AL FARABI KAZAKH NATIONAL UNIVERSITY
Medicine and Health Care Faculty
Higher School of Medicine
Department of Fundamental medicine

Final exam program of
OACh1201"The Human Body (Medical terminology include)**"**
(4 credits)
Spring semester 2021-2022 academic year

Topics for the final exam:

1. The language of medicine. Pronunciation. The position of the words. Stress rules. Grammatical categories of the noun - Gender. Anatomical position. Anatomical planes and sections. Directional terms.
2. Histology introduction. Cell and non-cellular structures. Cytoplasm, organelles. Simplast, syncytium and intercellular substance.
3. The language of medicine - grammatical categories of the noun - Number, Case, Declension. The main regions of the body (axial and appendicular regions). Membranes and cavities. Organ systems.
4. Human histology. Connective tissue. Actually connective tissues. Loose fibrous unformed and dense connective tissues. Connective tissues with special properties.
5. The language of medicine - grammatical categories of noun - Adjective, adjective forms. Scope of Anatomy and Physiology. Human structure.
6. Human histology. Connective tissue. Skeletal connective tissues: cartilage and bone tissues.
7. Human histology. Epithelial tissues. The integumentary epithelium. Glandular epithelium.
8. Human histology. Skin: Thick and thin skin. Skin derivatives. The skin is like an organ.
9. Cell biophysics. Structure, properties and functions of cells.
10. The language of medicine - grammatical categories of noun - Adjective, adjective forms. Human function.
11. The structure and functions of the skin. Dermal circulation. The structure and functions of the cutaneous glands. Skin disorders
12. Functions of the Skeleton. General Features of Bones. Histology of Osseous Tissue. Bone development.
13. Medical imaging I. X-ray examination; Positron emission tomography
14. Bone physiology. Bone disorders
15. Medical Imaging II. Computed tomography. Magnetic resonance imaging. Ultrasound examination
16. Overview of the Skeleton. The Vertebral Column. Cranial Bones
17. Facial Bones. Pectoral Girdle. Thoracic cage. Pelvic Girdle.
18. Upper Limb Bones. Lower Limb Bones.
19. Joints and their classification
20. Synovial joints and their movements.
21. Anatomy and physiology of the temporomandibular, atlanto-occipital, atlanto-axial, intervertebral, shoulder, elbow joints.
22. Anatomy and physiology of the joints of the hand, hip joint, knee, ankle, foot joints.

Learning outcomes

Students on the final written and test exam must demonstrate in their responses the ability to:

1) describe and determine the general plan of the structure of the human body;
2) describe and localize the bones of the trunk, skull and limbs, taking into account age, gender and individual characteristics;
3) describe and localize the joints of the bones of the body, head and extremities, their structure and movements in them, taking into account age, gender and individual characteristics;
4) describe and localize muscles, places of their origin and attachment, function, taking into account age, gender and individual characteristics;
5) find and show their anatomical structures of the musculoskeletal system in the image, dummy and preparation, medical imaging materials (taking into account age characteristics), name them, including in Latin;
6) find and palpate bone and muscle landmarks on a living person;
7) apply the basics of international medical terminology - anatomical and clinical;
8) integrate knowledge of anatomy, physiology, histology and medical biophysics to explain the main phenomena of important medical importance;
9) independently find, analyze and generalize educational and scientific information in relation to situations related to the content of the course;
10) work in a team, defend their point of view reasonably, consider the opinions of others, provide and receive feedback correctly using the skills of interpersonal and group communication

An approximate typology of tasks for the exam

To pass the exam in writing/oral.

