ЛД-21 ИН

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«North-Ossetia State Medical Academy»

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(FSBEI HE NOSMA MOH Russia)

Department of Biology and Histology

WORKBOOK

for practical classes and extracurricular independent work of students

in the discipline **"Histology, embryology, cytology»**

Part 2

1st year student _ _ _ _ _ _ group

medical faculty

TOPIC: SENSORY ORGANS. ORGAN OF VISION.

PC-5

I. Motivational characteristics of the topic.

Knowledge of the structure and histophysiology of sensory organs is necessary for understanding not only normal function, but also for proper diagnosis and prevention of diseases of these organs.

All sense organs, or analyzers, provide perception (reception) of irritation from the external and internal environment of the body, the transformation of the energy of irritation into a nerve impulse and the conduct of impulses along the nerves to the centers of higher analysis (cortical-subcortical centers).

According to the peculiarities of structure, development and function, analyzers are divided into: 1) sensory organs, in which the primary sensory stimuli are nerve cells (the organ of vision and smell);

2) sensory organs, in which the primary perceiving stimulus are special cells (organs of hearing, balance, taste), from which the excitation is transmitted to the first afferent neuron (secondary - feeling cell).

II.Targets.

1. Learn the General plan of the analyzer structure, be able to identify peripheral analyzers, their receptor and auxiliary departments.

2. Have an idea about the features of primary and secondary - sensing cells, know the structural and cytochemical bases of reception.

III.The required initial level of knowledge.

a) from the previous topics:

1.Features of the structure and classification of epithelial tissue.

2.Constituent elements and functional value of connective tissue.

3.Histogenetically features of nerve cells and nerve fibers.

b) from the current session:

1.The performance of the analyzers.

2.Sources of development of structural components of the eyeball.

3.Sheath of the eyeball and their derivatives functional devices.

IV.Object of study.

a) micro-products for self-study:

1.Cornea of the eye (color hematoxylin-eosin).

2.The back wall of the eye (hematoxylin-eosin stain).

3.Retina in the dark and in the light (hematoxylin-eosin stain).

V. Information part.

The eye is the peripheral part of the visual analyzer. It consists of the eyeball and auxiliary apparatus (eyelids, lacrimal glands, oculomotor muscles).

The visual analyzer is a type of primary-feeling analyzer.

The eyeball is formed by three membranes: fibrous (sclera and cornea), vascular and internal (sensory) and their derivatives (iris, ciliary body) and a lens, liquid front and rear chambers of the eye vitreous body. In the eyeball, there are three main functional devices: dioptric or light-refractive (cornea, fluid of the anterior and posterior chambers of the eye, lens, vitreous body); accommodation apparatus (iris, ciliated body with ciliated belt); receptor apparatus (retina).

The retina and optic nerve are formed from the rudiments of the nervous system. The lens is from the ectoderm (originally a hollow epithelial vesicle). Vasculature and sclera - from the surrounding eye glass mesenchyma.

The sclera is a dense connective tissue shell. Its bundles of collagen fibres pass into its own substance of the cornea. At the junction of the sclera with the cornea, there are cavities – the venous sinus of the sclera (the helmet channel). The inner surface of the sclera in the area of contact with the iris forms the space of the iridocorneal angle, in which the comb ligament is located.

The vasculature consists of the vasculature proper, the ciliated body, and the iris.In the vascular membrane proper, there are: supravascular, vascular, vascular-capillary (choriocapillary), basal complex.

The cornea is formed by the following layers: anterior epithelium (multilayered flat non-corneal), anterior border plate (consisting of collagen fibrils and

the main amorphous substance), the corneal substance itself (thin connective tissue plates consisting of bundles of collagen fibers, fibroblasts, the main amorphous substance, there are no blood vessels), the posterior border plate (thin collagen fibers and the main amorphous substance), the posterior epithelium (single-layer flat epithelium).

The lens has the form of a biconvex body, its front wall consists of a single-layer flat epithelium. At the equator is the growth zone of the lens. New epithelial cells give crystalline fibers that have the protein kristalin in their composition. In the center, the fibers form the nucleus of the lens. Supports the lens of the ciliated band.

The iris consists of an anterior epithelium (single-layer flat), an outer border layer (connective tissue and pigment cells), a vascular layer (loose connective tissue and vessels), an inner border layer (similar to the outer one), and a posterior pigment epithelium (two-layer epithelium).

Ciliated body (ciliary body), derived from the vascular membrane. It performs the function of fixing and changing the curvature of the lens. It consists of two parts: the inner-ciliary crown; the outer-ciliary ring. From the surface of the ciliary corona, ciliary processes depart, to which the fibers of the ciliary girdle are attached. The main part of the ciliary body is formed by the ciliary muscle. The ciliary body and ciliary processes are covered by the ciliary part of the retina.

The receptor apparatus of the eye consists of three radially located neurons (photoreceptor, associative, ganglionic) and two that are included in radial chains (horizontal and amacrine). Radial gliocytes are located between radially directed neurons. Cells form several layers: photosenor (form the outer segments of rods and cones); outer boundary layer (form the peripheral processes of neuroglial cells); outer nuclear layer (the bodies of rods and cones); outer mesh layer (axons of sensory and dendrites of bipolar cells); the inner nuclear layer (bodies of associative, horizontal and bipolar cells); the inner mesh layer (axons of bipolar and dendrites of ganglionic cells); the ganglionic layer (bodies of ganglionic cells); the outer boundary layer (form peripheral processes of neuroglial cells).

VI.Learning activity.

1.In the micro-preparation "cornea of the eye" find and draw the anterior epithelium (1) - a multi-layer flat non-corneal, under which lies the anterior border membrane (2), the cornea's own substance (3) - a dense formed connective tissue that does not have blood vessels, the posterior border membrane (4), the posterior border epithelium (5) - a single-layer flat.

2.In the micro-preparation "Back wall of the eye", consider and draw the eye shells: sclera(I), vascular (II) and retinal (III).

The sclera is determined by the presence of collagen bundles (1) and fibroblast nuclei (2). The vascular membrane is characterized by a large number of pigment cells (3) and blood vessels (4) located in it. The lower, pigmented layer is the retinal pigment layer(5). This is followed by the photosensory layer (6) - the layer of cones and rods. Then

there is a layer in which numerous nuclei are visible - the outer nuclear layer (7). Between it and the inner nuclear layer (8) is the outer mesh layer (9), and deeper than the inner nuclear layer is the inner mesh layer (10). Next to the inner retinal layer is the ganglion layer (11), which consists of large multipolar neurons. Then there is a layer of nerve fibers (12), on the inner surface of which lies the inner boundary layer (13). The outer boundary layer (14) is located between the rod and cone layer and the outer nuclear layer.

3.Examine the retina:

a) after the action of strong light on the eye. Retinal pigment epithelium with well-defined pigmented processes that extend between the rods and cones into the layer of rods and cones. Under the influence of bright light, the pigment moves from the bodies of pigment cells to their processes, protecting the photoreceptor cells from severe irritation.

b) after the effect on the eye of darkness. The processes of pigment epithelial cells are not visible due to the movement of pigment from them into the cell bodies. This creates optimal conditions for the functioning of photoreceptor cells in the dark.

4. Draw and mark drawings:

VII.Control question.

1.Classification of sense organs according to the genetic and morphological characteristics.

2.Embryonic sources of development of the main structural components of the eye.

3.The main shells of the eye, the features of their structure.

4.Characteristics of functional devices of the eye.

5.Neuronal composition of the retina, features of the ultramicroscopic structure of sensorineural cells.

VIII.Learning objective.

1.In the experiment, the animal was injured by the corneal epithelium. Is the regeneration process possible? If possible, at the expense of which cells?

2.A person has impaired twilight vision ("chicken blindness"). The function of which cells is impaired and what is the reason for this?

3.The patient sees well at close range and poorly at a distance. What structures of the eyeball can be associated with this condition?

4. During pregnancy, the woman long suffered from vitamin A. At birth it was discovered that the child is suffering from complete blindness. The administration of vitamin A to the child from the moment of birth led to the restoration of vision. What does this fact indicate?

IX. Abstract messages.

1.Origin of receptor cells.

2.Development and morpho-functional features of receptor cells of the visual organ in mammals.

3.Molecular and ultrastructural bases of reception.

4.Receptor evolution: cytological, membrane, and molecular levels.

5.Histophysiology of sensory systems (sense organs).

INDEPENDENT WORK

II. THE STUDENT SHOULD KNOW:

1.Classification of sense organs according to the genetic and morphological characteristics. The General plan of the structure of the analyzers. 2.The main membranes of the eye, the features of their structure. 4.Characteristics of functional devices of the eye. 5.Neuronal composition of the retina, features of the ultramicroscopic structure of sensorineural cells. 6.Auxiliary apparatus of the eye.	1.Histology: textbook / edited by Yu. I. Afanasiev, N. A. Yurina. - 5th ed., pererab. and add. - M.: Medicine, 2006. 2.Histology: textbook / Under the editorship of E. G. Ulumbekova, J. A. Chelysheva. - 2nd ed., pererab. and add. - M.: GEOTAR-MED, 2009. 3. Methodological guide for students in histology. Part 1. L. A. Akoeva, L. A. gireeva, L. S. Tabolova, and others. Vladikavkaz, 2008.

II. THE STUDENT MUST BE ABLE TO:

Determine the microscopic structures that form the cornea and back wall of the eye.

III. Tasks to prepare for the lesson:

Task 1. Continue your sentences.

1. The primary sense of the analyzer is…

2.The eye consists of the following shells:

1.

Two

3.

3.According to the function performed, the following parts of the eye are distinguished:

1.

2.

3.

4.The fibrous membrane is - …

5.Derivative of the fibrous shell -

6.The cornea is formed:

1.

2.

3.

4.

5.

7.Choroid – formed....., it performs the following functions.....

8.Derivatives of the vasculature:

1.

2.

9.The receptor apparatus of the eye is....

10.The light refractive apparatus of the eye is formed:

1.

2.

3.

4.

11.The eye's accommodation apparatus is formed:

1.

2.

The task 2. Fill in the table

The retina consists of 10 layers, each of which contains certain cells and their processes:

№	Name of the layer	Structures that form the layer
1.	pigment epithelium	
2.	layer of sticks and cones	
3.	The outer edge of the membrane	
4.	the outer nuclear layer	
5.	outer mesh layer	
6.	internal nuclear layer	

7.	inner mesh layer	
8.	ganglionic layer	
9.	layer of nerve fibers	
10.	The inner limiting membrane	

Task 3. Make 2-3 test tasks based on the sample.

The chain of transmission of electrical excitation in the retina:

(a) pigment cell→bipolar neuron→photoreceptor;

(b) photoreceptor→bipolar neuron→photoreceptor;

(C) photoreceptor→bipolar neuron→ganglion cell;

(d); pigment cell→ horizontal cell → bipolar neuron→photoreceptor;

(e) photoreceptor → horizontal cell → bipolar neuron → amacrine cell → ganglionic cell.

IV. Questions for self-monitoring:

1.Name the structures that form the light-refractive apparatus of the eye.

2.Name the structures that form the eye's accommodation apparatus.

3.Name the structures that form the iris.

4.Name three neurons that form the transmission of electrical excitation in the retina.

5.Features of the structure of the Central fossa and disk of the retina.

TEST YOURSELF:

CHOOSE ONE CORRECT ANSWER

1. Which cells in the sense organs are called primary-feeling cells?

a. Sessoamatoriale cells.

b. Neurocytes excited by epithelial cells.

c.into the Neurocytes of the sensitive nuclei of the brain.

d.Sensory cells.

2. What cells in the sense organs are called secondary-feeling cells?

a. Sessoamatoriale cells.

b. Neurocytes excited by epithelial cells.

c.into the Neurocytes of the sensitive nuclei of the brain.

d. Receptor nerve cells.

3. Why is the human retina called inverted?

a. the Image on it turns out to be inverted.

b. it absorbs all light.

the Photoreceptors are located deep in the retina, away from light.

d the Number of " sticks "is greater than the number of"cones".

4. In which layer of the retina are the horizontal neurons located?

and the Outer nuclear layer.

b Outer mesh layer.

c.into the Inner nuclear layer.

d. Inner mesh layer.

f.Ganglion layer.

5. In which layer of the retina are the amacrine neurons located?

a. the Outer nuclear layer.

b.Inner nuclear layer.

c.into the Inner mesh layer.

f.Ganglionic layer.

6. What is the structure of the" yellow spot " of the retina?

a. all the inner layers of the retina are Thinned and spread out in the path of light to the photoreceptor cells.

b. the axons of ganglion cells Converge.

c.the cones are Missing.

d. All layers of the retina are well developed.

7. What is the structure of the" blind spot " of the retina?

a. there are not enough Sticks, the cones become rod-shaped.

b. the axons of ganglion cells Converge, forming the optic nerve.

c.the cones Disappear.

d. All layers of the retina are well developed.

f. is Formed by a layer of nerve fibers.

8. Cornea:

a. the Outside is covered with a multi-layer flat non-corneal epithelium.

b.is covered with a single layer of epithelium on the Outside.

c.the Proper substance contains blood vessels.

f.Develops from the neural tube.

9. The outer segments of photoreceptor cells contain:

a. the Cilia.

b.Mitochondria.

c.into the Membrane disks.

f.Basal body.

10. The formation of the optic nerve involves:

a. Photoreceptor cells.

b. Bipolar neurons.

c.into the Ganglion cells.

d. Horizontal neurons

TOPIC: SENSORY ORGANS. ORGANS OF HEARING AND BALANCE.

PC-5

I. Motivational characteristics of the topic.

See the lesson on "organ of vision".

II.Targets.

1. Have an idea of the histogenetic features of secondary sensing receptor cells.

2. Study the morphofunctional features of the snail

3. To study the micro - and ultramicroscopic structure of the spiral organ and structural components of the vestibular apparatus.

III.The required initial level.

a) from the previous topics.

1. Features of the structure of epithelial tissue.

2. Constituent elements and functional value of connective tissue.

3. Histogenetically features of nerve cells and nerve fibers.

b) from the current session.

1. Representation of the classification of sense organs.

2. Morphological and functional characteristics of secondary sentient sense organs.

3. Structure of the membranous apparatus of the snail.

4. The structure of the receptor cells of the spiral organ.

5. Features of the organization of receptor cells of the organ of balance and gravity.

IV.Object of study.

a) micro-products for self-study.

1. Cortical organ (hematoxylin-eosin stain)

b) electronic messages.

No. 262, 268, 269.

V. Information part.

The structure of the organ of hearing and balance includes the outer, middle and inner ear. The inner ear is formed by a bony labyrinth and a membranous labyrinth located in it.

The receptor cells of the hearing organ are located in the spiral organ of the cochlea, and the balance organ - in the spots-macules of the saccules (sacculus and utriculus) and scallops - crystals of the ampullary part of the semicircular channels.

The balance organ consists of a spherical vesicle-SAC or sacculus, an elliptical vesicle of the uterus or utriculus, and three semicircular channels. At the junction of these channels with the uterus, extensions are formed-ampoules. The SAC connects to the canal of the snail. The ampoule contains receptor sites in the form of scallops or Crist. In the uterus and SAC, the receptor sites have the appearance of spots or macules. In these areas, the epithelium has a special structure, and the rest of the vestibular membranous labyrinth is lined with a single-layer flat epithelium. The macular epithelium consists of 7,000-9,000 sensory hair epithelial cells and supporting cells located between them. Over the surface of the epithelium is having a gelatinous consistency otolithic membrane containing calcium carbonate crystals (otoliths or statoconia). The otolith membrane is embedded with hairs of receptor cells that bend when the membrane is displaced. In this case, the hair cells are excited and transmit electrical impulses to the dendrites of bipolar neurocytes of the vestibular ganglion.

There are two types of hair cells:

* pear-shaped cells have a wide base and a narrow apical part. On the apical surface there is a cuticle with 60-80 fixed hairs-stereocilia. In addition, there is a mobile hair on the surface of the cells - a kinocilia, which is an eccentrically located cilia. At the base of each pear - shaped cell, a Cup-shaped nerve terminal is placed;

* cylindrical cells have a prismatic shape, and they end in the nerve endings of dendrites - bipolar cells of the point type. Otherwise, the structure of these cells is similar to that of the pear-shaped ones. Also in the macula there is a third type of cell-support cells, which have a prismatic shape and numerous microvilli on the apical surface. Its main function is holocrine secretion of otolith membrane components.

Maculae perceive the earth's gravity, linear acceleration. The sacculus is also responsible for vibrational perceptions. Scallops in ampoules of semicircular channels are fundamentally constructed in the same way as spots. They include receptor hair cells (cylindrical and pear-shaped) and support cells. The total number of hair cells is 15,000-17,000. Instead of an otolith membrane, a gelatinous substance is formed here in the form of a dome. The dome is a product of holocrine secretion of support cells, it does not contain otoliths, unlike the otolith membrane. The dome is filled with kinocilia and stereocilia. When the head moves and the body moves faster, the dome is deflected due to the

movement of the endolymph in the semicircular channels. The main function of scallops is the perception of angular accelerations

The cochlear part of the inner ear is represented by the bone canal of the cochlea, inside of which there is a membranous canal. The membranous labyrinth repeats the course of the bony labyrinth. On the cross section, the membranous canal of the snail has a triangular shape. The upper medial wall of the membranous canal of the cochlea is called the Reisner, or vestibular, membrane; the lateral wall is represented by a vascular stripe; the lower wall is called the basilar membrane or spiral membrane.

The spiral membrane is represented by a connective tissue plate consisting of collagen fibers immersed in an amorphous matrix. Collagen fibers consist of thin fibrils and play the role of strings. Short strings located at the base of the cochlea respond to high sounds, long strings located at the top respond to low sounds.

On the inner surface of the basement membrane is a spiral (cortical) organ. It includes internal and external hair (sensoepithelial) cells that support internal and external cells and column internal and external cells that belong to the group of supporting cells. Internal and external column cells limit the tunnel filled with endolymph. The cells of the spiral organ located between the tunnel and the vascular strip are called external, and between the tunnel and the limb – internal. Internal hair cells are arranged in a single row, have a pear-shaped shape, and lie on the internal supporting cells. There are about 60 fixed cilia (stereocilia) on the apical surface. The outer hair cells are arranged in 3-5 rows, prismatic in shape, and lie on the outer supporting cells. On the apical surface there are cilia (hairs), which contain holinoreceptor proteins and the enzyme acetylcholinesterase. The cover membrane is a connective tissue plate consisting of radially directed collagen fibers embedded in an amorphous matrix. The inner edge of the membrane is attached to the spiral comb, the outer edge freely hangs over the spiral organ throughout its entire length. When the spiral organ vibrates, the hairs (stereocilia) of the hair cells touch the covering membrane, which contributes to the appearance of a sound pulse. Sound effects on the eardrum are transmitted to the hammer, anvil, and stirrup, and then through the oval window to the perilymph, basilar and tectorial membranes. This movement strictly corresponds to the frequency and intensity of sounds and is associated with a certain level of the cochlear canal. In this case, there is a deviation of stereocilia and excitation of receptor cells. It is accompanied by interaction of acetylcholine with the endolymph holinoretseptoram protein membrane stereocilia. This leads to the emergence of a receptor potential.

VI.Learning activity.

1.Find and draw the following structures in the preparation "Kortiev organ": three to five whorls of the bone snail (1) around the bone rod of the snail (2). Inside each whorl of the snail, a triangular-shaped membranous canal (3) can be found. Its base is the basilar membrane (4), under which the drum ladder (5) is located; the outer wall is a vascular strip (6), adjacent to the outer wall of the bone snail (7); the inner upper wall is the vestibular ladder (8). The vascular strip is located on the spiral ligament (9). On the basilar membrane, attached from the inside to the spiral bone plate (10), there is a hearing organ - a spiral, or cortical organ (11). The periosteum of the spiral bony plate forms a thickening-limb (12), in which the upper vestibular lip (13) and the lower tympanic lip (13) are distinguished. At the base of the spiral bone plate lies a cluster of bipolar afferent neurons-the spiral ganglion (15). The spiral organ consists of two types of cells - support and receptor. Among the support cells that touch the basement membrane, internal (16) and external column cells (17) are distinguished, as well as internal (18) and external (19) supporting cells. The column cells form a triangular channel - tunnel (20). Outside of them, the external supporting cells are visible (16). Internal (21) and external (22) hair sensory epithelial cells lie on supporting cells: internal - in one row, external - in three or four rows. Over the spiral organ hangs a covering plate (23), which has a connection with the epithelium of the vestibular lip of the limb.

2. Draw and mark drawings:

VII.Control question.

1. Sources of development of the organ of hearing and balance.

1. Structure of the outer and middle ear.

2. Structure of the vestibular apparatus of the inner ear, morphofunctional characteristics of sacs and ampoules.

3. Name and describe the walls of the membranous labyrinth of the snail, their functional significance.

4. The structure of the spiral (Korteweg) of the body, morphological and functional properties of sensory and supporting cells.

VIII.Learning objective.

1.Patients who take large doses of antibiotics, Quinine, and other medications often experience hearing loss. What cells are not functioning properly? Which part of the analyzer is broken?

2.A person has a disturbed perception of irritation associated with the position of the body in relation to the gravitational field. Loss of function of which receptor cells can be assumed?

3.Can a person in a state of weightlessness navigate in space? If "Yes", then with what sense organs?

4.The spiral ganglion is completely affected by the pathological process. What functional changes will be detected?

IX.The topics of structural abstracts.

1. The receptor of gravity.

2. Cytological and molecular bases of reception.

3. The receptor of gravity.

4. The organ of Corti. Histophysiology and histochemistry

INDEPENDENT WORK

II. THE STUDENT SHOULD KNOW:

1.Classification of sense organs according to the genetic and morphological characteristics. The General plan of the structure of the analyzers. 2. Organ of hearing. Features of its structure. Snail, microscopic structure. The membranous canal of the cochlea (cochlear canal). 3. Spiral (cortical) organ. 4. Vestibular part of the membranous labyrinth. Spots of sacs (macula). Ampullary scallops (Krists)	1.Histology: textbook / edited by Yu. I. Afanasiev, N. A. Yurina. - 5th ed., pererab. and add. - M.: Medicine, 2006. 2.Histology: textbook / Under the editorship of E. G. Ulumbekova, J. A. Chelysheva. - 2nd ed., pererab. and add. - M.: GEOTAR-MED, 2009. 3. Methodological guide for students in histology. Part 1. L. A. Akoeva, L. A. gireeva, L. S. Tabolova, and others. Vladikavkaz, 2008.

II. THE STUDENT MUST BE ABLE TO:

Determine bone formations and their derivatives; inside the cochlea canal – three of its parts (the tympanic staircase, the membranous canal of the snail, the vestibular staircase; the spiral (cortical organ).

III. Tasks to prepare for the lesson:

Task # 1. Continue your sentences.

1. Continue the sentence " Secondary sensing analyzer is…

2.The ear consists of the following parts:

1.

Two

3.

3.The outer ear is formed

1.

2.

4.The border between the outer and middle ear -

5.The eardrum consists of -

6.The middle ear consists of:

1.

2.

3.

7.The bone snail forms in humans.....

8.The sides of the cochlear canal form:

1.

2.

3.

9.The spiral organ is....

10.Outer sessoamatoriale cells have the following characteristics and are located …

11.The vestibular part of the membranous labyrinth is.....

12.Ampullary scallops – Krists) are

The task № 2. Fill in the tables:

Table 1. First, insert the missing words in the second column, and then, in the 1st column, the name of the part of the vestibular apparatus, the description of which is given in the second column

	The receptors are contained in the epithelial spot, or..... , and they respond to gravitational forces.
	In this case, there is a gelatinous membrane over the sensitive cells of the spot, which, depending on the gravitational attraction, moves in one direction or another, which leads to irritation of the cells.

	Sensoepithelial cells also form a receptor....., covered with a gelatinous membrane, but react not only to gravity, but also to vibration (namely, to vibrational vibrations of the gelatinous membrane).

Table 2

Spiral (cortical) organ (in the membranous cochlea)	Perception ……
Elliptical SAC spot	Perception ……
Spot of spherical SAC	Perception ……and……
Ampoules of semicircular channels	Perception …… when the head and body rotate

Task 4. Make 2-3 test tasks based on the sample.

The organ of Corti has:

(a) stereocilia;

(b) cinalli;

(c) otolith membrane;

(d) cover membrane;

(e) supporting cells.

IV. Questions for self-monitoring:

1.Name the structures that form the sound-conducting part of the ear and their structure.

2.Name the structures that form the sound-receiving part of the ear and their structure.

3.Name the structures that form the vestibular part of the inner ear and their structure.

TEST YOURSELF:

1. In what formation of the inner ear is the spiral organ located?

a. Drum ladder.

b. Vestibular staircase.

c. into the Membranous canal of the snail.

d. Utriculus.

f. Sacculus

2.What is the limit of the membranous canal of the snail?

a. the Vestibular membrane.

b. basilar membrane.

c. in a Spiral ligament with a vascular strip.

d. the eardrum.

3. What formed the tunnel of the spiral organ?

a. Supporting the Outer lashes.

b. Cells of pillars.

c. In the Internal phalangeal cells.

d. Sessoamatoriale cells.

4. Where is the spiral (Cortical) organ located?

a. on the threshold of the snail.

b. In the spherical mamochke.

c. In the membranous canal of the snail.

d. In the semicircular canals.

5. What is the tunnel of the spiral organ?

a. Blood vessels.

b. Processes of neurons of the spiral ganglion.

c.into the Collagen fibers (strings).

6. Where are the auditory spots located?

a. in the cochlea.

b. in semicircular tubules.

c. in the bags of the threshold.

d. in the middle ear.

7. What is the hammer handle attached to?

a. To the outer surface of the eardrum.

b. To the inner surface of the tympanic membrane.

c. To the oval window.

f. To the round window.

