Methodological instructions for the self work

for 1\textsuperscript{st} 2\textsuperscript{nd} year students

MEDICAL, PEDIATRIC AND MEDICAL PREVENTIVE SPECIALITIES OF
ALL FACULTIES

Special histology

DNIPROPETROVSK

2014
Discussed, revised and approved by the methodical conference of the department
“___” _____________ 20__y. Protocol №_______
Head of the department ____________________________ prof. I.V. Tverdokhlib

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Head of the department ____________________________ prof. I.V. Tverdokhlib
1. **TOPIC:** Special histology. Cardiovascular system.

2. **LOCATION:** Study halls of the department of histology

3. **OBJECTIVE OF THE LESSON:**

   1. To know functions, development and structure of the heart, blood vessels and lymph vessels.
   
   2. Master the skills of work with the light microscope
   
   3. Diagnostic cardiovascular system at the microscopic level:
      - different types of arteries
      - different types of veins
      - arterioles (capillaries, venules)
      - endocardium, myocardium and tissues that they consist of.

4. **PROFESSIONAL ORIENTATION OF STUDENTS:**

   Microcirculatory bed is an important link of small-sized vessels. It begins with arterioles and lasts to the venules. This morphofunctional complex of vessels proves the regulation of organs blood supplying, transcapillary metabolism and homeostasis in tissues. Each organ and tissue has its own peculiarities of the blood supplying at the microcirculatory level, whose principle compounds are capillaries. The other compounds of the microcirculatory bed are arterio-lo-venule anastomoses, which promote direct passage of the arterial blood to the venules, pass round the capillaries. Lymphatic system is responsible for the normalization of the interstitial tissue and blood plasma volume.

6. **BASIC LEVEL OF KNOWLEDGE AND ABILITIES:**

<table>
<thead>
<tr>
<th>№</th>
<th>Subject</th>
<th>To know</th>
<th>To be able to</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal anatomy</td>
<td>1. Anatomy and topography of blood vessels, lymph vessels and heart</td>
<td>1. Diagnostic on histological specimen different types of arteries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Innervation and vascularization of the heart and vessels</td>
<td>2. Diagnostic on histological specimen different types of veins</td>
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<tr>
<td></td>
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<td>3. The principle of interdependence hemodynamic conditions and structural organization of the vessel’s wall</td>
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<td></td>
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<td>4. Vessels microcircular bed</td>
</tr>
<tr>
<td>2</td>
<td>Histology</td>
<td>1. Origin of the vessels</td>
<td>1. Diagnostic on histological specimen different types of arteries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Classification of arteries, veins, lymph vessels</td>
<td>2. Diagnostic on histological specimen different types of veins</td>
</tr>
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<td></td>
<td></td>
<td>3. The principle of interdependence hemodynamic conditions and structural organization of the vessel’s wall</td>
<td>3. Diagnostic on histological specimen arterioles</td>
</tr>
</tbody>
</table>
5. Wall’s structure and classification of capillaries
6. Origin of endo-, myo-, epicardium
7. General plan of structure of the heart wall
4. Diagnostic on histological specimen endocardium, myocardium and tissues that they consist of.

7. PLAN OF THE PRACTICAL LESSON (TECHNOLOGY):

<table>
<thead>
<tr>
<th>№</th>
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<tr>
<td>6.</td>
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</table>

8. LIST OF THEORETICAL QUESTIONS THAT ARE CONSIDERED ON THE LESSON:

1. Discuss the elements of the cardiovascular system and their function.
2. Describe the structure of the wall of a blood vessel including the components of each layer or tunic.
3. What are the basic histological differences between arteries and veins?
4. Indicate the histological features that permit identification of the various types of blood vessels.
5. How do structural variations of the blood vessel wall reflect the functional role of the vessel?
6. Which vessels are important for the maintenance of systemic blood pressure?
7. What is the role of the venules during inflammation?
8. How do fenestrated capillaries differ morphologically and functionally from continuous and discontinuous capillaries?
9. How do lymphatic vessels and capillaries differ functionally and morphologically from blood vessels and capillaries?
10. What are the names of three layers of the wall of the heart and identify the basic tissue types characteristically found in each layer.
11. List the components of the conducting system of the heart and describe their histological features.
12. To which layer of the blood vessel does each layer of the heart correspond?

9. METHOD OF A PRACTICE LESSON

1. Incoming control of knowledge and it’s analysis
2. For self-control students should fill in these tables:

Morphological characteristic of arteries

<table>
<thead>
<tr>
<th>Type of artery</th>
<th>Structure</th>
<th>Functions</th>
</tr>
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</table>

Morphological characteristic of different types of capillaries

<table>
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<tr>
<th>Type of capillaries</th>
<th>Structure</th>
<th>Functional properties</th>
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</table>

3. Explore, draw and identify structure the following specimens:

**SPECIMEN №1 Muscular artery (H&E)**
1. Tunica intima
2. Endothelial cells nuclei
3. Subendothelial layer
4. Internal elastic lamina
5. Tunica media
6. Smooth muscle cells
7. External elastic lamina
8. Tunica adventitia

**SPECIMEN №2 Elastic artery (aorta).**
1. Tunica intima
2. Subendothelial layer
3. Elastic fibers
4. Tunica media
5. Elastic fenestrated membrane
6. Tunica adventitia
7. Vasa vasorum

**SPECIMEN №3 Vein muscular (H&E)**
1. Tunica intima
2. Endothelial cells layer
3. Subendothelial layer
4. Tunica media
5. Nuclei of smooth muscle cells
6. Tunica adventitia
**SPECIMEN №4 Blood capillaries (H&E)**
1. Capillary
2. Endothelial cells nuclei

**SPECIMEN №5 Heart wall (H&E)**
1. Endocardium
   a) endothelium
   b) subendothelial layer
   c) muscular-elastic layer
   d) external connective tissue layer
   e) external connective layer
2. Myocardium
3. Conducting cardiac muscle cells (Purkinje fibers)
4. Contracting cardiac muscle cells

**10. SELF CONTROL**

1. In the specimen you can see an organ of circulatory system. Its function is to transport the blood with nutrients and oxygen to the tissues. Which organ is in the specimen?
   
   A. Artery.
   B. Vein.
   C. Heart.
   D. Capillary.
   E. Bronchus.

2. In the specimen you can see an organ of circulatory system. Its function is to transport the blood with catabolites and CO2 from tissues to the heart. Which organ is in the specimen?

   A. Artery.
   B. Vein.
   C. Heart.
   D. Capillary.
   E. Bronchus.

3. In the specimen you can see a vessel. Which cells line this organ?

   A. Cuboidal epithelial.
   B. Endothelial.
   C. Fibroblasts.
   D. Osteocytes.
E. Macrophages.

4. In the specimen you can see an organ, which is a hollow tube. Its wall includes three tunics and is lined by a single layer of endothelial cells. Which system is this organ referred to?
   A. Respiratory.
   B. Digestive.
   C. Male reproductive.
   D. Endocrine.
   E. Circulatory.

5. In the specimen you can see an artery. Which tunic is the thickest in this vessel?
   A. Intima.
   B. Media.
   C. Mucosa.
   D. Submucosa.
   E. Adventitia.

6. In the specimen you can see a vein. Which tunic is the thickest in this vessel?
   A. Intima.
   B. Media.
   C. Mucosa.
   D. Submucosa.
   E. Adventitia.

7. In the specimen you can see an organ of circulatory system. Its function is interchange between blood and tissues. Which organ is in the specimen?
   A. Artery.
   B. Vein.
   C. Heart.
   D. Capillary.
   E. Spleen.

8. In the specimen you can see an organ of circulatory system. Its function is to return the fluid of the tissue space to the blood. Which organ is in the specimen?
   A. Artery.
   B. Vein.
C. Heart.
D. Capillary.
E. Lymphatic vessel.

9. In the specimen you can see blood capillaries. Which is the function of this vessels?
A. To make exchange between blood and tissues.
B. To return the fluid of the tissue space to the blood
C. To carry the blood with nutrients and oxygen to the tissues
D. To pump the blood.
E. To transport the blood with catabolites and CO2 from tissues to the heart

10. In the electron microphotograph you can see a capillary. Its wall is characterised by the absence of fenestrae in endothelial cells and presence of continuous basal lamina. Which type of capillaries is described?
A. Somatic (continuous).
B. Fenestrated (visceral).
C. Sinusoidal (discontinuous).
D. Bile.
E. Lymphatic.

11. In the electron microphotograph you can see a capillary. Its wall is characterised by the presence of fenestrae in endothelial cells and continuous basal lamina. Which type of capillaries is described?
A. Somatic (continuous).
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D. Bile.
E. Lymphatic.

