
8. Preparation 22. Interphase nucleus
9. Preparation 27. Mitosis (in the onion root cells)

Section 2 "General histology"

1. Preparation 39(dem). Primitive streak
2. Preparation 40. Original derivatives of germ layers
3. Preparation 41. The latest gastrula
4. Preparation 42(dem). Segmentation of medial mesoderm to somites and brain vesicles formation (total preparation of bird embryo)
5. Preparation 139. Simple Squamous and Simple Columnar epithelia
6. Preparation 44. Simple Cuboidal epithelium
7. Preparation 47. Pseudostratified columnar ciliated epithelium
8. Preparation 48. Stratified Squamous nonkeratinized epithelium
9. Preparation 50. Transitional epithelium
10. Preparation 54(dem). Mesenchyme
11. Preparation 24. Blood smear
12. Preparation 64(dem). Reticular tissue
13. Preparation 60. Loose connective tissue
14. Preparation 58. Dense regular connective tissue (transection of tendon)
15. Preparation 62. White adipose tissue
16. Preparation 65. Hyaline cartilage
17. Preparation 8. Elastic cartilage
18. Preparation 66(dem). Fibrous cartilage
19. Preparation 68. Lamellar bone tissue
20. Preparation 69. Intramembranous bone formation
21. Preparation 70. Endochondral bone formation
22. Preparation 71. Smooth muscle tissue
23. Preparation 72. Skeletal muscle tissue

24. Preparation 73. Cardiac muscle tissue
25. Preparation 18(dem). Multipolar neuron
26. Preparation 74. Pseudounipolar neuron
27. Preparation 78(dem). Unmyelinated nerve fibers (isolated)
28. Preparation 79. Myelinated nerve fibers (isolated)

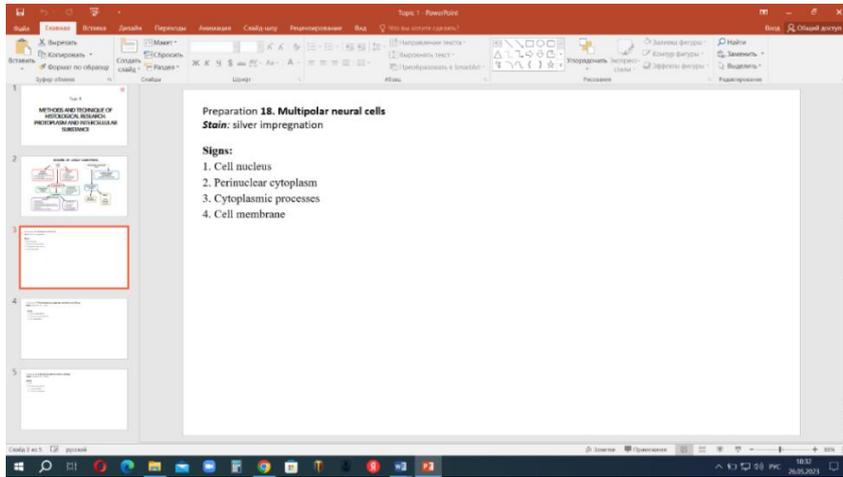
Section 3 "Special histology - 1"

1. Preparation 100. Microcirculatory bed
2. Preparation 101. Muscular artery
3. Preparation 102. Muscular vein
4. Preparation 103. Elastic artery
5. Preparation 106. Heart wall
6. Preparation 111. Red bone marrow (smear)
7. Preparation 162. Thymus
8. Preparation 108. Lymph node
9. Preparation 109. Spleen
10. Preparation 134. Tooth development – early stage
11. Preparation 135. Tooth development – late stage
12. Preparation 128. Tongue (sagittal section of the anterior part)
13. Preparation 131. Palatine tonsil
14. Preparation 136. Esophagus
15. Preparation 138. Stomach (fundic region)
16. Preparation 141. Duodenum
17. Preparation 143. Jejunum
18. Preparation 144. Large intestine
19. Preparation 145. Appendix
20. Preparation 146. Parotid gland
21. Preparation 147. Submandibular gland
22. Preparation 148. Pancreas
23. Preparation 150. Human liver
24. Preparation 149. Gallbladder

Section 4 "Special histology - 2"

1. Preparation 159. Pituitary gland (Hypophysis)
2. Preparation 160. Thyroid gland
3. Preparation 163. Suprarenal gland (Adrenal gland)
4. Preparation 165. Kidney
5. Preparation 168. Urinary bladder
6. Preparation 169. Testis
7. Preparation 170. Epididymis
8. Preparation 172. Prostate
9. Preparation 173. Ovary
10. Preparation 175. Uterus
11. Preparation 179. Mammary gland
12. Preparation 177. Maternal portion of placenta
13. Preparation 178. Fetal portion of placenta

4.4. Workbook sample on topics/sections of the discipline “Histology, embryology, cytology”:
UC-1, GPC-5, GPC-10



4.5. Electron microphotographs of histological structures by topics/sections of the discipline “Histology, embryology, cytology”: UC-1, GPC-5, GPC-10