8. The sound conducting apparatus of the hearing organ includes:

a. The Eardrum

b. The Auditory ossicles

c.In the Membrane of the oval window

f.Perilymph of the vestibular staircase of the snail

9. The basilar plate of the membranous canal of the snail contains:

a. The Basal membrane

b Thin collagen fibers

c. Into the Endothelium

d. Cover membrane

10. Ampullary scallops of the vestibular Department consists of:

a Supporting cells

b Gelatinous dome

c.In Sessoamatoriale cells

d. Otolith membrane

TOPIC: CARDIOVASCULAR SYSTEM.
PC-5

I. Motivational characteristics of the topic.
The cardiovascular system performs such important functions in the body as conducting and distributing blood in organs, regulating blood filling, metabolism between blood, tissues, etc.when the structure and function of different parts of the cardiovascular system are violated, severe diseases occur: heart defects, myocardial infarction, atherosclerosis, hypertension, etc. All this makes it necessary to study the cardiovascular system in detail for a future doctor of any profile.
II.Targets.
1. Understand the General principle of interdependence of the structure of the vessel wall and hemodynamic conditions.
2. Know the tissue composition of the walls of arteries and veins.
3. Have an idea about the vessels of the microcirculatory bed.

III.The required initial level of knowledge.
a) from the previous topics:
1.Structure and functional features of smooth muscle tissue.
2.Structure of loose fibrous connective tissue.
b) from the current session:
1.Embryonic source of vascular development.
2.General plan of the structure of the wall of arteries and veins, their classification and microscopic structure.
3.Representation of the microcirculatory bed. The main types of blood capillaries and their microscopic structure.
4.Classification of arteriolo-venular anastomoses.
5. Structure and localization of elastic type vessels.
6. Heart shells and their tissue composition, structure of heart valves. Age-related structural features of the heart.
IV.Object of study.
a) micro-products for self-study

1. Muscle-type artery (hematoxylin-eosin stain)
2. Muscle-type vein (hematoxylin-eosin stain)
3. Vessels of the microcirculatory bed (hematoxylin-eosin staining)

b) electronic messages
No. 280, 281, 299.

V. Information part.
The cardiovascular system is a set of organs (heart, blood and lymphatic vessels) that ensure the distribution of blood and lymph throughout the body, containing nutrients and biologically active substances, gases, and metabolic products. Blood vessels are a system of closed tubes of various diameters that perform transport functions, regulate blood supply to organs, and exchange substances between blood and surrounding tissues. In the circulatory system, there are arteries, arterioles, hemocapillaries, venules, veins, and arteriovenous anastomoses. The relationship between arteries and veins is carried out by the system of vessels of the microcirculatory bed. Blood flows through the arteries from the heart to the organs. This blood is oxygenated, with the exception of the pulmonary artery, which carries venous blood. Blood flows through the veins to the heart and contains little oxygen, but a lot of nutrients. Hemocapillaries connect the arterial link of the circulatory system with the venous, except for the so-called miracle networks, in which the capillaries are located between the same vessels. The thickness, tissue composition and functional features are not the same in different types of vessels.
Arteries. According to the structure of the artery there are three types: elastic, muscular and mixed. The artery wall consists of three layers: inner, middle and outer.
Most of the body's arteries are muscle-type arteries. These include mainly medium-and small-sized vessels, i.e. arteries of the body, limbs, and internal organs. The walls of these arteries have a relatively large number of smooth muscle cells, which provides additional pumping force and regulates blood flow to the organs. The inner shell consists of the endothelium, the subendothelial layer, and the inner elastic membrane. Endothelial cells are elongated along the longitudinal axis of the vessel. The subendothelial layer consists of thin elastic and collagen fibers, as well as poorly specialized connective tissue cells and smooth myocytes. To the outside of the subendothelial layer, there is a closely related internal elastic membrane (a plexus of elastic fibers). The middle shell is formed by smooth muscle cells arranged in a gentle spiral, between which there are a small number of connective tissue cells and fibers. Smooth muscle cells by their contractions maintain blood pressure, regulate blood flow to the vessels of the microcirculatory system of organs. Collagen fibers form a supporting framework for smooth myocytes. Elastic fibers merge with elastic membranes, creating a single elastic framework that gives the vessel elasticity when stretched and elasticity when compressed. The elastic framework prevents the decline of the arteries, which causes their constant gaping and continuity of blood flow. The outer elastic membrane is located on the border between the middle and outer shell. The outer shell consists of loose fibrous connective tissue, in which nerves and blood vessels that feed the wall constantly meet.
Elastic type arteries are characterized by a pronounced development of elastic structures in the middle shell. These include large-caliber vessels - the aorta and pulmonary artery, in which blood flows at a high speed (0.5-1.3 m/s) and at a high (120-130 mm Hg. art.) pressure. Large-caliber arteries perform mainly a transport function. The presence of a large number of elastic elements allows these vessels to stretch during systole and return to their original position during diastole. The inner shell includes the endothelium, the subendothelial layer, and the plexus of elastic fibers. The endothelium consists of cells of various shapes and sizes located on the basement membrane. Most often they are single-core, the cytoplasm has a poorly developed endoplasmic network of granular type. There are a large number of mitochondria, and microfilaments that form the cytoskeleton are very numerous. The subendothelial layer consists of loose, fine-fibrillar connective tissue rich in stellate cells. These cells support the endothelium. Deeper than this layer is a thick plexus of elastic fibers corresponding to the inner elastic membrane. The middle shell consists of a large number of elastic finned membranes connected by elastic fibers and forming a single elastic framework together with the elastic elements of other shells. Between the membranes lie obliquely arranged smooth muscle cells. The outer shell is constructed of loose fibrous connective tissue with a large number of collagen and elastic fibers that protect the vessel from overgrowth and breaks. The outer shell also contains feeding vessels and nerve trunks.
Mixed-type arteries (muscle-elastic) are larger in caliber than the previous ones and occupy an intermediate position between muscle-type and elastic-type vessels. These include the carotid and subclavian arteries. The inner shell consists of an endothelium, a subendothelial layer, and an internal elastic membrane. The middle shell contains an equal number of smooth myocytes and connective tissue elements. A small amount of collagen fibers and fibroblasts is found between smooth muscle cells and elastic elements. The outer shell has vascular vessels and nerve fibers.
The venous system makes up the diverting link of blood. The veins are similar in General plan to the arteries. In the veins, there are three shells: internal, middle and external, in the veins there are no internal and external elastic membranes. The structure of veins is closely related to the hemodynamic conditions of their functioning. Low blood pressure (15-20 mm Hg St.) and the insignificant speed of blood flow determine the relatively weak development of elastic elements in the veins and their greater extensibility. The number of smooth muscle cells in the vein wall varies and depends on whether the blood moves to the heart under the influence of gravity or against it. The need to overcome the gravity of the blood in the veins of the lower extremities leads to a strong development of smooth

muscle elements. According to the degree of development of muscle elements in the vein wall, they can be divided into two groups: muscle-free (fibrous) type veins and muscle-type veins. Veins of the fibrous type differ in the thinness of the walls and the absence of a middle shell, which is why they are called muscle-less veins. These include the veins of the Dura and soft meninges, the veins of the retina, the bones of the spleen and placenta. The veins of the meninges and retina of the eye are strongly stretched, and the blood in them under the influence of gravity, easily flows into the larger venous trunks. The veins of the bones, spleen and placenta are firmly fused with the dense elements of the corresponding organs and do not fall off. The wall of such veins is represented by an endothelium surrounded by a layer of connective tissue.
Veins of the muscular type are in turn divided into veins with weak development of muscle elements, veins with medium and strong development of muscle elements. Many veins have valves that are derived from the inner lining. Valves promote the flow of venous blood to the heart, preventing its reverse movement.
Veins with weak development of muscle elements – small and medium veins of the upper body, as well as large veins, such as the superior Vena cava. The walls of such veins are thinner in the caliber of the corresponding arteries. In their wall, the subendothelial layer is poorly developed, with a small number of smooth muscle cells lying in groups in the middle shell. In the outer shell, there are single longitudinally directed smooth muscle cells.
Veins with average development of muscle elements – medium-sized veins, (shoulder vein). The inner shell forms a valvular apparatus, formations in the form of pockets, the free edges of which are directed to the heart. The middle shell consists of circularly arranged bundles of smooth myocytes separated by layers of loose fibrous connective tissue. The outer shell is strongly developed, its size is 2-3 times larger than the size of the middle shell. The collagen and elastic fibers of this shell are directed longitudinally, and individual smooth muscle cells are also located longitudinally.
Veins with a strong development of muscle elements – large veins of the lower half of the trunk and legs (for example, the femoral and inferior Vena cava). They are characterized by the development of bundles of smooth muscle cells in all three shells, and in the inner and outer they have a longitudinal direction, and in the middle – circular. The inner shell forms valves and consists of the endothelium, a subendothelial layer formed by loose fibrous connective tissue, in which bundles of smooth muscle cells lie longitudinally. There is no internal elastic membrane, but clusters of elastic fibers are visible. The middle shell contains smooth muscle cells surrounded by collagen and elastic fibers. In the outer shell formed by loose fibrous connective tissue, bundles of longitudinally arranged smooth myocytes, vascular vessels and nerve fibers are found.
The microcirculatory bed is a complex of blood vessels surrounded by lymphatic vessels that regulates blood supply to organs, exchange at the tissue level, and tissue homeostasis. The microcirculatory bed includes three links: arterial (arterioles precapillaries); capillary; venous (postcapillaries, collective and muscle venules).

Functions of the microcirculatory bed:
* trophic and respiratory functions-the exchange surface of capillaries and venules is 1000 m2, or 1.5 m2 per 100 g of tissue;
* depositing function - in the vessels of the microcirculatory bed at rest, a significant part of the blood is deposited, which during physical work is included in the blood flow;
• the drainage function of the microcirculation collects blood from the arteries and bringing it distributes in the body;
* regulation of blood flow in the organ, this function is performed by arterioles due to the presence of sphincters in them;
• transport function.

Arterioles – microvessels connected, on the one hand, with arteries, and on the other hand gradually pass into capillaries. Arterioles have a diameter of 50-100 microns, their structure preserves three shells, but they are less pronounced than in the arteries. The inner shell consists of endothelial cells, a thin subdothelial layer, and a thin internal elastic membrane. The middle shell is formed by 1-2 layers of smooth muscle cells that have a spiral direction, in the precapillaries, smooth muscle cells are located singly. In arterioles, perforations are found in the basement membrane of the endothelium, thanks to which endotheliocytes and smooth muscle cells contact, which create conditions for the transmission of information. A small amount of elastic fibers is found between the muscle cells. There is no external elastic membrane. The outer shell is represented by loose fibrous connective tissue. In the area of departure from the capillary arteriole, there is a smooth muscle sphincter that regulates blood flow. This area is called the precapillary.
The structure of capillaries shows a layered principle. In their wall, three thin shells are distinguished, represented by cells. The inner layer is formed by the endothelium. The endothelial layer of the capillary is an analog of the inner shell. It lies on the basement membrane–a thin-fibrillar, porous, semi-permeable plate with a thickness of 30-35 nm, which consists of collagen, glycoproteins, fibronectin, and proteoglycans. which first splits into two leaves, and then joins. The result is a cavity in which lie the cells of the connective tissue pericytes, These cells have a process form and the form of a basket surrounded by blood vessels.. These cells end with vegetative nerve endings, under the regulating action of which cells can accumulate water, increase in size and close the lumen of the capillary. When water is removed from the cells, they decrease in size, and the lumen of the capillaries opens. Functions of pericytes: changing the lumen of capillaries; source of smooth muscle cells; control of endothelial cell

proliferation during capillary regeneration; synthesis of basement membrane components; phagocytic function. The basal membrane with pericytes is an analog of the middle shell. Outside of it is a thin layer of the main substance with adventitial cells that play the role of cambium for loose fibrous unformed connective tissue.
The outer layer has adventitial cells – these are poorly differentiated cells located outside of the pericytes. They are the cambial precursors of fibroblasts, osteoblasts, and adipocytes. There are three types of capillaries: somatic-capillaries with a solid endothelial lining and a basement membrane. They are found in the heart and skeletal muscles, in the lungs, CNS and other organs; fenestrated– capillaries with pores in endotheliocytes, tightened by the diaphragm (fenestrae). They are found in the endocrine organs, in the own plate of the mucous membrane of the small intestine, in brown adipose tissue, in the kidney; capillaries of a perforated type with through holes in the endothelium and basement membrane. They are characteristic of the hematopoietic organs, the liver. The diverting Department of the microcirculatory bed begins with the venous part of the capillaries. The diameter of the venous capillary can be 1.5-2 times wider than the arterial one. There are three types of venules: postcapillary, collective and muscular. Postcapillary venules in their structure resemble the venous part of the capillary but a larger diameter (12-30 microns) and a large number of pericytes.. In the collective venules (diameter 30-50 microns), which are formed when several postcapillary venules merge, there are already two distinct shells: the inner (endothelial and subendothelial layers) and the outer - loose fibrous unformed connective tissue. Muscle venules have one or two layers of smooth muscle cells and a relatively well-developed outer shell. In diameter, there are narrow (diameter-from 4.5 to 6-7mkm), medium diameter (7-11 microns), wide (20-30MKM) – sinusoid, with an interrupted basement membrane of the sinusoid type. Arteriolo-venular anastomoses or shunts are a type of vessels of the microcirculatory bed, through which blood from the arterioles enters the venules, bypassing the capillaries. Arteriolovenulyarnye anastomoses are: true and atypical. According to the structure, there are: a) simple ABA; b) atypical ABA
The heart is the main organ that drives the blood. In the heart wall there are three shells: an inner - endocardium, mid - myocardium, outer - epicardium.
Endocardium-lines the heart chambers, muscle papillae and tendon filaments, and heart valves from the inside. The surface of the endocardium facing the heart cavity is lined with endothelium, consisting of polygonal cells lying on a thick basement membrane. It is followed by a subendothelial layer formed by connective tissue rich in poorly differentiated connective tissue cells. Deeper is the muscle-elastic layer, in which elastic fibers intertwine with smooth muscle cells. The deepest layer of the endocardium – the external connective tissue-lies on the border with the myocardium. It consists of connective tissue containing thick elastic, collagen and reticular fibers. The endocardium forms duplicates-heart valves-dense plates of fibrous connective tissue with a small content of cells covered with endothelium. The atrial side of the valve is smooth, while the ventricular side is uneven and has outgrowths.
The myocardium - the muscle membrane of the heart-is formed by striated muscle cells that, when in contact with each other, form functional muscle fibers. There are typical contractile muscle cells, atypical cardiac myocytes that are part of the conducting system of the heart and secretory (endocrine) muscle cells. The main mass of the myocardium is made up of working (typical) cardiomyocytes. They have a rectangular shape, contain 1-2 nuclei in the Central part and myofibrils on the periphery. Numerous mitochondria are located between the myofibrils. The cells are covered with a sarcolemma consisting of a plasmolemma and a basement membrane, into which collagen and elastic fibers are intertwined, forming the "outer skeleton" of cardiomyocytes. The basal membrane, which contains a large number of glycoproteins and is able to bind CA+ ions, can participate along with the sacroplasmic network and mitochondria in the redistribution of CA+ in the contraction-relaxation cycle. The basal membrane has invaginations in the tubules of the T-system. Cardiomyocytes communicate with each other in the area of insert disks, which have the form of dark stripes. Insert disks are places where the cytolemma contacts neighboring cardiomyocytes, including desmosomes, places where myofibrils interweave into the plasmolemma (intermediate contacts) and slotted contacts – nexuses. If the first two sections perform a mechanical function, the third performs an electrical connection of cardiomyocytes. Nexuses provide metabolic (primarily ion) communication of cardiomyocytes. In functional terms, atypical muscle tissue is characterized by the ability to induce biopotentials in nodes, conduct impulses along the fibers of the conducting system and transmit them to contractile myocardiocytes. The conducting system of the heart includes the sinus-atrial node, atrioventricular node (sinus and atrioventricular node cells), atrioventricular bundle of GIS (right and left legs), cardiomyocytes from the bundle legs (Purkinje fibers) that transmit impulses to contractile muscle cells. There are three types of conducting cardiomyocytes, which are located in different proportions in different parts of this system. Pulse formation occurs in the sinus node, the Central part of which is occupied by cells of the first type-rhythm drivers, or pacemaker cells (P-cells), capable of spontaneous contractions. They differ in small size, polygonal shape, a small number of myofibrils that do not have an ordered orientation. The atrioventricular node contains transitional cells. These are thin, elongated cells, myofibrils in them are more developed, there are short T-tubes. The functional significance of these cells consists in the transfer of excitation from the P-cells to the bundle cells and the working myocardium. The cells of the conducting system bundle (GIS bundle) and its legs (Purkinje fibers) make up the third type. In functional terms, they are the transmitters of excitation from the transition cells to the cells of the working ventricular myocardium. Purkinje cells are the largest cells not only in the conducting system, but also in the entire myocardium. They contain a lot of glycogen, a rare network of myofibrils, and no T-tubes. Cells are linked by nexuses and desmosomes. Secretory cardiomyocytes are located in the Atria. These are cells of a process form, with a poorly

developed contractile apparatus and a significantly developed synthetic apparatus. The cytoplasm contains dense granules containing the hormone-atrial natriuretic factor-PF. Once in the blood, PF is brought to the target organs-kidneys, adrenal glands, brain, etc.PF causes stimulation of diuresis, natriuresis, vasodilation, inhibition of aldosterone, cortisol, vasopressin secretion, and a decrease in blood PRESSURE.
The epicardium and pericardium - the outer shell of the heart, is a visceral leaf of the pericardium, similar in structure to the serous membranes. The epicardium is formed by a thin layer of connective tissue that tightly fuses with the myocardium. Its free surface is covered with mesothelium. In the connective tissue base of the epicardium, there is a surface layer of collagen fibers, a layer of elastic fibers, a deep layer of collagen fibers and a deep collagen-elastic layer. In the parietal leaf of the pericardium, the connective tissue base is more developed than in the epicardium.

VI.Learning activity.

1.Find and draw three distinct vessel shells on the micro-product "muscle-type Artery". The inner shell (I) is formed by the endothelium (1) lining the vessel from the inside, which in the section has the appearance of a thin line with nuclei protruding into the lumen. Behind the endothelium is the subendothelial layer (2). The next layer is an internal elastic membrane (3) formed by a plexus of elastic fibers. The thickest middle shell (II) consists of circularly arranged smooth muscles (4). In larger arteries of this type, the middle membrane is separated from the outer by an elastic membrane (5). The outer shell (III) is formed by loose connective tissue, in which pass the vessels of the vessels (6) that feed the outer layers of the vessel wall.

2.On micropreparative "vein of muscular type" find and sketch the vein wall, but here the distinction between three shell to hold is difficult because the connective tissue, the basis of the whole wall moves from one shell to another, uniting them into one; also in veins no elastic membranes. In the inner shell (I), the endothelium(1) is well isolated. In places, you can distinguish a very thin subendothelial layer (2). Without a sharp border, the inner shell passes into the middle shell (II), which consists mainly of smooth muscle cells (3) lying in circular bundles. The outer adventitial sheath (III) is a loose connective tissue.

3.On the micro-product "Vessels of the microcirculatory bed" find capillaries (I), in the wall of which are visible longitudinally arranged nuclei of endotheliocytes (1) and more elongated nuclei of pericytes (2). Somewhat to the outside of them, also longitudinally lie the nuclei of adventitious cells (3). Arterioles (II) and venules (III) can be distinguished by the character of the striation of their walls, due to the circular arrangement of smooth muscles (4).

4.On the micro-preparation "Aorta" find three shells: internal (I), middle (II), external (III). In the inner shell, clearly visible sections of the longitudinal plexus of elastic fibers (1), cut mainly across. In the middle shell, dark-colored elastic end membranes (2) stand out sharply, and between them light layers of smooth muscles (3).

5.On the micro-product "heart Wall" find and draw the heart shells: endocardium (I), myocardium (II), epicardium (III). The following layers are defined in the endocardium: endothelial (1), subendothelial (2), muscle-elastic (3), and external connective tissue layer (4). The main mass of the heart wall is the myocardium, represented by cells-contractile cardiomyocytes (5), which have rounded nuclei (6) in the center of the cell. In the heart muscle, insert plates (7) and anastamoses (8) are isolated. Between the crossbars of the myocardium are connective tissue layers (9), with capillaries passing through it (10). Between the contractile muscle fibers and the endocardium are Purkinje fibers (11) with a lighter cytoplasm and eccentrically arranged nuclei.

6.Mark the drawings.

VII. Control question.
1.Sources of development and components of the cardiovascular system, the functional significance of its various departments.
2.Arteries, General plan of structure, classification.
3.Veins, General plan of structure, classification.
4.Vessels of the microcirculatory bed, structural features.
5.The lining of the heart and their tissue composition.
6.Functional significance and features of the structure of contractile and conducting muscle tissue of the myocardium.

VIII.Learning objective.
1.Two histological preparations are presented, one clearly shows the capillary network located between two arterioles, the second - between two veins. Give the name of the capillary network and in what organs is it located?
2.When studying the drug in the field of view of a light microscope, you can see a muscle-type artery and a vein of the same name, colored with orsein. What are the structural elements of the vessels will be coated with this dye? By what signs can you accurately determine the artery?
3.The venom of spiders and snakes containing hyaluronidase easily penetrates the capillary wall. What structural element of the walls of the blood capillary is associated with permeability and why?
4.In electron micrographs of the walls of blood capillaries are visible cells. One of them lies on the basal membrane, the other is surrounded by the basal membrane. What are these cells called?
5.The inner lining of blood vessels was impregnated with silver salts. Were identified cells with irregular sinuous borders, name the cells and the source of their development.
6.The drug contains arterioles and blood capillaries with a diameter of 20 microns. What is the basis for determining arterioles? What type of capillaries are these?
7.Two preparations of cross-striated muscle tissue are presented for medical examination. One shows symplastic structures where nuclei are located on the periphery. On the other-cellular, the nuclei are located in the center. Which of the drugs is related to heart muscle tissue?
8.When studying the ultrastructure of cardiomyocytes in the latter, well-developed myofibrils with dark and light disks, numerous mitochondria and insert disks were found. What type of heart tissue do these cells belong to?
9.There are many sensitive nerve endings in the heart muscle, but there are absolutely no effectors - motor endings. Where is the impulse to contract generated, how is it transmitted to the cardiomyocyte membrane and how is it distributed to the nearest heart cells?
10.In the myocardium of a young person who died suddenly, no pathological changes in cardiomyocytes were detected in the light microscope. A study in an electron microscope revealed a sharp expansion of the gaps between the membranes of cardiomyocytes in the composition of nexuses. Could such a violation of the nexus lead to cardiac arrest? Why?

IX.The topics of structural abstracts.
1. Ultramicroscopic structure of the capillary wall.
2. Features of microscopic and ultramicroscopic structure of vessels of the lymphatic system.
3. Vascular endothelium.
4. Angiogenesis. Formation, growth and development of blood vessels.

INDEPENDENT WORK
I. the STUDENT SHOULD KNOW:

1 General plan of the structure of the wall of arteries and veins, their classification and microscopic structure. Features of the structure of elastic vessels, the principle of the relationship between the conditions of hemodynamics and the structural organization of vessels. 2 Representation of the microcirculatory bed. The main types of blood capillaries and their microscopic structure. 3.The lining of the heart and their tissue composition, structure of heart valves. Morpho- functional features of the contractile and conducting systems of the heart.	1.Histology: textbook / edited by Yu. I. Afanasiev, N. A. Yurina. - 5th ed., pererab. and add. - M.: Medicine, 2006. 2.Histology: textbook / Under the editorship of E. G. Ulumbekova, J. A. Chelysheva. - 2nd ed., pererab. and add. - M.: GEOTAR-MED, 2009. 3.Methodological guide for students in histology. Part 2. L. A. Akoeva, L. A. gireeva, L. S. Tabolova, and others. Vladikavkaz, 2008. 4.Age and histology. Blood. The organs of hematopoiesis. Circulatory organs. Methodological guide for students of medical, pediatric, preventive medicine and dental faculties. L. A Akoeva., L,A, Gireiev, L. S. Tabolov. Vladikavkaz, 2011.

II.THE STUDENT MUST BE ABLE TO:

1.Determine morphological differences between arteries and veins of the muscular type, the structure of vessels of the microcirculatory bed at the microscopic level.

2. Determine the elastic type of artery sheath(aorta), the heart sheath at the microscopic level.

3.Perform morphological differentiation of typical and atypical cardiomyocytes at the microscopic level.

III. Tasks to prepare for the lesson:

Task 1. Fill in the table. "Differences in the structure of arteries and veins."

Vessels.	The arteries of muscular type.	Muscle-type veins
Endothelium and subendothelial layer		
Internal elastic membrane		
Muscular layer		
External elastic membrane		
Adventitious shell		

Task 2. Continue your sentences:

1. The structural and functional unit of striated muscle tissue is .....

2. Typical cardiomyocytes, in addition to cardiomyocytes that are part of the heart's conducting system, include....., whose function is to……

3. P-cells are located in the ....., their function is to.....

4. Working cardiomyocytes are connected to each other .....

5. The order of excitation by the conducting system of the heart: P-cells - .....

6. The aorta refers to the arteries..... type.

7. The elastic framework of the aortic wall is formed .....

Task 3.Complete the classification scheme for cardiomyocytes.

Task 4. Fill in the table. "Differences in the structure of the skeletal and

heart muscle tissue".

muscle tissue.	striated skeletal.	striated heart
distinctive feature		

Task 5. Make tests based on the sample.
The vessels of the microcirculatory bed include:
a. the small arteries
b. venules
c. capillaries
d. arterioles
f. arterio-venular anastomoses.

IV. Questions for self-monitoring:
1 General plan of the structure and classification of vessels.
2 the General principle of interdependence of the structure of the vessel wall and hemodynamic conditions.
3 Structural differences between arteries and veins of the muscular type.
4. What are the features of the structure and functioning of elastic vessels?
5 Features of the structure of vessels of the microcirculatory bed: arterioles, capillaries, venules, arterio-venous anastomoses.
6.The lining of the heart and their tissue composition. Functional significance and features of the structure of contractile and conducting muscle tissue of the myocardium.
7.The functional significance of intercalated disks of the myocardium.
8.Age and structural features of the heart.