10. ILLUSTRATIVE MATERIAL

SPECIMEN №1 Muscular artery pic. 55, p.72
SPECIMEN №2 Elastic artery (aorta) pic. 56, p.72
SPECIMEN №3 Vein muscular pic. 58, p.74
SPECIMEN №4 Blood capillaries pic. 53, p.70

SPECIMEN №5 Heart wall pic. 57, p.74

11. SOURCES


12. SELF WORKING PROGRAM:

Students should prepare for the practical class using the existing textbooks and lectures. Special attention should be paid to the following:

1. Circulatory system components.
2. The general features of vessels wall structure.
3. Dependence of vessel’s wall on the haemodynamic conditions.
5. Elastic, mixed and muscular arteries structure.
6. Veins, their differences compare to arteries.
7. Veins classification and functions
8. Layers of tissues (tunics) that make up the wall of the heart.
9. Structure of the endocardium. Comparison with the structure of the blood vessels wall.
10. Myocardium: structure of cardiac muscle cells compare to the cells of conductive system.
11. Comparison of the structure of the valves in the heart with that of those found in veins.
12. List, in order, the components of the impulse generating and conducting system of the heart through which an electrical stimulus must pass to cause contraction of the ventricular myocardium, include the cardiac muscle cells themselves.
14. Regeneration of the heart.

AUTHOR: Tverdokhlib Igor Volodymyrovych
1. TOPIC: Special histology. ORGANS OF HAEMOPOIESIS AND IMMUNE SYSTEM

2. LOCATION: Study halls of the department of histology

3. OBJECTIVE OF THE LESSON: Examine the functions, development and structure of red bone marrow, thymus, tonsils, lymph node and spleen.

4. PROFESSIONAL ORIENTATION OF STUDENTS: Actuality of investigated topic due to increasing the percentage of functional and organic disorders that occur in hematologic clinical practice, which requires understanding the molecular basis of formation interaction and operation of hematopoietic organs.

5. EDUCATIVE OBJECTIVE: Pay attention of the students on necessity to maintain in proper condition training equipment, histological specimens, the ability to efficiently organize your workplace and use study time.

6. BASIC LEVEL OF KNOWLEDGE AND ABILITIES:

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8. LIST OF THEORETICAL QUESTIONS THAT ARE CONSIDERED ON THE LESSON:

1. Functions of the lymphoid system.
2. Distinguishing features of the lymphoid organs.
3. Difference between central and peripheral lymphoid organs.
4. Description of the thymus in terms of its general functions, its location in the body and the type of reticular cells it contains and their embryonic germ layer of origin.
5. Comparison of the cortex and medulla of the thymus in terms of the packing density of lymphocytes and presence of Hassall’s corpuscles.
6. Location of the blood-thymus barrier, the layers through which a substance in the blood would have to pass to cross the blood-thymus barrier.
7. The probable function of the blood-thymus barrier.

9. METHOD OF A PRACTICE LESSON

1. Answer questions of a self control.
2. Solve situation task from 'Hematopoietic organs'
3. Explore, draw and identify structure the following specimens:

**SPECIMEN № lymph node (H&E)**
1. cortex
2. medulla
3. germinal centres
4. medullary cords
5. medullary sinuses
6. capsule
7. trabeculae
8. afferent lymphatic vessels
9. efferent lymphatic vessels
10. subcapsular sinus
11. post capillary venules (HEV)
12. lymphocytes
13. plasma cells

**SPECIMEN №2 Palatine tonsil, human (H&E)**
1. germinal centres
2. stratified squamous epithelium
3. crypts
4. lymphocytes
5. plasma cells

**SPECIMEN №3 Thymus (H&E)**
1. capsule
2. septa
3. cortex
4. medulla
5. lymphocytes
6. epithelioreticular cells
7. endothelial cells
8. Hassall’s corpuscle
9. blood-thymus barrier
10. blood vessels

**SPECIMEN № 4 Spleen (H&E)**
1. capsule
2. red pulp
3. white pulp
4. splenic nodule
5. germinal center
6. trabecula
7. lymphocytes
8. red blood cells
9. macrophages
10. central artery
11. penicillar arteries
12. periarterial lymphatic sheath

**SPECIMEN №5 Red bone marrow (H&E)**
1. Bone tissue
2. Reticular cells
3. Megakaryocytes
4. Lymphopoietic and erythropoietic cells/
5. Blood sinusoid capillaries
6. Adipocytes

10. **SELF CONTROL**

1. In the specimen you can see an organ of the immune system. Which tissues can form the parenchyma of this organ?
   A. Epithelial.
   B. Epithelial and/or nervous.
   C. Myeloid or lymphoid.
   D. Loose connective.
   E. Bone or/and cartilage.

2. In the specimen you can see the red bone marrow. Which tissue forms this organ?
   A. Myeloid.
   B. Epithelial.
   C. Lymphoid.
   D. Loose connective.
   E. Adipose.
3. In the specimen you can see the thymus. Which tissue forms the parenchyma of this organ?
   A. Myeloid.
   B. Epithelial.
   C. Lymphoid.
   D. Loose connective.
   E. Adipose.

4. In the specimen you can see the parenchymatous lobulated organ. Each lobule has a peripheral dark cortex and a central light medulla. Which organ is in the specimen?
   A. Spleen.
   B. Lymph node.
   C. Red bone marrow.
   D. Yellow bone marrow.
   E. Thymus.

5. In the specimen you can see the thymus. Which cells does this organ produce?
   A. Erythrocytes.
   B. T-lymphocytes.
   C. T- and B-lymphocytes.
   D. B-lymphocytes.
   E. Granulocytes.

6. In the specimen you can see an organ, which is distributed (situated) along the course of the lymphatic vessels. Which organ is in the specimen?
   A. Spleen.
   B. Red bone marrow.
   C. Thymus.
   D. Lymph node.
   E. Adrenal gland.

7. In the specimen you can see the lymph node. Which zones are defined in this organ?
   A. Cords and follicles.
B. Outer cortex, inner cortex (paracortical zone) and medulla.
C. Glomerulosa, fasciculata and reticularis.
D. Lobules with cortex and medulla.
E. Anterior part and posterior part.

8. In the specimen of the lymph node you can see its part that consists of cord (formed by lymphoid tissue) and sinuses. Which part of organ is in the specimen?
   A. Medulla.
   B. Paracortical zone.
   C. Zona reticularis.
   D. Outer cortex.
   E. White pulp.

9. In the specimen of the lymph node you can see the medulla. Which parts (structures) does it include?
   A. Red and white pulp.
   B. Lobules with cortex and medulla.
   C. Lymphoid nodules, subcapsular and intermediate sinuses.
   D. Epithelial cords and sinuses.
   E. Medullary cords and medullary sinus.

10. In bioptate of the lymph node of patient with immunodeficiency you can see a cortex, where inner cortex is absent. Alteration of which type immunity is occur in this patient?
    A. Humoral immunity.
    B. Cellular immunity.
    C. Opsonization.
    D. Antigen presentation.
    E. Phagocytosis.

11. ILLUSTRATIVE MATERIAL
    1. Light microscope
    2. Tables and slides to the studding topic.
    3. Question tasks to the studding topic.

12. SOURCES
1. Histology, cytology and embryology /Edited by N.O.Melnyk. – Kiiv, 2010. – P. 231-262


3. Histology, cytology and embryology (Atlas for individual work of students) / Edited by Yu.B.Chaikovsky, L.M. Sokurenko. – Luck, 2006. – P. 76-84

13. SELF WORKING PROGRAM:

1. To study the microscopic structure:
   -red bone marrow
   -thymus
   -palatine tonsils
   -lymph nodes
   -spleen

2. To be able to identify on histological specimen tissue composition and structural elements:
   -red bone marrow
   - thymus
   -palatine tonsils
   -lymph nodes
   -spleen

3. Pay attention to the following key questions:
   - localization of postembryonic hematopoiesis, the concept of central and peripheral hematopoietic organs
   - general plan of the structure of hematopoietic organs, their participation on the hematopoietic
   - influence of factors on the structure of the hematopoietic organs

AUTHOR: Tverdokhlib Igor Volodymyrovych
METHODOLOGICAL INSTRUCTION №15

1. **TOPIC:** Special histology. SENSE ORGANS.

2. **LOCATION:** Study halls of the department of histology

3. **OBJECTIVE OF THE LESSON:**
   1. To know functions, development and structure of the sense organs
   2. Master the skills of work with the light microscope
   3. Diagnostic nerve system organs on microscopic level

4. **PROFESSIONAL ORIENTATION OF STUDENTS:** The central nervous system receives some information as for the outside world and the inner state of the organism with the aid of senses. The sensations resulted from this information reflect something existing regardless of our consciousness - the objective reality of everything around us. Needless to say, without our sense organs we would be completely helpless and unable to survive for any appreciable length in time. Doctors of many specialities such as oculists, otorhinolaryngologists, neurologists, psychiatrists need deep knowledge of the structure and functions of the sense organs. The knowledge of morphofunctional peculiarities of the recepient's organs are also necessary for pediatricists and therapeutists for preventing unfavourable influence of the environment on the histophysiology of the sense organs

5. **EDUCATIVE OBJECTIVE:** Pay attention of the students on necessity to maintain in proper condition training equipment, histological specimens, the ability to efficiently organize your workplace and use study time.