1.	Cell membrane and a glycocalyx (electron micrograph x 200,000)
2.	Electron micrograph of agranular (or smooth) endoplasmic reticulum (1) and granular (or rough) endoplasmic reticulum (2)
3.	Electron micrograph (x 200,000) of a mitochondrion (1) with the cristae (C) 2 – granular (or rough) endoplasmic reticulum
4.	Lysosomes (A – electron micrograph x 27,000; B – electron micrograph x 60,000)
5.	Golgi apparatus (electron micrograph x 55,000)
6.	Microtubules in longitudinal profile
7.	Parent and daughter centrioles in a fibroblast (electron micrograph x 90,000)
8.	Cytoplasmic inclusions and organelles of a hepatocyte (electron micrograph x 17000)
9.	Intercellular junctions
10.	Microvilli with glycocalyx on the apical surface of an absorptive cell (electron micrograph x 100,000)
11.	Cilia of epithelial cell A. Longitudinal section of the apical part of a cell (electron micrograph x 36,000) B. Cross sections of cilia (electron micrograph x 88,000)
12.	Numerous pinocytotic vesicles (arrows) within the cytoplasm of simple squamous epithelium (endothelium) of a blood vessel (electron micrograph x 60,000)
13.	Active (phagocytic) macrophage obtained from the peritoneum of a rat which had previously been injected with latex particles; a number of particles have been engulfed by the cell (electron micrograph x 11,600)
14.	Cell nucleus (electron micrograph x 16,762)
15.	Nuclear (or fibrous) lamina of an oocyte (scanning electron micrograph x 16,762)
16.	Metaphase of mitosis in mammary gland cell (electron micrograph x 15,000)
17.	Telophase of mitosis in a spermatogonium demonstrating the forming midbody or cytokinesis
18.	Spermatozoon a). Head (longitudinal section, electron micrograph x 14,000) b) Neck, middle piece and principal piece (longitudinal section, electron micrograph x 17,000) c) Middle piece (cross section, electron micrograph x 48,000)
19.	Primordial ovarian follicle (electron micrograph x 6,200)
20.	Fertilization (scanning electron micrograph x 5,700)
21.	Numerous pinocytotic vesicles (arrows) within the cytoplasm of the simple squamous epithelium (endothelium) of a blood vessel (electron micrograph x 60,000)
22.	Simple columnar epithelium (absorptive cells and goblet cell in the intestinal epithelium). Electron micrograph x 6,000
23.	Pseudostratified (respiratory) epithelium A. Three main cell types of the respiratory epithelium (electron micrograph x 1,800) B. Luminal surface of the trachea (scanning electron micrograph x 1,200)
24.	Active macrophage obtained from the peritoneum of a rat which had previously been injected with latex particles; a number of particles have been engulfed by the cell (electron micrograph x 11,600)
25.	Fibroblast (electron micrograph x 12,000)
26.	Mast cell (electron micrograph x 10,000)

27.	Plasma cell (electron micrograph x10,000)
28.	Adipocytes (fat cells) a. Adipocytes of white fat (unilocular fat cells) in various stages of maturation b. Adipocyte of brown fat (multilocular fat cell)
29.	Erythrocytes and thrombocytes of blood (light and electron micrographs) a) R – reticulocytes of blood among mature erythrocytes (cresyl blue&eosin x1,200) b) Erythrocytes (electron micrograph x16000): c) Thrombocytes among erythrocytes (Giemsa x1,600) d) Thrombocytes (electron micrograph x22,500):
30.	Leukocytes of blood (scheme of the ultrastructural organization)
31.	Young chondrocyte (electron micrograph x16,000)
32.	Osteogenic cells (electron micrograph x2,500)
33.	The different functional states of an osteocyte (electron micrograph x25,000)
34.	Electron micrograph of an osteoclast
35.	Skeletal muscle fiber (electron micrograph x33,000)
36.	Interrelations between thin and thick myofilaments (electron micrograph x900,000)
37.	Intercalated disc between cardiac myocytes (electron micrograph x31,000)
38.	Smooth myocyte in cross section (electron micrograph x 34,000)
39.	Unmyelinated nerve fibers
40.	Myelinated nerve fibers
41.	A. Splenic sinus and cords of reticular cells (scanning electron micrograph x 4,400) B. Splenic sinus (scanning electron micrograph x 5,300)
42.	Corneal stroma (electron micrograph x 16,700)
43.	Photoreceptor cells of the retina a. Portion of the inner and outer segments of rod-cell of the retina (electron micrograph x 32,000) b. Portion of the inner and outer segments of cone-cell of the retina (electron micrograph x 32,000)
44.	Hair cells of the organ of Corti A. Stereocilia on the apical surfaces of the cochlear hair cells (scanning electron micrograph x 3,250) B. Outer hair cells (transmission electron micrograph x 6,300)
45.	Intercalated disc between cardiac myocytes (electron micrograph x 31,000)
46.	Comatic or continuous hemocapillary (electron micrograph x 12,000)
	Pericytes on the outer surface of hemocapillary (scanning electron micrograph x 5,000)
47.	Sinusoidal capillary of the liver (electron micrograph)
48.	Hassall's corpuscle (electron micrograph x 5000)
49.	A. Splenic sinus and cords of reticular cells (scanning electron micrograph x 4,400) B. Splenic sinus (scanning electron micrograph x 5,300)
50.	Thyroid follicle (electron micrograph x 6,800)
51.	Odontoblast and dentin in the developing tooth A. Odontoblast layer is identified by a brace; dentinal tubules are indicated by arrows (electron micrograph x 3,416) B. Cytoplasmic process of a young odontoblast (electron micrograph x 34,000)
52.	Structure of young enamel (electron micrograph x 60,000)
53.	Taste bud. (Diagram) Electron micrograph. × 17500
54.	Surface-lining cell from the body of a stomach (electron micrograph x 11632)
55.	Chief cell within a fundic gland of stomach (electron micrograph x 11837)
56.	Parietal cell within a fundic gland of stomach (electron micrograph x 9600)
57.	Mucous neck cell within a fundic gland of stomach (electron micrograph x 11000)
58.	Enteroendocrine cell within a fundic gland of stomach (electron micrograph x 11000)
59.	Small intestine enterocytes A. (Electronic micrograph x 4540) B. (Electronic micrograph x 22000)
60.	Part of the pancreatic acinus (Electronic micrograph x 8500)
61.	Human liver tissue (electron micrograph)
62.	Gallbladder epithelium (electron micrograph x 29,000)
63.	Bile and sinusoidal capillaries of a liver (electron micrograph) A. Low-power scanning electron micrograph from a liver showing a sinusoid (asterisk) and bile canaliculi between hepatocytes (arrows). B. High-power scanning electron micrograph from a liver showing numerous microvilli within the bile canaliculus (arrow).

64.	Renal corpuscle
65.	Convulated tubules of a nephron
66.	Juxtaglomerular apparatus
67.	Sperm (electron micrograph)
68.	Seminiferous epithelium (electron micrograph)
69.	Junctional complexes between adjacent Sertoli cells (electron micrograph)
70.	Leydig cells (electron micrograph)
71.	Primordial ovarian follicle
72.	Oviduct epithelium
73.	Lactating mammary gland
74.	Fertilization (scanning electron micrograph x 5,700)
75.	Placental barrier (electron micrograph x 45000)

5. THE CONTENT OF THE ASSESSMENT TOOLS OF MID-TERM ASSESSMENT

Mid-term assessment is carried out in the **form of exam**.