TEST YOURSELF:
CHOOSE THE CORRECT ANSWERS

1. The vessels of the microcirculatory bed do not include:
a. Vessels > 100 microns in diameter.
b. Arterioles.
c. Capillaries.
d. Venules.
f. Arteriolo-venular anastomoses..

2.Which of the following structures is not part of emocapella?

a. Elastic membrane.

b. Smooth myocytes.

c. Subendothelial layer.

d. Basal membrane.

f. Endothelium.

3. Not in the myocardium:

a. Intercalated disc

b. Anastomoses between cells

c. Large number of capillaries

d. 1-2 nuclei and the center of the cell

f. Abundance of loose connective tissue between cells

4. Not in the endocard:

a. Endothelial

b Subendothelial layer

c.Muscle-elastic layer

d.External connective tissue elephant

f.Layer of blood vessels

5. Which of the following veins refer to the veins of muscular type with strong development of muscular elements?

a. Brachial vein.

b.Femoral vein.

c. Veins of the bones.

d.Superior Vena cava.

6. Sinusoid capillaries:

a. Located in the red bone marrow.

b. Found in the spleen and liver.

b. Found in the skin and muscles.

c. Have a diameter of 8-10 microns.

d. Have a diameter of 20-30 microns.

7. The endocardium contains all layers except:

a. Endothelium.

b. Subendothelial.

c. The Muscular-elastic.

d. External elastic membrane

8. For muscle-type arteries, it is typical:

a. The Outer elastic membrane is better expressed than the inner one.

b. Smooth Muscle cells in the middle shell are oriented spirally.

c. Adventitia, numerous nerve fibers are present.

d. Control blood flow to the organs.

9. Capillaries. Everything is correct EXCEPT:

a. Contain pericytes.

b. Contain smooth muscle cells.

c. Ensure the exchange of substances between blood and tissues.

10. Which of the following structures are part of emocapella?

a. Endothelium.

b Basal membrane.

c. Pericytes.

d. Adventitial cells.

f. Smooth Muscle cells.

MODULE 3
Targets.
1. Show knowledge of theoretical material on the studied topics.
2. Be able to determine and differentiate histological structures of tissues in micro-preparations.
3. Solve situational problems and tests.
4. Show knowledge in defining electronograms.

Control question:
1. Classification of sense organs according to the genetic and morphological characteristics.
2. Embryonic sources of development of the main structural components of the eye.
3. The main membranes of the eye, the features of their structure.
4. Characteristics of functional devices of the eye.
5. Neuronal composition of the retina, features of the ultramicroscopic structure of sensorineural cells.
6. Sources of development of the organ of hearing and balance.
7. Structure of the outer and middle ear.
8. Structure of the vestibular apparatus of the inner ear, morphofunctional characteristics of sacs and ampoules.
9. Name and describe the walls of the membranous labyrinth of the snail, their functional significance.
10. The structure of the spiral (Korteweg) of the body, morphological and functional properties of sensory and supporting cells.
11. Sources of development and components of the cardiovascular system, the functional significance of its various departments.
12. Arteries, General plan of structure, classification.
13. Veins, General plan of structure, classification.
14. Vessels of the microcirculatory bed, structural features.
15. The lining of the heart and their tissue composition.
16. Functional significance and features of the structure of contractile and conducting muscle tissue of the myocardium.
17. The functional significance of intercalated disks of the myocardium.
18. Age and structural features of the heart.

Micropreparations:

1. Cornea of the eye (color hematoxylin-eosin).
2. Back wall of the eye (hematoxylin-eosin stain).
3. Retina in the dark and in the light (hematoxylin-eosin stain).
4. Cortical organ (hematoxylin-eosin stain)
5. Muscle-type artery (hematoxylin-eosin stain)
6. Muscle-type vein (hematoxylin-eosin stain)
7. Vessels of the microcirculatory bed (hematoxylin-eosin staining)
8. The aorta is an elastic type of artery (orsein staining).
9. Heart wall (hematoxylin-eosin stain).

Test task

TOPIC: ORGANS OF HEMATOPOIESIS AND IMMUNE PROTECTION. PC-5

I. Motivational characteristics of the topic.

Blood, lymph and organs where they are formed, as well as blood cells that have "moved out" into connective and epithelial tissues, make up the blood system, which is involved in maintaining the constancy of the internal environment of the body and protecting genetic integrity. Hematopoiesis and the formation of immune functions of blood cells is a complex multi-stage process, violations of which lead to a number of diseases. Knowledge of normal hematopoiesis, the structure and participation of hematopoietic organs in the body's protective reactions is necessary for a doctor of any profile.

II. Targets.

1.Know the unitary theory of hematopoiesis. Have an understanding of the unitary theory of hematopoiesis and blood stem cell.
2.Know the features of postembryonic hematopoiesis.
3.To study the features of the structure and functioning of various hematopoietic organs, their role in the formation of humoral and cellular immunity.

III. The required initial level of knowledge.

a) from the previous topics:
1.The content of the concept of "reticular tissue".
2.Scheme of post-embryonic hemopoiesis-lymphocytopoiesis.
b) from the current session:
1.General characteristics of Central and peripheral hematopoietic organs.
2.Sources of development and the General plan of structure, and the functional significance of the red bone marrow and thymus.
3.Sources of development and the General plan of the structure, and the functional significance of the lymph nodes.
4. Sources of development and the General plan of the structure, and the functional significance of the spleen.
5.Functional significance and Prince of the organization of lymphoepithelial organs on the example of the Palatine amygdala and Appendix.

IV. Object of study.

a) micro-products for self-study
1. Thymus (hematoxylin-eosin stain)
2. Lymph node (hematoxylin-eosin stain)
3. Spleen (hematoxylin-eosin stain)
b) electronic messages
No. 317, 322, 340.

V. Information part.

The organs of hematopoiesis and immunological protection include: red bone marrow; thymus; lymph nodes; spleen and lymph nodes of the digestive tract. There are Central (thymus, red bone marrow) and peripheral hematopoietic organs (the rest).
The red bone marrow is the Central organ of hematopoiesis, containing hematopoietic stem cells and performing myeloid, lymphoid hematopoiesis, erythropoiesis, and thrombocytopoiesis. It is a universal hematopoietic organ. The basis of the organ is a reticular stroma, through which many blood vessels pass. The most intense hematopoiesis occurs near the endost. Hematopoietic cells are located in Islands surrounding the macrophage. Granulopoietic cells form Islands surrounded by proteoglycans. Megakaryoblast and megakaryocytes are in contact with slits capillaries. There are also small clusters of bone marrow lymphocytes and monocytes.
The thymus (thymus or goiter) is the Central organ of lymphocytopoiesis (T-lymphocytes) and immunogenesis. On the basis of reticuloendothelial fabric. Here there is an antigen-independent differentiation of t-lymphocyte precursors into T-lymphocytes, which carry out cellular immunity reactions and regulate humoral immunity reactions. Removal of the thymus leads to a weakening of the immune system, rejection of organ transplants and increased sensitivity to infectious diseases. In the cortical substance is gematotropnye barrier. The thymus reaches its maximum development in early childhood. From 3 to 20 years, there is a stabilization of the mass, and then there is an age-related involution of the thymus gland. During the stress reaction, accidental involution occurs.
Lymph nodes - peripheral organs of lymphocytopoiesis, immunological protection and Deposit of leaking lymph. This is a parenchymal organ covered with a connective tissue capsule, consisting of cortical and cerebral matter, as well as sinuses. The cortical substance consists of cortical and paracortical (thymus-dependent, which mainly contains T-lymphocytes) zones. The cortical part consists of many lymphatic follicles (consisting of B-lymphocytes, follicular process cells and macrophages). The brain substance is represented by trabeculae, brain cords, and sinuses. Sinuses of the lymph node: marginal, intermediate, sinuses of the medulla.
The spleen is an organ of peripheral hematopoiesis, involved in the formation of cellular and humoral immunity, the production of substances that inhibit erythropoiesis in the red bone marrow. It takes part in the elimination of aging red blood cells and platelets. The spleen is covered with a connective tissue capsule containing smooth muscle cells. The spleen is a parenchymal organ based on reticular tissue. The parenchyma is formed by a white and red pulp. In the reticular stroma of the red pulp, red blood cells predominate and numerous macrophages are present that destroy obsolete red blood cells. White pulp-clusters of globular nodules and periarterial sheaths. In the lymph node, there is a periarterial zone (consisting of T-lymphocytes), a reproduction center (consisting of proliferating B-lymphocytes), a mantle zone (consisting of small B-lymphocytes and a small number of T-lymphocytes) and a marginal or marginal zone (consisting of B - and T-lymphocytes). The nodule artery (Central artery) runs eccentrically through the nodule.

VI. Learning activity.

1.Using the classroom tables, learn to identify Islands of red bone marrow hematopoietic cells, be able to distinguish them, and know the features of cell differentiation in each hematopoietic row.
2.On the micro-preparation "Thymus" find and draw a connective tissue capsule (1) covering the organ, under which the lobules of the gland (2) are visible. In the lobule, you can distinguish a darker cortical (3) and a light - brained (4) substance. The basis of the lobule is epithelial tissue. Layered epithelial cells form Hassal corpuscles (5), located in the brain substance.
3.On the micro-drug "Lymph node" find and draw a connective tissue capsule (1), from which the trabeculae (2) depart inside the organ. Under the capsule is a darker cortical substance (3), represented by lymphoid nodules (4). The periphery of the nodule is formed by Mature lymphocytes (5), the Central part (the center of reproduction, the reactive center) is represented by lymphoblasts (6). From the lymphoid follicles depart ribbon-like clusters of lymphocytes-brain strands (7). Between the follicles, trabeculae and brain cords, light spaces are visible-sinuses (8).
4.Find and draw a connective tissue capsule (1) covered with mesothelium (2) on the spleen micropreparation. From it, the trabeculae(3) extend deep into the organ, in which blood vessels are clearly visible (4). The parenchyma of the organ is represented by a white pulp-lymphoid follicles (5) , consisting of a cluster of lymphocytes around the Central artery (6). Between the follicles and the trabeculae is a red pulp (7) - sinusoid capillaries filled with blood.
5.Mark the drawings.

VII. Control question.

1.General characteristics of hematopoietic organs and their classification.

2.Structure, localization, features of postembryonic hematopoiesis of the red bone marrow.

3.Thymus, structure, localization, features of hematopoiesis, functions. Age-related and accidental thymus involution.

4.Localization, structure and function of lymph nodes.

5.Features of blood circulation, localization, structure, functional value of the spleen.

VIII. Learning objective.

1.When transplanting foreign tissue, the recipient animal develops protective reactions that cause the death of the transplanted tissue. Which cells of the recipient body cause the death of the transplanted tissue and in which hematopoietic organ are they formed?

2.When the thymus is removed from a newborn animal, pronounced morphological changes occur in the peripheral lymphoid organs. Which areas of the spleen and lymph nodes most clearly respond to this operation, and what is their intra-organ specialization?

3.The researcher in the histological preparation of the spleen revealed an increased content of iron. What is the source of iron in the spleen? What does the increase in its content indicate?

4.The patient has impaired processes of erythropoiesis, granulocytopoiesis, monocytopoiesis, and thrombocytopoiesis. Which hematopoietic organ pathology is indicated by these disorders?

5.The gunshot wound caused acute bleeding. How will this condition affect the hematopoietic activity of the bone marrow, the number of blast cells?

6.If a newborn animal has a thymus removed and then a foreign graft is transplanted, the rejection reaction does not develop. Explain the reason for this phenomenon.

7.The animal was placed in sterile conditions immediately after birth. Can secondary follicles form in peripheral hematopoietic organs in this situation, if so, why, and if not, why?

8.The student claimed that the spleen in the postembryonic period is one of the organs of hematopoiesis, but he did not answer questions about where it occurs in the spleen and what shaped elements of blood are formed in this case. How do you answer these questions?

IX. The topics of structural abstracts.

1. Age-related thymus involution and its changes under the influence of stress.

2. The structure of the thymus and differentiation of T-lymphocytes.

INDEPENDENT WORK

I. THE STUDENT SHOULD KNOW:

1. Unitary theory of hematopoiesis 2. The concept of a hematopoietic stem cell 3. Features of post-embryonic hematopoiesis 4. Classification of hematopoietic organs 5. Localization, features of structure and functioning, role in the formation of humoral and cellular immunity: bone marrow, thymus, lymph nodes and spleen. 6. The concept of age-related and accidental thymus involution 7. Features of blood supply and lymph flow in the lymph nodes and spleen	1.Histology: textbook / edited by Yu. I. Afanasiev, N. A. Yurina. - 5th ed., pererab. and add. - M.: Medicine, 2006. 2.Histology: textbook / Under the editorship of E. G. Ulumbekova, J. A. Chelysheva. - 2nd ed., pererab. and add. - M.: GEOTAR-MED, 2009. 3. Methodological guide for students in histology. Part 1. L. A. Akoeva, L. A. gireeva, L. S. Tabolova, and others. Vladikavkaz, 2008. 4.Age and histology. Blood. The organs of hematopoiesis. Circulatory organs. Methodological guide for students of medical, pediatric, preventive medicine and dental faculties. L. A Akoeva., L,A, Gireiev, L. S. Tabolov. Vladikavkaz, 2011.

II. THE STUDENT MUST BE ABLE TO:

1.Using the classroom tables, determine the Islands of hematopoietic cells and distinguish them.

2.Determine at the microscopic level the structural components of hematopoietic and immune defense organs

III. Tasks to prepare for the lesson:

Task 1. Fill in the table: "the White pulp of the spleen»

Zone.	Localization.	Cellular composition.	Functional significance

Task 2. Continue your sentences:

«Lymph node».

1. The basis of the lymph node is ..... cloth.

2. The main structural component of the cortical substance are..... Their Central part looks brighter because CTO.....
.....

3. The microenvironment for lymphocytes paracortical areas are.....cells. They produce....., which
……..……...

4. The sinuses called..... Distinguish between sinuses:.....……
……..

Task 4. Make 2-3 test tasks based on the sample.
The stromal component of the red bone marrow is mainly formed:
A) bone tissue
B) epitheliomuscular cloth
C) loose connective tissue
D) adipose tissue
E) reticular tissue

IV. Questions for self-monitoring

1. Classification and sources of development of hematopoietic organs and immune protection.
2. Features of the microscopic structure and main functions of the bone marrow.
3. Thymus: structure and role in the processes of immunogenesis. Gematotropnye barrier.
4. Age-related and accidental thymus involution.
5. The structure of white and red pulp of the spleen.
6. The concept of closed and open blood circulation of the spleen.
7. Structure and functional significance of t-zones of lymph nodes.
8. Structure and functional value of b-zones of lymph nodes.

TEST YOURSELF:
CHOOSE ONE CORRECT ANSWER
1.Where are the precursors of lymphocytes formed?
a. in the thymus.
b. in the spleen and lymph nodes.
c. in the lymphatic follicles of the digestive canal.
d. in the red bone marrow.

2.Where are the layered epithelial bodies of Hassal?
a. in the red bone marrow.
b. in the medulla of the thymus lobes.
c. in the cortical substance of the thymus lobes.
d. in the brain substance of the lymph nodes.
f. in the lymphoid follicles of the spleen.

3.What happens in the lymph nodes?
a. antigen-dependent proliferation and differentiation of t and b lymphocytes.
b. formation of monocytes.
c. formation of neutrophilic granulocytes.
d. antigen-independent proliferation of B-lymphocytes.

4.Where is the T - zone located in the lymph nodes?
a. in the cortical substance.
b. in the brain substance.
c. in the paracortical zone.
d. in the area of the gate.

5.Which cells produce antibodies?
a. fibroblasts.
b. macrophages.
c. plasma cells.
d. eosinophilic granulocytes.
f. t - helper cells.

SELECT THE CONDITION UNDER WHICH THIS STATEMENT IS TRUE

6. What morphological changes accompany the ripening of cells
the granulocytic series?
a. the core disappears.
b. accumulation of specific granularity in the cytoplasm.
c. changing the shape of the core from rounded to segmented.
d. accumulation of hemoglobin.

7. Where does antigen-dependent differentiation of B-lymphocytes begin?
a. in the paracortical zone of the lymph node.
b. in the red bone marrow.
c. in the lymphoid follicles of the spleen.
d. in the lymphoid follicles of the cortical zone of the lymph node.
f. in the lobules of the thymus gland.

8. What cells are present in the lobule of the thymus gland?
a. macrophages.
b. b-lymphoblasts.
c. t-lymphoblasts.
d. epithelial cells.
f. t-lymphocytes.
e. fibroblasts.

9. What cells of the thymus gland form and secrete thymosin?
a. Epitheliomuscular.
b. Macrophages.
c. Fibroblasts.
d. T-lymphocytes.

10. Where does antigen-dependent differentiation of B-lymphocytes begin?
a. in the paracortical zone of the lymph node.
b. in the red bone marrow.
c. in the lymphoid follicles of the spleen.
d. in the lymphoid follicles of the cortical zone of the lymph node.
f. in the lobules of the thymus gland.

TOPIC: ENDOCRINE SYSTEM.
PC-5

I. Motivational characteristics of the topic.

Regulation and coordination of body functions is provided by the action of the nervous and endocrine systems. Organs of the endocrine system (endocrine glands) are an efferent link of the regulating system designed to maintain homeostasis in the body. They perform their function with the help of hormones released into the blood. A change in the functional activity of these organs is accompanied by a restructuring of their structure and, conversely, a violation of the structure of organs entails an imbalance of the corresponding hormones. The knowledge acquired on this topic is necessary for understanding the morphological manifestations of disorders of hormonal regulation.

II. Targets.

1. To study the General laws of the structure of endocrine organs.
2. Know the mechanisms of hypothalamic control of endocrine functions and the morphology of structures that provide it.
3. To understand the role of glandular cells of endocrine organs in the production of certain hormones.

III. The required initial level.

a) from the previous topics:

1. Features of the structure and function of secretory cells.
2. The concept of endocrine and exocrine glands.
3. The structure of the neurosecretory cells.
b) from the current session:
1. Structural and functional characteristics of endocrine glands.
2. Classification of endocrine system organs.
3. Sources of development, structure and function of the endocrine glands.
4. Structure and function of the neural secretory nuclei of the hypothalamus.
5. Endocrine gland hormones and their significance.
6. The concept of a diffuse endocrine system.
7. Structure and function of the pituitary, adrenal, thyroid and parathyroid glands.

IV. Object of study.

a) micro-products for self-study
1. Cat's pituitary gland (color hematoxylin-eosin).
2. The adrenal gland (color hematoxylin-eosin).
3. The thyroid gland (color hematoxylin-eosin).
4. Parathyroid gland (color hematoxylin-eosin).
b) electronic messages

№№328, 332,346, 347, 349.

V. Information part.

The endocrine system together with the nervous system regulates and coordinates the functions of the body. The endocrine system consists of specialized endocrine glands, devoid of excretory ducts, richly supplied with vessels of the microcirculatory bed, which secrete products of secretion, single endocrine cells (diffuse endocrine system DES), scattered across various organs and tissues. Among single hormone-producing cells, there are two independent groups: I-neuroendocrine cells of the APUD-series (1-derived neuroectoderm; 2-derived skin ectoderm; 3-derived intestinal endoderm; 4-derived mesoderm; 5-derived mesenchyma), II - cells of non-neural origin (this group includes cells of endocrine and non-endocrine organs that secrete hormones.

The pituitary consists of three lobes: anterior, middle, and posterior. The anterior lobe is formed by chromophilic and chromophobic cells that produce follitropin, lutropin, tyrotropin, adrenocorticotropin, somatotropin, and prolactin. The average share produces melanocortin and lipotropin. The anterior and middle lobes form the adenohypophysis. The adenohypophysis is connected to the hypothalamus by a single blood supply system. In the posterior lobe - the neurohypophysis, antidiuretic hormone (vasopressin) and oxytocin are accumulated, which are produced in the neurosecretory nuclei of the anterior hypothalamus.

The adrenal glands are paired organs consisting of two independent hormone-producing glands that make up the cortex and brain matter of different origin. In the cortex there are three zones: glomerular, bundle and mesh, which produce respectively mineralocorticoids, glucocorticoids, analogs of male and female sex hormones. The brain substance produces catecholamines (epinephrine and norepinephrine).

The thyroid gland is a parenchymal lobular organ. The structural unit of the lobule is the follicle, in which the cells of thyrocytes synthesize iodine - containing hormones-thyroxine and triiodothyronine, which regulate the basic metabolism of the body. In the interfollicular layers of connective tissue are located parafollicular cells that secrete the hormone calcitonin (regulates the exchange of calcium in the body).

The parathyroid glands are a parenchymal organ in which parathyroid cells form strands. There are: main, oxyphilic and fat cells. The main function(main cells) is the production of the hormone parathyrin (PG), which increases the level of calcium in the blood.

VI. Learning activity.

1.On the microparticle "pituitary" find and draw: the anterior lobe (I), the middle lobe (II), which completely surrounds the posterior (III). In the anterior lobe, cells are arranged in strands around sinusoid capillaries (1) lined with endothelium. The bulk of the anterior lobe cells are poorly colored cells with large nuclei - the main ones (2). Among them, groups of eosinophilic cells are located (3). Basophilic cells (4) are less common. The middle (intermediate) lobe has the form of a narrow strip adjacent directly to the posterior lobe. It is a cluster of small cells lying in many rows, between which capillaries are

visible. The posterior lobe is formed by axons of neurosecretory cells of the supraoptic and paraventricular nuclei of the neuroglia (5), represented by pituitary cells (6).
2.Find and draw a connective tissue capsule with large blood vessels (1), under which there are cortical (I) and cerebral (II) substances. The outer glomerular zone (2) is formed by rounded clusters of small cells; deeper is the bundle zone (3), in which large cells are arranged in bundles. The mesh zone (4) consists of strands of small cells intertwining like a network. The brain substance is formed by large cells, between which there are sinusoid capillaries(5).
3. On the micro-product "Thyroid gland" find and draw a lobule of the thyroid gland (I), the bulk of which is made up of follicles (1) - closed glandular vesicles. The follicle wall is formed by thyrocytes (2), the follicle cavity is filled with colloid (3). Parafollicular cells are located between the follicles mainly in the Central part of the lobes of the gland (4).
4.On the micro-preparation "Parathyroid gland" find a connective tissue capsule (1), from which connective tissue layers (2) with blood vessels (3) enter into the body. The parenchyma of the gland is represented by epithelial cords (4) consisting of small cells.
5.Mark the drawings.

VII. Control question.

1.The concept of organs of the endocrine system and endocrine cells of non-endocrine organs. Connection of the nervous and endocrine systems.
2.Functional classification of endocrine glands. Hypothalamic-pituitary system.
3.Neural secretory nuclei of the hypothalamus. Neurohormones, their effect on the body.
4.General morphofunctional characteristics of the pituitary gland, its hormones.
5.Features of the structure of the cortical and cerebral substances of the adrenal gland, its hormones.
6.Thyroid. Structure, localization, hormones and their role.
7.Microscopic and ultramicroscopic structure of the parathyroid glands and their role in the body.

VIII. Learning objective.

1.A woman during childbirth has a decrease in the contractile capacity of the uterus. What hormone released by the hypothalamus can increase the contractility of the uterus in this situation?
2.The animal's thyroid was removed. Hypertrophy, which cells will be detected in the animal?
3.In a proportionally built child, there was a decrease in the growth rate. What pituitary hormone secretion deficiency may be associated with this lag?
4.On the preparation of the thyroid gland visible follicles with a flat epithelium, filled with dense colloid. What functional state of the gland is indicated by this picture?
5.The animal's parathyroid gland was removed. How will the level of calcium in the blood change?
6.One section of the thyroid gland is examined after staining with silver nitrate, the other-after the introduction of radioactive iodine into the body. Which cells of the gland will be detected in each section? What hormones do they secrete?
7.Viewing a series of preparations of the adrenal glands, the researcher noted that different sections show areas of the organ consisting of: 1-strands of epithelial cells located near the connective tissue capsule in the form of rounded clusters: 2-lighter, which form strands oriented in one longitudinal direction; 3-clusters of large basophilic cells, which on specially colored preparations show affinity for chromium, silver, osmium salts. Which parts of the adrenal gland were analyzed in each case? What is the functional value of the constituent cells?
8.During embryogenesis, the migration of neuroblasts from ganglion plates was experimentally disrupted. On the structure of what endocrine organs, and how will such an intervention affect?

IX.The topics of structural abstracts.

1. Features of the structure of capillaries of endocrine glands.

2. Ultrastructure and morphology of parafollicular cells of the thyroid gland.
3. Modern understanding of the role of the epiphysis in the system of neuroendocrine regulation.
4. Histology and biochemistry of chromaffin tissue of the adrenal glands.

INDEPENDENT WORK

1.THE STUDENT SHOULD KNOW:

1.Structural and functional characteristics of endocrine glands. Classification of endocrine system organs. 2. Structure and function of the neural secretory nuclei of the hypothalamus. Structure and function of the pituitary gland. 3. Structure and function of the adrenal glands 4. Structure and function of the thyroid gland. 5. Structure and function of the parathyroid glands.	1.Histology: textbook / edited by Yu. I. Afanasiev, N. A. Yurina. - 5th ed., pererab. and add. - M.: Medicine, 2006. 2.Histology: textbook / Under the editorship of E. G. Ulumbekova, J. A. Chelysheva. - 2nd ed., pererab. and add. - M.: GEOTAR-MED, 2009. 3. Methodological guide for students in histology. Part 2. L. A. Akoeva, L. A. gireeva, L. S. Tabolova, and others. Vladikavkaz, 2008.