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<td>1. Anatomy of eye</td>
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<td></td>
<td>2. Anatomy of smell sense organ</td>
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<td></td>
<td>3. Anatomy of hearing and balance</td>
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<td>4. Anatomy of taste</td>
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<tr>
<td>Histology</td>
<td>1. Morphofunctional particular senses of ner-vynno-sensitive cells</td>
<td>Diagnostic of the specimen and recognize structural components of the senses organs</td>
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<td>2. Sources of structural components shackles apples</td>
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<td></td>
<td>3. Shell shackles apples and performed their func-tion</td>
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<td>4. Structural components that are part of the receptor reflex, and accommodative dioptic apparatus of the eye.</td>
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<td>5. Avilable receptor elements olfactory organ</td>
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<td>6. Morphofunctional peculiarities of sensations receptor cells</td>
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7. Tissue elements that make up the peretyncha-rick maze snail
8. The structure of the receptor cells of the spiral organlianopodibnyh nerve fibers and tangles cerebellum
9. Morphofunctional characteristics of neurons and layers of the cerebral cortex

7. PLAN OF THE PRACTICAL LESSON (TECHNOLOGY):

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8. LIST OF THEORETICAL QUESTIONS THAT ARE CONSIDERED ON THE LESSON:

1. Classifications of sensory receptors. List the receptors that fit into each class.

2. Description of general features of the sense organs.

3. The major steps in the embryonic development of the eye.

4. 3 compartments in the eye, give the boundaries of each.

5. 3 basic tunics that make up the globe of the eye. List the major components of each, in order from anterior to posterior.

6. Description of sclera in terms of its predominant tissue type, its vascularity and the proportion of the eye it covers.

7. 5 layers of the cornea and description of composition of each.

8. Comparison of the rods and cones in terms of their visual acuity in bright and low light.

9. METHOD OF A PRACTICE LESSON

1. Answer questions of a self control.
2. Solve situation task

3. Explore, draw and identify structure the following specimens:

**SPECIMEN № 1 Retina (H&E).**
1. Pigmented retinal epithelial cells
2. Photoreceptor (rods and cones) layer
3. Outer limiting membrane
4. Outer nuclear membrane
5. Outer plexiform membrane
6. Inner nuclear membrane
7. Inner plexiform membrane
8. Ganglion cell layer
9. Optic nerve fibers layer
10. Inner limiting membrane

**SPECIMEN №2 Cochlea (H&E)**
1. Body cochlea
2. Membranaceous labyrinth
3. Vestibular membrane
4. Scala vestibuli
5. Stria vascularis
6. Spiral ligament
7. Basilar membrane
8. Spiral crest
9. Limb
10. Labium of vestibular limb
11. Tectorial membrane
12. Labium of tympanic limb
13. Organ of Corti
14. Scala tympani

**10. SELF CONTROL**

1. In the specimen you can see the eye globe. Its wall is composed of three concentric layers. Which are they?
   
   A. Tunica intima, tunica media, tunica adventitia.
   
   B. Mucosa, submucosa and adventitia.
   
   C. Mucosa, cartilaginous, adventitia.
   
   D. Tunica fibrosa, the vascular layer and the retina.
   
   E. Mucosa, muscularis and adventitia.
2. In the specimen of the eye globe wall you can see the external layer (tunica fibrosa). Which structures does it include?

A. Sclera and cornea.
B. Choroid, ciliary body and iris.
C. Pigmented epithelium and retina proper.
D. Sclera and iris.
E. Sclera and ciliary body.

3. In the specimen of eye globe you can see a space between cornea on the one side and iris with lens on the another side. Which fluid does this space contain?

A. Blood.
B. Lymph.
C. Cerebro-spinal fluid.
D. Aqueous humor.
E. Tissue fluid.

4. In the specimen of eye globe wall you can see a part of tunica fibrosa, which doesn't have vessels. Which structure is in the specimen?

A. Sclera.
B. Iris.
C. Ciliary body.
D. Retina.
E. Cornea.

5. In the specimen you can see the retina of the posterior part of the eye. It includes photosensitive neurons. Which are they?

A. Horizontal and bipolar.
B. Ganglionar and amacrine.
C. Bipolar and ganglionar.
D. Rods and cones.
E. Horizontal and Muller cells.

6. In the specimen of the eye wall you can see the retina. Which tissues does it include?
   A. Loose connective and nervous.
   B. Pigmented epithelium and nervous.
   C. Nervous and loose connective.
   D. Smooth muscle and epithelial.
   E. Nervous and smooth muscle.

7. In the electron microphotograph of the retina you can see the rod. Which photopigment does this cell have?
   A. Iodopsine.
   B. Rodopsine.
   C. Melanin.
   D. Bilirubin.
   E. Verdoglobin.

8. In the specimen of the inner ear you can see the macula. Which stimuli does this structure respond to?
   A. Light.
   B. Sound wave.
   C. Linear accelerations.
   D. Angular accelerations.
   E. Chemical molecules.

9. In the specimen of the inner ear you can see the crista. Which stimuli does this structure respond to?
   A. Light.
   B. Sound wave.
   C. Linear accelerations.
   D. Angular accelerations.
10. In the specimen of the inner ear you can see the organ of Corti in the cochlear duct. Which stimuli does this structure respond to?

A. Light.
B. Sound wave.
C. Linear accelerations.
D. Angular accelerations.
E. Chemical molecules.

11. In the specimen of the inner ear you can see the macula. In which part of membranous labyrinth is this structure located?

A. Cochlear duct.
B. Semicircular ducts.
C. Utricle and saccule.
D. Scala vestibuli.
E. Scala tympani.

12. In the specimen of the inner ear you can see the crista. In which part of membranous labyrinth is this structure located?

A. Cochlear duct.
B. Semicircular ducts.
C. Utricle and saccule.
D. Scala vestibuli.
E. Scala tympani.

11. ILLUSTRATIVE MATERIAL


12. SOURCES

1. Histology, cytology and embryology /Edited by N.O.Melynky. – Kiyv, 2010. – P. 231-262
13. SELF WORKING PROGRAM:

1. General characteristic features of the audiovestibular organ: the external, middle and internal ear.
2. Ultrastructure and functions of the tympanic membrane.
3. Bone and membranous labyrinthes of the internal ear.
4. Vestibular portion of the membranous labyrinth - vestibular organ.
5. Ampullary crests, spots of the utricle and saccule: disposition, ultrastructure and functions.
7. Spiral Corti’s organ: disposition and functions.
10. Audiovestibular organ histophysiology.

AUTHOR: Tverdokhlib Igor Volodymyrovych
1. **TOPIC:** Special histology DIGESTIVE SYSTEM. ORAL CAVITY. TONGUE. TONSILS (3 hours)

2. **LOCATION:** Study halls of the department of histology

3. **OBJECTIVE OF THE LESSON:**
   1. To know functions, development and structure of oral cavity
   2. Master the skills of work with the light microscope
   3. Diagnostic nerve system organs on microscopic level

4. **PROFESSIONAL ORIENTATION OF STUDENTS:** Digestive system is the only way for nutritive substances introducing into human body from outside. It is opened from both sides that's why its wall is a border between environment and internal medium of human body. Morphologically digestive tube is a hollow structure, which promote gradual and successive mechanical and chemical processing of the food for its further absorption. It has some general features of the wall structure but at the same time there are some morphofunctional peculiarities in different parts of digestive system. Deep knowledge of the digestive system organs histophysiologies is necessary to future doctor for the creation of the clinical mentality, correct analyses of the modern investigation results (biopsy, endoscopy), choice of better way of medicines introduce and treatment and prophylaxis of digestive system diseases

5. **EDUCATIVE OBJECTIVE:** Pay attention of the students on necessity to maintain in proper condition training equipment, histological specimens, the ability to efficiently organize your workplace and use study time.

6. **BASIC LEVEL OF KNOWLEDGE AND ABILITIES:**

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<thead>
<tr>
<th>Subject</th>
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<tbody>
<tr>
<td>Anatomy</td>
<td>1. Anatomical structure of the anterior part of the digestive tube (the organs of the mouth, pharynx, esophagus)</td>
<td>1. Diagnose bodies anterior digestive tube (salivary glands, tongue, esophagus) at the microscopic level</td>
</tr>
</tbody>
</table>
6. Morphofunctional characteristics of gloss schok, ash, hard and soft which uvula, tongue, salivary glands  
7. Morphofunctional characteristics of nasal and throat departments hortanevoho  
8. Morphofunctional structural features of shells esophagus

4. Diagnose by microscopic tissue level furnace element you of the esophagus

7. PLAN OF THE PRACTICAL LESSON (TECHNOLOGY):

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8. LIST OF THEORETICAL QUESTIONS THAT ARE CONSIDERED ON THE LESSON:

1. Indicate the general features of digestive system.
2. Recognise lips, cheeks, soft and dark palatine, their structure and functions.
3. Interpret the structure and functions of the tongue, tissues compounds, structural peculiarities of the upper, lower and back surfaces.
4. Characterise of the tongue papillae.
5. Explain the taste bud structure and functions.