The bank of assessment tools for mid-term of students is presented on the Educational Portal of the PRIMUM: <https://sdo.pimunn.net/mod/quiz/view.php?id=2673>

5.1. The list of control tasks and other materials necessary for the assessment of knowledge, skills and work experience

Test tasks

Test tasks	Competence code (according to the WPD)
1. THE SPECIFIC TERM TO SIGN SO-CALLED ABILITY "ACID-LOVING": 1) acidophilia 2) chromophilia 3) chromophobia 4) basophilia 5) neutrophilia	UC-1, GPC-5, GPC-10
2. THE SPECIFIC TERM TO SIGN WEAK AFFINITY FOR BOTH ACID AND BASIC DYES: 1) acidophilia 2) chromophilia 3) chromophobia 4) basophilia 5) neutrophilia	
3. CONSTANT ESSENTIAL CYTOPLASMIC PARTICLES: 1) organelles 2) inclusion 3) fibrils 4) cisternae 5) granules	
4. NONMEMBRANOUS ORGANELLES: 1) ribosomes 2) microtubules 3) cytoplasmic filaments 4) centrosome 5) lysosomes	

<p>5. CELL ORGANELLE, RESPONSIBLE FOR MACROERGIC MOLECULES SYNTHESIS:</p> <ol style="list-style-type: none"> 1) granular endoplasmic reticulum 2) lisosomes 3) mitochondrion 4) ribosomes 5) agranular endoplasmic reticulum 	
<p>6. CYTOPLASMIC INCLUSION THAT HAS ITS OWN COLOR:</p> <ol style="list-style-type: none"> 1) secretory 2) excretory 3) trophic 4) pigment 5) metabolic 	
<p>7. TYPES OF NUCLEAR CHROMATIN:</p> <ol style="list-style-type: none"> 1) euchromatin 2) heterochromatin 3) sex chromatin 4) basophilic substance 5) chromatophilic substance 	
<p>8. DOUBLE SET OF CHROMOSOMES (IN HUMANS 46):</p> <ol style="list-style-type: none"> 1) haploid 2) diploid 3) tetraploid 4) polyploid 5) triploid 	
<p>9. PERIOD OF THE CELL LIFE, INCLUDING INTERPHASE AND MITOSIS:</p> <ol style="list-style-type: none"> 1) cell cycle 2) biological cycle 3) determination 4) differentiation 5) regeneration 	
<p>10. PERIODS OF INTERPHASE:</p> <ol style="list-style-type: none"> 1) G1-period (postmitotic, presynthetic) 2) M-period 3) G2-period (premitotic, postsynthetic) 4) S-period (synthetic) 5) X period 	
<p>11. STRUCTURE CONNECTING EPITHELIUM TO CONNECTIVE TISSUE:</p> <ol style="list-style-type: none"> 1) basement membrane 2) cytolemma 3) plasma membrane 4) amorphous substance 5) glycocalyx 	
<p>12. TYPES OF COVERING EPITHELIA BY NUMBER OF LAYERS:</p> <ol style="list-style-type: none"> 1) simple 2) pseudostratified 3) intermediate 4) stratified 5) transitional 	

<p>13. VARIETIES OF STRATIFIED SQUAMOUS EPITHELIUM:</p> <ol style="list-style-type: none"> 1) nonkeratinized 2) transitional 3) pseudostratified 4) desquamated 5) keratinized 	
<p>14. TYPES OF CONNECTIVE TISSUE PROPER DEPENDING ON THE PREDOMINANCE OF FIBERS OR AMORPHOUS MATERIALS:</p> <ol style="list-style-type: none"> 1) loose 2) dense 3) regular 4) irregular 5) fibrous 	
<p>15. THE MAIN TYPE OF CELLS OF LOOSE CONNECTIVE TISSUE, SYNTHESIZING ITS INTERCELLULAR MATRIX:</p> <ol style="list-style-type: none"> 1) plasma cells 2) macrophages 3) adventitial cells 4) fibroblasts 5) mast cells 	
<p>16. BLOOD CELL – PRECURSOR TO MACROPHAGE:</p> <ol style="list-style-type: none"> 1) lymphocyte 2) monocyte 3) neutrophil 4) the eosinophil 5) basophil 	
<p>17. RESIDENT CONNECTIVE TISSUE CELLS THAT PRODUCE HISTAMINE AND HEPARIN:</p> <ol style="list-style-type: none"> 1) plasma cells 2) macrophages 3) adventitial cells 4) fibroblasts 5) mast cells 	
<p>18. RESIDENT CONNECTIVE TISSUE CELLS (EFFECTOR IMMUNOCYTES) DERIVED FROM B-LYMPHOCYTES:</p> <ol style="list-style-type: none"> 1) adventitial cells 2) macrophages 3) plasma cells 4) fibroblasts 5) mast cells 	
<p>19. THE MAIN TYPES OF CONNECTIVE TISSUE FIBERS:</p> <ol style="list-style-type: none"> 1) collagen 2) reticular 3) elastic 4) ossein 5) fibrin 	
<p>20. MAIN GROUPS OF FORMED ELEMENTS OF BLOOD:</p> <ol style="list-style-type: none"> 1) red blood cells 2) leukocytes 3) reticulocytes 4) platelets 5) lymphocytes 	

<p>21. THE TYPES OF WBC DEPENDING ON THE PRESENCE OR ABSENCE OF SPECIFIC GRANULES:</p> <ol style="list-style-type: none"> 1) granulocytes 2) agranulocytes 3) neutrophilic 4) basophilic 5) eosinophilic 	
<p>22. MAIN TYPES OF ADIPOSE TISSUE:</p> <ol style="list-style-type: none"> 1) white 2) yellow 3) red 4) subcutaneous 5) brown 	
<p>23. ALTERNATIVE TYPES OF MUSCLE TISSUE BASED ON OPTICAL HOMOGENEITY OF THEIR CYTOPLASM:</p> <ol style="list-style-type: none"> 1) contractile 2) smooth 3) striated 4) cardiac 5) visceral 	
<p>24. MAJOR PROTEIN FILAMENTS OF MYOFIBRILS:</p> <ol style="list-style-type: none"> 1) actin 2) myosin 3) tropomyosin 4) troponin 5) intercalated 	
<p>25. PARTS OF THE NEURON CAN FORM SYNAPTIC CONTACTS:</p> <ol style="list-style-type: none"> 1) axon 2) dendrite 3) neuron body 4) spines 5) nucleus 	
<p>26. LAYERS OF THE CORNEA:</p> <ol style="list-style-type: none"> 1) anterior epithelium 2) anterior limiting membrane 3) corneal stroma 4) posterior limiting membrane 5) posterior endothelium 	
<p>27. TUNICS OF THE MAIN BLOOD VESSELS:</p> <ol style="list-style-type: none"> 1) serosa 2) intima 3) media 4) adventitia 5) mucosa 	
<p>28. CLASSIFICATION OF HEMOCAPILLARIES:</p> <ol style="list-style-type: none"> 1) endothelial 2) somatic 3) fenestrated 4) sinusoidal 5) lymphatic 	