II. THE STUDENT MUST BE ABLE TO:
Determine the organs of the endocrine system and their components at the microscopic level.
III. Tasks to prepare for the lesson:

Task # 1. Fill in the tables.
1.Organs of the endocrine system

Central endocrine organs	1. 2. 3.
Peripheral endocrine glands	1. 2. 3.
Organs that combine endocrine and non-endocrine functions	1. 2. 3.
Single hormone-producing cells (components of the diffuse endocrine system)	

2.Anterior pituitary lobe (complete the missing information)
Action

Hormones	Действие
1-3. Gonadotropic hormone: follicle-stimulating hormone (FSH), luteinizing hormone (LH), or lutropin, lactotropic hormone (LTG), prolactin, or luteotropic hormone.	1. FSH stimulates 2. LG stimulates 3. LTG stimulates
4-5. Hormones that stimulate other (non-sexual) glands: thyroid-stimulating hormone (TSH), adrenocorticotropic hormone (ACTH).	4. TSH stimulates the formation of thyroid hormones 5. ACTH stimulates the formation of hormones in the adrenal cortex.
6. Somatotropic hormone (STH), growth hormone,	6. STG stimulates

or somatotropin	

3.Medium (intermediate) lobe of the pituitary

Hormones	Action
1. Melanocytestimulating hormone (MSG), or melanocortin. 2. Lipotropin	1. MSG encourages 2. Lipotropin stimulates

4.Posterior pituitary lobe

In the posterior pituitary:

The task № 2. Fill in the table: "Thyroid gland" (fill in the missing information)

Hormones	Action
1. Thyroid hormone: thyroxine and its precursors – triiodothyronine, diiodothyronine.	Thyroid hormone a) stimulate b) speed up processes
2. Calcitonin	Calcitonin reduces … slimming … by increasing …

Task 3. Fill in the table: "adrenal Gland" (fill in the missing information)
1.Cortical substance

1. Mineralocorticoid: aldosterone	a) Aldosterone strengthens … raises -…
2. Glucocorticoids: cortisone, corticosterone, hydrocortisone.	Glucocorticoids carry out a) stimulate … b) increase …
3. Androgens: Androstenedione, etc. (synthesized in the adrenal glands of both men and women)	Androstenedione (as well as other androgens - male sex hormones) stimulates but) … b) development …

2.Brain substance

Hormones	Action
Catecholamines: adrenaline, norepinephrine	Epinephrine a) entering the bloodstream… b) stimulates

Task 4. Make 2-3 test tasks based on the sample.
What hormones does ACTH stimulate?

1.Aldosterone 2.Glucocorticoids
3.Androgens'
4.Thyroxine's

IV. Questions for self-monitoring:

1. The concept of organs of the endocrine system and endocrine cells of non-endocrine organs. Connection of the nervous and endocrine systems.
2. Functional classification of endocrine glands, hypothalamic-pituitary system.
3. Neural secretory nuclei of the hypothalamus. Neurohormones, their effect on the body.
4. General morphofunctional characteristics of the pituitary gland, its hormones.
5. Features of the structure of the adrenal cortex and medulla, its hormones.
6. The thyroid gland, Structure, localization, hormones and their role.
7. Microscopic and ultramicroscopic structure of the parathyroid glands and their role in the body.
8. The pineal gland, its structure and function.

TEST YOURSELF:
CHOOSE ONE CORRECT ANSWER

1.In which Department of the adrenal glands are synthesized hormones that suppress inflammatory processes:
a. in the glomerular zone
b. in the beam zone
c. in the mesh zone
d. in the brain substance

2.The bundle zone of the adrenal cortex occupies:
a. about 75% of the bark thickness
b. about 25% of the bark thickness
c. about 50% of the bark thickness
d. about 90% of the bark thickness

3.The main cells that produce parathyrin are:
a. neutrophilic parathyroid cells
b. the main partiality
c. the parafollicular endocrinocytes
d. oxyphilic parathyrocytes

4. Specify the place of formation of steroid hormones?
a. adenohypophysis.
b. the brain part of the adrenal glands.
c. thyroid gland.
d. bundle zone of the adrenal cortex.
f. the neurohypophysis

5.What cells are located in the posterior pituitary lobe?
a. basophilic adenocytes.
b. the oxyphilic identity.
c. chromophobic cells.
d. glial cells (pituitary cells).

SELECT THE CONDITION UNDER WHICH THIS STATEMENT IS TRUE

6. What features of the structure of follicles are observed in hypofunction of the thyroid gland?
a. decrease in the size of follicles.
b. increasing the size of follicles.
c. flattening of the epithelium.
d. thickening and cracking of the colloid.
f. the epithelium becomes high prismatic.

7. What glands are affected by the tropic hormones of the adenohypophysis?
a. testes and ovaries.
b. the thyroid gland.
c. the parathyroid gland.
d. the adrenal cortex.

8. What hormones does ACTH stimulate?
a. aldosterone.
b. glucocorticoids (corticosterone).
c. androgenov.
d. thyroxine.

9.What processes in the body are regulated by the endocrine system:
a. metabolism and energy
b. secretion and excretion
c. growth, reproduction, reproduction and differentiation of cells
d. suction

10.The features of the action of hormones include:
a. selectivity
b. distance
c. specificity
d. accumulation of
f. high activity in small doses

TOPIC: SKIN AND ITS DERIVATIVES.

PC-5

I. Motivational characteristics of the topic.
The skin, forming the outer cover, performs many vital functions
important function. Color, temperature, humidity and other indicators can tell the doctor about age, gender, hormonal status, the presence and stage of development of the disease, etc.the Study of the fine structure of the skin and its derivatives serves as the basis for forming the doctor's ideas about the functions of the skin in normal and pathological conditions.

II. Targets.
1. Know at a microscopic level the structure of the skin layers, their tissue elements and skin derivatives (glands, hair, nails).
2. Explain the structural features of the skin and its derivatives in various topographic zones in connection with the function performed.
3. Explain the structural organization of the skin due to environmental factors.

III. The required initial level of knowledge.
a) from the previous topics:
1. The structure of multilayer plane not becoming Horny epithelium.
2. Structure of the connective tissue itself.
b) from the current session:
1. Source of skin development.
2. General plan of the structure and tissue composition of the skin.
3. Receptors in the skin
4. Derivatives of the skin.

IV. Object of study.

a) micro-products for self-study:
1. The skin of a human finger. "Thick skin" (color hematoxylin-eosin).
2. Skin with hair. "Thin skin" (hematoxylin-eosin color).
b) electronic messages
No. 465.

V. Information part.

The skin forms the outer cover of the body. It consists of two parts-epithelial and connective tissue. The skin epithelium (epidermis) is a multi - layer flat keratinized, consisting of 5 layers: basal, spiny, granular, shiny, and Horny. The connective tissue part of the skin (dermis) includes two layers: papillary and reticular. The papillary layer consists of loose connective tissue rich in blood vessels and nerve endings. This layer defines the individual skin pattern. The mesh layer is formed by dense unformed connective tissue, bundles of collagen fibers in which form a network. This layer of skin contains skin derivatives-glands and hair. Sweat glands-simple, tubular, unbranched, secreted by merocrine and partially apocrine type. The sebaceous glands are simple, alveolar, branched, and secrete a holocrine type. Their exit ducts open directly into the hair funnel. Hair can be long, bristly, downy. They are epithelial appendages of the skin. In the hair, there are two parts: the rod and the root. The hair root is located in the hair SAC, the wall of which consists of two epithelial sheaths - external and internal. Outside, the hair SAC is surrounded by a connective tissue dermal vagina (hair bag). The root of the hair ends in a hair bulb, into which the hair papilla (loose connective tissue rich in blood vessels) is pushed. At the junction of the hair root to the rod, the skin's epidermis forms a hair funnel. The hair itself consists of a brain, cortical substance and cuticle.

VI. Learning activity.

1. On the micro-product "finger Skin" consider the epidermis, dermis, subcutaneous fat. In the dermis, find the end sections and excretory ducts.
2. Find and draw the epidermis (I), dermis (II), and subcutaneous fat (III) on the micro-product "Skin with hair". The following layers are distinguished in the epidermis: basal (1), spiny (2), granular (3), shiny (4), Horny (5). The connective tissue papillae of the dermis are deeply embedded in the basal layer of the epidermis, making up its papillary layer (6), which goes deeper into the reticular layer of the dermis (7), underlain by subcutaneous tissue (8). In the deep layers of the dermis, there are encapsulated nerve endings (9). In the reticular layer of the dermis and subcutaneous fat are located the end sections of the sweat glands (10), lined with cubic epithelium (11), surrounded by myoepithelial cells (12). The hair roots are also located here. At the end of the root there is a hair bulb (13), into which the hair papilla (14) is pushed. The hair is well defined located in the center of the brain
substance (15), on both sides of which is located the cortical substance (16) and one layer of flat cells - the cuticle (17). The hair root is surrounded by two epithelial sheaths: external (18) and internal (19). The cells of the inner root vagina move up to the level of the confluence of the sebaceous gland, where they are flushed, so there is no inner root vagina above the level of the sebaceous gland. Around the epithelial vagina is a connective tissue hair bag (20). Near the roots of the hair, there are sebaceous glands (21), whose short excretory ducts open into the hair funnel (22). A muscle that lifts the hair is attached to the hair (23).

3.Mark the drawing.

VII. Control question

1.General plan of the skin structure. Skin function.
2.Skin derivatives: sweat and sebaceous glands, their structure, localization, types of secretion.
3.Hair, hair types, structure, role of the hair bulb.

VIII. Learning objective.

1.As a result of the disease, the function of the sebaceous glands decreased. What changes will occur in the state of the epidermis and hair?
2.In the dermis of the skin there are bundles of smooth muscle cells, the contraction of which causes the appearance of the so-called "goose skin". What is the significance of this reaction?
3.Two preparations of sweat glands are presented. On the first end sections of the glands are larger than on the second, their secret is richer in protein substances. What type of glands are represented on the first and second preparation?
4.Sweat glands that secrete apocrine type function in a certain age period. What endocrine glands are involved in this?
5.It is known that the epidermis and dermis contain pigment cells. What are their structural and functional differences?
6.The body is in a state of starvation. In which areas of the body does the skin retain a layer of subcutaneous fat, even when it is extremely depleted? Why?
7.Under the influence of UV rays, most of the skin of Europeans turns brown. When the UV light ceases, it brightens after a while, except for certain areas (around the nipple of the breast, scrotum, etc.). What determines the skin color that changes under UV irradiation? What cells are involved in this?

The topics of structural abstracts.

1.Age-related changes in skin morphology and cytochemistry.
2.Morphological features of various skin areas.
3.Morphological features of blood vessels of the skin.

INDEPENDENT WORK

I.THE STUDENT SHOULD KNOW:

1. Structure of skin layers, their tissue elements and skin derivatives (glands, hair, nails). 2. Structural features of the skin and its derivatives in various topographic zones in connection with the function performed. 3. Features of the structural organization of the skin due to the influence of environmental factors.	1.History: textbook / edited by Yu. I. Afanasiev, N. A. Yurina. - 5th ed., pererab. and add. - M.: Medicine, 2006. 2.Histology: textbook / Under the editorship of E. G. Ulumbekova, J. A. Chelysheva. - 2nd ed., pererab. and add. - M.: GEOTAR-MED, 2009. 3. Methodological guide for students in histology. Part 2. L. A. Akoeva, L. A. gireeva, L. S. Tabolova, and others. Vladikavkaz, 2008.

II. THE STUDENT MUST BE ABLE TO:

At the microscopic level, distinguish the components of the skin, find structures in the drug that build hair and determine the glands.

I. Tasks to prepare for the lesson:

Task 1. Fill in the table: "Differences in the structure of thick and thin skin»

	localization.	epidermis.	dermis.	Derivatives of

				the skin
thick skin				
thin skin				

Task 2. Fill in the table: "skin Glands»

Name of the gland.	Sweat gland.		Sebaceous gland
	merocrine	apocrine	
localization			
part of the secret			
terminal divisions and their cellular composition			
excretory duct			

Task 3. Continue your sentences:
"The structure of the hair»
There are three types of hair: .....(hair of the head, beard, mustache, armpits and pubis), bristly (hair……
…….....), ...(the rest of the hair).
Part of the hair is included: .....,
..……....……..... A hair bag is.....
…….....
Task 4. Make 2-3 test tasks based on the sample.
What layers of the epidermis contain melanocytes?
1. Basal.
2. Thorny.
3. Granular.
4. Brilliant.
5. Horny.

1V. Questions for self-monitoring
1.General plan of the skin structure. Skin function.
2.Skin derivatives: sweat and sebaceous glands, their structure, localization, types of secretion.
3.Hair, hair types, structure, role of the hair bulb.
TEST YOURSELF:
CHOOSE ONE CORRECT ANSWER

1.The structure of the sebaceous glands:
a. complex alveolar-tubular branched
b simple alveolar unbranched

c.in a simple branched alveolar
d. complex tubular branched

2.Which of the listed cells of the epidermis perform immunological functions:
a.Merkel's cells
b. keratinocytes
c.into the melanocytes
d. Langerhans cells

3.The hair follicle (SAC) is formed:
a loose fibrous connective tissue
b epithelial tissue
c.in muscle tissue
d. adipose tissue

4.In what part of the skin are the end sections of the sweat glands located:
a. in the epidermis
b in the deep parts of the reticular layer of the dermis
c. at the border of the reticular and papillary layers of the dermis
d. in the papillary layer of the dermis

5.On the structure of the sweat glands:
a. simple tubular branched
b. simple tubular unbranched
c.in a simple branched alveolar
d. complex tubular branched

SELECT THE CONDITION UNDER WHICH THIS STATEMENT IS TRUE
6.The papillary pattern of the skin due to:
a. uneven thickness of the stratum corneum of the epidermis
b. the location of proliferative units in the epidermis
c.in the outlet of the ducts of the glands
d. papillary layer of the dermis

7.The mesh layer of the dermis contains:
a thick bundles of collagen fibers
b elastic fibers
c.in fibroblasts
d. striated muscle fibers

8.When the skin is damaged, the source of the epidermis cells are:
a. the ducts of the sweat glands
b .external root vaginas of hair follicles
c.into the intact epidermis
d.endothelium of capillaries

9 Skin glands:
a. provide thermoregulation
b. protect the skin from drying out
c. they secrete some metabolic products
d. participate in the synthesis of melanin

10.For thick skin is typical:
a. weak development of the stratum corneum
b. relatively thin dermis
c. covers the palms and soles
d. there are hair, skin glands

f.it consists of 4 layers

TOPIC: RESPIRATORY SYSTEM.
PC-5

I. Motivational characteristics of the topic.

The respiratory system unites a group of organs whose important function is to provide external respiration and gas exchange at the level of the lungs. Knowledge of the structure and histophysiology of the respiratory system is important for a doctor to understand the disorder of these functions and conduct targeted therapy. The development and application of modern methods of research and diagnosis of respiratory diseases, such as bronchoscopy, laboratory studies, are based on these data.

II. Targets:

1. Determine the respiratory organs at the microscopic level.
2. To study the microscopic and ultramicroscopic structure of the respiratory organs.
3. Explain the role of structural components of the airway wall and the respiratory Department in the implementation of respiratory functions of the lungs.
4. To identify structural elements aerogematiceski barrier on the submicroscopic level.

III. The required initial level of knowledge.

a) from the previous topics
1. Structure of the scintillating epithelium.
2. Structure of hyaline cartilage.
3. Structure of exocrine glands.

b) from the material of the current topic
1. Sources of development of the respiratory system
2. Microscopic and ultramicroscopic structure of the nasal cavity, larynx, trachea.
3. The air-bearing part of the lung. Features of the structure of the bronchial tree.
4. Respiratory Department of the lung. The pulmonary acinus.
5. The structure aerogematiceski barrier.

IV. Information part.

The trachea is a hollow tubular body composed of mucosa, submucosa, fibrous-cartilaginous, adventitia shells. The mucous membrane is lined with a multi-row prismatic ciliated epithelium consisting of ciliated, goblet-shaped, endocrine and basal cells. Under the epithelium is its own plate of the mucous membrane, consisting of loose fibrous connective tissue. The submucosal base is a loose connective tissue that passes without sharp borders into the dense connective tissue of the supracondyle. The fibrous-cartilaginous membrane consists of 16-20 open hyaline cartilage rings connected by bundles of smooth muscle cells. The adventitial membrane consists of loose fibrous connective tissue.

The lung consists of the airway system-the bronchial tree and the alveolus system - the respiratory Department. The bronchial tree includes the main bronchi, extrapulmonary lobe bronchi (large, 1st order), zonal extrapulmonary (2nd order bronchi), segmental, sub-segmental (medium caliber), small caliber and terminal (final) bronchioles. Changes in the structure of the bronchi with a decrease in caliber occur in each shell. The mucosa changes both the character of the epithelium (multi-row turns into a single-row) and the cellular composition. In its own plate, the number of muscle fibers gradually increases, which form a muscle plate in the small bronchi. In the submucosa, the glands gradually disappear, and then at the level of the small bronchi, the shell itself disappears. The fibrous-cartilaginous membrane undergoes changes at the level of each caliber, turning from closed hyaline rings into single Islands of hyaline, and later elastic tissue, and then disappears altogether. The adventitial shell is preserved throughout, gradually passing into the interlobular and interlobular connective tissue.

The respiratory Department has its structural unit acinus, which is a system of alveoli located in the wall of the respiratory bronchiole, alveolar passages and sacs that carry out gas exchange between the blood and air of the alveoli. Acinus includes respiratory bronchioles of the 1st, 2nd, and 3rd orders, alveolar

passages that end in two alveolar sacs consisting of alveoli. The alveola is an unclosed vesicle lined from the inside with alveolocytes of the 1st, 2nd, and 3rd types and alveolar macrophages. Aerogematiceski barrier (the barrier between blood and air) provides gas exchange, the thickness is about 0.5 μm.
V. objects of study.
a) micro-products
1. Trachea (hematoxylin-eosin stain)
2. Lung (hematoxylin-eosin stain)
b) electronic messages.
No. 449.

VI. Learning activity.

1.On the "Trachea" micropreparation, find and draw the tracheal shells: mucous (I), submucosal (II), fibrous-cartilage (III), adventitial (IV). The mucous membrane is lined with a multi-row scintillating epithelium (1), under which there is a proper plate of connective tissue (2). In the submucosa, the terminal divisions of the mixed glands are located in groups (3). The submucosal layer passes into the supra-cartilage (4), followed by a wide belt of hyaline cartilage (5), which forms a semicircle. The gap between the ends of the cartilage semicircles is replaced by muscle tissue (6). In the adventitial sheath, there are blood vessels (7) and nerves (8) in the loose connective tissue.
2.On the micro-preparation "lung" find and draw the middle bronchus (1), the cartilaginous skeleton of which is represented on the preparation by separate plates of hyaline cartilage (2). The middle bronchi is lined with a multi-row scintillating epithelium (3), which is underlain by a thin own plate of the mucous membrane (4), which has a continuous layer of smooth muscles (5). The next submucosal layer (6) has more mucous glands (7). The fibrous membrane (8) passes into the interalveolar connective tissue of the lung (9). The majority of small bronchi (10) on a cross section has a stellate lumen formed due to the reduction of smooth muscles embedded in their wall, collecting the bronchial mucosa in high folds. The bronchus is lined with a single-layer cubic epithelium (11). Behind its own shell is an annular layer of smooth muscles (12). There is no cartilage backbone in the small bronchi. The respiratory section of the lung begins with respiratory bronchioles (13), which are lined with cubic epithelium (14). Respiratory bronchioles continue into alveolar passages (15) ending in alveoli (16).
3.Mark the drawings.

VII. Control question:

1. General plan of the structure of the respiratory system.
2. Structure of the trachea.
3. Features of the structure of the air-bearing Department of the lungs.
4. How does the structure of the bronchi change with the change in the air-carrying part of the lungs?
5. Respiratory Department of the lungs, its components, their structure.

6. Aerogematiceski barrier, its components, importance.

VIII. Learning objective.
1.In emphysema (disease) of the lungs, the lungs are not sufficiently collapsed when exhaling. What are the structural components of the respiratory damaged?
2.When inhaling air polluted with dust, foreign particles enter the Airways and alveoli. Which airway cells are involved in air purification and how?
3.In bronchial asthma, suffocation attacks are caused by spasms of smooth muscle cells in the intra-pulmonary bronchi. What kind of bronchial tubes are used primarily? What structural elements of the bronchi cause their spasm?
4.When Smoking for a long time or breathing dusty air, dust and smoke particles accumulate in the tissues of the lung and regional lymph nodes, so that the color of these organs changes (from pink to gray). What happens to dust and smoke particles when they enter the lumen of the alveoli and how do they end up in the regional lymph nodes?
5. With prolonged Smoking, the structure of the alveolar epithelium changes dramatically until its death. The surfactant is damaged, and breathing is sharply disrupted. What is the reason for this?
IX. The topics of structural abstracts.
1. Surfactant complex.
2. Alveolar macrophages.
3. Endocrine cells of the Airways.

INDEPENDENT WORK
I.THE STUDENT SHOULD KNOW:

1.Anatomical, microscopic and ultramicroscopic structure of the respiratory organs. 2.The role of structural components of the airway wall and the respiratory Department in the implementation of respiratory functions of the lungs. 3.Structural elements aerogematiceski barrier at the submicroscopic level	1.History: textbook / edited by Yu. I. Afanasiev, N. A. Yurina. - 5th ed., pererab. and add. - M.: Medicine, 2006. 2.Histology: textbook / Under the editorship of E. G. Ulumbekova, J. A. Chelysheva. - 2nd ed., pererab. and add. - M.: GEOTAR-MED, 2009. 3.Methodological guide for students in histology. Part 2. L. A. Akoeva, L. A. gireeva, L. S. Tabolova, and others. Vladikavkaz, 2008. 4.Age and histology. Respiratory system. Respiratory system. Methodological guide for students of medical, pediatric, preventive medicine and dental faculties. L. A Akoeva., L,A, Gireiev, L. S. Tabolov. Vladikavkaz, 2011.

III. THE STUDENT MUST BE ABLE TO:

1.	Determine the respiratory organs and their components at the microscopic level.
2.	Differentiate the components of the air-carrying and respiratory sections of the lung.

III. Tasks to prepare for the lesson:
Task # 1. Fill in the tables.
1.Features of the fibrous-cartilaginous lining of the bronchi.

Fibrous-cartilaginous membrane	trachea and main bronchi	
	large bronchi	

	medium-sized bronchi	
	small bronchi	

#2. Features of the structure of the middle bronchus

Epithelium	
Muscle plate of the mucous membrane	
Glands of the submucosa of the	
Fibrous-cartilaginous membrane	

Task 2. Fill in the table.
The alveola of the lung contains:

Name of the cell.	Structural feature.	Function

Task 3. Fill in the table. «Surfactant»

Name of the phase.	Location.	Composition.	Source of education.	Functions
Pituitary				
Membrane phase				

Task 4. Make 2-3 test tasks based on the sample.
Which cells form the surfactant?
1. Alveolocytes of the 2nd type (secretory).
2. Mesenchymal cells of the bronchi.
3. Respiratory alveolocytes.
4. Alveolar macrophages.
IV. Questions for self-monitoring:
1. Morphological and functional characteristics of the respiratory system. Respiratory and non-respiratory functions.

2. General plan of the structure of the respiratory system.
3. Structure and function of the trachea.
4. Features of the structure of the air-bearing Department of the lungs.
5. How does the structure of the bronchi change with the change in the air-carrying part of the lungs?
6. Respiratory Department of the lungs, its components, their structure.
7. Aerogematiceski barrier, its components, importance.

TEST YOURSELF:
CHOOSE ONE CORRECT ANSWER
1. What prevents the alveoli from sticking together when you exhale?
a. the basal membrane.
b. alveolocytes.
c. the surrounding blood capillaries.
d. surfactant.

2. How thick is aerogematiceski barrier?
a. 5 nm.
b. 0.5 microns.
c. 15 microns,.
d. 0.5 mm.

3.Airways include everything except
a. nasal cavities
b. trachea
c. bronchial tree
d. respiratory bronchioles
f. nasopharynx

4.In the submucosal base of the trachea are located:
a. simple protein glands
b. complex protein-mucosal glands
c. complex protein glands
d. complex mucosal glands
f. simple protein-mucosal glands

5.Determine the correct branching sequence of the bronchial tree:
a. main bronchi - zonal bronchi-lobar bronchi-segmental bronchi - sub-segmental bronchi - small bronchi - terminal bronchioles
b. main bronchi - lobar bronchi-segmental bronchi-zonal bronchi - sub-segmental bronchi - small bronchi - terminal bronchioles
c. main bronchi - zonal bronchi-lobar bronchi-small bronchi-segmental bronchi - sub-segmental bronchi - terminal bronchioles
d. main bronchi - lobar bronchi-zonal bronchi-segmental bronchi - sub-segmental bronchi - small bronchi - terminal bronchioles

SELECT THE CONDITION UNDER WHICH THIS STATEMENT IS TRUE
6. In which structures of the listed, there is a gas exchange between alveolar air and blood?
a. small bronchi.
b. the terminal bronchioles.
c. respiratory bronchioles.
d. alveolar passages.
f. the alveolar sacs.

7. What happens to the inhaled air in the Airways of the respiratory system?
a. cleaning.
b. warming.
c. humidification.

d. gas exchange with blood.

8. What are the shells of the tracheal wall?
a. mucosa.
b. submucosal
c. muscle.
d. fibrous-cartilaginous.
f. the adventitia.
e. serous.

9. Than aerogematiceski formed a barrier of light?
a. nuclear-free areas of respiratory alveolocytes.
b. non-nuclear portions of the endothelial cells of adjacent blood capillaries.
c. the common basal membrane of alveolocytes and blood capillaries.
d. alveolocytes of type II.

10. What role does the surfactant alveolar complex play?
a. trophic.
b. prevents the alveoli from falling off when exhaling.
c. prevents the penetration of microorganisms from the inhaled air through the wall of the alveoli.
d. prevents blood plasma from escaping from the surrounding capillaries into the alveoli.

MODULE 4
Targets.
1. Show knowledge of theoretical material on the studied topics.
2. Be able to determine and differentiate histological structures of tissues in micro-preparations.
3. Solve situational problems and tests.
4. Show knowledge in defining electronograms.