9. METHOD OF A PRACTICE LESSON

1. Answer questions of a self control.
2. Solve situation task from 'Mesenchyme, blood, lymph, reticular tissue'
3. Explore, draw and identify structure the following specimens:

SPECIMEN № 1 Tongue (H&E)
1. Filiform papillae
   a) primary papilla
   b) secondary papilla
   c) stratified squamous epithelium
2. Filiform papillae
   d) primary papilla
e) secondary papilla
f) stratified squamous epithelium
3. Lingual muscles

**SPECIMEN №2 Parotid gland (H&E)**
1. Capsule
2. Interlobular connective tissue
3. Serous acinus
4. Serocyte
5. Intercalated excretory duct
6. Striated excretory duct
7. Interlobular duct

**SPECIMEN №3 Sublingual gland (H&E)**
1. Capsule
2. Interlobular connective tissue
3. Mucous acinus
4. Seromucous acinus
   a) mucocyte
   b) serocyte
5. Intercalated excretory duct
6. Striated excretory duct
7. Interlobular duct

**SPECIMEN №4 Esophagus (H&E)**
1. Tunica mucosa
2. Stratified squamous epithelium
3. Lamina propria of tunica mucosa
4. Muscularis mucosae
5. Submucosa
6. Acini of esophageal glands
7. Tunica muscularis
8. Tunica adventitia

10. SELF CONTROL

   1. In the histological specimen you can see a muscular organ covered by mucosa on the dorsal surface, which forms numerous papillae. What type of epithelium lines the mucosa of ventral surface of this organ?

      A. Stratified squamous.
      B. Simple columnar.
      C. Simple ciliated.
      D. Stratified cuboidal.
      E. Transitional.
2. In the histological specimen you can see a muscular organ covered by mucosa on the dorsal surface and mucosa with submucosa on the ventral surface. Mucosa on the dorsal surface forms numerous papillae. Which organ is this?
   A. Stomach.  
   B. Esophagus.  
   C. Small intestine.  
   D. Large intestine  
   E. Tongue.

3. In the histological specimen of tongue you can see the most numerous papillae. They have conical elongated shape and are covered with stratified squamous keratinized epithelium. Which type of papillae is described/found?
   A. Foliate .  
   B. Primary.  
   C. Fungiform.  
   D. Filiform.  
   E. Circumvallate.

4. In the histological specimen of tongue the filiform papillae are found. Which type of epithelium lines these papillae?
   A. Stratified squamous keratinized.  
   B. Stratified squamous nonkeratinized  
   C. Simple columnar.  
   D. Stratified cuboidal.  
   E. Transitional.

5. In the histological specimen of tongue you can see papillae. They are located between filiform papillae, have mushroom shape, and their covering epithelium has taste buds. Which type of papillae is described?
   A. Foliate .
B. Primary.
C. Fungiform.
D. Filiform.
E. Circumvallate

11. ILLUSTRATIVE MATERIAL

1. Light microscope
2. Tables and slides to the studding topic.
3. Question tasks to the studding topic.

12. SOURCES

1. Histology, cytology and embryology /Edited by N.O.Melnyk. – Kiiv, 2010. – P. 71-84

AUTHOR: Tverdokhlib Igor Volodymyrovych
METHODOLOGICAL INSTRUCTION №17

1. TOPIC: Special histology. DIGESTIVE SYSTEM: STOMACH, SMALL AND LARGE INTESTINE (3 hours)

2. LOCATION: Study halls of the department of histology

3. OBJECTIVE OF THE LESSON: Examine the functions, development and structure of the stomach, small and large intestine.

4. PROFESSIONAL ORIENTATION OF STUDENTS: Digestive system is the only way for nutritive substances introducing into human body from outside. It is opened from both sides that’s why its wall is a border between environment and internal medium of human body. Morphologically digestive tube is a hollow structure, which promote gradual and successive mechanical and chemical processing of the food for its further absorption. It has some general features of the wall structure but at the same time there are some morphofunctional peculiarities in different parts of digestive system. Deep knowledge of the digestive system organs histophysioologies is necessary to future doctor for the creation of the clinical mentality, correct analyses of the modern investigation results (biopsy, endoscopy), choice of better way of medicines introduce and treatment and prophylaxis of digestive system diseases.

5. EDUCATIVE OBJECTIVE: Pay attention of the students on necessity to maintain in proper condition training equipment, histological specimens, the ability to efficiently organize your workplace and use study time.

6. BASIC LEVEL OF KNOWLEDGE AND ABILITIES:

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<tr>
<td>Anatomy</td>
<td>Anatomical structure of the middle and posterior parts of the digestive tube</td>
<td>1. Diagnose shell bottom and pyloric area of the stomach and tissue elements at the microscopic level</td>
</tr>
</tbody>
</table>
| Histology     | 2. Morphofunctional characteristics of stomach, departments of small and large intestines  
3. Tissue contents defense stomach, departments  
4. Tissue composition defense different parts of intestine | 2. Diagnose shell duodenum and tissue elements on specimens  
3. Diagnose intestinal membrane and tissue elements on microscopic framework of development  
4. Histological |
7. PLAN OF THE PRACTICAL LESSON (TECHNOLOGY):

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8. LIST OF THEORETICAL QUESTIONS THAT ARE CONSIDERED ON THE LESSON:

1. General morphofunctional characteristic of large salivary glands and their classification.
2. Structural peculiarities of the parotid, submandibular and sublingual glands secretory portions (acini).
3. Main microscopic and ultrastructural signs of muco- and serocytes.
4. Large salivary glands excretory ducts.
5. Salivary glands excretory products and hormones.
6. Morphogenesis and regeneration of the salivary glands.
7. Salivary glands aging.

9. METHOD OF A PRACTICE LESSON

1. Answer questions of a self control.
2. Solve situation task
3. Explore, draw and identify structure the following specimens:

SPECIMEN №1 Fundus of the stomach (H&E)

1. Tunica mucosa
2. Gastric pits
3. Simple cylindrical epithelium
4. Lamina propria of tunica mucosa
5. Gastric glands
   a) chief cells
   b) parietal cells
c) mucous neck cells
6. Muscularis mucousae
7. Submucosa

**SPECIMEN №2 Esophageal – stomach junction (H&E)**
1. Tunica mucosa of esophagus
2. Submucosa of esophagus
3. Tunica muscularis of esophagus
4. Tunica serosa of esophagus
5. Tunica mucosa of the stomach cardiac part
6. Submucosa of the stomach cardiac part
7. Tunica muscularis of the stomach cardiac part
8. Tunica serosa of the stomach cardiac part

**SPECIMEN №3 Small intestine (H&E)**
1. Tunica mucosa
2. Simple cylindrical epithelium
3. Lamina propria of tunica mucosa
4. Villus
5. Crypt
6. Muscularis mucousae
7. Submucosa
8. Tunica muscularis
9. Tunica serosa

**SPECIMEN №4 Large intestine (H&E)**
1. Tunica mucosa
2. Simple cylindrical epithelium
3. Lamina propria of tunica mucosa
4. Crypt
5. Muscularis mucousae
6. Submucosa
7. Tunica muscularis
8. Tunica serosa
9. Lymphatic nodule

**10. SELF CONTROL**

1. In the histological specimen you can see an organ of digestive tract. Its wall consists of mucosa, submucosa, muscularis externa and adventitia. Mucosa of the organ is covered by stratified squamous nonkeratinized epithelium. Which organ is found in the specimen?

   A. Stomach.
   B. Esophagus.
   C. Larynx.
   D. Trachea.
2. In the histological specimen you can see an organ of digestive tract. Its function is to transport foodstuffs from the mouth to the stomach. Which organ is found in the specimen?

A. Stomach.
B. Esophagus.
C. Larynx.
D. Trachea.
E. Small intestine.

3. In the histological specimen you can see esophagus. Which type of epithelium lines this organ?

A. Stratified squamous keratinized.
B. Stratified squamous nonkeratinized.
C. Simple columnar.
D. Stratified cuboidal.
E. Transitional.

4. In the histological specimen you can see an organ of digestive tract, which lined by stratified squamous nonkeratinized epithelium and has mucous glands in submucosa. Its muscularis externa is formed by skeletal and smooth muscles. Which organ is found in the specimen?

A. Stomach.
B. Esophagus.
C. Larynx.
D. Trachea.
E. Small intestine.

5. In the histological specimen you can see esophagus. Which tissues form muscularis externa of this organ?
A. Smooth muscle and epithelium.
B. Loose connected and epithelial.
C. Skeletal and smooth muscle.
D. Hyaline cartilage and bone.
E. Cardiac muscle and loose connective

11. ILLUSTRATIVE MATERIAL

1. Light microscope
2. Tables and slides to the studding topic.
3. Question tasks to the studding topic.

12. SOURCES


AUTHOR: Tverdokhib Igor Volodymyrovych
METHODOLOGICAL INSTRUCTION №18

1. TOPIC: Special histology. DIGESTIVE SYSTEM: LIVER. PANCREAS(3 hours)

2. LOCATION: Study halls of the department of histology

3. OBJECTIVE OF THE LESSON: Examine the functions, development and structure of the liver and pancreas.

4. PROFESSIONAL ORIENTATION OF STUDENTS: The liver is one of the most frequently damaged organs in the body, and it is indeed fortunate that it has an enormous functional reserve. The extrahepatic biliary system – the gall bladder and the extrahepatic bile ducts – maintains a direct connection between the liver and the gastrointestinal tract and thus serves as an essential link in the enterohepatic circulation. Diseases of these organs loom large in clinical practice and in pathologic specimens. The list of diseases, which affect the liver, spans a wide range of vascular, metabolic, toxic, obstructive and neoplastic involvements. Inflammation of the gallbladder comprises the second most common cause (next to appendicitis) of abdominal pain and abdominal surgery. Extrahepatic biliary ducts are relatively common and are invariably extremely serious, because most are malignant.