№	Lesson topics	Exam question
1	**Organization of the body.** The language of medicine. Pronunciation. The position of the words. Stress rules. Grammatical categories of the noun - Gender. Anatomical position. Anatomical planes and sections. Directional terms. The language of medicine - grammatical categories of the noun - Number, Case, Declension. The main regions of the body (axial and appendicular regions). Membranes and cavities. Organ systems.The language of medicine - grammatical categories of noun - Adjective, adjective forms. Scope of Anatomy and Physiology. Human structure. The language of medicine - grammatical categories of noun - Adjective, adjective forms. Human function.	*1. Pronounce Latin diphthongs and digraphs.* *2. Pronounce Latin vowels and consonants.* *3. Read Latin words and word combinations.* *4. Use correct endings relating to the word gender* *5. Use word stress in Latin correctly* *6. Demonstrate the anatomical position* *7. Describe the human body using directional and regional terms* *8. Identify three planes most commonly used in the study of anatomy* *9. Define number and case of Latin nouns.* *10. Determine the stem and the declension of nouns.* *11. Distinguish between the posterior (dorsal) and the anterior (ventral) body cavities, identifying their subdivisions and representative organs found in each* *12. Describe serous membrane and explain its function, localisation, structure and relationship between structure and functions.* *13. Use properly the stem and the declension of adjectives.* *14. Make grammatical agreement of adjectives with nouns.* *15. Define anatomy ,physiology relate them to each other* *16. define the levels of human structure from the most complex to the simplest* *17. Discuss the clinical significance of anatomical variation among humans* *18. Explain the importance of physiological variation among persons* *19. State the characteristics that distinguish living organisms from nonliving objects* *20. Use properly the stem and the declension of adjectives.* *21. Make grammatical agreement of adjectives with nouns.* *22. Define homeostasis and explain why this concept is central to physiology* *23. Define negative feedback, give an example of it, and explain its importance to homeostasis* *24. Define positive feedback and give examples of its beneficial and harmful effects* *25. Define gradient, describe the variety of gradients in human physiology, and identify some forms of matter and energy that flow down gradients*

2	**Tissue of Human body.** Introduction. General features of Cell. Cell components, cell membranes, the cytoplasm, organelles. non-cellular structures, syncytium and intercellular substance. Cell inclusions.Human histology. Connective tissue. Connective tissues proper. Loose fibrous connective tissues, dense regular connective tissue and dense irregular connective tissue. adipose connective tissues, reticular connective tissues mucous connective tissues Human histology. Connective tissue. Skeletal connective tissues: cartilage and bone tissues.Human histology. Epithelial tissues.General features of Epithelial tissues. Classification of Epithelial tissues.GlandsHuman histology. Skin: Thick and thin skin. Skin appendages. Skin of the human body. The skin as an organ.	1. *explain and identify general structure of cells (nucleus, cytoplasm, mitosis), and cell organelles, noncellular structures – syncytium, intercellular ground substance.* 2. *identify the organelles, inclusions and cytoskeleton of cell under the microscope and in a micrographs* 3. *correlate the relation of these structures to function.* 4. *explain the technique of making histological slides* 5. *discuss the basic steps in preparing histological slides for light microscopy.* 6. *explain the difference between the resolution of light and electron microscopes and discuss which organelles can be identified with these microscopes.* 7. *explain the basics of studying 3-dimensional shapes of morphology biological structures based on examination of 2-dimensional light microscopic images* 8. *use red blood cells to estimate the size of other cells* 9. *draw a typical cell and indicate the cell organelles* 10. *describe the general structure of the fibers in the extracellular matrix and the cells residing within connective tissue* 11. *recognise various components of connective tissue under the microscope* 12. *discuss the structure and functions of the cell types found in connective tissues: fixed cells and wandering cells* 13. *define the components of the extracellular matrix and describe their role each plays in tissue integrity.* 14. *identify the different types of connective tissue* 15. *describe the structure and distinguish loose and dense connective tissue* 16. *describe the structure and functions of the reticular tissue, mucous tissue adipose tissue* 17. *describe the histological structure and function of cartilage* 18. *describe the structural differences between the different types of cartilage* 19. *explain the mechanical properties of the different types of cartilage* 20. *identify different types of cartilage in a micrographs* 21. *describe the histological structure and function of bone* 22. *distinguish osteoblasts, osteocytes, and osteoclasts* 23. *distinguish compact bone and trabecular bone* 24. *explain the structural arrangement of the bone to its function* 25. *classify epithelia based on their structure and functions* 26. *describe the histological structure of squamous, cuboidal, columnar, and transitional epithelia* 27. *distinguish simple, stratified, and pseudostratified epithelia* 28. *clarify the microscopic and ultramicroscopic structure of the epithelium and its functional significance* 29. *describe the microscopic structure of the epidermis, dermis and hypodermis* 30. *describe skin appendages: eccrine and apocrine sweat glands, sebaceous glands, hairs, nails and specialized glands* 31. *discuss the structural and functional differences between apocrine and eccrine sweat glands*