Control question:
1. General characteristics of hematopoietic organs and their classification.
2. Structure, localization, features of postembryonic hematopoiesis of the red bone marrow.
3. Thymus, structure, localization, features of hematopoiesis, functions. Age-related and accidental thymus involution.
4. Localization, structure and function of lymph nodes.
5. Features of blood circulation, localization, structure, functional value of the spleen.
6. The concept of organs of the endocrine system and endocrine cells of non-endocrine organs. Connection of the nervous and endocrine systems.
7. Functional classification of endocrine glands. Hypothalamic-pituitary system.
8. Neural secretory nuclei of the hypothalamus. Neurohormones, their effect on the body.
9. General morphofunctional characteristics of the pituitary gland, its hormones.
10. Features of the structure of the cortical and cerebral substances of the adrenal gland, its hormones.
11. Thyroid. Structure, localization, hormones and their role.
12. Microscopic and ultramicroscopic structure of the parathyroid glands and their role in the body.
13. General plan of the skin structure. Skin function.
14. Skin derivatives: sweat and sebaceous glands, their structure, localization, types of secretion.
15. Hair, hair types, structure, role of the hair bulb.
16. General plan of the structure of the respiratory system.
17. Structure of the trachea.
18. Features of the structure of the air-bearing Department of the lungs.
19. How does the structure of the bronchi change with the change in the air-carrying part of the lungs?
20. Respiratory Department of the lungs, its components, their structure.
21. Aerogematiceski barrier, its components, importance.

Control micro-products:

1. Thymus (hematoxylin-eosin stain)
2. Lymph node (hematoxylin-eosin stain)
3. Spleen (hematoxylin-eosin stain)
4. Cat's pituitary gland (color hematoxylin-eosin).
5. The adrenal gland (color hematoxylin-eosin).
6. The thyroid gland (color hematoxylin-eosin).
7. Parathyroid gland (color hematoxylin-eosin).
8. The skin of a human finger. "Thick skin" (color hematoxylin-eosin).
9. Skin with hair. "Thin skin" (hematoxylin-eosin color).
10. Trachea (hematoxylin-eosin stain)
11. Lung (hematoxylin-eosin stain)

Test task.

TOPIC: DIGESTIVE SYSTEM.
PC-5

ANTERIOR PART OF THE DIGESTIVE SYSTEM.

I. Motivational characteristics of the topic.

The human digestive system includes the organs that make up the digestive canal, and closely related large digestive glands – the salivary glands, liver, and pancreas. The wall of the hollow organs of the digestive system is formed by the mucous membrane, submucosal base, muscle membrane and adventitial or serous membrane.

Knowledge of the histofunctional features of the digestive system is necessary for a doctor to conduct a preventive examination, diagnose their condition (x-ray, endoscopy, biopsy, etc.) and choose treatment options.

II. Targets.

1. To study the microscopic, ultramicroscopic structure and histophysiology of the anterior part of the digestive tube: salivary glands, tongue, tonsils.
2. Understand the anatomical, microscopic and ultramicroscopic structure of the tooth components.

III. The required initial level.

a) from the previous topics

1. Morphofunctional and histogenetic features of multilayer epithelium.
2. Structure and classification of exocrine glands.
3. Structure of striated and smooth muscle tissue.
4. Structure and functional significance of lymph nodes.

b) from the current session

1. General plan of the structure of the digestive tube.
2. Structure and functional significance of the tonsils.
3. General plan of the structure of large and small salivary glands.
4. Structure of the language.
5. Structure of the tooth, tissue composition.

IV. Object of study

a) micro-products for self-study

1. Parotid gland (hematoxylin-eosin stain)
2. Submandibular gland (hematoxylin-eosin stain)
3. Hyoid gland (hematoxylin - eosin stain)
4. Papillae of the tongue (color hematoxylin-eosin)
5. Palatine amygdala (hematoxylin - eosin color)

b) electronic messages

Nos. 377, 379.

V. Information part.

Large salivary glands: parotid, submandibular, sublingual are complex alveolar or alveolar-tubular glands. They consist of end sections and exit ducts. The end sections of the structure and nature of the secreted secret are of three types: protein, mucosal and mixed. The output ducts are complex and branched. The type of secretion is merocrine.

The tongue is a muscular organ represented by striated muscle tissue, the fibers of which are located in three mutually perpendicular planes. Above and below the surface of the tongue is covered with a mucous membrane. The lower surface of the tongue is mobile due to the presence of a submucosal membrane. There are four types of papillae on the upper surface of the tongue: filamentous, leaf-shaped, mushroom-shaped, and grooved. The papillae are based on loose connective tissue that forms primary and secondary papillae. The surface of the papillae is covered with a multi-layer flat non-keratinized epithelium or partially keratinized epithelium (filiform papillae). In the root of the tongue there are clusters of lymphoid tissue (lingual amygdala).

On the border of the oral cavity and pharynx are clusters of lymphoid tissue-tonsils that perform a protective function, participate in the reactions of humoral and cellular immunity. The Palatine, tubal, laryngeal, pharyngeal and lingual tonsils form a lymphoepithelial ring.

The tooth consists of a crown, neck, and root. The tooth contains solid components (enamel, dentin, cement) and soft components (tooth pulp). Enamel-contains 3% organic and 97% inorganic substances; it is constructed from enamel prisms consisting of a thin fibrillar network containing hydroxyapatite crystals. Prisms are arranged in bundles, have a convoluted course and lie almost perpendicular to the surface of the dentin. Dentin-contains 28% organic and 72% inorganic substances; built from the main substance, which is permeated with dentin tubes. They are appendages of destinobles located in the pulp of the tooth, and tissue fluid. Cement-contains 30% organic and 70% inorganic substances. According to the histological structure, there is a distinction between cellular and non-cellular cement. The pulp consists of three layers: peripheral, intermediate and Central.

VI. Learning activity.

1.On the microparticle "Parotid gland" find a connective tissue capsule (1), a lobule of the gland (2), interlobular connective tissue (3) with blood vessels (4) and interlobular ducts (5). The lobule shows protein secretory divisions (6) surrounded by myoepithelial cells (7). Between the end sections inside the lobule, the output ducts are visible: insertion (8), striated (9).

2.On the microparameter "Submandibular gland" find and draw a lobule of the gland (1), interlobular connective tissue (2) with blood vessels (3) and interlobular excretory ducts (4). In the lobule, groups of mixed terminal divisions (6) are found among the protein terminal divisions (5). The nuclei of serocytes (7) are rounded, lying in the basal part of the cells. Mucosal cells mucocytes (8) have a flattened, pressed to the base of the nucleus (9). Serosity in mixed divisions form the end of half moon (10). The terminal sections are surrounded by myoepithelial cells (11).Insertion divisions (12) are poorly developed.

3.On the micropreparation "Hyoid gland" consider the lobule of the gland. The lobule is dominated by mixed protein-mucosal end sections. Pure protein end sections are extremely rare. There are almost no insertion ducts, and the striated ducts are poorly developed.

4.Find and draw thread-like (I), mushroom-like (II), leaf-like(III) , and grooved (IV)papillae on the micro-preparation "Papillae of the tongue". The base of the papilla is loose connective tissue (1). On top of the papillae are covered with a multi-layer flat non-keratinizing (2) or partially keratinizing (3) epithelium. In the epithelium of the lateral surfaces of the leaf-shaped and mushroom-shaped papillae, taste buds are determined (4). Between the muscles of the tongue (5) lie the end sections of the protein (6) and mucous (7) glands, as well as accumulations of adipose tissue (8). The excretory ducts (9) of the glands open between the papillae. On the lower surface of the tongue, there is a submucosal membrane (10) - a loose connective tissue that passes into its own plate of the mucous membrane (11), covered with a multi-layer flat non-corneal epithelium (12).

5.Consider and draw crypts (1) that look like narrow slits on the "Palatine amygdala" micropreparation. The mucous membrane is lined with a multi-layer flat non-corneal epithelium (2), blood vessels (4) are located in its own plate (3) and along the crypt - lymphoid follicles (5). They show bright areas-germinative centers (6). In the submucosa (7), there are blood vessels (4) and end sections of the mucous glands (8).

6.On the classroom tables, consider the anatomical and structural components of the tooth.

7.Mark the drawings.

VII. Control question.

1. General characteristics of salivary glands.
2. Features of the structure of the parotid, submandibular and sublingual glands.
3. Structure of the language. Types of papillae, their localization, structural features.
4. Peripharyngeal lymphoepithelial ring. Features of the structure of the Palatine amygdala.

VIII. Learning objective.

1. In the oral cavity, under the influence of enzymes, food carbohydrates begin to break down. Which cells in the oral cavity secrete digestive enzymes?
2. Due to the diverse microflora of the oral cavity, antigen-dependent proliferation and differentiation of lymphocytes occurs. In which formations of the oral cavity are these processes carried out?
3. When a disease of the gastrointestinal tract forms a white plaque on the tongue. What language structures are involved in this?
4. Preparations are prepared from the tip of the tongue and the root of the tongue. How can they be distinguished?
5. The animal is tied with a common excretory duct of the parotid gland. What morphological changes will occur in the secretory cells of the organ? Which cells of the ductal system will remain unchanged and why?
6. For microscopic analysis, preparations of a number of lymphoid organs are presented – the thymus gland, the lymph node, and the tonsils. What feature can be used to identify the amygdala among them?

IX. The topics of structural abstracts.

1. Structure, function and adaptive growth of salivary glands.
2. Regularities of ontogenetic and pheno-and genotypic variability of the dental apparatus.
3. Development of the oral cavity and face.
4. Lymph-epithelial ring of Pirogov (structure and function)

INDEPENDENT WORK

I. THE STUDENT SHOULD KNOW:

1.General plan of the structure of the digestive tube 2. Structure and functional significance of the tonsils 3.General plan of the structure of large salivary glands, tissue composition, function 4. Structure and function of the language.	1.History: textbook / edited by Yu. I. Afanasiev, N. A. Yurina. - 5th ed., pererab. and add. - M.: Medicine, 2006. 2.Histology: textbook / Under the editorship of E. G. Ulumbekova, J. A. Chelysheva. - 2nd ed., pererab. and add. - M.: GEOTAR-MED, 2009. 3. Methodological guide for students in histology. Part 2. L. A. Akoeva, L. A. gireeva, L. S. Tabolova, and others. Vladikavkaz, 2008.

II. THE STUDENT MUST BE ABLE TO:

1.Define and differentiate between organs of the mouth at a microscopic level.
2.Find in the drugs of the structure and to determine their constituent components.

III. Tasks to prepare for the lesson:

Task # 1. Fill in the tables.

1. Classification characteristics of glands

	Parotid gland.	The submandibular gland .	The sublingual gland
Morphological type			
End sections: by the nature of secretion			
End sections: by shape			

2. Cells of end sections

The name of the cells.	Protein end sections.	Mucosal end sections.	Mixed end departments
Myoepithelial cells			

3. The excretory ducts of the salivary glands

	Insertion ducts.	Streaked channels.	Interstitial ducts.	The ducts of the glands
Localization				
Epithelium				

The task № 2. Papillae of the tongue. Comparative characteristic

Type of papillae.	Localization.	Quantity.	Form.	Receptors.	Epithelium
Threadlike					
Mushroom					
Foliaceous					
Fluted					

Task # 3.Complete the sentence: the Palatine tonsil is a…
……..,
consists of.....shells.

Task 4. Make 2-3 test tasks based on the sample.
What end sections are present in the hyoid gland?
1 .protein
2. mucous
3. mixed.
IV. Questions for self-monitoring:
1. General characteristics of salivary glands
2. Features of the structure of the parotid salivary gland.
3. Features of the structure of the submandibular salivary gland.
4. Features of the structure of the sublingual salivary gland.
5. Structure of the language. Types of papillae, their localization, features of the structure.
6. Peripharyngeal lymphoepithelial ring. Features of the structure of the Palatine amygdala.

TEST YOURSELF:
CHOOSE ONE CORRECT ANSWER
1. What are the features of the structure of the mucous membrane on the upper surface of the tongue?
a. the mucosa is smooth, loosely fused with the muscular base of the tongue.
b. the mucosa forms folds, contains lymph nodes.
c. the mucosa is tightly fused with the muscular body of the tongue, forming papillae.
d. the mucosa is smooth and contains lymph nodes.

2. What are the papillae of the tongue mucosa formed by?
a. own plate (connective tissue papilla) and multilayer flat epithelium.
b. outgrowths of the muscular body of the tongue.
c. submucosa and stratified squamous epithelium.
d. only the epithelium.

3. What is the structure of the mucous membrane on the lower surface of the body of the tongue?
a. the mucosa is smooth, with a submucosal base fused with the muscular body of the tongue, mobile.
b. the mucosa forms folds, contains lymph nodes.
c. the mucosa is tightly fused with the muscular body of the tongue, forming papillae.
d. the mucosa is smooth and contains lymph nodes.

4. Which of the large salivary glands are purely protein (serous)?
a. submandibular.
b. the parotid.
c. sublingual.

5. What epithelium are the organs of the anterior and posterior divisions lined with
of the digestive system?
a. single-layer prismatic.
b. multi-row flickering.
c. multi-layer flat non-cornering.
d. transitional.

SELECT THE CONDITION UNDER WHICH THIS STATEMENT IS TRUE
6. What end sections are present in the submandibular gland?
a. mucous membranes.
b. mixed.
c. protein.

7. What cells are part of the mixed end of the salivary system
glands?
a. protein.
b. flickering.
c. mucous membranes.
d. myoepithelial.

8. The lower surface of the tongue is different
a. lack of papillae
b. the presence of a muscle plate of the mucous membrane
c. the presence of the submucosa of the
d. the absence of the submucosa of the

9. The leaf-shaped papillae of the tongue are constructed from:
a. multi-layer keratinizing epithelium
b. multilayer non-corneal epithelium
c. muscle sheath
d. own plate of the mucous membrane

10.The parotid salivary gland has ducts:
a. interline
b. inserts
c. General
d. striated

TOPIC: DIGESTIVE SYSTEM. ESOPHAGUS. STOMACH. PC-5

I. Motivational characteristics of the topic.

The esophagus and stomach are the front and middle parts of the digestive tube. Knowledge of the microscopic structure of these organs and related functions (histophysiology), especially of the stomach, creates the initial basis for mastering the sections of biomedical and clinical disciplines, understanding the causes of pathology, making a diagnosis and predicting the outcome of the disease.

II. Targets.

1. To study the structure of the anterior and middle sections of the digestive tube (microscopic ultramicroscopic).
2. Determine the esophagus and stomach at a microscopic level.
3. Identify the glands in different parts of the stomach and explain their functional significance.

III. The required initial level of knowledge.

a) from the anatomy course:
1. Anatomical and topographical features of the esophagus and stomach.

a) from the previous topics:
2. The structure of a single layer of epithelium and exocrine glands.
3. Structure of striated and smooth muscle tissue.
4. Structure of the autonomic ganglia and peripheral nerves.
5. Structure and functional significance of lymph nodes.

b) from the current session:
1. Structure of the membranes of the organs of the anterior and middle part of the digestive tube.
2. Structure of the gastric mucosa in connection with the function performed.

IV. Object of study.

a) micro-products for self-study
1. Esophagus (hematoxylin - eosin stain)
2. Bottom of the stomach (hematoxylin - eosin stain)
3. Transition of the esophagus to the stomach (hematoxylin - eosin stain)
4. Pyloric Department of the stomach (color hematoxylin-eosin)

b) electronic messages
399, 400, 402.

V. Information part.

The stomach in the body performs important functions: secretory-the production of gastric juice, mechanical-mixing food and pushing it in the caudal direction, absorption of digested substances, the production of anti-anemic factor,

The stomach, as part of the digestive tube, is formed by the following membranes: mucosal, submucosal, muscular, or serous.

The mucous membrane is represented by three plates-epithelial, formed by a multi-layer flat non-corneal epithelium in the esophagus or a single-layer cylindrical one in the stomach; own plate of the mucosa (loose connective tissue in which the esophagus contains cardiac glands); muscle plate - smooth muscle tissue that forms one layer in the esophagus and three layers in the stomach.

The submucosal membrane is a loose connective tissue rich in blood vessels and nerves, and contains its own glands in the esophagus - mucous by the nature of the secreted secretions; in the stomach, these glands are not contained in this shell.

The muscle membrane-in the esophagus is formed by two layers (longitudinal and circular), and the nature of the muscle tissue varies depending on the third of the esophagus. In the upper third-striated muscle tissue, in the middle third-striated and smooth muscle, in the lower third-smooth muscle tissue. There are three layers of smooth muscle tissue in the stomach: longitudinal, circular, oblique.

On the outside, two-thirds of the esophagus is covered with adventitial membrane-loose connective tissue. The lower third of the esophagus and stomach are covered with a serous membrane (loose connective tissue and mesothelium).

The mucous membrane of the stomach contains folds, fields and pits. The epithelium lining it is glandular. The mucus produced by it performs a protective function. In the stomach, according to the anatomical departments are located: cardiac, own (fundal), pyloric glands. Own glands: simple, tubular unbranched. Each consists of: an isthmus, a neck, and a main one that has a bottom and a body. The glands consist of 5 types of glandular cells: main (secrete pepsinogen and other enzymes); parietal (secrete chlorides that turn into hydrochloric acid); mucous; endocrine (there are several types of them: EC-sceretiruyut serotonin and melatonin, G-secrete gastrin and melatonin, P-bombensin, ECL-histamine, D-somatostatin, D1-vasointestinal peptide-VIP, A-glucagon,); undifferentiated epithelial cells; cervical mucocytes. Cardiac glands are simple, tubular, highly branched. Their end sections are formed by cubic and prismatic mucous cells. The main and parietal cells are small in number. Pyloric glands: simple tubular branched. They are characterized by the absence of parietal cells, a large number of mucocytes and endocrine cells.

VI. Learning activity.

1.On the micro-product "Esophagus" find and draw the esophageal membranes - mucous (I), submucosal (II), muscle (III), adventitial (IV). The mucous membrane is lined with a multi-layer flat non-corneal epithelium (1), under which there is a proper plate (2) containing loose fibrous connective tissue, behind it lies a layer of transversely cut, smooth myocytes (3). The submucosa formed by a loose
connective tissue (4), here are located blood vessels (5) and mucous glands (6) - the esophagus's own glands. The ducts of the glands (7) pass through their own plate of the mucous membrane and open on the surface of the epithelium. The muscle membrane is formed by striated muscle tissue (8). The outer shell is adventitial-loose connective tissue.

2.On the micro-product "Bottom of the stomach" find and draw the stomach lining - mucous (I), submucosal (II), muscle (III), serous (IV). On the surface of the stomach, depressions are defined - gastric pits (1), lined with a single layer of prismatic epithelium (2), which continue into narrow necks of the glands (3). In its own plate (4) there are many fundal glands (5), between which there are thin layers of loose connective tissue (6). In the bottom of the gland (7), clusters of main exocrinocytes (8) are visible - small cells that occupy a Central position; outside of them are large, rounded orange - colored cells-parietal exocrinocytes (9). The muscle layer of the mucous membrane (12) is represented by a narrow strip of smooth muscles, consisting of three layers. Then there is the submucosa - loose connective tissue (10) with blood vessels (11) and nerves. The muscle membrane (12) consists of three layers separated by layers of connective tissue (13). The serous membrane consists of a connective tissue layer (14) and the mesothelium covering it (15).

3.Find and draw the mucosa (I) and submucosa (II) on the micro-preparation "Transition of the esophagus to the stomach". In the area of the esophagus transition to the stomach, there is a sharp change of the multilayer flat non-corneal epithelium (1) of the esophagus to the single-layer prismatic glandular epithelium (2) of the stomach. The relief of the mucosa changes, and pits appear in the stomach (3), at the bottom of which the excretory ducts of the cardiac glands open (4). There are cardiac glands in the proper plate of the esophagus and stomach mucosa (5). The muscle plate of the esophageal mucosa (6) passes into the three-layer plate of the stomach (7). The submucosa of the esophagus contains its own glands (8), while the stomach plate contains no glands, and is rich in blood vessels (9).
4.Find and draw the mucosal (I) and submucosal (II) membranes on the micro-preparation "Pyloric Department of the stomach". The relief of the mucous membrane is characterized by the presence of deep pits (1); the epithelial plate is represented by a single-layer cylindrical glandular epithelium (2), in its own plate (3) groups are located pyloric glands (4), the end sections (5) of which are branched, the lumen is wider. Under its own plate is a well-defined muscle layer (6)of the mucous membrane, and then-the submucosa.
5.Mark the drawings.

VII. Control question.

1.General plan of the structure of the digestive tube.
2.Features of the structure of the esophagus.
3.Anatomical divisions of the stomach, features of the microscopic structure of various departments.
4.Cancer of the stomach, their structure, distinctive features.
5.Functions of the stomach.

VIII. Learning objective.

1.Stomach diseases are often accompanied by a decrease or increase in the content of hydrochloric acid in the gastric juice. Violation of the functional activity of what cells is it connected?
2.In the stomach juice, the content of mucus is increased, which makes it difficult to digest food. What cells are not functioning properly?
3.Preparations are prepared from the upper and lower part of the esophagus. On what basis can they be distinguished?
4.In case of stomach disease, anemia is detected. Violation of the functional activity of cells which may be it is connected?
5.On the drug, large, rounded cells are visible in the stomach mucosa. The cytoplasm is oxyphilic. On electronograms they found many mitochondria and intracellular canaliculi. What are these cells called? Where are they localized? What function do they perform?
6.In the stomach cavity, the content of mucus is sharply increased, which makes it difficult to digest food? Violation of the functional activity of what cells is it connected?
7.Preparations are prepared from the bottom and pyloric part of the stomach. By what features of their structure can they be distinguished?
8.Morphological analysis of the biopsy material of the gastric mucosa taken from a patient suffering from gastritis revealed a sharp decrease in the number of parietal cells. What changes in the composition of gastric juice led to a decrease in the number of parietal cells? From what part of the stomach lining was the material taken for analysis?

IX. Abstract messages.

1. Properties and features of the esophageal epithelium.
2. Functional morphology of the gastric mucosa.
3. Inhibitors and blockers of gastric juice secretion.

INDEPENDENT WORK

I. THE STUDENT SHOULD KNOW:

1. General plan of the structure of the shells of the organs of the anterior and middle sections of the digestive tube. Features of the structure of the esophagus. Relationship of the structure to the function being performed. 2.Features of the structure of the stomach wall, tissue composition. Cancer of the stomach	1.History: textbook / edited by Yu. I. Afanasiev, N. A. Yurina. - 5th ed., pererab. and add. - M.: Medicine, 2006. 2.Histology: textbook / Under the editorship of E. G. Ulumbekova, J. A. Chelysheva. - 2nd ed., pererab. and add. - M.: GEOTAR-MED, 2009. 3. Methodological guide for students in histology. Part 2. L. A. Akoeva, L. A. gireeva, L. S. Tabolova, and others. Vladikavkaz, 2008.

II. THE STUDENT MUST BE ABLE TO:

Find the lining of the esophagus and stomach walls in the preparation, determine the relief structures, glands and their tissue composition.

III. Tasks to prepare for the lesson:

Task # 1. Comparative characteristics of organs.

	The esophagus the	Stomach: cardiac region
Relief		
Epithelium		
Own plate of the mucous membrane		
Muscle plate		
Submucosa		
Muscular layer		

The task № 2. Cancer of the stomach.

	Own (or fundal)	Cardiac glands.	Pyloric glands

	glands.		
Localization			
End departments			
Ekzokrinnye			
Endocrinocytes			

Task # 3. Gastric endocrinocytes (Complete the missing information).

Cells.	Produced substances.	Physiological effect
…- Cells	Serotonin Серотонин	
	Melatonin	Стимулирует секреторную и моторную активность желудка.
…- Cells		
G- Cells		It stimulates the secretory and motor activity of the stomach.

…- Cells		Inhibits exocrine and endocrine functions of the gastrointestinal tract.
D1- Cells		

Task 4. Make 2-3 test tasks based on the sample.
What is the function of the parietal cells of the stomach's own glands?
1. Regeneration
2. The production of chlorides and an anti-anaemic factor
3. The production of pepsinogen
4. The production of mucus.
IV. Questions for self-monitoring:
1. General plan of the structure of the digestive tube.
2. Structure of the esophagus, its features.
3. Anatomical divisions of the stomach, features of the microscopic structure of various departments.
4. Cancer of the stomach, the distinctions and structure.
5. Functions of the stomach.

TEST YOURSELF:
CHOOSE ONE CORRECT ANSWER
1. The glands are found in the submucosal base:
a. the bottom of the stomach
b. pyloric Department of the stomach
c. jejunum
d. duodenum
e. ileum

2. What is the function of the parietal cells of the stomach's own glands?
a. regeneration.
b. the production of chlorides and anti-anemic factor.
c. pepsinogen production.
d. the production of mucus.

3. What formations form the relief of the gastric mucosa?
a. folds, margins, and pits.
b. crypts, villi.
c. folds.
d. the mucosa is smooth.

4. What types of muscle tissue form the muscle envelope in the middle third of the esophagus?
a. only smooth muscle tissue.
b. only striated muscle tissue.
c. smooth and striated muscle tissue.

5. What kind of epithelium is the esophagus lined with?
a. multi-layer flat non-cornering.
b. single-layer prismatic.
c. transitional.
d. multi-row flickering.

SELECT THE CONDITION UNDER WHICH THIS STATEMENT IS TRUE
6. The pyloric part of the stomach differs from the fundal:
a. deeper pits
b. shorter and branched glands
c. absence of parietal cells in the glands
d. high content of mucocytes in the glands

7.At the junction of the esophagus to the stomach:
a. multi-layer epithelium changes to a single-layer prismatic
b. pits appear
c. tubular glands appear in the mucosa and disappear in the submucosal base
d. smooth muscle tissue is replaced with striated

8. What is the function of the neck cells of the stomach glands?
a. regenerative.
b. the production of chlorides and anti-anemic factor.
c. pepsinogen production.
d. the production of mucus.

9. Where are the esophageal cardiac glands located?
a. throughout the esophagus.
b. in the submucosal base of the mucous membrane.
c. in the proper layer of the mucous membrane.
d. at the level of the ring-shaped cartilage of the larynx.
e. at the junction of the esophagus to the stomach.

10. What are the composition and method of secreting secretions are the own esophageal glands?
a. mucous membranes.
b. merocrine.
c. protein (serous).
d. apocrine

TOPIC: DIGESTIVE SYSTEM. INTESTINE.
PC-5

I. Motivational characteristics.
The intestines are the middle part of the digestive tube. Knowledge of the microscopic structure and related functions of histophysiology) of the small and large intestines create the initial basis for mastering the sections of biomedical and clinical disciplines, understanding the causes of pathology, making a diagnosis and predicting the outcome of the disease.