5. EDUCATIVE OBJECTIVE: Pay attention of the students on necessity to maintain in proper condition training equipment, histological specimens, the ability to efficiently organize your workplace and use study time.

6. BASIC LEVEL OF KNOWLEDGE AND ABILITIES:

1. Structural peculiarities of the liver and gallbladder (department of anatomy).


7. PLAN OF THE PRACTICAL LESSON (TECHNOLOGY):

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8. LIST OF THEORETICAL QUESTIONS THAT ARE CONSIDERED ON THE
LESSON:

1. Describe the liver’s double blood supply.
2. Interpret the complex structure of a hepatocyte and relation of its structure to its main
functions.
3. Recognise the classic liver lobule, the portal lobule, and the hepatic acinus (of
Rappaport).
4. Identify the principal components of a portal triad.
5. Characterise the major cell types that border the hepatic sinusoids and cells that
border the space of Disse.
6. Describe of the composition and production of bile.
7. Explain the functions of the gall bladders.

9. METHOD OF A PRACTICE LESSON

1. Answer questions of a self control.
2. Solve situation task
3. Explore, draw and identify structure the following specimens:

SPECIMEN №1 Pancreas (H&E)
1. Interlobular connective tissue septa
2. Pancreatic acinus
3. Pancreatic acinar cells
4. Intercalated excretory duct
5. Interlobular duct
6. Endocrine portion (islet of Langerhans)

SPECIMEN №2 Human liver (H&E)
1. Portal triads
2. Central (terminal portal) vein
3. Liver plates
4. Sinusoids
5. Kupffer cells

SELF CONTROL

1. In the histological specimen you can see a gland associated with digestive system.
Its function is metabolism and storage of nutrient, detoxication, production of plasma
proteins and bile secretion in digestive tract. Which gland is found in the specimen?

A. Submandibular.
B. Parotid.
C. Pancreas.
D. Liver.
E. Thyroid.
2. In the histological specimen you can see a gland associated with digestive system. Its function is metabolism and storage of nutrient, detoxication, production of plasma proteins and bile secretion in digestive tract. Which tissue forms the parenchyma of this organ?

A. Smooth muscle.
B. Lymphoid
C. Loose connective
D. Nervous.
E. Epithelial.

3. In the histological specimen you can see a gland associated with digestive system. Its function is bile synthesis and secretion in the digestive tract. Which is the name of parenchymal cells?

A. Hepatocytes.
B. Acinocites.
C. Serous cells.
D. Lymphocytes.
E. Mucocytes.

4. In the histological specimen of liver you can see a lobule. Which vessel is situated in the center of this structure?

A. Interlobular artery.
B. Interlobular vein.
C. Central vein.
D. Sublobular vein.
E. Hepatic vein.

5. In the histological specimen of liver you can see a lobule. Which organisation has the epithelium of this structure?

A. Acini.
B. Islands
C. Follicles.
D. Plates.
E. Tubules.

6. In the histological specimen you can see the liver. Lobule is polygonal mass, arranged by radially directed epithelial plates. At the corners of lobules there are portal space of connective tissue, which includes triads. Which structures are found in this region?

A. Interlobular artery, interlobular vein and bile duct.
B. Interlobular artery, interlobular vein, sublobular vein.
C. Interlobular artery, central vein and bile duct
D. Central artery, central vein and bile duct
E. Interlobular artery, interlobular vein and sinusois.

7. In the electron microphotograph of liver plate you can see a bile canaliculus. Which structures forms the wall of this portion of bile duct system?

A. Simple cuboidal epithelium.
B. Plasma membranes of adjacent hepatocytes.
C. Endotheliocytes.
D. Liver plates.
E. Basal membrane.

11. ILLUSTRATIVE MATERIAL

1. Light microscope
2. Tables and slides to the studding topic.
3. Question tasks to the studding topic.

12. SOURCES

METHODOLOGICAL INSTRUCTION №19

1. **TOPIC:** Special histology. RESPIRATORY SYSTEM (3 hours)

2. **LOCATION:** Study halls of the department of histology

3. **OBJECTIVE OF THE LESSON:** Examine the functions, development and structure of respiratory system organs.

4. **PROFESSIONAL ORIENTATION OF STUDENTS:** It is impossible to overemphasize the importance of lung disease in the overall perspective of pathology and clinical medicine. Primary respiratory infections, such as bronchitis, bronchopneumonia and other forms of pneumonia, are commonplace in clinical and pathologic practice. In this day of cigarette smoking and air pollution, emphysema has become rampant, affecting large segments of the total population. Malignancy of the lungs has risen steadily in incidence, until it is now the most common form of visceral malignancy in the male.

5. **EDUCATIVE OBJECTIVE:** Pay attention of the students on necessity to maintain in proper condition training equipment, histological specimens, the ability to efficiently organize your workplace and use study time.

6. **BASIC LEVEL OF KNOWLEDGE AND ABILITIES:**
   1. Structure and topography of the respiratory system (department of anatomy).
   2. The gas exchange in the lungs (course of biology, school).

7. **PLAN OF THE PRACTICAL LESSON (TECHNOLOGY):**

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8. LIST OF THEORETICAL QUESTIONS THAT ARE CONSIDERED ON THE LESSON:

1. Divisions of the respiratory system and the components of each division.
2. Important tissues and layers of the wall of the respiratory tract and function of each.
3. Comparison of the structure of the wall of the various components of the respiratory tract.
4. Important cell types of the wall of the respiratory tract, structure and function of each.

9. METHOD OF A PRACTICE LESSON

1. Answer questions of a self control.
2. Solve situation task
3. Explore, draw and identify structure the following specimens:

SPECIMEN №1 Trachea (H&E)

1. Tunica mucosa
2. Pseudostratified ciliated epithelium
   a) ciliated cells
   b) intercalated cells
   c) globet cells
3. Lamina propria of tunica mucosa
4. Submucosa
5. Muco-serous acini
6. Fibrous-cartilaginous membrane
7. C-shaped ring of hyaline cartilage
8. Adventitia
9. Smooth myocytes

SPECIMEN №2 Lung (H&E)

1. Large diameter bronchus
   a) pseudostratified ciliated epithelium
   b) muco-serous acini
   c) cartilage plates of tunica media
2. Medium diameter bronchus
   d) pseudostratified ciliated epithelium
   e) smooth muscle plate
   f) muco-serous acini
   g) cartilage islets of tunica media
3. Small diameter bronchus
   h) pseudostratified (two-rowed) ciliated epithelium
   i) lamina muscularis
4. Alveolar duct
5. Alveolar sacs alveolaris
6. Alveoli
10. SELF CONTROL

1. An organ presented in the histological specimen is hollow tube, which wall includes four layers. They are: mucosa, submucosa, cartilaginous and adventitia. Organ of which system is presented in the histological specimen?
   A. Digestive.
   B. Reproductive.
   C. Respiratory.
   D. Endocrine.
   E. Circulatory/Cardiovascular.

2. An organ presented in the histological specimen is referred to the respiratory tract. Which layers does its wall include? Which layers compose the wall of this organ?
   A. Tunica intima, tunica media and tunica adventitia.
   B. Mucosa, muscularis and serosa.
   C. Mucosa, submucosa, muscularis externa and adventitia.
   D. Mucosa, submucosa, cartilaginous and adventitia.
   E. Mucosa, submucosa and adventitia.

3. In the histological specimen of larynx you can see the true vocal folds. Which epithelium covers this structures?
   A. Stratified squamous nonkeratinized.
   B. Simple columnar.
   C. Pseudostratified ciliated.
   D. Stratified cuboidal.
   E. Transitional.

4. In the histological specimen you can see a hollow tube, which wall includes four layers. They are: 1) mucosa, which includes pseudostratified ciliated epithelium and lamina propria; 2) submucosa with the mixed glands, 3) C-shaped rings of hyaline cartilage and 4) adventitia. Which organ is found in the histological specimen?
   A. Esophagus.
   B. Larynx.
   C. Bronchus.
D. Trachea.
E. Artery.

5. In the histological specimen you can see trachea. Which epithelium lines the mucosa of this organ.
   A. Stratified squamous.
   B. Simple columnar.
   C. Pseudostratified ciliated.
   D. Stratified cuboidal.
   E. Transitional.

6. In the histological specimen you can see a large bronchus. Which epithelium lines the mucosa of this organ.
   A. Stratified squamous.
   B. Simple columnar.
   C. Pseudostratified ciliated.
   D. Stratified cuboidal.
   E. Transitional.

11. ILLUSTRATIVE MATERIAL

1. Light microscope
2. Tables and slides to the studying topic.
3. Question tasks to the studying topic.

12. SOURCES

AUTHOR: Tverdokhlib Igor Volodymyrovych
1. **TOPIC:** Special histology. SKIN AND ITS DERIVATIVES (3 hours)

2. **LOCATION:** Study halls of the department of histology

3. **OBJECTIVE OF THE LESSON:** Examine the functions, development and structure of the skin.