		32. *explain the structure and function of hair* 33. *recognize the skin on its constituent tissue elements at the microscopic level* 34. *identify the thin and thick skin under the microscope and in a micrographs*
3	**The integumentary system.** The structure and functions of the skin. Dermal circulation. The structure and functions of the cutaneous glands. Skin disorders	1. *list the functions of the skin and relate them to its structure;* 2. *describe the histological structure of the epidermis,dermis, and subcutaneous tissue;* 3. *describe the normal and pathological colors that the skin can have, and explain their causes; and* 4. *name two types of sweat glands, and describe the structure and function of each;* 5. *describe the location, structure, and function of sebaceous and ceruminous glands; and* 6. *discuss the distinction between breasts and mammary glands, and explain their respective functions.* 7. *relate the features of the three classes of burns to the skin functions and the priorities in burn treatment*
4	**Cell of a human body** Cell biophysics. Structure, properties and functions of cells.	1. *define the model and structure of membranes and the mechanisms of their functioning* 2. *define and provide types and functions of membrane proteins, physicochemical properties of membranes.* 3. *give characteristics of the movement of lipids, proteins in the membrane;* 4. *have skills in calculating the electrical capacity of the membrane, the sedentary life and the frequency of hopping of phospholipids of the membrane*
5	**Medical imaging.** X-ray examination; Positron emission tomography. Computed tomography. Magnetic resonance imaging. Ultrasound examination	1. *define radiation and their biological effects on a living organism;* 2. *describe methods for obtaining x-rays;* 3. *explain principles of operation of an x-ray tube and an optical quantum generator;* 4. *describe the methods of protection against ionizing radiation.* 5. *explain the nature of the occurrence of x-rays;* 6. *calculate the amount of energy released by ionizing radiation;* 7. *recognize the level of danger of radiation.* 8. *describe the types of doses and dosimeters.*
6	**Skeletal system:** Functions of the Skeleton. General Features of Bones. Histology of Osseous Tissue. Bone development.Bone physiology. Bone disorders. Overview of the Skeleton. The Vertebral Column. Cranial Bones. Facial Bones. Pectoral Girdle. Thoracic cage. Pelvic Girdle. Upper	1. *name the tissues and organs that compose the skeletal system;* 2. *state functions of the skeletal system;* 3. *distinguish between bone as a tissue and as an organ;* 4. *describe the general features of a long bone and a flat bone* 5. *state the importance of each constituent of bone tissue;* 6. *distinguish between the two types of bone marrow.* 7. *describe two mechanisms of bone formation;* 8. *explain how mature bone continues to grow and remodel itself.* 9. *relate the structure of two types of bone tissue to their functions* 10. *describe the processes by which minerals are added to and removed from bone tissue;* 11. *discuss the role of the bones in regulating blood calcium and phosphate levels;*

	Limb Bones. Lower Limb Bones.	*12. name the main hormones that regulate bone physiology, and describe their effects* *13. name and describe several bone diseases;* *14. name and describe the types of fractures;* *15. explain how a fracture is repaired;* *16. discuss some clinical treatments for fractures and other skeletal disorders* *17. define the two subdivisions of the skeleton;* *18. state the anatomical variation of the vertebral column;* *19. define several terms that denote surface features of bones.* *20. describe the general features of the vertebral column and those of a typical vertebra;* *21. describe the structure of the intervertebral discs and their relationship to the vertebrae;* *22. describe the special features of vertebrae in different regions of the vertebral column and discuss the functional significance of the regional differences* *23. distinguish between cranial and facial bones;* *24. name the bones of the cranial skull and their anatomical features;* *25. identify the cavities in the skull and in some of its individual bones;* *26. name the principal sutures that join the bones of the skull;* *27. describe the development of the skull from infancy through childhood.* *28. name the bones of the facial skull and their anatomical features.* *29. describe the anatomy of the sternum and ribs and how the ribs articulate with the thoracic vertebrae.* *30. identify and describe the features of the clavicle, scapula.* *31. identify and describe the features of the pelvic girdle.* *32. compare the anatomy of the male and female pelvic girdles and explain the functional significance of the differences.* *33. identify and describe the features of the humerus, radius, ulna, and bones of the wrist and hand.* *34. identify and describe the features of the pelvic girdle, femur, patella, tibia, fibula, and bones of the foot;*