<p>29. TUNICS OF THE HEART WALL:</p> <ol style="list-style-type: none"> 1) pericardium 2) endocardium 3) myocardium 4) epicardium 5) conducting system 	
<p>30. MUCOSAL LAYERS OF THE ESOPHAGUS:</p> <ol style="list-style-type: none"> 1) epithelial 2) subepithelial 3) lamina propria 4) muscular plate 5) glandular 	
<p>31. TUNICS OF THE STOMACH WALL:</p> <ol style="list-style-type: none"> 1) mucosa 2) submucosa 3) muscularis 4) propria 5) serosa 	
<p>32. FINGER-LIKE PROJECTIONS OF THE INTESTINAL MUCOSA:</p> <ol style="list-style-type: none"> 1) villi 2) crypts 3) papillae 4) wrinkles 5) outgrowths 	
<p>33. SIMPLE TUBULAR GLAND IN THE INTESTINAL MUCOSA:</p> <ol style="list-style-type: none"> 1) Pits 2) crypts 3) deepenings 4) folds 5) invaginations 	
<p>34. STRUCTURAL ELEMENTS OF THE INTESTINAL VILLI:</p> <ol style="list-style-type: none"> 1) intestinal epithelium 2) loose connective tissue 3) hemocapillaries 4) lymphatic capillaries 5) smooth myocytes 	
<p>35. THE INDICATIVE FEATURE OF THE DUODENAL SUBMUCOSA:</p> <ol style="list-style-type: none"> 1) nervous plexus 2) glands 3) blood vessels 4) loose connective tissue 5) lymphatic nodules 	
<p>36. INTRALOBULAR DUCTS OF THE PAROTID GLAND:</p> <ol style="list-style-type: none"> 1) intercalated duct 2) striated duct 3) convoluted 4) straight 5) collecting 	
<p>37. CELLS OF TERMINAL DIVISIONS IN THE PAROTID SALIVARY GLANDS:</p>	

<ol style="list-style-type: none"> 1) serocytes 2) mucocytes 3) myoepithelial cells 4) endocrine 5) regenerative 	
<p>38. CELLS OF TERMINAL DIVISIONS IN MIXED SALIVARY GLANDS:</p> <ol style="list-style-type: none"> 1) serocytes 2) mucocytes 3) myoepithelial cells 4) endocrine 5) regenerative 	
<p>39. WALL OF THE BILE CANALICULUS:</p> <ol style="list-style-type: none"> 1) endothelium 2) the basement membrane 3) the pericytes 4) hepatocytes 5) epithelium 	
<p>40. CHARACTERISTIC TYPE OF THE HEPATIC HEMOCAPILLARIES:</p> <ol style="list-style-type: none"> 1) somatic 2) fenestrated 3) sinusoidal 4) lymphatic 5) bile 	
<p>41. HORMONE B-CELLS OF PANCREATIC ISLET:</p> <ol style="list-style-type: none"> 1) VIP-hormone 2) PP-hormone 3) insulin 4) glucagon 5) somatostatin 	
<p>42. THE MAIN COMPONENTS OF THE PANCREAS:</p> <ol style="list-style-type: none"> 1) acini 2) duct system 3) exocrine 4) endocrine 5) islets 	
<p>43. ENDOCRINE CELLS OF THE ISLET OF LANGERHANS:</p> <ol style="list-style-type: none"> 1) acinar cells 2) myoepithelial 3) epithelial 4) serocytes 5) insulocytes 	
<p>44. THE CENTRAL ORGANS OF THE ENDOCRINE SYSTEM:</p> <ol style="list-style-type: none"> 1) thyroid gland 2) hypothalamus 3) hypophysis 4) pineal gland 5) adrenal gland 	

<p>46. DUCT SYSTEM OF THE KIDNEY:</p> <ol style="list-style-type: none"> 1) proximal convoluted 2) loop of Henle 3) distal convoluted 4) collecting tubules 5) collecting ducts 	
<p>47. CELL DIFFERON OF THE SPERMATOGENIC EPITHELIUM:</p> <ol style="list-style-type: none"> 1) spermatogonia 2) spermatocytes 1 3) spermatocytes 2 4) spermatids 5) spermatozoa 	
<p>48. STAGES OF MATURITY OF THE OVARIAN FOLLICLE:</p> <ol style="list-style-type: none"> 1) atretic 2) primordial 3) primary growing 4) secondary growing 5) tertiary (graafian) 	
<p>49. CELLS OF THE PRIMORDIAL FOLLICLE:</p> <ol style="list-style-type: none"> 1) oocyte 2) fibroblasts 3) endocrine cells 4) follicular cells 5) granular cells 	
<p>50. AXIAL GERM OF CNS, SEPARATED FROM ECTODERM:</p> <ol style="list-style-type: none"> 1) neural plate 2) nerve groove 3) neural tube 4) neural crest 5) ganglionic plate 	

Test task number	No. of response template	Test task number	No. of response template	Test task number	No. of response template
1	1	18	3	35	2
2	5	19	1, 2, 3	36	3
3	1	20	1, 2, 4	37	1, 2
4	1, 2, 3, 4	21	1, 2	38	1, 3
5	3	22	1, 5	39	1, 2, 3
6	4	23	2, 3	40	4
7	1, 2	24	1, 2	41	3
8	2	25	1, 2, 3	42	3
9	1	26	1, 2, 3, 4, 5	43	3, 4
10	1, 3, 4	27	2, 3, 4	44	5
11	1	28	2, 3, 4	45	2, 3, 4
12	1, 4	29	2, 3, 4	46	1, 2, 3, 4, 5
13	1, 5	30	1, 3, 4	47	1, 2, 3, 4, 5
14	1, 2	31	1, 2, 3, 5	48	2, 3, 4, 5
15	4	32	1	49	1, 4
16	2	33	2	50	2, 3
17	5	34	1, 2, 3, 4, 5		