II. Targets.
1. Study the microscopic and ultramicroscopic structure and
functions of the small and large intestines.
2. Get acquainted with the histophysiology of the absorption process.
3. Get acquainted with the function of the intestine as an integral part of a single
immune system.

III. The required initial level.
a) from the anatomy course:
1. Anatomical and topographical features of the small and large intestines.
2. The main physiological processes occurring in the small and large intestines.

b) from previous topics:
1. Structure of the single-layer epithelium.
2. Structure of endocrine glands.
3. Structure and histochemical characteristics of mucous and serous glandular cells.
4. Structure and significance of lymph nodes.

C) from the current session.
1. Structure of the membranes of the organs of the middle part of the digestive tube.
2. Structure of the mucosa of the small and large intestines in connection with the function performed.
3. The concept of cavity and wall digestion in the small intestine.
4. The main types of intestinal endocrine cells, their topography and significance.

IV. Object of study.

a) micro-medications for self-study
1. Small intestine (hematoxylin-eosin stain).
2. 12-duodenum (hematoxylin-eosin stain).
3. Colon (hematoxylin-eosin stain).
b) electronic messages
Nos. 417, 418.

V. Information part.

In the small intestine, all types of nutrients are processed, the process of absorption of the products of the breakdown of proteins, fats and carbohydrates into the blood and lymphatic vessels occurs. The intestines perform mechanical and endocrine functions, participate in a single system of immune responses. The intestinal wall is made up of mucosa, submucosa, muscle and serous membranes. The relief of the mucous membrane of the small intestine is represented by circular folds, villi, crypts. These structures increase the overall surface of the small intestine. Circular folds are formed by the mucous and submucosal basis. Intestinal villi-protrusion of the mucous membrane of the finger-shaped or leaf-shaped form. The villi are lined with a single layer of cylindrical epithelium, in which there are three types of cells: columnar, M-cells, goblet-shaped and endocrinocytes. On the apical surface of columnar exocrinocytes, there is a striated margin formed by a set of microvilli. There is a splitting and absorption of food substances, i.e. parietal digestion. In the apical part there is a terminal layer consisting of a network of filaments. Enterocytes also perform a secretory role. M-cells (cells with microblades) are a type of enterocytes that are located on the surface of lymphatic follicles. They are using MicroSCADA capture macromolecules (antigens) from the lumen of the intestine, forming vesicles and transportyou them to the basolateral plasmalemma. Goblet associaciy – typical mucous cells. Under the epithelium of the villi, behind the basement membrane is a loose fibrous connective tissue with bundles of smooth myocytes and reticular fibers. It contains blood and lymphatic vessels.
Intestinal glands (crypts) - tubular recesses of the epithelium in its own plate of the mucous membrane. Crypt epithelium is represented by the following types of cells: columnar, stem, progenitor cells of columnar epithelial cells, goblet-shaped, endocrinocytes and Pannet cells at all stages of development (cells with acidophilic granules). The columnar ones have a thinner striated border. There are many dividing cells in the lower part of the crypts. Paneth cells are located at the bottom of the crypts. Their function is the secretion of enzymes that break down dipeptides to amino acids; antibacterial (production of lysozyme). There are more endocrinocytes in the crypt than in the villi. Endocrine cells ECL-cells (secrete serotonin, motilin and substance P; A-cells (glucagon); S-cells (secretin); I-cells (cholecystokinin and pancreozymin); G-cells (gastrin); D-cells (somatostatin); D1-cells (VIP). The own plate of the mucous membrane contains a large number of reticular fibers, smooth muscle cells, blood capillaries, and clusters of lymphoid tissue. The muscle plate consists of two layers of smooth muscles - longitudinal and circular. The submucosal base is a loose connective tissue in which the duodenal glands are located in the 12-duodenum. The muscle membrane consists of two layers of smooth muscles - internal - circular and external - longitudinal. The serous membrane covers the small intestine on all sides, with the exception of the 12-digit intestine, which is covered by the peritoneum only in front. The duodenal glands (alveolar-tubular branched) are also located in the 12-duodenal intestine. Their end sections contain mucosal, cambial, and endocrine cells. The mucous membranes produce a mucus secret, whose functions are digestive (involved in the spatial and structural organization of hydrolysis processes – in flocculation) and protective (protects the intestinal wall from damage)

The colon consists of the colon and rectum. In the colon, there are: mucous, submucosal, muscle and serous membranes. A feature of the structure is: the predominance of goblet-shaped cells in the epithelial plate; a more pronounced muscle plate of the mucous membrane; clusters of lymphoid nodules in the submucosal base; circular folds have a semilunar shape; the outer longitudinal layer of the muscle shell is collected in three bands; the serous shell covers the colon outside and, sometimes, it forms finger-like outgrowths. In the anal part of the rectum, there are three zones: columnar, intermediate, and cutaneous. The epithelium in the upper part of a single-layer, prismatic; columnar zone in the lower portion – layered, cubic, and the intermediate – stratified squamous neorogovevayuschy; in skin – stratified squamous keratinizing. The muscular membrane is also characterized by a transition from smooth muscle to striated, forming two sphincters in the end sections.

VI. Learning activity.

1.Find and draw the mucosal (I), submucosal (II), muscle (III), and serous (IV) membranes on the micro-preparation "Small intestine". The surface of the villi (1) is lined with a single-layer prismatic epithelium (2), in which there are goblet-shaped cells (3). The stroma of the villi(4) is formed by a thin-fiber connective tissue, which contains smooth muscle cells (5) and blood capillaries (6). Crypts (7) open at the base of the villi. In the submucosa - loose connective tissue (8) there are lymphoid follicles (9). The muscle membrane has longitudinal (10) and circular (11) layers. The serous membrane is formed by connective tissue (12) and mesothelium (13).

2.Find and draw the mucosal (I) and submucosal (II) membranes on the micro-preparation "12-duodenum". In the submucosa, the loose connective tissue (1) contains duodenal (2) glands with branching excretory ducts (3) that open at the bottom of the crypts (4) or at the base of the villi (4).

3.Find and draw folds (1), crypts (2), mucosa (I), submucosa (II), muscle (III), and serous (IV) membranes on the "Colon" micro-product. The surface of the mucosa is lined with a single-layer prismatic epithelium (3), rich in goblet cells (4). Its own plate (5) is infiltrated by individual lymphocytes. The muscle plate (6) is formed by smooth muscle. The submucosa contains large accumulations of lymphoid tissue (7). The outer layer of the muscle sheath (8) is assembled in three bands, the inner layer (9) is solid.

3.Mark the drawings.

VII. Control question.

1.General characteristics of the relief and membranes of the small intestine.

2.Microscopic and ultramicroscopic structure of the villi and crypt.

3.Histophysiology of the absorption process.

4.Distinctive features of the structure of various parts of the small intestine. Functions of the small intestine.

5.Features of the structure of the large intestine.

6.Structure of the worm-like process. Functions of the large intestine

7.Rectum. Features of the structure.

VIII. Learning objective.

1.Two drugs without a name are proposed. One preparation shows broad and low villi and crypts, and in the submucosal layer - glands. The muscle membrane consists of 2 layers. On the other-deep dimples, simple glands, tubular unbranched, located in its own plate of the mucous membrane. The muscle membrane consists of three layers. What parts of the gastrointestinal tract are represented on these drugs?

2.Two drugs are given. One has broad and low villi and crypts, and the submucosal base has glands. Goblet cells are rarely found in the intestinal epithelium. On the second-the villi are high and thin, they are much more than in the previous preparation. Among epithelial cells, highly prismatic cells and goblet-shaped cells predominate. What parts of the intestine are represented in the preparations?

3.As a result of long-term treatment with antibiotics, the patient has impaired the process of digestion of fiber in the large intestine. What is the reason for this?
4.As a result of the injury, the epithelium of the mucous membrane of the small intestine is damaged. At the expense of which cells will its regeneration be carried out? In what structures of the intestine are they located? 5.At the height of digestion, there is an active movement of the intestinal villi, which changes their length. What is the reason for this?
6.The villi of the intestine are covered with epithelium, which consists of three types of cells. Which of them are involved in the processes of wall digestion?
7.Preparations are prepared from the duodenum and jejunum. By what features of their structure can they be distinguished?
8.Preparations are prepared from the jejunum and colon. How can you tell them apart?
9.In the epithelial plate of the intestine, cells in the form of light bubbles are isolated on a preparation stained with hematoxylin – eosin. What are these cages? What is their functional significance?
IX. The topics of structural abstracts.
1. Some features of the structure of aggregates of lymphoid nodules of the small intestine. Their role in the formation of immunity.
2. The value of the worm-like process in the life of the body.
3. Endocrinocytes of the digestive tract. Their localization and functional significance.

INDEPENDENT WORK

I. THE STUDENT SHOULD KNOW:

1.Structure of the membranes of the small intestine. Features of the structure of various parts of the small intestine 2. The concept of cavity and wall digestion in the small intestine. The main types of intestinal endocrine cells, their topography and significance. 3.Features of the structure of the large intestine. Vermiform.	1.History: textbook / edited by Yu. I. Afanasiev, N. A. Yurina. - 5th ed., pererab. and add. - M.: Medicine, 2006. 2.Histology: textbook / Under the editorship of E. G. Ulumbekova, J. A. Chelysheva. - 2nd ed., pererab. and add. - M.: GEOTAR-MED, 2009. 3.Methodological guide for students in histology. Part 2. L. A. Akoeva, L. A. gireeva, L. S. Tabolova, and others. Vladikavkaz, 2008.

II. THE STUDENT MUST BE ABLE TO:
Determine the various parts of the intestine, the intestinal lining and their tissue composition
III. Tasks to prepare for the lesson:

Task # 1. Comparative characteristic.

Departments of the intestine.	12-finger.	Jejunum.	Ileum.	Caecum and colon
Relief				
The epithelium of the mucosa				
Cellular composition				
the lamina propria of the mucosa				
muscle plate				

submucosa				
muscular layer				
serous membrane				

The task № 2. List the features of the structure of the worm-like process:

1.
2.
3.
4.
5.

Task # 3. Complete the phrase. The anal part of the rectum includes three зоны:.....
...

The task № 4.Features of the structure of the walls of the rectum.

	Supra-ampullary and ampullary divisions.	Anal Department		
		The columnar area.	Hemorrhoid zone.	Skin zone
Crypts				
Epithelium				
Own plate of the mucous membrane				
Muscle plate				
Submucosa				
Muscular layer				
Outer shell				

Task 5. Make 2-3 test tasks based on the sample.
What cells are part of the epithelium of the villi of the small intestine?
1. Columnar edged epithelial cells.
2. Goblet-shaped
3. Endocrine.
4. Cambial (capless)
5. With apical grit (cells of Paneth)
IV. Questions for self-monitoring:
1. General characteristics of the relief of the small intestine.
2. Structure of the membranes of the small intestine.
3. Microscopic and ultramicroscopic structure of the villi and crypt.
4. Histophysiology of the absorption process.
5. Distinctive features of the structure of various parts of the small intestine.
6. Functions of the small intestine.
7. Features of the structure of the large intestine.
8. Structure of the worm-like process.

TEST YOURSELF:
CHOOSE ONE CORRECT ANSWER
1. The villi of the small intestine are:
a. mucosal outgrowths
b. outgrowths of the integumentary epithelium
c. set of microvilli
d. folds of the mucous and submucosal membranes
e. deepening of the epithelium into its own plate of the mucous membrane

2. What kind of epithelium lines the mucosal surface of the small intestine?
a. single-layer cubic.
b. a single layer of prismatic ciliated.
c. single-layer prismatic edged.
d. single-layer prismatic ferruginous.
f. multi-layer flat non-cornering.

3. What are the villi of the small intestine mucosa formed by?
a. epithelium and its own plate of the mucous membrane.
b. muscle and its own plates.
c. epithelium, its own plate and individual muscle cells of the mucous membrane.

4. What types of cells predominate in the epithelium of the crypts of the colon?
a. columnar edged epithelial cells.
b. goblet cells.
c. endocrinocytes.
d. cells with acidophilic granularity.
f. poorly differentiated cells.

5. What kind of digestion occurs in the brush border?
a. cavity.
b. parietal.
c. membrane.
d. intracellular.

SELECT THE CONDITION UNDER WHICH THIS STATEMENT IS TRUE
6. What is the difference between the jejunum and ileum and the 12-digit one?
a. The absence of duodenal glands.
b. longer and thinner hairs.
c. a Large number of goblet-shaped cells.
d. a Large number of lymphatic follicles.

f. the Presence of endocrine cells.

7. What is the difference between crypts of the colon and crypts of the small intestine?
a. Large size.
b. a Large number of goblet-shaped cells.
c. at the severity of the brush edges in epithelial cells.
d. the Presence of endocrine cells.

8. What structures form the relief of the small intestine mucosa?
a. Circular folds.
b. Villi.
d. Crypts.
f. Yamki.

9. What structures form the relief of the mucous membrane of the colon?
a. Circular folds.
b. Villi.
c. Crypts.
d. Dimples.

10. What is characteristic of the colon?
a. Developed crypts.
b. Many goblet-shaped cells.
c. the Mucosa has short villi.
d. Missing crypts.
f. Has the features of the muscle shell.

TOPIC: DIGESTIVE SYSTEM.
LIVER. PANCREAS.
PC-5

I. Motivational characteristics.

The liver and pancreas are the largest glands in the digestive system. Liver functions are extremely diverse. Therefore, knowledge of the microscopic structure and related functions (histophysiology) of the liver and pancreas provide the initial basis for mastering the sections of biomedical (normal and pathological physiology, biochemistry, pathological anatomy, etc.) and clinical disciplines, understanding the causes of pathology, diagnosis and prognosis of the outcome of the disease.

II. Targets.

1. To study the microscopic and ultramicroscopic structure of the large digestive glands.
2. Be able to analyze at the ultramicroscopic level the structure of hepatocytes, sinusoid capillary cells, bile ducts, as well as the structural relationships between them.
3. Be able to analyze exocrine and main types of endocrine cells of the pancreas at the ultramicroscopic level.

III. The required initial level.

a) from the anatomy course:
1. Anatomy and functional significance of the liver and pancreas.
2. Features of blood supply to the liver.
b) prior to the:
1. Structure of blood capillaries, arteries and veins.
2. Macrophages, their function and origin.
3. Cellular organelles, their structure and functional significance.

C) from the current session:
1. Morphological characteristics of the liver.
2. Structure of the classic liver lobule.
3. Features of blood supply to the liver.
4. Morphological characteristics of the pancreas.

IV. Object of study.

a) micro-medications for self-study
1. The liver of a mammal
2. Human liver (color hematoxylin-eosin).
3. Pancreas (color hematoxylin-eosin).
b) electronic messages
No. 424, 425, 426.

V. Information part.

The liver is the largest digestive gland. Liver functions are diverse: inactivation of hormones and biogenic amines; formation of glycogen, synthesis of plasma proteins; participation in the exchange of cholesterol, participation in protective reactions against microbes and foreign bodies, depot of fat – soluble vitamins (A, D, E, K, etc.), bile formation and participation in iron metabolism, and in the embryonic period-the hematopoietic organ. The liver is a parenchymal lobular organ. The structural and functional unit of the liver is the hepatic lobule (classical, portal, hepatic acinus), consisting of hepatic beams and intra-lobular sinusoid blood capillaries. The circulatory system of the liver is divided into three parts: the inflow system, the circulation system, and the outflow system. The inflow system is represented by the portal vein and hepatic artery. In the liver, they are simultaneously divided into: lobular, segmental, inter-lobular, and circular arteries and veins. Throughout these vessels are accompanied by the same name bile ducts, making up triads. The circulation system consists of hemocapillaries through which mixed blood flows, with a predominance of venous blood. They are surrounded by circular sinusoidal spaces. Intra-lobular hemocapillaries of sinusoid type are located between the hepatic beams, radially converging to the Central veins. Intra-lobular blood capillaries are lined with endothelial cells that have small pores. Located between the endothelial cells, stellate macrophages (Kupffer cells). The capillaries are surrounded by a circular sinusoidal space (disse space). In the liquid that fills the perisinusoidal space, there are microvilli of hepatocytes, argyrophilic fibers, and lipocytes (ito cells). The outflow system begins with the Central veins, which flow into the collective (poddolkovye) veins, then the hepatic veins, which flow into the lower Vena cava.
Rows of hepatocytes, closely adjacent to each other, form hepatic beams. Inside the hepatic beams are located bile capillaries. Their wall is formed by touching surfaces of hepatocytes. Bile capillaries blindly end at the Central end of the hepatic beam, on the periphery they pass into cholangioles that flow into the interlobular bile capillaries. Liver cells (hepatocytes) have an irregular polygonal shape. Up to 20% of them contain two or more cores. All types of common organelles and various types of inclusions are present in cells.
The pancreas is a mixed, complex, alveolar, branched, including exocrine and endocrine parts.
The exocrine part prevails (97%) and produces pancreatic juice rich in digestive enzymes. It consists of pancreatic acinuses and a system of excretory ducts (insertion, intra-lobular, inter-lobular, common excretory duct). Acinus, the structural and functional unit of the exocrine part of the pancreas, consists of secretory departments and insertion ducts. The pancreatic acinus is the kind of bag, consisting of 8-12 acinatico that perform the secretory function. Acinocyte-a conical cell in which there are two zones: homogeneous (the basal part of the cell, in which the nucleus and organoids of synthesis are located) and zymogenic (apical, containing secret granules in an inactive form). Eye-catching secret falls in the intercalated duct, which in some cases penetrate into the center of the acini (centroacinar cells). These cells have a flattened shape. Then follows the interacinous duct, its wall is formed by a single-layer cubic epithelium. The interacinous duct continues into the intra-lobular (single-layer cubic epithelium), which passes into the inter-lobular (single-layer prismatic epithelium). They flow into the common excretory duct of the pancreas (single-layer prismatic epithelium). In the epithelium of the last 2 ducts, there are also goblet cells, endocrinocytes (produce pancreozymin and cholecystokinin).
The endocrine part is 3% of the organ's parenchyma. It is formed by a cluster of endocrine cells that form Islands of Langerhans. The islets are scattered between the acini of the exocrine part of the gland. The largest number of Islands is located in the tail part of the gland. The Islands contain the following

endocrinocytes: B cells (secrete insulin), A cells (secrete glucagon), D cells (secrete somatostatin), D1 cells (secrete VIP), PP cells (secrete pancreatic polypeptide).

VI. Learning activity.

1.On the micro-product "mammalian Liver", find and draw liver lobules (I) separated from each other by interlobular connective tissue (1). Inside the lobule, liver beams (2) are determined, consisting of hepatocyte cells (3), between which the hemocapillary (4) is located on one side, and the bile capillary (5) on the other side. There is a Central vein in the center of the lobule (6). In the interlobular connective tissue, triads (7) are defined, including the interlobular vein (a), artery (b), and bile capillary(C). Between the lobules are located individually collective (poddolkovye) veins (8).

2.On the micro-preparation "human Liver", consider all the structures described in the previous preparation, and compare with the preparation "mammalian Liver".

3.Find and draw the lobe of the gland (I), the exocrine part (II), and the endocrine part (III) on the "Pancreas" micropreparation. In the lobule, determine the acinus (1), consisting of acinocytes (2), the insertion duct (3), and the intra-lobular duct (4). Between the acinuses there are small clusters of endocrine cells (5) - Islands. Between the lobules in the connective tissue (6) are determined interlobular output ducts (7).

4.Mark the drawings.

VII. Control question.

1.General plan of the liver structure. The concept of the liver lobule. Liver function.

2.Features of blood supply to the liver.

3.What is the triad of the liver?

4.Liver beams, microscopic and ultramicroscopic structure of hepatocytes.

5.Morphology and histophysiology of the exocrine pancreas.

6.Morphology and histophysiology of the endocrine Department of the pancreas. Functions of the pancreas.

VIII. Learning objective.

1.The patient's blood is slowly clotting. What is the function of the liver may have been violated? What histostructure liver is the violation?

2.The patient has a pronounced jaundice of the skin, mucous membranes and sclera. When morphological analysis of the liver punctate found that as a result of the pathological process, part of the hepatocytes died. What morphological changes in the liver are the basis for the appearance of jaundice (take into account when deciding that the morphofunctional state of the interstitial bile ducts is normal)?

3.Two preparations of the pancreas are presented, prepared from the glands of a hungry animal and an animal that has previously been given food. How to distinguish the drug pancreatiti hungry and well-fed animal?

4.The animal was injected with alloxan, which selectively damages the B cells of the pancreatic islets. What function of the pancreas will be disrupted?

5.The animal was given a drug that selectively damages The a-cells of the pancreatic islet (cobalt salts). What function of the pancreas will be disrupted? 6.The first group of animals was injected with insulin, the second with glucagon. Will the preparations obtained from the liver differ if they are colored for the content of glycogen? If so, what is the difference, what is the reason?

7. In the patient's blood, a decrease in the content of prothrombin was detected. What is the function of the liver disturbed? What are the consequences of this?

8.Ink was introduced into the bloodstream of the experimental animal. After a certain period of time, the paint with the blood current got into the liver. What cells will react to the carcass entering the liver? What mechanism lies at the basis of the response of these cells?

9.The suggested two drugs in the liver. On one of them, you can see segments that are sharply bounded from each other by connective tissue, on the other-the connective tissue between the segments is poorly developed. Determine which drug represents the human liver?
10.In the cytoplasm of hepatocytes, an unusually large number of glycogen clumps are detected on the drug. What processes in the body are associated with this phenomenon?
11.Two preparations of different exocrine glands that secrete protein secret are presented. The first preparation shows the end sections consisting of cells whose cytoplasm is uniformly colored with the main dye. On the second preparation, the end sections of the glands are visible, the cells of which are colored with basic dyes at the base, and acidic at the apical surface. Determine which drug represents the pancreas?
12.On the preparation of the digestive gland, which produces a protein secret, between the end sections, clusters of cells are visible, surrounded by numerous wide capillaries. The cytoplasm of these cells is much less colored than the rest of the gland. Determine which gland is represented on the drug? What cells are visible in the field of view?

IX. The topics of structural abstracts.
1. Macrophages of the liver.
2. The ability of the liver to regenerate and cirrhosis problems
3. Endocrinocytes of the pancreas. Their micro-and ultrastructure, function and place in the system of hormone-producing cells of the digestive system.

INDEPENDENT WORK
I. THE STUDENT SHOULD KNOW:

1. General plan of the liver structure. Features of blood supply to the liver 2.Structure of the classical lobule. Features of the structure and functioning of hepatocytes. 3.General plan of the structure of the pancreas. Endocrine and endocrine parts of the pancreas.	1.History: textbook / edited by Yu. I. Afanasiev, N. A. Yurina. - 5th ed., pererab. and add. - M.: Medicine, 2006. 2.Histology: textbook / Under the editorship of E. G. Ulumbekova, J. A. Chelysheva. - 2nd ed., pererab. and add. - M.: GEOTAR-MED, 2009. 3. Methodological guide for students in histology. Part 2. L. A. Akoeva, L. A. gireeva, L. S. Tabolova, and others. Vladikavkaz, 2008.

II.THE STUDENT MUST BE ABLE TO:
1. Determine the exocrine and endocrine part of the pancreas in micro-preparations.
2. Determine the structure of the liver in the drug.

III. Tasks to prepare for the lesson:
Task # 1. Add the missing information:
The blood flow system is represented by……
……
The circulation system is presented ……
……
The system of blood outflow is presented.....……....
……
The formation of bile occurs in ....., whose wall is formed by.....
The triad is……
……
Liver beams are……
The space of disse is located between the……
……
The hepatocyte has two sides- .....,addressed to ..... and ……., addressed to……
The task № 2. Fill in the table. "The cells of emocapella". Add the missing information.

Name of the cell.	origin.	Features of the structure.	function
1.			
2.Kupfer cells			
3.			
4.	They are formed in the red bone marrow.	cells contain granules.	natural killers

Task # 3. Fill in the table. Structure of the pancreas.

Products of secretion.	The exocrine part.	The endocrine part of the

The task № 4. Fill in the table. "Cells of the pancreatic islets".

Name of the cell.	hormone	

V. self-monitoring Questions:
1. General plan of the liver structure
2. The concept of the liver lobule
3. Features of blood supply to the liver.
4. What is the triad of the liver?
5. Liver beams, microscopic and ultramicroscopic structure of hepatocytes.
6. Morphology and histophysiology of the exocrine pancreas.
7. Morphology and histophysiology of the endocrine Department of the pancreas.
8. Functions of the pancreas.
Task 5. Make 2-3 test tasks based on the sample
What vessels flow blood from the liver lobes?
1. Interlobular veins
2. Interlobular arteries
3. Central veins
4. Podmoskovye of Vienna.

TEST YOURSELF:
CHOOSE ONE CORRECT ANSWER
1.Blood flow in the liver. Select the correct statement:
a. blood flow from the interlobular veins and arteries enters the sinusoids
b. blood from sinusoids enters the interlobular vein
c. emocapella Central veins contain adrenergic receptors
d. blood from the liver flows through the portal vein
f. through the gate of the liver include hepatic vein

2.Disse space is limited:
a. hepatocytes and ITO cells
b. endothelial cells and hepatocytes
c. neighboring strands of hepatocytes

d. neighboring hepatocytes
f. endothelial cells and Kupfer cells

3. What cells form the walls of bile capillaries?
a. Kupfer Cells.
b. Endothelial cells.
c. the Hepatocytes.
d. Perisinusoidal lipocytes.
f. Patching of cells.

4.What kind of education according to the classical views is morphofunctional unit of the liver?
a. alveola.
b. the hepatic lobule.
c. portal lobule.
d. hepatic acinus.
f. liver beam.

5. In what direction does the blood move in the classic liver lobule?
a. from the center to the periphery.
b. around the lobes.
c. from the periphery to the center.
d. from top to bottom

SELECT THE CONDITION UNDER WHICH THIS STATEMENT IS TRUE
6.What does the liver stroma consist of?
a. connective tissue capsule around the organ.
b. a layer of loose connective tissue between the hepatic lobules.
c. liver beams.
d. interlobular bile ducts.