7	**Joints.** Joints and their classification. Synovial joints and their movements. Anatomy and physiology of the temporomandibular, atlanto-occipital, atlanto-axial, intervertebral, shoulder, elbow joints. Anatomy and physiology of the temporomandibular, atlanto-occipital, atlanto-axial, intervertebral, shoulder, elbow joints.	1. *explain what joints are, how they are named, and what functions they serve;* 2. *name and describe the four major categories of joints, their subcategories and give an example of each;* 3. *explain, with examples, why some joints change categories as a person ages* 4. *identify the anatomical components of a typical synovial joint;* 5. *discuss the factors that determine a joint's range of motion;* 6. *name and describe six classes of synovial joints;* 7. *use the correct standard terminology for joint movements, define the axes, planes and range of motions for them* 8. *identify the major anatomical features of the temporomandibular, atlanto-occipital, atlanto-axial, intervertebral, shoulder, elbow joints;* 9. *explain how the anatomical differences between these joints are related to differences in function.* 10. *identify the major anatomical features of the hand, hip joint, knee, ankle, foot joints;* 11. *explain how the anatomical differences between these joints are related to differences in function*

An example of an OSPE station on anatomy.

Skull (Bones of the brain skull)

From the bones offered to you, find **Os frontale** and write down its structural units according to the table.

№	Latin name	English name	Points
	foramen/incisura supraorbitale		

From the bones offered to you, find **Os sphenoidale** and write down its structural units according to the table.

№	Latin name	English name	Points
		optic foramen	
6			
	Lamina medialis processus pterygoidei		

From the bones offered to you, find **Os Parietale** and write down its structural units according to the table.

№	Latin name	English name	Points
	Sutura sagittalis		

From the bones offered to you, find **Os temporale** and write down its structural units according to the table.

№	Latin name	English name	Points
3			
		carotid foramen	

From the bones offered to you, find **Os occipitale** and write down its structural units according to the table.

№	Latin name	English name	Points
		occipital condyle	

From the bones offered to you, find **Os ethmoidale** and write down its structural units according to the table.

№	Latin name	English name	Points
4			

An example of an OSPE station on histology

Description of the histological slide

Please, describe the histological slide of _____ tissue, determine staining and function.

Description of micrograph №

Correctly identify the histological slide and write the complete tissue name and staining	
Indicate the tissue structure on the histological slide and shown on it	
Indicate the main type of tissue that makes up the structure, describe the cellular organization of this structure	
List the functional significance of tissues and their mechanisms	

The list of anatomical structures to be submitted to the exam.

Skeletal system		
Skull		
supraorbital foramen / notch	inferior nuchal line	chin protrusion
supraorbital margin	orbital plate	chin hole
glabella	superior turbinate	condylar process
saddleback	middle turbinate	coronoid process
visual canal	cockscomb	mandibular notch
anterior wedge-shaped process	infraorbital foramen	mandibular foramen
superior orbital fissure	frontal process	lower jaw angle

pituitary fossa	orbital surface	mandibular ramus
round hole	alveolar ridge	body of the hyoid bone
oval hole	palatine process	big horn
spinous foramen	maxillary sinus	little horn
torn hole	external occipital protuberance	
Shoulder girdle		
top edge	medial margin	supraspinatus fossa
lateral margin	bottom corner	acromion
top corner	spine of the scapula	subscapular fossa
infraspinatus fossa	scapula notch	acromial end
glenoid cavity	coracoid process	rib furrow
rib head	sternal end	suprasternal (jugular) notch
rib neck	costal tubercle	clavicular notch
cone-shaped tubercle	sternum body	xiphoid process
sternum handle	sternum angle	
Pelvic bones		
iliac crest	ischial tuberosity	lesser ischial notch
acetabulum	iliac fossa	lower anterior iliac spine
upper anterior iliac spine	superior ramus of the pubic bone	lower branch of the pubic bone
obturator hole	ischial ramus	ischial spine
large sciatic notch	superior posterior iliac spine	ear-shaped surface