5.1.1. Questions for the discipline exam “Histology, embryology, cytology”

Question		Competence code (according to the WPD)
1.	Subject and objectives of the course of histology with cytology and embryology. Significance for medicine.	UC-1, GPC-5, GPC-10
2.	Protoplasm. Cell. Intercellular substance. Cytoplasm. Organelles, inclusions, hyaloplasm. Organelles, classification, structure, meaning. Inclusions, classification, structure, meaning	UC-1, GPC-5, GPC-10
3.	Biological membrane. Cell membrane, structure and significance. Microvilli. Cilia. Intercellular connections	UC-1, GPC-5, GPC-10
4.	Cell nucleus compartments . Chromatin: euchromatin, heterochromatin, differences in appearance and function, chromosomes. Nuclear envelope: structural and functional characteristics	UC-1, GPC-5, GPC-10
5.	Cell cycle: sequence and significance. Mitosis: phases and results	UC-1, GPC-5, GPC-10
6.	Fertilization and Gastrulation: phases and results. The basic germs of embryo and their derivatives. Histogenesis and organogenesis and their results d its results.	UC-1, GPC-5, GPC-10
7.	General morphofunctional characteristics of epithelia. Classification of epithelia. The basement membrane. Intercellular junctions of epithelial cells	UC-1, GPC-5, GPC-10
8.	Classification of glands. Types of secretion. Epithelial regeneration.	UC-1, GPC-5, GPC-10
9.	Classification of connective tissues, criteria for differentiation. Cell composition of the connective tissues proper. Fibroblasts, Macrophages - structural and functional characteristics	UC-1, GPC-5, GPC-10
10.	Adipose cells, structural and functional characteristics.	UC-1, GPC-5, GPC-10
11.	Mast cells, Plasma cells, Adventitial cells - structural and functional characteristics.	UC-1, GPC-5, GPC-10
1.	General structural and functional characteristics of blood. General characteristics of blood cells. Red blood cells: morphological and functional characteristics, structural variants, life span. Platelets: morphological and functional characteristics, life span.	UC-1, GPC-5, GPC-10
2.	White blood cells: classification, morphological and functional characteristics of varieties, life span. A complete blood count (CBC). Blood plasma.	UC-1, GPC-5, GPC-10
3.	Reticular tissue: morphological and functional characteristics, localization in the human body	UC-1, GPC-5, GPC-10
4.	General concept and classification of cartilage tissue. Differentiation of the concepts " cartilage tissue" and " cartilage".	UC-1, GPC-5, GPC-10
5.	General characteristics and features of hyaline, elastic and fibrous cartilage. Origin, composition and role of intercellular substance of cartilage tissue. Features of the structure of mature and young cartilage tissue. Structure and function of the perichondrium. Growth and regeneration of cartilage.	UC-1, GPC-5, GPC-10
6.	General concept and classification of bone tissue. Differentiation of the concepts "bone tissue" and "bone".	UC-1, GPC-5, GPC-10
7.	General characteristics and features of lamellar and nonlamellar bone tissue. Bone cells, their varieties and origin. The structure and functions of osteoblasts and osteocytes. Features of the structure and function of osteoclast. The concept of osteon. Origin, composition and role of extracellular matix of the bone tissue. Structure and function of the periostium	UC-1, GPC-5, GPC-10
8.	General properties of muscle tissues. Differentiation of the concepts of “muscle tissue” and “muscle”.	UC-1, GPC-5, GPC-10
9.	Classification of muscle tissue. The structure of striated muscle fiber. The concept of symplast. Structural organization of the sarcomere. The structure of cardiac muscle tissue. Structural features of a typical cardiomyocyte	UC-1, GPC-5, GPC-10
10.	Features of the structure and function of smooth muscle tissue. Structural features of a smooth myocyte.	UC-1, GPC-5, GPC-10
11.	The ability to regenerate different types of muscle tissue	UC-1, GPC-5, GPC-10
12.	Structural elements of nervous tissue. Fundamental features of the structure and	UC-1, GPC-5,

	function of nerve cells. Classification of neurons. Neuroglia cells, their classification and functions	GPC-10
13.	The tissue elements of the peripheral nervous system. Origination of the peripheral nervous system formations in embryogenesis.	UC-1, GPC-5, GPC-10
14.	Nerves: organic composition. The tissue elements of the nerve trunk. Functional types of nerve fibers. Connective tissue stroma of the nerves.	UC-1, GPC-5, GPC-10
15.	Craniospinal ganglia: structural and functional characteristics. The place and role of nerves and craniospinal ganglia in the sensory system.	UC-1, GPC-5, GPC-10
16.	Ability of the peripheral nervous system elements for regeneration	UC-1, GPC-5, GPC-10
17.	General classification of vessels. Features of the structure and functioning of different types of blood vessels. Innervation. Features of the structure of the lymphatic vessels	UC-1, GPC-5, GPC-10
18.	Vessels of the microcirculatory bed, their role in the blood supply to organs. Classification and histophysiological features of hemocapillaries and types of arterio-venular anastomoses. Features of their structure and meaning. Endothelium of blood vessels, its structural and functional properties	UC-1, GPC-5, GPC-10
19.	Arteries and veins. The main types and features of their structure. Tissue and cellular composition of different types of vessels.	UC-1, GPC-5, GPC-10
20.	A heart. Sources of development. Endocardial and epicardial layers. Membranes, tissue and cellular composition, fibrous skeleton of the heart. Valves. Types of cardiomyocytes. Conductive (generating) system. Endocrine properties of the heart	UC-1, GPC-5, GPC-10
21.	Skin. Classification. Structural and functional characteristics of parts and layers; features of their structure and blood supply.	UC-1, GPC-5, GPC-10
22.	Respiratory organs. Airways. Nasal mucosa. Larynx, trachea. The lung.	UC-1, GPC-5, GPC-10
23.	Red bone marrow. Source of development and General morphofunctional characteristics. Localization. The composition of the tissue, stroma, blood vessels. Structure of the red bone marrow and characteristics of postembryonic hematopoiesis in it. The compartments, colony-forming unit (CFU). The role of stromal elements in hematopoiesis. Compartments of myeloid hematopoiesis. CFU. Yellow bone marrow.	UC-1, GPC-5, GPC-10
24.	Thymus. Embryonic sources of development. Structure and functional significance. Differentiation of T-lymphocytes and hemato-thymus barrier. Thymic corpuscles. Endocrine function of the thymus. Age and accidental involution.	UC-1, GPC-5, GPC-10
25.	Organs and tissues of the immune system. Classification of lymphocytes. Zones of localization of T- and B-lymphocytes in peripheral lymphoid organs. The role of macrophages and other connective tissue cells in immunogenesis.	UC-1, GPC-5, GPC-10
26.	The lymph node. Structure and functional significance. Participation in the formation of T - and B-lymphocytes. Sinuses of the lymph node. Main structural and functional parts and types of lymph nodes. A ring of lymphatic tissue at the entrance of the oropharynx. The structure of the palatine tonsil	UC-1, GPC-5, GPC-10
27.	The spleen. Structure and functional significance. T - and B-zones. Blood supply: features and role in ensuring the function of the spleen.	UC-1, GPC-5, GPC-10
28.	Tooth structure: parts and tissues. Tooth development: sources and stages. Tooth tissues. Development of dentin. Histogenesis of enamel.	UC-1, GPC-5, GPC-10
29.	Types of mucous membranes of the oral cavity. Structural and functional characteristics and age peculiarities	UC-1, GPC-5, GPC-10
30.	Alimentary canal. General plan of the wall structure. The sources of development and histogenetically characteristic of the tunics of the main portions	UC-1, GPC-5, GPC-10
31.	Esophagus: the structure of the wall, its features throughout the organ and in the area of the esophagus transition to the stomach.	UC-1, GPC-5, GPC-10
32.	Stomach. General morphofunctional characteristics. Source of development. Features of the structure of different portions, in the area of the transition of the esophagus to the stomach. Gastric epithelium: structure and function. Cancer of the stomach: types, structure, cellular composition, function. Internal anti-anemic factor	UC-1, GPC-5, GPC-10
33.	General signs and features in the structural and functional organization of different parts of the intestine	UC-1, GPC-5, GPC-10