4. **PROFESSIONAL ORIENTATION OF STUDENTS:** Skin is the largest single organ in the body. Its chief functions are concerned with sensation, protection, temperature regulation and control of water output. It is closely associated with the underlying structures, from which and through which it receives its nutrition, and because of its location it is in intimate relation with the external environment. Therefore, its status is readily affected by general or local diseases of the body as well as external factors. More often, it is a combination of systemic and local factors which produces visible skin lesions. It must be remembered that because the skin can be directly observed, many of the clinical objective findings actually represent the gross pathology of the various dermatologic diseases. Clinical description usually includes the macroscopic and microscopic pathology.

5. **EDUCATIVE OBJECTIVE:** Pay attention of the students on necessity to maintain in proper condition training equipment, histological specimens, the ability to efficiently organize your workplace and use study time.

6. **BASIC LEVEL OF KNOWLEDGE AND ABILITIES:**

   1. Basic anatomical structures of the skin (department of anatomy).

7. **PLAN OF THE PRACTICAL LESSON (TECHNOLOGY):**

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8. LIST OF THEORETICAL QUESTIONS THAT ARE CONSIDERED ON THE LESSON:

1. Important skin’s functions and relation of them to its structure.
2. Major layers of skin and the basic tissue type that predominates in each.
3. Cell types commonly found in the epidermis and description of their structure, function, and location.
4. Layers of the epidermis of thick skin and description of the distinguishing structural features of each.
5. Steps in the processes of epidermal cell renewal and keratinization in relation to the epidermal layers.
6. Comparison of the 2 layers of the dermis.
7. Description of the important components of the skin derivatives.
8. Comparison of the 3 types of glands associated with the skin.

9. METHOD OF A PRACTICE LESSON

1. Answer questions of a self control.

2. Solve situation task

3. Explore, draw and identify structure the following specimens:

SPECIMEN №1 Skin fingertip (hick skin) (H&E)
1. Epidermis
2. Stratum basale
   a) Stratum spinosum
   b) Stratum granulosum
   c) Stratum lucidum
   d) Stratum corneum
3. Dermis
   e) papillary dermis
   f) reticular dermis
4. Hypodermis

SPECIMEN №2 Skin with hair follicle (thin skin) (H&E)
1. Epidermis
2. Dermis
3. Hypodermis
4. Follicular canal
5. Hair shaft
6. Sebaceous gland
7. Hair root
   a) hair bulb
   b) hair papilla
   c) internal root sheath
   d) external root sheath
e) sheath of connective tissue
8. Secretory part of sweet gland
9. Excretory portion of sweet gland

SLIDE №3. Mammary gland (H&E)
1. Glandular lobule
2. Interlobular septum
3. Alveoli
4. Alveolar cells
5. Excretory duct
6. Blood vessels

10. SELF CONTROL

1. In the histological specimen you can see a skin. Which layers does this organ include? Which layers compose this organ?
   A. Epidermis, dermis and hypoderma.
   B. Simple columnar epithelium and derma.
   C. Mucosa, submucosa and muscularis externa.
   D. Tunica intima, tunica media and tunica adventitia.
   E. Mucosa, muscularis externa and serosa.

2. An organ presented in the histological specimen consists of epidermis and derma. Which organ is found in the specimen?
   A. Liver.
   B. Esophagus.
   C. Skin
   D. Tongue.
   E. Stomach.

3. In the histological specimen of skin you can see epidermis. Which tissue forms this layer of the organ?
   A. Stratified squamous nonkeratinised.
   B. Simple columnar.
   C. Simple ciliated.
   D. Stratified squamous keratinised.
E. Transitional epithelium.

4. In the histological specimen of skin you can see dermis. Which tissues form this layer of the organ?
   A. Stratified squamous epithelium and loose connective tissue
   B. Smooth muscles and connective tissue.
   C. Loose connective tissue and cartilage.
   D. Loose connective and adipose tissue.
   E. Loose and dense connective tissues.

5. In the histological specimen of skin you can see a layer which includes four types of cells. They are: keratinocytes, melanocytes, Langerhans cells and Mercel’s cells. In which layer are they found?
   A. Epidermis.
   B. Dermis.
   C. Hypodermis.
   D. Tunica inima.
   E. Mucosa.

6. Under the action of solar radiation (the sun UV-rays) the protective reaction is activated in epidermis. It is related with increase of pigment production. Which cells type of epidermis is responsible for this process?
   A. Keratinocytes.
   B. Fibroblasts.
   C. Melanocyte.
   D. Mercel’s cells.
   E. Macrophages.

7. In the histological specimen of skin you can see the papillary layer of dermis. Which tissue forms this layer?
   A. Simple epithelium.
   B. Stratified squamous keratinized epithelium.
C. Stratified squamous nonkeratinized epithelium
D. Loose connective system.
E. Dense connective tissue.

11. ILLUSTRATIVE MATERIAL

1. Light microscope
2. Tables and slides to the studding topic.
3. Question tasks to the studding topic.

12. SOURCES


AUTHOR: Tverdokhlib Igor Volodymyrovych
1. **TOPIC:** Special histology. RESPIRATORY SYSTEM (3 hours)

2. **LOCATION:** Study halls of the department of histology

3. **OBJECTIVE OF THE LESSON:** Examine the functions, development and structure of respiratory system organs.

4. **PROFESSIONAL ORIENTATION OF STUDENTS:** It is impossible to overemphasize the importance of lung disease in the overall perspective of pathology and clinical medicine. Primary respiratory infections, such as bronchitis, bronchopneumonia and other forms of pneumonia, are commonplace in clinical and pathologic practice. In this day of cigarette smoking and air pollution, emphysema has become rampant, affecting large segments of the total population. Malignancy of the lungs has risen steadily in incidence, until it is now the most common form of visceral malignancy in the male.

5. **EDUCATIVE OBJECTIVE:** Pay attention of the students on necessity to maintain in proper condition training equipment, histological specimens, the ability to efficiently organize your workplace and use study time.
6. BASIC LEVEL OF KNOWLEDGE AND ABILITIES:

3. Structure and topography of the respiratory system (department of anatomy).
4. The gas exchange in the lungs (course of biology, school).

7. PLAN OF THE PRACTICAL LESSON (TECHNOLOGY):

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8. LIST OF THEORETICAL QUESTIONS THAT ARE CONSIDERED ON THE LESSON:

5. Divisions of the respiratory system and the components of each division.
6. Important tissues and layers of the wall of the respiratory tract and function of each.
7. Comparison of the structure of the wall of the various components of the respiratory tract.
8. Important cell types of the wall of the respiratory tract, structure and function of each.

9. METHOD OF A PRACTICE LESSON

1. Answer questions of a self control.
2. Solve situation task
3. Explore, draw and identify structure the following specimens:

SPECIMEN №1 Trachea (H&E)

1. Tunica mucosa
2. Pseudostratified ciliated epithelium
   a) ciliated cells
   b) intercalated cells
   c) globet cells
3. Lamina propria of tunica mucosa
4. Submucosa
5. Muco-serous acini
6. Fibrous-cartilaginous membrane
7. C-shaped ring of hyaline cartilage
8. Adventitia
9. Smooth myocytes

SPECIMEN №2 Lung (H&E)

1. Large diameter bronchus
   a) pseudostratified ciliated epithelium
   b) muco-serous acini
   c) cartilage plates of tunica media
2. Medium diameter bronchus
   d) pseudostratified ciliated epithelium
   e) smooth muscle plate
   f) muco-serous acini
   g) cartilage islets of tunica media
3. Small diameter bronchus
   h) pseudostratified (two-rowed) ciliated epithelium
   i) lamina muscularis
4. Alveolar duct
5. Alveolar sacs alveolaris
6. Alveoli

10. SELF CONTROL

1. An organ presented in the histological specimen is hollow tube, which wall includes four layers. They are: mucosa, submucosa, cartilaginous and adventitia. Organ of which system is presented in the histological specimen?
   A. Digestive.
   B. Reproductive.
   C. Respiratory.
   D. Endocrine.
   E. Circulatory/Cardiovascular.

2. An organ presented in the histological specimen is referred to the respiratory tract. Which layers does its wall include?/ Which layers compose the wall of this organ?
   A. Tunica intima, tunica media and tunica adventitia.
   B. Mucosa, muscularis and serosa.
   C. Mucosa, submucosa, muscularis externa and adventitia
   D. Mucosa, submucosa, cartilaginous and adventitia.
3. In the histological specimen of larynx you can see the true vocal folds. Which epithelium covers this structures?
   A. Stratified squamous nonkeratinized.
   B. Simple columnar.
   C. Pseudostratified ciliated.
   D. Stratified cuboidal.
   E. Transitional.

4. In the histological specimen you can see a hollow tube, which wall includes four layers. They are: 1) mucosa, which includes pseudostratified ciliated epithelium and lamina propria; 2) submucosa with the mixed glands, 3) C-shaped rings of hyaline cartilage and 4) adventitia. Which organ is found in the histological specimen?
   A. Esophagus.
   B. Larynx.
   C. Bronchus.
   D. Trachea.
   E. Artery.

5. In the histological specimen you can see trachea. Which epithelium lines the mucosa of this organ.
   A. Stratified squamous.
   B. Simple columnar.
   C. Pseudostratified ciliated.
   D. Stratified cuboidal.
   E. Transitional.

6. In the histological specimen you can see a large bronchus. Which epithelium lines the mucosa of this organ.
   A. Stratified squamous.
   B. Simple columnar.
   C. Pseudostratified ciliated.
D. Stratified cuboidal.
E. Transitional.