7. What vessels flow blood from the liver lobes?
a. interlobular veins.
b. interlobular arteries.
c. Central veins.
d. Podmoskovye of Vienna.

8. What is the classic liver lobule made of?
a. liver beams.
b. liver plates.
c. sinusoid capillaries.
d. connective tissue interlayers.

9. Secretory cells in the pancreas are:
a. insulocytes
b. echinocyte
c. interim
d. centroacinary

10.The composition of the pancreatic acinus includes:
a. exocrine pancreatocytes
b. insulocytes
c. cells of the insertion Department
d. myoepithelial cells

MODULE 5
Targets.
1. Show knowledge of theoretical material on the studied topics.
2. Be able to determine and differentiate histological structures of tissues in micro-preparations.
3. Solve situational problems.
4. Show knowledge in defining electronograms.
Control question:
1. General characteristics of salivary glands.
2. Features of the structure of the parotid, submandibular and sublingual glands.
3. Structure of the language. Types of papillae, their localization, structural features.
4. Peripharyngeal lymphoepithelial ring. Features of the structure of the Palatine amygdala.
5. Anatomical divisions, microscopic and ultramicroscopic structure of the tooth components.
6. General plan of the structure of the digestive tube.
7. Features of the structure of the esophagus.
8. Anatomical divisions of the stomach, features of the microscopic structure of various departments.
9. Cancer of the stomach, their structure, distinctive features.
10. Functions of the stomach.
11. General characteristics of the relief and membranes of the small intestine.
12. Microscopic and ultramicroscopic structure of the villi and crypt.
13. Histophysiology of the absorption process.
14. Distinctive features of the structure of various parts of the small intestine. Functions of the small intestine.
15. Features of the structure of the large intestine.
16. Structure of the worm-like process. Functions of the large intestine
17. Rectum. Features of the structure.
18. General plan of the liver structure. The concept of the liver lobule. Liver function.
19. Features of blood supply to the liver.
20. What is the triad of the liver?
21. Liver beams, microscopic and ultramicroscopic structure of hepatocytes.
22. Morphology and histophysiology of the exocrine pancreas.
23. Morphology and histophysiology of the endocrine Department of the pancreas. Functions of the pancreas.
Micropreparations:
1. Parotid gland (hematoxylin-eosin stain)
2. Submandibular gland (hematoxylin-eosin stain)
3. Hyoid gland (hematoxylin - eosin stain)
4. Papillae of the tongue (color hematoxylin-eosin)
5. Palatine amygdala (hematoxylin - eosin color)
6. Esophagus (hematoxylin - eosin stain)
7. The bottom of the stomach (color hematoxylin-eosin)
8. Transition of the esophagus to the stomach (hematoxylin - eosin stain)
9. Pyloric Department of the stomach (color hematoxylin-eosin)
10. Small intestine (hematoxylin-eosin stain).
11. 12-duodenum (hematoxylin-eosin stain).
12. Colon (hematoxylin-eosin stain).
13. The liver of a mammal (color of the fuchsin).
14. Human liver (color hematoxylin-eosin).
15. Pancreas (color hematoxylin-eosin).
Test task

TOPIC: URINARY SYSTEM.
PC-5

I. Motivational characteristics of the topic.
With the help of excretory organs, up to 80% of harmful metabolic products, as well as some water and electrolytes, are removed from the body together with urine. Due to this, the kidneys

as the urinary organs of the excretory system play an important role in maintaining homeostasis. In the case of diseases of the urinary organs, homeostasis is disrupted, and poisoning with harmful products of nitrogen metabolism may occur. For the purpose of correct diagnosis and successful treatment of diseases of the excretory system, methods of laboratory analysis, clinical samples and lifetime collection of material for histological research are widely used. All of them are based on knowledge of the histology of the excretory system.

II.Targets.
1. Know the structure of the nephron as a histofunctional unit of the kidney.
2. Develop an idea of urination as a process occurring in the main parts of the nephrons due to their structural features.
3. Know the features of the structure and functions of parotid nephrons.
4. Know the structural elements involved in the endocrine function of the kidneys.
5. Be able to identify the walls of the urinary organs of the renal pelvis, ureters, and bladder.

III.The required initial level of knowledge.
a) from the previous topics:
1. The structure of blood capillaries of the fenestrated type and their participation in metabolism.
2. Structure and role of the suction edge of cells.
3. Structure of the transitional epithelium.

b) from the material of the current topic:
1. The main stages of embryonic development of the excretory system.
2. The concept of the nephron as a structural and functional unit of the kidney.
3. Structure and blood supply of cortical and parotid nephrons.
4. Structure and endocrine function of the SOUTH.

IV. Information part.
The kidney is a paired, parenchymal organ, covered with a connective tissue capsule on top and a serous membrane in front. The organ parenchyma consists of cortical and cerebral substances. The structural and functional unit of the kidney is the nephron. Part of the nephron include: glomerulus capsule, proximal convoluted tubule, proximal straight tubule, thin tubule (involves descending and ascending part), the distal convoluted tubule. The renal body includes the vascular glomerulus and the glomerular capsule that covers it. By location and functional characteristics of the nephron is divided into cortical (80%) and juxtamedullary (20%).
Blood circulation in the kidney has a number of features. The renal artery enters the gate of the kidney, which splits into inter-lobular, then arc, inter-lobular, intra-lobular, from which the bringing arterioles begin. They break down into a system of emocapella, which are collected in efferent arterioles. There is a wonderful network here. The outputting arterioles again break up into a secondary peritubular capillary network. Then the blood is collected in the stellate veins, then in the interstitial, interstitial, renal, coming out of the gate of the kidney.
Urination is a complex process that occurs in the nephrons. In the renal corpuscles, the first phase occurs - filtration. In the tubules of the nephrons, the second phase occurs - reabsorption. The third phase-secretion-occurs in the collecting tubes.
The juxtaglomerular apparatus secretes renin into the blood, which indirectly has a vasoconstrictor effect, stimulating the production of aldosterone. Part of the SOUTH includes juxtaglomerular cells, tight spot, juxtamedullary cells (Goormaghtigh).
The urinary tract includes the renal calyx and pelvis, ureters, bladder, and urethra. They have a General plan of structure: the mucous membrane, submucosal base, muscle and adventitial membranes.

V. objects of study.

a) micro-products:
1. Kidney (hematoxylin - eosin stain)
2. Bladder (hematoxylin - eosin stain)
3. Ureter (hematoxylin - eosin stain)
b) electronic messages:
№№ 480, 483, 484, 485, 488, 489, 490, 491, 495, 496, 497, 498.

VI.Learning activity:
1.Find and draw cortical (I), cerebral (II) substances, large arc arteries and veins (III) on the "Kidney" micropreparation. The cortical substance lies on the periphery of the kidney in a solid layer, it contains the renal corpuscles (1) and tubules. Renal corpuscles are rounded formations consisting of a vascular glomerulus (2), two capsule leaves, and a cavity (3). The inner leaf of the capsule is firmly fused with the capillary wall, the outer leaf (4) consists of flat cells. In the cortical substance, the proximal (5) and distal (6) tubules of the nephrons are determined. In the brain substance lie mainly loops of Henle (7), having the form of tubes, lined with flat or cubic epithelium. There are also collecting tubes (8).
2.Find and draw the mucous (I), submucosal(II), muscle (II), and serous (III) membranes on the micro-preparation "bladder". The mucous membrane is lined with a transitional epithelium (1), under which is its own plate (2) - a loose connective tissue that gradually passes into the submucosal membrane. The muscle envelope consists of three layers of smooth muscle. The outer shell, depending on the cut, can be represented by either adventitia 3), or serous shell. The latter has a thick layer of connective tissue (4) covered with mesothelium (5).
3.Mark the drawings.

VII. Control question.
1.The main functions of the excretory system and its organ composition.
2.General plan of the kidney structure.
3.Nephron as a structural and functional unit of the kidney. perinatalthe cortex and the nephrons. Topography of parts of the nephron in the kidney.
4.Circulatory system, features of the microcirculatory bed of the renal corpuscle.
5.Histophysiology of individual parts of the nephron according to electron microscopy and histochemistry.
6.Juxtaglomerular apparatus (SOUTH) of the renal corpuscle, its structure, value.
7.Features of the structure of the urinary tract.

VIII. Learning objective.
1.When measuring blood pressure in the glomerular capillaries, it was found that in the first case it is 80-90 mm, in the second-40 mm of mercury. What type of nephron belongs to the vascular system in the first and second cases?
2.The inflammatory process affects the renal corpuscles. What are the functions of the nephron can be broken?

3.In some pathological conditions of the kidney, the microvilli of the epithelium lining the proximal part of the nephron are rejected. What process of urination will be disrupted?
4.When measuring the diameter of the bringing and taking out arterioles of the vascular system of the nephron, it was found that it is almost identical. What type of nephron does this vascular system belong to?
5.The patient releases up to 10 liters of urine during the day. What parts of the nephron are affected? What can be caused by the marked violation of urination?
6.The patient has a constant thirst and the release of highly diluted urine. Whether this pathology is only associated with the defeat of the urinary system, if not, what does the endocrine system matter?
7.In the urine of the patient, protein and shaped elements of blood are detected. What is the process broken? Which Department of the nephron?
8.In the experiment, the animal increased the activity of blood circulation. The vascular system of which nephrons is additionally included in the outflow of blood?
9.Fresh red blood cells were found in the patient's urine. In which Department of the urinary system is there a pathology?
10.On the kidney preparation # 1, small renal corpuscles per unit area are in the field of view. On drug # 2, the renal corpuscles are large, located much less frequently. Which of the drugs belongs to the newborn's kidney?
IX. The topics of structural abstracts.
1. Modern concepts of endocrine function of the kidneys.
2. Histophysiology of the juxtaglomerular apparatus of the kidney.
3. Development of the excretory system and its specificity at different stages of ontogenesis.

INDEPENDENT WORK
1. THE STUDENT SHOULD KNOW:

1. The structure of the nephron as gestionale unit of the kidney. 2. About urination as a process that occurs in the main parts of the nephrons due to their structural features. 3. Features of the structure and functions of parotid nephrons. 4. Structural elements involved in endocrine function of the kidneys.	1.Gistologiya: Textbook / Ed. Yu.I.Afanaseva, N.A.Yurinoy. - 5 th ed., Revised. and ext. - M .: Medicine, 2006. 2.Gistologiya: Textbook / Ed. E.G.Ulumbekova, Yu.A.Chelysheva. - 2 nd ed., Revised. and ext. - M .: GEOTAR MED-2009. 3. Toolkit for students on histology. Part 2. LA Akoev, LA Gireev, LS Tabolova and others. Vladikavkaz 2008.

II.THE STUDENT MUST BE ABLE TO:
Determine the structure of the cortical, cerebral substance of the kidney and urinary tract.
III.Tasks to prepare for the lesson:
Task 1. Add the missing information.
There are three main processes that occur in the kidneys during the formation of urine:
1. Filtration - ……..……
……....occurs in ……
2.....- (reverse absorption) of most of the water and substances dissolved in it from the lumen of the tubules into the capillaries, occurs in .....……..
3. ……....-.....……....……....…....

…….. happening in .....…….....

Task 2. Fill in the table : "structural components of the kidney »

nephron	Type of lining epithelium	Function

Task 3.Fill in the table: "Types of nephrons"

types of nephrons	Distinctive features
cortical	
juxtamedullary	

Task 4.Fill in the table: "juxtaglomerular apparatus of the kidney"

Composite components	Morphology	Function
Dense spot		
Juxtaglomerular cells		
Juxtavascular cells		

Task 5. Make 2-3 test tasks based on the sample.

The following hormones regulate the functions of the nephron:

1. vasopressin (antidiuretic hormone).
2. progesterone.
3. aldosterone.
4. testosterone.
5. somatostatin.

IV. Questions for self-monitoring:

1.The main functions of the excretory system and its organ composition.

2.General plan of the kidney structure.

3.Nephron as a structural and functional unit of the kidney. Okolovskoye the cortex and the nephrons.Topography of parts of the nephron in the kidney.

4.Circulatory system, features of the microcirculatory bed of the renal corpuscle.

5.Histophysiology of individual parts of the nephron

6.Juxtaglomerular apparatus (SOUTH) of the renal corpuscle, its structure, value.

Types of nephrons

Distinctive feature

Cortical

Juxtamedullary

7.Features of the structure of the urinary tract.

TEST YOURSELF:

CHOOSE ONE CORRECT ANSWER

1. The filtration barrier of the kidney consists of:
a. from proximal nephrocytes and their basal membrane.
b. of the distal kidney cells causes significant release and their basement membrane.
c. of podocytes, endothelial cells and their shared basement membrane.
d. from the basal membrane of the epithelium, which has pores.

2. The proximal convoluted canaliculus is formed:
a. nephrocytes that do not have a brush border on the apical surface (microvilli).
b. nephrocytes that have a brush border and basal striation (invagination of the cytolemma with mitochondria between them).
c. nephrocytes that have basal striation (invagination of the cytolemma with mitochondria between them).
d. dark kidney cells causes significant release with intracellular secretory canaliculi with the adjoining mitochondria.

3. What epithelium is lined with the urinary tract?
a. multi-layer flat non-cornering.
b. multi-layer transition.
c. single-layer prismatic ferruginous.
d. multi-row flickering.

4. When the nephrons to produce more primary urine?
a. parotid.
b. intermediate.
c. korkovykh.

5. What is the primary urine?
a. blood plasma without large proteins.
b. the liquid part of the blood.
c. water and dissolved minerals

SELECT THE CONDITION UNDER WHICH THIS STATEMENT IS TRUE
6. What are the characteristic features of the proximal convoluted tubules:
a. single-layer flat epithelium
b. cells do not have a brush border
c. there is basal striation
d. single-layer cubic epithelium

7. The cortical substance of the kidney consists of:
a. kidney cells.
b. direct descending and ascending parts of the nephron loops.
c. proximal and distal convoluted tubules.
d. collecting tubes.

28. The brain substance of the kidney consists of:
a. kidney cells.
b. straight tubules.
c. convoluted tubules.
d. collecting tubes.
f. papillary channels.

9. An important condition for the filtration process (the first phase of urination) is:
a. the diameter of the outputting arterioles is smaller than the diameter of the bringing arterioles.
b. the diameter of the outputting arterioles is greater than the diameter of the bringing arterioles.
c. the diameter of the outputting and bringing arterioles is the same.
d. blood pressure in the capillaries of the glomeruli of cortical nephrons is higher than 50 mm Hg.st.
f. blood pressure in the capillaries of the glomeruli of cortical nephrons is low - about 10 mm Hg.st.

10. The structure of the juxtaglomerular apparatus of the kidney includes:
a. cells of the dense spot of the distal tubule.
b. juxtavascular cells.
c. juxtaglomerular cells of bringing and taking out arterioles.
d. podocytes.
f. mesangial cells.

TOPIC: MALE REPRODUCTIVE SYSTEM.
PC-5

I. Motivational characteristic themes.
Organs of the reproductive system plays a crucial role in ensuring the preservation of the species. Due to its inherent generative function. No less important is the endocrine function of sexual glands. It ensures the implementation of the generative functions, determines the secondary sexual characteristics of the individual. Sexual behavior. Knowledge of the morpho-functional characteristics of organs of the reproductive system is required for a proper understanding of the laws of the early stages of embryonic development. The cause of infertile marriages can be congenital or acquired secondary generative disorders or endocrine function of sexual glands. Functional changes are accompanied by changes of normal organ structures, the concept of which must be qualified.

II. Targets.
1. Be able to determine the organs of the male sexual system and their tissue elements at a microscopic level.
2. Be able to identify the types of cells in the spermatogenic epithelium and hormone-producing cells of the testis.
3. Be able to explain the content and essence of the phases of spermatogenesis.
4. Be able to explain the mechanism of regulation of generative and endocrine functions of the testicle.
5. Be able to explain the features of the embryonic development of the male reproductive system.

III. The required initial level of knowledge.
a) from other courses:
1. Anatomy of the male reproductive system
2. Biological reproduction (sexual, asexual)
3. Meiosis

b) from previous topics:
1. Germ leaves and their derivatives
2. Features of the structure of endocrine glands
3. Structure of the male sex cell

C) on the topic of the lesson:
1. Embryogenesis of organs of the male sexual system
2. Structure and function of the testicle
3. Spermatogenesis
4. Structure and functions of the VAS deferens and additional sexual glands
5. Hormonal regulation of the function of the male reproductive system

IV.Object of study.
a) micro-products
1. Testis (color hematoxylin-eosin)
2. Tubules of the appendage of the testis (color hematoxylin-eosin)
3. Prostate (hematoxylin-eosin stain)
b) electronic messages.
№№ 504, 508, 509, 510, 511, 512.

V. Information part.
The male sexual system consists of the sexual glands (testes) and additional organs of the sexual tract - the VAS deferens, seminal vesicles, and prostate.
The testis is a paired, parenchymal lobular organ. This is a mixed-secretion gland. The parenchyma is formed by convoluted seminal tubules, the wall of which is formed by basal, myoid and fibrous layers. Inside, the convoluted tubules are lined with spermatogenic epithelium. Spermatogenesis - the formation of germ cells-takes place in the convoluted tubules and includes 4 stages: reproduction, growth, maturation, and formation. According to the stages of spermatogenesis, the following types of spermatogenic epithelium are distinguished: spermatogonia, spermatocytes of the 1st order, spermatocytes of the 2nd order, spermatids, spermatozoa. As a result of spermatogenesis, four spermatozoa are formed from one spermatogony. The process of spermatogenesis proceeds continuously throughout the entire puberty of a man.
The VAS deferens make up the system of tubules of the testis and its appendages. Diverting pathways begin with straight tubules of the testis, flowing into the network of the testis, located in the mediastinum. From this network, 12 to 15 convoluted outputting tubules branch off, which connect to the appendage duct in the area of the appendage head. This duct, repeatedly twisting, forms the body of the appendage and in the lower tail part of it passes into a straight VAS deferens. All VAS deferens are built on a General plan and consist of mucous, muscular, adventitial membranes. Distinctive features are the epithelium of the tubules of the head (alternating cubic and ciliated prismatic) and the body of the appendage (two-row, having stereocilia on the apical surface), as well as the number of muscle layers in the muscle shell (from 1 to 3).
The prostate is a muscular-glandular organ that covers the upper part of the urethra. It is a lobular, parenchymal organ covered with a connective tissue capsule. Its parenchyma consists of numerous separate mucous glands located in three groups. The end sections of individual tubular glands are represented by high mucosal and small insertion cells. The excretory ducts expand and are lined with multi-row prismatic epithelium, flowing into the urethra. The muscle-elastic stroma of the gland is formed by loose connective tissue and powerful bundles of smooth muscles.
VI. Learning activity.
1.On the microparameter "Testis" find and draw the protein shell (1), from which the connective tissue partitions (2) with a large number of blood vessels (3) extend deep into the organ. Under the protein envelope, the cross section contains convoluted tubules (4), which contain spermatogenic epithelium (5) located on the basement membrane (6) and supporting Sertoli cells (7). Spermatogonia (8) lie directly on the basement membrane, above are the largest cells of the

spermatogenic epithelium - spermatocytes of the 1st order (9). Spermatocytes of the 2nd order (10) make up the third row of cells. The last generation of spermatogenic cells is spermatids (11), which are arranged in several rows. Spermatozoa are visible in the lumen of the tubules (12). Between the seminal tubules is interstitial connective tissue (13), in which groups of interstitial Leydig cells are located (14).
2.Find and draw cross sections of the tubules of the head (I) and the body of the appendage (II), surrounded by connective tissue with blood vessels (1) on the microparameter "Appendage of the testis". The epithelium of the tubules of the head is a single-row prismatic, alternating with low cubic cells (2), the proper plate is loose connective tissue(3), the muscle shell is a single layer of smooth muscles (4), the adventitial shell (5) is loose connective tissue. The epithelium of the tubules of the body of the appendage is two-row (6), under it there are also its own plate (3), the muscle sheath (4), and the adventitial sheath (5).
3.On the "Prostate" micro-product, find and draw a lobe of the gland (1) separated from the neighboring one by layers of connective tissue (2) rich in blood vessels (3). The secretory sections (4) on the cross section have a diverse shape, uneven lumen, they are lined with a single-layer cubic epithelium (5). Prostatic stones are sometimes found in the lumen of the gland (6). The excretory ducts (7) have wide lumen and are lined with a single layer of cylindrical epithelium (8). In the thickness of the organ lies the urethra (9), which has a narrow, stellate lumen, lined with transitional epithelium (10). Powerful bundles of smooth muscle lie around the end sections (11).
4.Mark the drawings.

VII. Control question:
1.General plan of the structure and function of the testes.
2.Cytogenetic characteristics of spermatogenesis.
3.Functions and structure of the convoluted seminal tubule.
4.Gepatolentikuliarnaya barrier, its value and structural organization.
5.General morphofunctional characteristics of the VAS deferens. Features of the structure of different departments.
6.Structure, localization, and function of the prostate.
7.Hormonal regulation of the function of the male reproductive system.
VIII. Learning objective:
1.During endocrinological examination of the patient, it was found that there is an increased amount of testosterone in the blood plasma. Which organs of the patient the doctor is obliged to examine in the first place?

2.The sick boy was found to have a hormonal tumor consisting of glandulocytes and bearing the name leidigoma. At the same time, premature puberty was found as one of the symptoms. How are these phenomena related?
3.Men who survived the atomic bombings of Hiroshima and Nagasaki had a high rate of children born with genetic abnormalities. What is the reason for this phenomenon?
4.On the section of the testes of an adult, Mature spermatozoa are not found in the lumen of the convoluted seminal tubules. Does this indicate a violation of spermatogenesis?
5.Morphological analysis of prostate biopsy material revealed that almost all secretory departments contain rounded structures, the Central part of which consists of a homogeneous homogeneous material, and the periphery is formed by wrinkled epithelial cells. What kind of education is this? What does their increased content indicate?
6.Men who work in hot shops for a long time without special protection develop aspermatogenesis. What is the reason for this phenomenon?
7.The patient underwent total extirpation of the prostate for a malignant neoplasm. Will this affect the subject's fertility?
8.When examining the child, it was found that he did not have a timely descent of the testes into the scrotum. If this does not happen in the future, will spermatogenesis take place in the testes?
9.On the section of the appendage of the testis, all the tubules contain a large number of Mature spermatozoa. Most of the cells lining the canal of the appendage are devoid of stereocilia. What is the evidence of an excessive number of spermatozoa in the appendage of the testis?
10.On the preparation, sections of convoluted seminal tubules clearly protrude supporting cells. The spermatogenic epithelium is atrophied, the connective part of the stroma is well developed, forming dense shells around the tubules. What is the state of the testis?
IX.Topics of research papers
1. Migration of primary germ cells in human embryogenesis according to histochemistry.
2. Embryonic development and postnatal development of the male reproductive system.

INDEPENDENT WORK
I. the STUDENT SHOULD KNOW:

1. Microscopic structure and function of the testis. spermatogenesis 2.Stroenie and function of the seminiferous tract and accessory sex glands 3.Gormonalnaya regulation of the function of organs of the male reproductive system	1.Gistologiya: Textbook / Ed. Yu.I.Afanaseva, N.A.Yurinoy. - 5 th ed., Revised. and ext. - M .: Medicine, 2006. 2.Gistologiya: Textbook / Ed. E.G.Ulumbekova, Yu.A.Chelysheva. - 2 nd ed., Revised. and ext. - M .: GEOTAR MED-2009. 3. Toolkit for students on histology. Part 2. LA Akoev, LA Gireev, LS Tabolova and others. Vladikavkaz 2008.

II.STUDENT MUST UMET-
1. Identify the microscopic structure of the organs of the male reproductive system.

III. Tasks for preparation for classes.
Exercise 1.Fill in the table. Spermatogenesis.

Name of germ cells	phase of spermatogenesis	The process underlying cell transformation	Location spermatogonia cells in the epithelium

task 2. To add missing information.
The function of Sertoli cells

cell function	The mechanism of the function
1. Support	Their processes cells. Sertoli create "....", which are fixed spermatogenic cells.
2. barrier	Contact between the cells. Sertoli - the most important part .... .barera.
3. Trophic	Power cells beyond the barrier (i.e. ..... compartment) takes place exclusively due to Sertoli cells.
4. Phagocytic	Cl. Sertoli phagocytose and digest those numerous germ cells that ..... during spermatogenesis; cytoplasmic droplets (residual body) otshnurovyvayuschiesya from late ....
5. secretory	Cl. Sertoli secrete into the lumen of the seminiferous tubules ..... in which sperm get a loss of communication with the "epithelium".
6. The coordinating	Cl. Sertoli apparently coordinated developments of spermatogenic cells and gradual .... last to the lumen of the tubule; regular wave propagation initiation of spermatogenesis ..... seminiferous tubule.
7. Participation in endocrine relationship	a) Sertoli Cells are one of the objects of influence ....(..... pituitary hormone) - in this connection, they have receptors for.....hormone. b) but the Sertoli cells themselves have an endocrine function: they synthesize a factor,

	..... (on the principle of feedback) production of FSH by the pituitary gland; factor, …….. the division of spermatogonia. C) at the Same time they form .....…….. for testosterone-ASB (androgen-binding protein): only by binding to the latter, testosterone has an effect on the development of spermatids.

Task 3. Make 2-3 test tasks based on the sample
Sertoli cells (Mark correct answers):
(a) are part of the spermatogenic epithelium;
(b) have follitropin receptors;
(C) perform a trophic function;
(C) synthesize testosterone.
IV.Questions for self-monitoring
1 .General plan of the structure and function of the testes.
2.Cytogenetic characteristics of spermatogenesis.
Z. Functions and structure of the convoluted seminal tubule. Age characteristics.
4.Gepatolentikuliarnaya barrier, its value and structural organization.
5.General morphofunctional characteristics of the VAS deferens. Features of the structure of different departments.
6.Structure, localization, and function of the prostate. Age change.
7.Hormonal regulation of the function of the male reproductive system.

TEST YOURSELF:
CHOOSE ONE CORRECT ANSWER
1. In which the tubules of the testes develop sperm:
a. in the testicle network.
b. in straight tubules.
c. convoluted seminiferous tubules.
d. in the outputting tubules.