34.	Small intestine wall: tunics, layers, intestinal villi and crypts. Cell composition and histophysiology of the intestinal epithelium. Parietal digestion and absorption of nutrients. Tissue and cellular composition. Peyer's patches	UC-1, GPC-5, GPC-10
35.	Large intestine: tunics, their tissue and cellular characteristics. The characteristic features of the structure of the colon	UC-1, GPC-5, GPC-10
36.	Appendix. Tunics and layers. Their tissue and cellular characteristics. The specificity of the structure and significance of the organ	UC-1, GPC-5, GPC-10
37.	Morphological classification of exocrine glands. Salivary glands. Large salivary glands. The principles of the structure. The similarity and structural features of various salivary glands. Role in the body. Histophysiological characteristics of the cellular composition of the terminal sections and excretory ducts	UC-1, GPC-5, GPC-10
38.	Pancreas. General plan of the structure. Exocrine part: acinus, excretory ducts, enzymes. Endocrine part: histophysiological characteristics of the islets of Langerhans, hormones. The functions and importance of the organ	UC-1, GPC-5, GPC-10
39.	Morphological classification of exocrine glands. Liver. The principles of the structure. The similarity and structural features of various liver. Histophysiological characteristics of the cellular composition of the terminal sections and excretory ducts	UC-1, GPC-5, GPC-10
40.	Gallbladder. General plan of the structure. The functions and importance of the organ	UC-1, GPC-5, GPC-10
41.	General morphological and functional properties of the endocrine glands. Hypothalamus (endocrinocytes and hormones, target cells and their properties). Hypothalamic-pituitary relations.	UC-1, GPC-5, GPC-10
42.	Pituitary gland: development and structure. Role in the endocrine system. The connection of the pituitary gland with the hypothalamus. Morphological and functional characteristics of the cellular composition. Cellular composition. Hormones	UC-1, GPC-5, GPC-10
43.	The thyroid gland. Development. Structure: tissue and cellular composition, follicular and parafollicular cells. Hormones. Functions of the gland. The secretory cycle. Parathyroid glands. Development. Parathyroid glands. Development. Morphological and functional characteristic	UC-1, GPC-5, GPC-10
44.	The adrenal glands. Structural and functional features of the parts and zones distinguished in the organ. The cellular structure of the cortex and medulla. Endocrine function, its regulation	UC-1, GPC-5, GPC-10
45.	General characteristics of the urinary system. Kidney. Nephron and urine formation. Renal interstitium. Juxtaglomerular apparatus. Endocrine function of the kidney. Blood supply of the kidney. Excretory passages of the urinary system: ureter, urinary bladder, urethra	UC-1, GPC-5, GPC-10
46.	Male reproductive organs. Testes: structure and functions. The convoluted seminiferous tubules: a tubular epithelium, a spermatogenic epithelium, a cellular composition, a blood-testicular barrier. Spermatogenesis. Endocrine function of the testis. Genital ducts and accessory glands of the male reproductive system. Epididymis, seminal vesicles, prostate. Development, structure, functions.	UC-1, GPC-5, GPC-10
47.	Ovary. Development of the ovary. Oogenesis and endocrine function. Follicles, their varieties and derivatives. The structure of a mature follicle. Follicle atresia, atretic body, structure and importance. Ovulation. Endocrine structures of the ovary. Yellow body. Hormonal regulation of cyclic changes in the ovary. Age-related changes.	UC-1, GPC-5, GPC-10
48.	Uterus: the structure of the wall. Tissue and cellular composition. Features of the structure and function of the cervix. Intra-organ vessels. Cyclic changes of the uterus and their hormonal regulation. Oviducts: development, structure, functioning and cyclical changes.	UC-1, GPC-5, GPC-10
49.	The mammary gland. The structure and function. Tissue and cellular composition. Morphological features of "active" and "resting" mammary glands. Types of the secretion and the endocrine regulation of the gland.	UC-1, GPC-5, GPC-10
50.	Embryonic membranes and provisional organs in human embryogenesis. Their development, structure and meaning. Human placenta. The role of the yolk sac.	UC-1, GPC-5, GPC-10
51.	Placenta. The sources of its formation and the main parts and functions. Tissue and cell composition. The placental barrier. Decidual cells. Fibrinoid. Cotyledons	UC-1, GPC-5, GPC-10

5.1.2. Questions for the credit in the discipline (*not included in the curriculum*)

5.1.3. The subject of term papers (*not included in the curriculum*)

5.1.4. Histological preparations by topics/sections of the discipline “Histology, embryology, cytology” (UC-1, GPC-5, GPC-10)