Lower posterior iliac spine		
Upper limb		
anatomical neck	large tubercle	small tubercle
intertubular groove	deltoid tuberosity	humerus head
humerus block	medial epicondyle	medial supracondylar crest
lateral epicondyle	lateral supracondylar crest	olecranon fossa
coronary fossa	radial fossa	radial tuberosity
styloid process	elbow notch	radius neck
block cut	olecranon	coronoid process
radial notch	styloid process	interosseous margin
Lower limb		
fossa of the head	large spit	small spit
intertrochanteric crest	rough line	
intertrochanteric line	comb line	medial epicondyle
gluteal tuberosity	medial supracondylar line	lateral epicondyle
intercondylar fossa	lateral supracondylar line	medial condyle
lateral condyle	patellar surface	popliteal surface
lateral condyle	intercondylar eminence	fibula head
medial condyle	tibial tuberosity	medial malleolus
apex of the fibula	lateral malleolus	scaphoid
lunate bone	trapezius bone	base of the metacarpal bone

triangular bone	capitate bone	proximal phalanx
pisiform bone	hook bone	distal phalanx
bone-trapezoid	metacarpal head	middle phalanx
calcaneus	talus	scaphoid
medial sphenoid bone	intermediate sphenoid bone	lateral sphenoid bone
cuboid		
Vertebral column		
tooth	cross hole	superior articular surface
inferior costal fossa	vertebral body	anterior sacral foramen
lower articular surface	spinous process	costal fossa of the transverse process
superior costal fossa	posterior tubercle	anterior tubercle
median sacral crest	lateral sacral crest	posterior sacral foramen
ear-shaped surface	cape	superior articular process
transverse process		
Joints		
coracoacromial ligament	coracoclavicular ligament	coracoclavicular ligament
cone-shaped ligament	trapezius ligament	acromioclavicular ligament
patellar ligament	radial ligament	peroneal collateral ligament
anterior cruciate ligament	tibial collateral ligament	posterior cruciate ligament
anterior fibular head ligament	transverse knee ligament	posterior meniscofemoral ligament
sacro-tuberous ligament		

List of histological preparations submitted for examination

1. Low prismatic epithelium of the renal tubules. Hematoxylin-eosin
2. High prismatic epithelium of renal tubules. Hematoxylin-eosin
3. Multi-row ciliated epithelium; Hematoxylin-eosin
4. Stratified squamous non-keratinizing epithelium; Hematoxylin-eosin
5. Stratified squamous keratinizing epithelium; Hematoxylin-eosin
6. Bladder epithelium; Hematoxylin-eosin
7. Finger skin. Epidermis; Hematoxylin-eosin
8. Finger skin. Dermis; Hematoxylin-eosin
9. Skin with hair. Hair follicles. Hematoxylin-eosin
10. Skin with hair. Hair root. Hematoxylin-eosin;
11. Skin with hair. Sebaceous glands. Hair lifting muscle. Hematoxylin-eosin;
12. Skin with hair. Cross section through the hair root. Azocarmine;
13. Loose unformed connective tissue; Iron hematoxylin.
14. Loose unformed connective tissue; Macrophages. Iron hematoxylin.
15. Loose unformed connective tissue; Fibroblasts. Iron hematoxylin.
16. Dense loose fibrous connective tissue of the skin of the finger. Mallory staining;
17. Tendon longitudinal section; Hematoxylin-eosin
18. Lymph node reticular tissue. Hematoxylin-eosin
19. Hyaline cartilage.Hematoxylin-eosin;
20. Elastic cartilage. Hematoxylin - orcein;
21. Fibrous cartilage. Hematoxylin-eosin;
22. Lamellar bone tissue. Schmorl staining.
23. Mesenchymal bone development. Hematoxylin-eosin;

Response quality scale (written / oral response)

Mark	Criteria	Scale, points
Excellent	1. all key aspects are included and presented logically; 2. high accuracy (relevance, without redundancy) and constant attention to the issue; 3. excellent integration of theoretical questions; 3. providing relevant examples; 4. in-depth analysis and theoretical justification of the problem (if applicable), all key aspects identified and interpreted; 5. fluency in professional terminology	90 - 100
Good	1. all key aspects are included and presented logically; 2. constant focus on the issue with satisfactory accuracy, relevance, and / or some redundancy; 3. satisfactory integration of theoretical questions; 3. the lack of examples; 4. satisfactory analysis and theoretical justification of the problem (if applicable), most of the key aspects identified and interpreted; 5. correct use of professional terminology	75 - 89
Satisfactory	1. most of the key aspects are included; 2. satisfactory focus on the question - some errors and / or noticeable redundancy; 3. theoretical problems presented without noticeable integration; 3. Providing failed examples or no examples; 4. some analysis and theoretical justification of this problem (if applicable), most of the key aspects are	50 - 70