2. What part of the VAS deferens forms the head of the appendage?
a. network of the testis (testicle).
b. the efferent tubules.
c. straight tubules.
d. the VAS deferens.
f. duct of the appendage.

3. The formation of any cell to complete the period of growth in spermatogenesis?
a. spermatozoa.
b. spermatogonia.
c. spermatids.
d. spermatocytes of the 1st order.
f. spermatocytes of the 2nd order.

4. What cells are formed after the completion of the second division of maturation in spermatogenesis?
a. spermatogonia.
b. spermatids.

c. spermatozoa.
d. spermatocytes of the 1st order.

5. Which cells synthesize and secrete testosterone?
a. spermatogonia.
b. Sertoli cells (sustantivity).
c. interstitial Leydig cells (glandulosity).
d. myoid cells.

SELECT THE CONDITION UNDER WHICH THIS STATEMENT IS TRUE
6. Leydig Cells:
a. located in the basal space between Sertoli cells
b. have lutropin receptors
c. produce testesterone
d. they have an oxyphilic cytoplasm and a developed smooth EPS

7. Prostate:
a. parenchyma consists of tubular-alveolar glands
b. the excretory ducts of the gland open into the VAS deferens
c. acid phosphotase is present in the secret
d. the contraction of striated muscles of the prostate gland contribute to the release of secretions during ejaculation

8. What are the functions sustantivity (Sertoli cells)?
a. nutrition of spermatogenic cells and their fragments.
b. synthesis of androgen-binding protein.
c. the creation of the microenvironment for developing sperm.
d. phagocytosis of dying spermatogenic cells and their fragments.
f. contractile activity (provides movement of spermatozoa).

9. What cells are distinguished in the epithelium of the excretory tubules that form the head of the appendage?
a. high ciliated.
b. low secretory.
c. goblet-shaped.
d. two-row epithelium with stereocilia.
f. kamchatyi.

10. Which spermatogenic cells have a haploid set of chromosomes?
a. spermatogonia.
b. spermatocytes of the 1st order.
c. spermatocytes of the 2nd order.
d. spermatids.
f. spermatozoa.

TOPIC: FEMALE REPRODUCTIVE SYSTEM. OVARY. OOGENESIS. ENDOCRINE REGULATION.
PC-5
I. Scientific and methodological justification of the topic.

Obstetric and gynecological practice is largely based on knowledge of the laws of the structural and functional organization of the female sexual system. Their peculiarity in the norm is cyclical implementation of the reproductive and endocrine functions. Functional changes that occur with a certain frequency in the organs of the female sexual system are associated with changes in their microstructure. Data based on microscopic analysis is often used to determine the phases of the ovarian –menstrual cycle (vaginal smears), as well as to clarify the diagnosis of diseases. In this regard, knowledge of the morpho-functional features of the female genital system is the basis for successful study of their pathology in the clinic.

II. Targets.
The student should know:
1. Features of the embryonic development of the female reproductive system.
2. Features of ovarian structure.
3. Generative and endocrine functions of the ovaries.
4. Ovogenesis and its regulation.

The student must be able to:
1. Identify the organs of the female reproductive system and their tissue elements at the microscopic level.
2. Identify different types of ovarian follicles.
3. Determine the yellow body at the microscopic level.

III. The required initial level.
a) from other courses
1. Anatomy of the female reproductive system
2. Reduction division (mitosis)

b) from previous topics
1. Germ leaves and their derivatives
2. Features of the structural organization of endocrine glands
3. Gonadotropic functions of the pituitary gland
4. Structure of the female sex cell. Types of eggs.

c) on the topic of the lesson
1. Embryogenesis of the female reproductive system
2. Structure and functions of the female genital tract
3. Oogenesis.

IV. Object of study
a) micro-products
1. The ovary of a mammal (coloration with hematoxylin-eosin)
2. Yellow body of a mammal (coloration with hematoxylin-eosin)
b) electronic messages
№№ 520, 522,531, 532, 542, 543.

V. Information part.
The female sexual system includes the gonads (ovaries) and the excretory pathways (oviducts, uterus, vagina, and external female genitalia).
The ovary is a paired, parenchymal organ that performs reproductive (egg formation) and endocrine functions (ovarian hormone production). Outside, the ovaries are covered with a dense connective tissue capsule (protein shell), on which a layer of surface epithelium is located. The ovaries consist of cortical and cerebral substances. Brain matter is loose connective tissue rich in

blood vessels and nerves. The cortical substance is formed by follicles of different degrees of maturity. There are primordial (primary), secondary, tertiary (vesicular), and atretic follicles. Each primary (primordial) follicle initially contains a primary female sex cell-ovogonia, covered with a single layer of flat cells of the follicular epithelium. At the end of the 3rd month of fetal development ovogonii after division transform into primary oocytes. After that, the primary follicle is a primary ovocyte with a diameter of 25-30 microns, covered with two layers of cubic follicular epithelial cells, surrounded by a basement membrane. The secondary follicle is a growing primary ovocyte covered with several layers of follicular epithelial cells. A transparent shell is formed around the cytolemma of the ovocyte due to the secretion of glycosaminoglycans and mucoproteins by follicular cells. The transparent shell has a thickness of 5-10 microns and is a fine-grained layer that separates the ovocyte from the cells of the follicular epithelium. Numerous microvilli of the ovocyte and cytoplasmic processes of follicular cells are embedded in the transparent zone and approach the cytolemma of the ovocyte. At the same time, the connective tissue surrounding the follicle forms its Teka.

During the period of active (large) growth, the secondary follicle turns into a tertiary, or vesicular, follicle (Graaf's vesicle). The latter is an ovocyte covered with a transparent shell and a set of follicular epithelial cells, between which a cavity filled with follicular fluid appears. Around the transparent zone there is a single layer of follicular cells that form a radiant crown. Follicular cells separated from the radiant crown by follicular fluid form a granular layer. In one area, this layer is thickened, there is an egg-bearing mound, in which the egg lies. The outside of the follicle is surrounded by a formed Teka. It is distinguished by an outer shell formed by dense connective tissue, and an inner shell rich in blood vessels.

Ovogenesis – the process of formation of female germ cells-proceeds cyclically. The first stage - the period of reproduction of oogonias-is carried out during intrauterine development, characterized by the formation of primary follicles. The second stage-the growth period-occurs in the ovary and is characterized by the transformation of the primary follicle into an ovocyte of the 1st order. The third stage-the maturation period-ends with the formation of an ovocyte of the 2nd order, proceeds outside the ovary, ends with the formation of a Mature egg and two reducing bodies. The fourth stage - formation - is absent in ovogenesis.

Ovulation. The growing tertiary follicle gradually protrudes, stretches and thinns the outer shell of the ovary, which eventually leads to ovulation. Ovulation is the rupture of a follicle and the release of a 1st-order ovocyte into the abdominal cavity. This process is influenced by the pituitary luteinizing hormone. Ovulation is associated with an increase in blood flow to the capillaries of the inner shell and an increase in intrafollicular pressure. In addition, the source and loosening of the follicle contribute to the proteolytic enzymes located in its shell. Oocyte of the 1st order, surrounded by follicular epithelium, from the abdominal cavity falls on the fimbriae of the funnel and then into the lumen of the fallopian tube. There are rapid divisions of maturation and a Mature egg is obtained, ready for fertilization.

After ovulation, a temporary endocrine gland - the yellow body-is formed in the ovary. At the same time, blood from the vessels of the inner shell is poured into the cavity of the burst, neglected follicle. The resulting blood clot is quickly replaced by connective tissue. In the further development of the yellow body, there are 4 stages: proliferation and vascularization, glandular metamorphosis, flowering, and reverse development. In the first stage, the cells of the former granular layer multiply and the capillaries of the inner shell grow between them. In the stage of glandular metamorphosis, the cells of the follicular epithelium hypertrophy and the pigment lutein (lutein cells) accumulates in them. In the heyday stage, the volume of the yellow body increases and it begins to produce the hormone progesterone. The duration of this stage varies. If fertilization has not occurred, the flowering period is 12-14 days. This yellow body is called menstrual (diameter 1.5-2 cm). For a longer time, the yellow body is preserved if pregnancy has occurred – the yellow body of pregnancy (diameter more than 5 cm). After the termination of the functioning of the corpus luteum undergoes involution (reverse development). As a result of the

growth of connective tissue in place of the yellow body, a white body is formed (connective tissue scar).
A significant number of follicles do not reach the tertiary follicle stage and undergo atresia. In particular, at birth, a girl has an average of 2 million primordial follicles. By the time of puberty, there are 300-400 thousand of them, of which only 400-500 Mature during their entire life. Atresia – the peculiar restructuring of a destructive nature. As a result, an atretic body develops, which looks like a yellow body, but differs from the latter in the presence of a shiny ovocyte shell in the center.
In the ovary produces estrogens, progesterone, gonadotropin. The activity of the ovary is controlled by hormones of the pituitary gland: follitropina, lutropina.

VI. Learning activity.
1.On the micro-preparation "Ovary" find and draw the protein shell (I), cortical (II), brain matter (III). In the cortical substance, primary follicles (1), growing follicles at the stage of small (2) and large (3) growth are located directly under the protein envelope. In the thickness of the cortical substance, graafov's vesicles (4) are located, surrounded by a connective tissue shell (5). Below it are located cells of the granular layer (6), secreting follicular fluid. The ovum (7) is surrounded by a shiny shell (8) and a radiant crown (9), and is pushed to one pole - the oviposal tubercle (10). Part of the eggs at different stages dies, turning into atretic follicles (11). Yellow bodies are defined in the cortical substance (12). In the center of the organ - the brain substance (13).
2.Consider the drug "Yellow body".
3.Mark the drawings. VII. Control question:
1.General plan of the structure and function of the ovaries. Types of follicles.
2.Structural foundations of the generative function of the ovary (structure and development of follicles in connection with ovogenesis)
3.Oogenesis. Its periods and their features.Differences between ovogenesis and spermatogenesis.
4.Ovulation. Formation and morpho-functional characteristics of the yellow body.
5.Atresia of follicles. Structure and function of atretic follicles.
6.Hormonal regulation of cyclic changes in the ovary.
VIII. Learning objective.
1.As a result of frequent inflammatory processes, the protein shell of the ovary has become dense and wide. What are the consequences of this pathology?
2.The sections in the cortical substance of the ovary visible structure that looks similar to the yellow body. In the center of some is a wrinkled shell, in the center of others-a connective tissue scar. What structures are visible on the slice?
3.The pathological process disrupted the allocation of LH and LTG of the pituitary gland. What changes will occur in the ovary?
4.When the pituitary function is sharply suppressed, a follicle-stimulating hormone is introduced to the animal. How will this affect the structure of the ovary?
5.In the cells of the yellow body, signs of degeneration appear: the formation of autophagic vacuoles, pycnosis of the nuclei, and accumulation of lipids. What stage of development of the yellow body corresponds to this picture?
6.A woman with laparoscopy found a large vesicular follicle in the ovary, which swells sharply above its surface. On what day of the menstrual cycle is this pattern observed?

IX.The topics of structural abstracts
1. Embryonic formation of the sexual system.
2. Postnatal formation of the sexual system.
3. Histochemistry data on the mechanism of ovulation in animals and humans.
4. Structure and regulation of ovarian functions.
5. Endocrinology of gender.

INDEPENDENT WORK

I. the STUDENT SHOULD KNOW:

1. Microscopic structure and function of the ovary. Generative function. Oogenesis. Ovulation. The corpus luteum. Endocrine ovarian function. 2. Uterus. The fallopian tubes. Microscopic structure. Hormonal regulation of the function of organs of the female reproductive system. Ovarian-menstrual cycle. 3.Mikroskopicheskoe structure of mammary glands	1.Gistologiya: Textbook / Ed. Yu.I.Afanaseva, N.A.Yurinoy. - 5 th ed., Revised. and ext. - M .: Medicine, 2006. 2.Gistologiya: Textbook / Ed. E.G.Ulumbekova, Yu.A.Chelysheva. - 2 nd ed., Revised. and ext. - M .: GEOTAR MED-2009. 3. Toolkit for students on histology. Part 2. LA Akoev, LA Gireev, LS Tabolova and others. Vladikavkaz 2008.

II.THE STUDENT MUST BE ABLE TO-

1.Determine microscopic structures of the female reproductive system.

2.Identify distinctive features of the structure of the endometrium in different periods of the menstrual cycle.

3.Identify features of the structure of the breast during pregnancy and lactation.

IV. Tasks to prepare for the lesson.

Task # 1. Fill in the table :" differences between ovogenesis and spermatogenesis»

	Stage (title)	The place where the proceeds	The product of each step	Number of mature cells	The term of the formation of mature cells
spermatogenesis	1.				
	2.				
	3.				
	4.				
ovogenesis	1.				
	2.				
	3.				
	4.				

Task 2.Fill the table. "Ovarian follicles."

types follicles	developmental stage	location	dimensions	follicular cells	The presence of theca

Task 3. Fill in the missing information.
In an adult woman, the variety of follicles in the ovaries depends on the phase of the menstrual cycle. In the menstrual and postmenstrual periods in the ovaries are follicles: .... In the premenstrual period in the ovaries are follicles:……
……....
Task 4. Make 2-3 test tasks based on the sample
When is formed and what secretes the yellow body of the ovary?
1. in the postmenstrual phase.
2. in the premenstrual phase.
3. progesterone.
4. estrogen.
5. androgens.

1V. Questions for self-monitoring
1 .General plan of the structure and function of the ovaries.Types of follicles.
2.Structural foundations of the generative function of the ovary (structure and development of follicles in connection with ovogenesis)
Z. Ovogenesis. Its periods and their features.Differences between ovogenesis and spermatogenesis.
4.Ovulation. Formation and morpho-functional characteristics of the yellow body.
5.Atresia of follicles. Structure and function of atretic follicles.
6.Hormonal regulation of cyclic changes in the ovary.
7.Structural and functional changes of the endometrium in different periods of the ovarian-menstrual cycle.
8.Miroscopic structure of the mammary glands. Hormonal regulation of milk synthesis and secretion.
TEST YOURSELF:
CHOOSE ONE CORRECT ANSWER
1.A primary follicle. Everything is correct except:
a. first formed with the onset of puberty
b. contains the oocyte of the first order
c. follicular cells are cylindrical in shape
d. a Teka is formed around the follicle

2.After ovulation in place of the burst follicle is formed:
a. white body
b. yellow body
c. atretic follicle
d. graph the bubble
f. primordial follicle

3.Intrafollicular fluid secretes:
a. ovogonia
b. the oocyte of the first order
c. ovocyte of the second order
d. follicular cells
f. Mature ovum.

4.At the end of the ovarian-menstrual cycle, the greatest changes are:
a. endometrium
b. myometrium
c. perimetry
d. all walls of the organ

5. Ovogenesis is characterized by:
a. 4 phases of development.
b. no phase propagation ovogonii.
c. presence of the formation phase.
d. 3 phases of development.

SELECT THE CONDITION UNDER WHICH THIS STATEMENT IS TRUE
6. The yellow body of the ovary is characterized by the following signs:
a. develops in place of the atretic follicle.
b. it is an exocrine gland.
c. is an endocrine gland.
d. develops in the postmenstrual period.
f. develops in the premenstrual period.

7. What is true for the ovary?
a. layered organ.
b. consists of three shells.
c. parenchymal organ.
d. consists of stroma and parenchyma.
f. covered with mesothelium.

8. What is true for the ovary?
a. consists of cortical and cerebral substance.
b. the cortical substance contains follicles at different stages of development.
c. the brain substance consists of connective tissue with large blood vessels.
d. the medulla is located outside the ovary.

9. What is true for the primordial follicles of the ovary?
a. the ovocyte is surrounded by a shiny shell.
b. the follicular epithelium around the ovocyte is single-layer flat.
c. oocyte of the 1st order is located in the diplotene of meiosis prophase.
d. ovocyte contains a haploid set of chromosomes.
f. their 300-400 thousand at the birth of a girl.

10. What is characteristic of secondary follicles of the ovary?
a. follicular cells multiply intensively.
b. folliculitis secrete estrogens.
c. a follicle cavity is formed, filled with a liquid containing estrogens.
d. they are formed only after puberty.
f. they are formed by the action of the pituitary luteinizing hormone.

TOPIC: FEMALE REPRODUCTIVE SYSTEM. UTERUS.MENSTRUA CYCLE. PC-5

I. Scientific and methodological justification of the topic.
Obstetric and gynecological practice is largely based on knowledge of the laws of the structural and functional organization of the female sexual system. Their peculiarity in the norm is cyclical implementation of the reproductive and endocrine functions. Functional changes that occur with a certain frequency in the organs of the female sexual system are associated with changes in their microstructure. Data based on microscopic analysis is often used to determine the phases of the ovarian –menstrual cycle (vaginal smears), as well as to clarify the diagnosis of diseases. In this regard, knowledge of the morpho-functional features of the female genital system is the basis for successful study of their pathology in the clinic.

II. Targets.
The student should know:
1.Features of the embryonic development of the female reproductive system.
2. Mechanisms of cyclic activity of the female reproductive system and their regulation.
3. Structure and features of the functioning of the breast. The influence of hormones on the work of the mammary glands.
The student must be able to:
1.Identify the organs of the female reproductive system and their tissue elements at the microscopic level.
2.Determine the phase of the menstrual cycle by the structure of the endometrium.
3.Identify tissue elements of the breast in the lactating and non-lactating state.

III. The required initial level.
a) from other courses
3. Anatomy of the female reproductive system
4. Reduction division (mitosis)
b) from previous topics
5. Germ leaves and their derivatives
6. Features of the structural organization of endocrine glands
7. Gonadotropic functions of the pituitary gland
8. Structure of the female sex cell. Types of eggs.
c) on the topic of the lesson
4. Embryogenesis of the female reproductive system
5. Structure and functions of the female genital tract
6. Sexual cycle and its regulation
7. Structure of mammary glands, their function. Connection with the organs of the female sexual system.

IV. Object of study
a) micro-products
1. The uterus of a mammal in a rest period (coloration with hematoxylin-eosin)
2. Lactating mammary gland (hematoxylin-eosin stain)
b) electronic messages
No. 532, 542, 543.

V. Information part.
The uterus is a hollow muscular organ consisting of the following membranes: mucous (endometrium), muscular (myometrium), serous (perimetry). The mucous membrane of the uterus is lined with a single-layer prismatic epithelium formed by ciliated and microvilli epithelial cells. In the endometrium, there are two layers: basal and functional. The basal layer contains numerous simple tubular glands and straight vessels. The structure of the functional layer undergoes changes depending on the phase of the sexual cycle. It has spiral arteries. The

muscle membrane consists of 3 layers: internal oblique, middle circular, rich in blood vessels,and external oblique. The perimetrium covers the entire surface of the uterus with the exception of the supravaginal part of the cervix.

In the ovarian-menstrual cycle, there are three periods: menstrual, or the desquamation phase (occurs without the participation of ovarian hormones), postmenstrual, or the proliferation phase (regulated by estrogen), premenstrual, or the secretion phase (regulated by progesterone). On average, it lasts 28 days. The menstrual period lasts about 4 days. Before this phase begins, the blood flow in the spiral arteries slows down, and their muscle sheath contracts. Ischemia of the functional layer of the endometrium occurs. Then the spasm passes, and the blood re-enters the vessels. However, as a result of ischemia, blood vessels are damaged, so blood penetrates into the connective tissue, and from there into the uterine cavity. In addition, due to ischemia, sections of the functional layer are necrotised and they are rejected. In this case, the veins are also damaged, so the bleeding increases. These events are associated with a drop in progesterone levels. After the end of menstruation, only the basal layer remains, in which the fallopian glands are preserved. In the postmenstrual period, under the influence of estrogen, the functional layer of the endometrium regenerates and thickens, and the glands are restored. This phase continues from the 5th to the 15th day of the cycle. The fallopian glands grow rapidly during this period, but remain narrow and do not secrete. At this time, under the influence of FSH, a new follicle quickly grows in the ovary, and it gradually forms an ovocyte of the 2nd order. By the 14th day, the follicle reaches its maturity and ovulation occurs. During the premenstrual period, the uterus is prepared to receive the embryo. In the ovary at the site of the ruptured follicle forms a yellow body that produces progesterone. Under its influence, the fallopian glands begin to secrete. The epithelium lining the uterine cavity swells, it increases the number of ciliated cells. In connective tissue cells, glycogen clumps and lipid droplets appear, and some of them are differentiated into decidual cells. If fertilization occurs, the premenstrual period lasts 6-8 weeks and is involved in the development of the placenta. If fertilization does not occur, the endometrium is destroyed and rejected during the next menstruation.

Mammary glands are modified skin sweat glands. The mammary gland consists of 15-20 separate glands separated by layers of loose connective tissue. The structure of mammary glands is complex, branched, alveolar, apocrine. Milk production occurs in the secretory departments - alveoli, which have the form of rounded bubbles, lined with cubic epithelium and surrounded by myoepithelial cells. System the excretory ducts of the dairy are presented by passages, channels and sinuses. The secret of the mammary glands-milk is a complex aqueous emulsion containing droplets of fat, protein (casein), carbohydrates (lactose), salt and water.

The activity of the breast is regulated by the hormones prolactin (stimulates breast formation) and oxytocin (stimulates breast output).

VII. Object of study. Learning activity.

1.Find and draw the endometrium (I), myometrium (II), and perimetrium (III) on the "Uterus" micropreparation. The endometrium is represented by an epithelial plate (1) - a single - layer prismatic epithelium, under which is located its own plate (2) - loose connective tissue, in which the fallopian glands are immersed (3), having the form of a tube with wide lumen, lined with a single-layer prismatic epithelium. Myometrium consists of three layers of smooth muscle tissue - submucosal (4), vascular (5) and supravascular (6). The perimetrium surrounds the myometrium, formed by connective tissue (7) and mesothelium (8).

2.On the micro-product "Lactating mammary gland" find and draw a lobule of the breast (I), inter-lobular connective tissue (II), rich in blood vessels (1) and containing inter-lobular excretory ducts (2).The lobules are formed by alveoli (3), separated from each other by thin layers of connective tissue (4), in which the milk passages (5) are located. The alveoli are lined with a cubic epithelium (6), which externally covers the myoepithelial cells (7).

3.Fill in the table.

days of the cycle	Name phase ova	Hormones secreted	Processes based on	Hormones secreted	The name of the	Processes proish-

	ble cycle	by the hypo-mye-fizom	pro-ing in the ovary	Rui-egg-com	mother cycle stages	dyaschie in endomet-rii
1-14						
15-28						

4.Mark the drawings.

VIII. Control question:
1.Structure and function of the uterus.
2.Menstrual cycle and its phases. Endometrial changes in various phases of the cycle.
3.Relationship of the menstrual cycle with the ovarian one. The role of hormones.
4. Structure of the breast. The role of hormones in the activity of this organ.
IX. Learning objective.
1.During the abortion, the woman had all the layers of the endometrium radically removed. What kind of pathological condition will this lead to?
2.When analyzing the blood of a woman, it was found that the content of the hormones progesterone and estrogen is approaching the lower limit of the norm. At what stage of the cycle was the blood test taken?
3.Histological analysis of a healthy woman's endometrial biopsy revealed large, compactly arranged polygonal cells rich in lipids and glycogen. What cells are we talking about?. During what period of the menstrual cycle was the biopsy taken?
4.The woman in labor has a weak labor activity due to a weak contractile ability of the myometrium. How can she be helped by hormonal intervention?
5. When analyzing the two sections of the mammary glands is visible in one of the alveolar ducts, and in the other ducts and the alveoli. What is the functional state of the organ in both cases?

MODULE
Targets.
1. Show knowledge of theoretical material on the studied topics.
2. Be able to determine and differentiate histological structures of tissues in micro-preparations.
3. Solve situational problems.
4. Show knowledge in defining electronograms
Control question:

1. The main functions of the excretory system and its organ composition.
2. General plan of the kidney structure.
3. Nephron as a structural and functional unit of the kidney. Okolovskoye the cortex and the nephrons.Topography of parts of the nephron in the kidney.
4. Circulatory system, features of the microcirculatory bed of the renal corpuscle.
5. Histophysiology of individual parts of the nephron according to electron microscopy and histochemistry.
6. Juxtaglomerular apparatus (SOUTH) of the renal corpuscle, its structure, value.
7. Features of the structure of the urinary tract.
8. General plan of the structure and function of the testes.
9. Cytogenetic characteristics of spermatogenesis.
10. Functions and structure of the convoluted seminal tubule.
11. Gepatolentikuliarnaya barrier, its value and structural organization.
12. General morphofunctional characteristics of the VAS deferens. Features of the structure of different departments.
13. Structure, localization, and function of the prostate.
14. Hormonal regulation of the function of the male reproductive system.
15. General plan of the structure and function of the ovaries. Types of follicles.
16. Structural foundations of the generative function of the ovary (structure and development of follicles in connection with ovogenesis)
17. Oogenesis. Its periods and their features.Differences between ovogenesis and spermatogenesis.
18. Ovulation. Formation and morpho-functional characteristics of the yellow body.
19. Atresia of follicles. Structure and function of atretic follicles.
20. Hormonal regulation of cyclic changes in the ovary.
21. Structure and function of the uterus.
22. Menstrual cycle and its phases. Endometrial changes in various phases of the cycle.
23. Relationship of the menstrual cycle with the ovarian one. The role of hormones.
24. Structure of the breast. Regulation of its activity by pituitary hormones.

Control micro-products:
1. Kidney (hematoxylin - eosin stain)
2. Bladder (hematoxylin - eosin stain)
3. Ureter (hematoxylin - eosin stain)
4. Testis (color hematoxylin-eosin)
5. Tubules of the appendage of the testis (color hematoxylin-eosin)
6. Prostate (hematoxylin-eosin stain)
7. The ovary of a mammal (coloration with hematoxylin-eosin)
8. Yellow body of a mammal (coloration with hematoxylin-eosin)
9. The uterus of a mammal in a rest period (coloration with hematoxylin-eosin)
10. Lactating mammary gland (hematoxylin-eosin stain)

Test task