1. Preparation **41. The latest gastrula**
2. Preparation **24. Blood smear**
3. Preparation **60. Loose connective tissue**
4. Preparation **58. Dense regular connective tissue (transection of tendon)**
5. Preparation **65. Hyaline cartilage**
6. Preparation **8. Elastic cartilage**
7. Preparation **68. Lamellar bone tissue**
8. Preparation **69. Intramembranous bone formation**
9. Preparation **70. Endochondral bone formation**
10. Preparation **72. Skeletal muscle tissue**
11. Preparation **73. Cardiac muscle tissue**
25. Preparation **100. Microcirculatory bed**
26. Preparation **101. Muscular artery**
27. Preparation **102. Muscular vein**
28. Preparation **103. Elastic artery**
29. Preparation **106. Heart wall**
30. Preparation **162. Thymus**
31. Preparation **108. Lymph node**
32. Preparation **109. Spleen**
33. Preparation **134. Tooth development – early stage**
34. Preparation **135. Tooth development – late stage**
35. Preparation **128. Tongue** (sagittal section of the anterior part)
36. Preparation **131. Palatine tonsil**
37. Preparation **136. Esophagus**
38. Preparation **138. Stomach** (fundic region)
39. Preparation **141. Duodenum**
40. Preparation **143. Jejunum**
41. Preparation **144. Large intestine**
42. Preparation **145. Appendix**
43. Preparation **146. Parotid gland**
44. Preparation **147. Submandibular gland**
45. Preparation **148. Pancreas**
46. Preparation **150. Human liver**
47. Preparation **149. Gallbladder**
48. Preparation **159. Pituitary gland (Hypophysis)**
49. Preparation **160. Thyroid gland**
50. Preparation **163. Suprarenal gland (Adrenal gland)**
51. Preparation **165. Kidney**
52. Preparation **168. Urinary bladder**
53. Preparation **169. Testis**
54. Preparation **170. Epididymis**
55. Preparation **172. Prostate**
56. Preparation **173. Ovary**
57. Preparation **175. Uterus**
58. Preparation **179. Mammary gland**
59. Preparation **177. Maternal portion of placenta**
60. Preparation **178. Fetal portion of placenta**

61. Preparation 149. Gallbladder

5.1.5. Electron microphotographs of histological structures by topics/sections of the discipline “Histology, embryology, cytology” (UC-1, GPC-5, GPC-10)

1.	Cell membrane and a glycocalyx (electron micrograph x 200,000)
2.	Electron micrograph of agranular (or smooth) endoplasmic reticulum (1) and granular (or rough) endoplasmic reticulum (2)
3.	Electron micrograph (x 200,000) of a mitochondrion (1) with the cristae (C) 2 – granular (or rough) endoplasmic reticulum
4.	Lysosomes (A – electron micrograph x 27,000; B – electron micrograph x 60,000)
5.	Golgi apparatus (electron micrograph x 55,000)
6.	Microtubules in longitudinal profile
7.	Parent and daughter centrioles in a fibroblast (electron micrograph x 90,000)
8.	Cytoplasmic inclusions and organelles of a hepatocyte (electron micrograph x 17000)
9.	Intercellular junctions A – Occluding (1) and anchoring (2,3) intercellular junctions (electron micrograph x 95,000) B – Gap junction, or nexus or electrical synapse, related to communicating junctions (electron micrograph x 80,000)
10.	Microvilli with glycocalyx on the apical surface of an absorptive cell (electron micrograph x 100,000)
11.	Cilia of epithelial cell A. Longitudinal section of the apical part of a cell (electron micrograph x 36,000) B. Cross sections of cilia (electron micrograph x 88,000)
12.	Numerous pinocytotic vesicles (arrows) within the cytoplasm of simple squamous epithelium (endothelium) of a blood vessel (electron micrograph x 60,000)
13.	Active (phagocytic) macrophage obtained from the peritoneum of a rat which had previously been injected with latex particles; a number of particles have been engulfed by the cell (electron micrograph x 11,600)
14.	Cell nucleus (electron micrograph x 16,762)
15.	Nuclear (or fibrous) lamina of an oocyte (scanning electron micrograph x 16,762)
16.	Metaphase of mitosis in mammary gland cell (electron micrograph x 15,000)
17.	Telophase of mitosis in a spermatogonium demonstrating the forming midbody or cytokinesis (arrowhead). Electron micrograph.
18.	Spermatozoon a). Head (longitudinal section, electron micrograph x 14,000) b) Neck, middle piece and principal piece (longitudinal section, electron micrograph x 17,000) c) Middle piece (cross section, electron micrograph x 48,000)
19.	Primordial ovarian follicle (electron micrograph x 6,200)
20.	Fertilization (scanning electron micrograph x 5,700)
21.	Numerous pinocytotic vesicles (arrows) within the cytoplasm of the simple squamous epithelium (endothelium) of a blood vessel (electron micrograph x 60,000)
22.	Simple columnar epithelium (absorptive cells and goblet cell in the intestinal epithelium). Electron micrograph x 6,000
23.	Pseudostratified (respiratory) epithelium A. Three main cell types of the respiratory epithelium (electron micrograph x 1,800) B. Luminal surface of the trachea (scanning electron micrograph x 1,200)
24.	Active (phagocytic) macrophage obtained from the peritoneum of a rat which had previously been injected with latex particles; a number of particles have been engulfed by the cell (electron micrograph x 11,600)
25.	Fibroblast (electron micrograph x 12,000)
26.	Mast cell (electron micrograph x 10,000)
27.	Plasma cell (electron micrograph x 10,000)
28.	Adipocytes (fat cells) a. Adipocytes of white fat (unilocular fat cells) in various stages of maturation b. Adipocyte of brown fat (multilocular fat cell)
29.	Erythrocytes and thrombocytes of blood (light and electron micrographs) a) R – reticulocytes of blood among mature erythrocytes (cresyl blue & eosin x 1,200) b) Erythrocytes (electron micrograph x 16000):