11. ILLUSTRATIVE MATERIAL

1. Light microscope
2. Tables and slides to the studding topic.
3. Question tasks to the studding topic.

12. SOURCES


AUTHOR: Tverdokhlib Igor Volodymyrovych
METHODOLOGICAL INSTRUCTION №21

1. TOPIC: Special histology. URINARY SYSTEM. (3 hours)

2. LOCATION: Study halls of the department of histology

3. OBJECTIVE OF THE LESSON: Examine the functions, development and structure of the urinary tract.

4. PROFESSIONAL ORIENTATION OF STUDENTS: Few organs of the body are as clever and can simultaneously carry out as many complex and diverse functions as the kidney. Involved as it is in filtration, concentration and secretion, it is not surprising that it has a complex structure. An understanding of diseases of the kidney requires a thorough knowledge of its structure and the intimate interrelationships and interdependence of the four basic morphologic components: glomeruli, tubules, blood vessels and interstitium. Because all forms of serious renal disease may ultimately lead to renal failure, it is appropriate first to present this pathologic process in kidney with special techniques.

5. EDUCATIVE OBJECTIVE: Pay attention of the students on necessity to maintain in proper condition training equipment, histological specimens, the ability to efficiently organize your workplace and use study time.

6. BASIC LEVEL OF KNOWLEDGE AND ABILITIES:


7. PLAN OF THE PRACTICAL LESSON (TECHNOLOGY):

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8. LIST OF THEORETICAL QUESTIONS THAT ARE CONSIDERED ON THE LESSON:

1. Parts and functions of the urinary system and description of the roles of each organ.
2. Juxtaglomerular apparatus.
3. Description of the smooth muscle fibers in the muscularis of urinary bladder.
5. Comparison of the urethras of males and females in terms of length, function, and epithelial lining.
6. Comparison of the internal and external urinary sphincters in terms of their location, muscle type and fiber orientation.

9. METHOD OF A PRACTICE LESSON

1. Answer questions of a self control.
2. Solve situation task
3. Explore, draw and identify structures of the following specimens:

**SPECIMEN №1 Kidney (H&E)**
1. Capsule
2. Cortex
3. Medulla
4. Renal corpuscle
5. Renal tubules
6. Collecting tubules

**SPECIMEN №2. Ureter (H&E)**
Check list for SLIDE:
1. Tunica mucosa
2. Transitional epithelium
   a) basal layer
   b) intermediate layer
   c) surface layer
3. Lamina propria of tunica mucosa
4. Submucosa
5. Tunica muscularis

10. SELF CONTROL

1. In electron microphotograph of renal cortex you can see juxtaglomerular cells, macula densa, juxtavascular cells. Which endocrine apparatus do they form?
   A. Prostaglandin.
   B. Bradiokinin.
   C. Juxtaglomerular.
   D. Insular.
2. In electron microphotograph of renal cortex you can see the components of juxtaglomerular apparatus. Which of them secrete the renin?
   A. Juxtaglomerular cells.
   B. Juxtavascular cells
   C. Macula densa...
   D. Mesangial cells.
   E. Podocytes.

3. In electron microphotograph of renal cortex you can see the components of juxtaglomerular apparatus. Which of them is chemoreceptor?
   A. Interstitial cells.
   B. Juxtavascular cells
   C. Macula densa.
   D. Mesangial cells.
   E. Podocytes.

4. In electron microphotograph of renal corpuscle you can see the juxtaglomerular cells with renin granules. Where are they located?
   A. In capillaries.
   B. In wall of afferent arteriole.
   C. In wall of proximal tubule.
   D. In mesangium.
   E. Between podocytes.

5. In the electron microphotograph you can see an interstitial cell of renal medulla. Which substances does this cell produce?
   A. Renin.
   B. Testosterone.
   C. Estrogen.
   D. Angiotensin II.
6. In the electron microphotograph you can see a cell of renal medulla, which produce prostaglandines. Which is the name of this cell?
   A. Juxtaglomerular.
   B. Follicular.
   C. Juxtavascular.
   D. Interstitial.
   E. A-cell.

7. In the histological specimen you can see a hollow tube. Its wall consists of mucosa, submucosa, muscular layer, adventitia or serosa. The mucosa is lined by transitional epithelium. Muscular layer consists of 3 distinct layers. Which organ is found in the specimen?
   A. Stomach.
   B. Esophagus.
   C. Bladder.
   D. Trachea.
   E. Small intestine.

8. In the histological specimen you can see a hollow tube. Its wall consists of mucosa, submucosa, muscular layer and adventitia or serosa. The mucosa is lined by transitional epithelium. Which system is this organ referred to?
   A. Digestive.
   B. Male reproductive.
   C. Respiratory.
   D. Urinary
   E. Circulatory.

11. ILLUSTRATIVE MATERIAL

1. Light microscope

2. Tables and slides to the studying topic.
3. Question tasks to the studding topic.

12. SOURCES


AUTHOR: Tverdokhib Igor Volodymyrovych
METHODOLOGICAL INSTRUCTION №22

1. **TOPIC:** Special histology. MALE REPRODUCTIVE SYSTEM. (3 hours)

2. **LOCATION:** Study halls of the department of histology

3. **OBJECTIVE OF THE LESSON:** Examine the functions, development and structure of the male reproductive system.

4. **PROFESSIONAL ORIENTATION OF STUDENTS:** Spermatic excretory ducts are represented by the system of ducts, though which spermogenic cells move up into the uterine. The epithelium of the mucous tunic of the spermatic excretory ducts produces fluid that dilutes sperm and promotes saving and motulating spermatozoa. The epididymis is a reservoir that accumulates sperm. The prostate gland produces ekzo- and endocrine secrets that stimulate the motion of spermatozoa, give alkalin reaction to sperm. Elderly men often suffer from the diseases of prostate (adenoma, cancer etc).

5. **EDUCATIVE OBJECTIVE:** Pay attention of the students on necessity to maintain in proper condition training equipment, histological specimens, the ability to efficiently organize your workplace and use study time.

6. **BASIC LEVEL OF KNOWLEDGE AND ABILITIES:**
   1. Male genital organs – Human anatomy department.
   2. Histology: a) glandular epithelium; b) proper connective tissue; c) male genital cells; d) haemocapillaries.

7. **PLAN OF THE PRACTICAL LESSON (TECHNOLOGY):**

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8. LIST OF THEORETICAL QUESTIONS THAT ARE CONSIDERED ON THE LESSON:

1. Structure of the wall of the tubuli recti, the rete testis and the mediastinum testis.
2. Structure of the wall of the ductus efferents and the ductus epididimus.
3. Morphology of the ductus deferents, the ductus ejaculatorius and the urine.
4. General structure and function of the prostate gland.
5. Structure of the paraurethral gland of the prostate.
6. Seminal vesicles and bulbourethral glands, their fine structure.
7. Hormonal interaction of the hypophysis and the male reproductive system.

9. METHOD OF A PRACTICE LESSON

1. Answer questions of a self control.
2. Solve situation task
3. Explore, draw and identify structure the following specimens:

SPECIMEN №1 The testis (H&E)
1. Tunica albuginea
2. Seminiferous tubule
3. Germinal epithelium
4. Sertoli cells
5. Spermatozoa
6. Testicular interstitium
7. Interstitial cells of Leydig (glandulocytes)

SPECIMEN №2. Epididymis (H&E)
1. Capsule
2. Ductules efferentes
3. Epithelium of ductules efferentes
4. Tunica muscularis of ductules efferentes
5. Adventitia of ductules efferentes
6. Ductus epididymidis
7. Tunica mucosa of ductus epididymidis
8. Tunica muscularis of ductus epididymidis
9. Adventitia of ductus epididymidis
10. Spermatozoa in ductus lumen

SPECIMEN №3 Prostate (H&E)
1. Capsule
2. Prostatic glands (acini)
3. Excretory duct
4. Septum
5. Bundles of smooth muscle cells
10. SELF CONTROL
1. In the specimen of epididymis you can see the tubules, which lined by two types of cells. They are: columnar cells with stereocilia and basal cells. Which tubule is present?
   A. Seminiferous tubules.
   B. Ductus epididimis.
   C. Tubule of the rete testis.
   D. Tubulus rectus.
   E. Tubulus efferentis.

2. In the specimen you can see an excretory genital duct. Its wall consists of three layers: mucosa, muscularis and adventitia. The mucosa forms longitudinal folds and is lined by pseudostratified epithelium with stereocilia. The muscular layer is thick and includes longitudinal and circular bundles of smooth muscle cells. Which duct is described?
   A. Seminiferous tubule.
   B. Ductus epididimis.
   C. Ductus deference.
   D. Uretra.
   E. Tubulus efferentis.

3. In the specimen you can see the testis. There are interstitial cells in its intralobulated loose connective tissue. Which function of these cells?
   A. Supporting.
   B. Transporting.
   C. Receptor.
   D. Endocrine.
   E. Protective.