	defined and interpreted; 5. correct use of professional terminology	
Unsatisfactory (FX)	1. most of the key aspects are omitted; 2. lack of attention to the issue-irrelevant and significant redundancy; 3. some theoretical problems presented without integration and understanding; 3. missing or outdated examples; 4. some analysis and theoretical justification of this problem (if applicable), most of the key aspects are omitted; 5. problems in using professional terminology	25 - 49
Unsatisfactory (F)	1. most or all of the key aspects are omitted; 2. no focus on the question, not much related to the issue of information; 3. significant gaps in theoretical questions, or their superficial consideration; 3. the lack of examples or irrelevant examples; 4. there is no analysis and no theoretical justification for the given problem (if applicable), most of the key aspects are omitted; 5. problems in using professional terminology	0-24

Grading system

Rating by letter system	Digital equivalent of points	Percentage	Evaluation using the traditional system
A	4,0	95-100	Excellent
A-	3,67	90-94	

B+	3,33	85-89	Good
B	3,0	80-84	
B-	2,67	75-79	
C+	2,33	70-74	Satisfactory
C	2,0	65-69	
C-	1,67	60-64	
D+	1,33	55-59	
D-	1,0	50-54	
FX	0	25-49	Unsatisfactory
F	0	0-24	
I (Incomplete)	-	-	«Discipline is not completed» (*it is not taken into account when calculating the GPA)*

Bibliography

Basic literature:

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2. Costanzo, Linda S.: BRS Physiology. Board Review Series.7 edition. -Wolters Kluwer Health, 2018.- 307p. - ISBN 1496367693, 9781496367693
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Additional literature:

1. Standring, Susan: Gray's Anatomy: The Anatomical Basis of Clinical Practice. - 41 Elsevier Limited, 2016
2. Elaine N. Marieb, Lori A. Smith: Human Anatomy & Physiology Laboratory Manual, Main Version. - 11 edition. - Pearson Education,2015. - ISBN 9780133999143
3. Scanlon V. C, Essentials of Anatomy and Physiology 8th Edition, F.A. Davis Company, 2018
4. Victor P. Eroschenko, Atlas of Histology with Functional Correlations 13th Edition, LWW, 2017
5. William Bialek: Biophysics: Searching for Principles. -Princeton University Press, 2012. - ISBN 0691138915, 9780691138916
6. Ghosh, Byas Deb. Human Anatomy [Text] : For Students / B. D. Ghosh ; [Anatomical Society of India (West Bengal Chapter) et al.]. - 2nd ed. - New Delhi ; Panama City ; London : Jaypee, 2013. - 948 p. : il. - Ind.: p. 913-948. - ISBN 978-93-5025-942-9
7. Mazumdar, Sibani. Anatomy at a Glance [Text] : An Exam-Oriented Text / S. Mazumdar ; Calcutta National Medical College [et al.]. - 2nd ed. - New Delhi ; London ; Philadelphia : Jaypee, 2014. - 534 p. : il. - Ind.: p. 525-534. - ISBN 978-93-5152-355-0 : App.: p. 519-520. Glossary: p. 521-524.
8. Baktybayeva, Lyaila Kyrgyzbayevna. Base of Physiology [Text] : laboratory practicum / L. K. Baktybayeva, G. T. Zhamanbayeva, M. S. Kulbayeva ; Al-Farabi Kazakh National University. - Almaty : Qazaq University, 2017. - 146 p. : il. - Bibliogr.: p. 145. - ISBN 978-601-04-3138-6 :

Online resources:

1. https://app.lecturio.com/#/
2. https://3d4medical.com/
3. https://www.youtube.com/channel/UCc_I2c2bUtO0p4DVeo6-Kxg
4. https://sites.google.com/a/umich.edu/bluelink/curricula/anatomy-403?authuser=0
5. https://histologyknmu.wixsite.com/info/gistologicheskie-sajty
6. http://www.histology-world.com/contents/contents.htm
7. http://www.histologyguide.com/slidebox/02-epithelium.html
8. https://histology.medicine.umich.edu/resources
9. https://web.duke.edu/histology/
10. http://virtualslides.med.umich.edu/Histology/view.apml?listview=1&