	c) Thrombocytes among erythrocytes (Giemsa x1,600) d) Thrombocytes (electron micrograph x22,500):
30.	Leukocytes of blood (scheme of the ultrastructural organization)
31.	Young chondrocyte (electron micrograph x16,000)
32.	Osteogenic cells (electron micrograph x2,500)
33.	The different functional states of an osteocyte (electron micrograph x25,000)
34.	Electron micrograph of an osteoclast
35.	Skeletal muscle fiber (electron micrograph x33,000)
36.	Interrelations between thin and thick myofilaments (electron micrograph x900,000)
37.	Intercalated disc between cardiac myocytes (electron micrograph x31,000)
38.	Smooth myocyte in cross section (electron micrograph x 34,000)
39.	Unmyelinated nerve fibers
40.	Myelinated nerve fibers
41.	A. Splenic sinus and cords of reticular cells (scanning electron micrograph x 4,400) B. Splenic sinus (scanning electron micrograph x 5,300)
42.	Corneal stroma (electron micrograph x 16,700)
43.	Photoreceptor cells of the retina a. Portion of the inner and outer segments of rod-cell of the retina (electron micrograph x 32,000) b. Portion of the inner and outer segments of cone-cell of the retina (electron micrograph x 32,000)
44.	Hair cells of the organ of Corti A. Stereocilia on the apical surfaces of the cochlear hair cells (scanning electron micrograph x 3,250) B. Outer hair cells (transmission electron micrograph x 6,300)
45.	Intercalated disc between cardiac myocytes (electron micrograph x 31,000)
46.	Comatic or continuous hemocapillary (electron micrograph x 12,000)
	Pericytes on the outer surface of hemocapillary (scanning electron micrograph x 5,000)
47.	Sinusoidal capillary of the liver (electron micrograph)
48.	Thin skin (electron micrograph x 8,000)
49.	Stratum spinosum and stratum granulosum of the thin skin a. Stratum spinosum and stratum granulosum (electron micrograph x 15,000) b. Stratum spinosum (electron micrograph x 58,000)
50.	Olfactory epithelium (electron micrograph x 8,260)
51.	Respiratory epithelium A. Three main cell types of the respiratory epithelium (electron micrograph x 1,800) B. Luminal surface of the trachea (scanning electron micrograph x 1,200)
52.	The wall of a terminal bronchiole (electron micrograph)
53.	Air-blood barrier (electron micrograph x 33,000)
54.	Type II pneumocyte protruding into alveolar lumen (electron micrograph x 30,000)
55.	Alveolar brush cell (electron micrograph)
56.	Hassall's corpuscle (electron micrograph x 5000)
57.	A. Splenic sinus and cords of reticular cells (scanning electron micrograph x 4,400) B. Splenic sinus (scanning electron micrograph x 5,300)
58.	Thyroid follicle (electron micrograph x 6,800)
59.	Odontoblast and dentin in the developing tooth A. Odontoblast layer is identified by a brace; dentinal tubules are indicated by arrows (electron micrograph x 3,416) B. Cytoplasmic process of a young odontoblast (electron micrograph x 34,000)
60.	Taste bud (Diagram) Electron micrograph. × 17500
61.	Surface-lining cell from the body of a stomach (electron micrograph x 11632)
62.	Chief cell withing a fundic gland of stomach (electron micrograph x 11837)
63.	Parietal cell withing a fundic gland of stomach (electron micrograph x 9600)
64.	Mucous neck cell withing a fundic gland of stomach (electron micrograph x 11000)
65.	Enteroendocrine cell within a fundic gland of stomach (electron micrograph x 11000)
66.	Small intestine enterocytes A. (Electronic micrograph x 4540) B. (Electronic micrograph x 22000)
67.	Part of the pancreatic acinus (Electronic micrograph x 8500)
68.	Human liver tissue (electron micrograph)
69.	Gallbladder epithelium (electron micrograph x 29,000)

70.	Bile and sinusoidal capillaries of a liver (electron micrograph) A. Low-power scanning electron micrograph from a liver showing a sinusoid (asterisk) and bile canaliculi between hepatocytes (arrows). B. High-power scanning electron micrograph from a liver showing numerous microvilli within the bile canaliculus (arrow).
71.	Renal corpuscle
72.	Convoluting tubules of a nephron
73.	Juxtaglomerular apparatus
74.	Sperm (electron micrograph)
75.	Seminiferous epithelium (electron micrograph)
76.	Junctional complexes between adjacent Sertoli cells (electron micrograph)
77.	Leydig cells (electron micrograph)
78.	Primordial ovarian follicle
79.	Oviduct epithelium
80.	Lactating mammary gland
81.	Fertilization (scanning electron micrograph x 5,700)
82.	Placental barrier (electron micrograph x 45000)

6. CRITERIA FOR EVALUATING LEARNING OUTCOMES

Learning outcomes	Assessment of competence developed			
	unsatisfactory	satisfactory	good	excellent
Completeness of knowledge	The level of knowledge is below the minimum requirements. There were bad mistakes	The minimum acceptable level of knowledge. A lot of light mistakes were made	The level of knowledge in the volume corresponding to the training program. A few light mistakes were made	The level of knowledge in the volume corresponding to the training program, without errors
Availability of skills	Basic skills are not demonstrated when solving standard tasks. There were bad mistakes	Basic skills are demonstrated. Typical problems with light mistakes have been solved. All tasks have been completed, but not in full.	All basic skills are demonstrated. All the main tasks have been solved with light mistakes. All tasks have been completed, in full, but some of them with shortcomings	All the basic skills were demonstrated, all the main tasks were solved with some minor shortcomings, all the tasks were completed in full
Availability of skills (possession of experience)	Basic skills are not demonstrated when solving standard tasks. There were bad mistakes	There is a minimal set of skills for solving standard tasks with some shortcomings	Basic skills in solving standard tasks with some shortcomings are demonstrated	Skills in solving non-standard tasks without mistakes and shortcomings are demonstrated
Characteristics of competence formation*	The competence is not fully formed. The available knowledge and skills are not enough to solve professional tasks. Repeated training is required	The formation of competence meets the minimum requirements. The available knowledge and abilities are generally sufficient to solve professional tasks, but additional	The formation of competence generally meets the requirements, but there are shortcomings. The available knowledge, skills and motivation are generally sufficient to solve professional tasks, but additional	The formation of competence fully meets the requirements. The available knowledge, skills and motivation are fully sufficient to solve complex professional tasks

Learning outcomes	Assessment of competence developed			
	unsatisfactory	satisfactory	good	excellent
		practice is required for most practical tasks	practice is required for some professional tasks	
The level of competence formation*	Low	Below average	Intermediate	High

For testing:

Mark "5" (Excellent) - points (100-90%)

Mark "4" (Good) - points (89-80%)

Mark "3" (Satisfactory) - points (79-70%)

Less than 70% – Unsatisfactory - Mark "2"

Developer:

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