11. ILLUSTRATIVE MATERIAL
1. Light microscope
2. Tables and slides to the studding topic.
3. Question tasks to the studding topic.
12. SOURCES


AUTHOR: Tverdokhlib Igor Volodymyrovych
1. **TOPIC:** Special histology: FEMALE REPRODUCTIVE SYSTEM. (3 hours)

2. **LOCATION:** Study halls of the department of histology

3. **OBJECTIVE OF THE LESSON:** Examine the functions, development and structure of the female reproductive system.

4. **PROFESSIONAL ORIENTATION OF STUDENTS:** In addition to the reproduction function of the ovaries, the production of oocytes capable of fertilization, the ovaries play a great part in the endocrine system. The sexual hormones are produced in the ovaries, growth and differentiation of the sexual system depending from it, and normal birth of children becoming possible. However, many experimental and clinical investigations proved, that the ovaries can not be studied separately, taking only their importance in the sexual system into consideration. Their normal anatomic and morphologic development and physiology state have influence on the development of the somatic sexual signs. It promotes the transformation of the organism into specific woman organism with its peculiar morphological signs and features as for the substance exchange the tissue tonus. The disease of the ovaries is usually accompanied by violations of their inner secretory function resulting to the marked endocrine disorders.

5. **EDUCATIVE OBJECTIVE:** Pay attention of the students on necessity to maintain in proper condition training equipment, histological specimens, the ability to efficiently organize your workplace and use study time.

6. **BASIC LEVEL OF KNOWLEDGE AND ABILITIES:**

   1. Female reproductive organs. Ovary of woman (Anatomy department).

7. **PLAN OF THE PRACTICAL LESSON (TECHNOLOGY):**

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8. LIST OF THEORETICAL QUESTIONS THAT ARE CONSIDERED ON THE LESSON:

1. Development and general structure of the ovary. The role of the interstitium.
2. Incretory function of the ovary and correlation with the other endocrine glands.
3. Thin structure of the cortex of the ovary.
4. Ovogenesis (main stages and their morphofunctional characteristics). Comparison of the stages of the ovogenesis and spermatogenesis.
5. Dynamics of the development of the follicles of the ovary. (Structure of the primordial, primary, secondary and mature folliculi).
6. Ovulation, its biological essence and hormonal regulation of this process.
7. Stages of the formation of the Corpus luteum, its endocrine function.
8. Artesia of the folliculi. Atretic body, its main differences from Corpus albicans and Corpus luteum.

9. METHOD OF A PRACTICE LESSON

1. Answer questions of a self control.
2. Solve situation task
3. Explore, draw and identify structure the following specimens:

SPECIMEN №1 Ovary (H&E)
1. Tunica albuginea
2. Cortex
3. Medulla
4. Primordial follicle
5. Primary follicle
6. Secondary follicle
7. Mature (Graafian) follicle
   a) oocyte
   b) zona pellucida
   c) corona radiata
   d) cumulus oophorus
   e) antrum
   f) follicular cells
   g) theca
8. Corpus luteum ovarian
9. Atretic follicle

SPECIMEN №2. Uterus (H&E)
1. Endometrium
   a) simple columnar epithelium
   b) lamina propria
   c) uterine glands
d) decidual cells
2. Myometrium
e) inner layer
f) stratum vasculare
g) outer layer
3. Perimetrogium

**SPECIMEN №3 Oviduct (uterine tube) (H&E)**
1. Tunica mucosa
2. Folds of tunica mucosa
   a) simple columnar epithelium
   b) lamina propria
3. Tunica muscularis
4. Tunica serosa

**10. SELF CONTROL**
1. In the specimen you can see the ovary. Which functions does this organ perform?
   A. Hormone production.
   B. Immune defence.
   C. Oogenesis, estrogens and progesterone production
   D. Spermatozoa and estrogens production.
   E. Metabolism regulation.

2. In the specimen of ovary you can see the follicle. Which cells are included in this structure?
   A. Follicular cells and primary oocyte.
   B. Supporting and spermatogenic cells.
   C. Interstitial cells and oocyte.
   D. Follicular cells and egg cell.
   E. Supporting cells and oocyte.

3. In the specimen of ovary you can see a rounded structure, which consists of oocyte and follicular cells, in cortical region. Which structure is found?
   A. Nephron.
   B. Blood vessel.
   C. Follicle.
   D. Corpus luteum.
   E. Seminiferous tubule.

4. In the specimen of ovary you can see a follicle in the superficial layer of cortical region. This follicle consists of primary oocyte enveloped by a single layer of flattened follicular cells. Which follicle is found?
   A. Primordial.
   B. Unilaminar primary.
   C. Secondary (antral).
   D. Mature (preovulatory).
   E. Multilaminar primary.
5. In the specimen of ovary you can see a follicle. It consists of primary oocyte surrounded by zona pellucida and a single layer of columnar follicular cells. Which follicle is found?
   A. Primordial.
   B. Unilaminar primary.
   C. Secondary (antral).
   D. Mature (preovulatory).
   E. Multilaminar primary.

6. In the specimen of ovary you can see various follicles. They are composed by oocyte and follicular cells, which produce hormone. Which hormone do they produce?
   A. Testosterone.
   B. Estrogens.
   C. Progesterone.
   D. Insulin.
   E. Glucocorticoids.

7. In the specimen of ovary you can see the corpus luteum. Which hormone does it produce?
   A. Estrogens.
   B. Follicle stimulating hormone.
   C. Luteinizing hormone.
   D. Progesterone.
   E. Testosterone.

11. ILLUSTRATIVE MATERIAL

1. Light microscope
2. Tables and slides to the studding topic.
3. Question tasks to the studding topic.

12. SOURCES


AUTHOR: Tverdokhlib Igor Volodymyrovych
1. **TOPIC:** Special histology and embryology. Placenta (3 hours)

2. **LOCATION:** Study halls of the department of histology

3. **OBJECTIVE OF THE LESSON:** Examine the functions, development and structure of the placenta.

4. **PROFESSIONAL ORIENTATION OF STUDENTS:** After the implantation a specific interrelation has established between the embryo and the female organism. The embryo is growing up and developing inside the endometrium of uterine wall. It is covered by chorion. In the early weeks of development the entire surface of chorion has the villi. As pregnancy advances this situation changes. The villi on the embryonic pole continue to grow and expand, thus giving rise to the chorion frondosum, those on abembryonic pole degenerate and is known as the chorion laeve. The difference in the abembryonic poles of the chorion is also reflected in the structure of decidua. The decidua over the chorion frondosum, the decidua basalis, consists of a compact layer which is tightly connected with the chorion. This layer is referred to as the decidual plate. The decidual layer over the abembryonic pole is known as the decidua capsulans. The rest of uterine endometrium forms the decidua parietalis. Placenta is a unique human organ because it consists of two absolutely different parts and materials: fetal and maternal. It performs many vitaly important functions (nutritive, protective, endocrine, respiration). Abnormality of its position and structure may produce interruption of pregnancy. On the other hand there are some especial processes in the course of embryogenesis when the danger to normal human development persists. Doctors have to recognise the significance and peculiarities of critical periods to prevent any negative influence on the human being at these moments.

5. **EDUCATIVE OBJECTIVE:** Pay attention of the students on necessity to maintain in proper condition training equipment, histological specimens, the ability to efficiently organize your workplace and use study time.

6. **BASIC LEVEL OF KNOWLEDGE AND ABILITIES:**

   1. Human anatomy department.

   2. School course of human anatomy and physiology.

7. **PLAN OF THE PRACTICAL LESSON (TECHNOLOGY):**

<table>
<thead>
<tr>
<th>№</th>
<th>Elements of practical lessons</th>
<th>Time (min)</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Checking the present</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>Incoming control of knowledge and it’s analysis (examination, tests, situational tasks, written responses to questions).</td>
<td>20</td>
</tr>
<tr>
<td>3.</td>
<td>Comments and explanations specimens to the topic by tables, slides</td>
<td>10</td>
</tr>
</tbody>
</table>
4. Individual work of students to study histological specimens and execution of the protocols

5. Final control of knowledge and practical skills, results and summary assessment skills of students.

6. Home tasks for the next lesson

8. LIST OF THEORETICAL QUESTIONS THAT ARE CONSIDERED ON THE LESSON:

1. Trophoblast origin, structure and functions.
2. Human chorion histophysiology.
3. Placents types. Human placenta, its morphological characteristic and functions.
4. The structure of fetal placenta.
5. Uterine decidual tunics.
7. Structural compounds of haemochorial barrier.

9. METHOD OF A PRACTICE LESSON

1. Answer questions of a self control.
2. Solve situation task
3. Explore, draw and identify structure the following specimens:

SPECIMEN № 1 Placenta (H&E)

I. Fetal part of placenta
II. Maternal part of placenta
1. Basal lamina
2. Decidual cells
3. Chorionic villi
4. Cytotrophoblast
5. Syncytiotrophoblast
6. Connective tissue of villus
7. Blood vessels in chorionic villi
8. Lacuna filled with maternal blood
9. Amniotic epithelium
10. Chorionic plate
11. Blood vessels of chorionic plate

10. SELF CONTROL
1. As a rule maternal and fetal blood has no direct communication. Embryo blood is passes in the placenta vessels and mother blood circulates in the intervillous space. Name the cells and the tissues which separate maternal and fetal blood circulation in the second trimester of pregnancy?

2. In a histologic specimen there is a maternal placenta with large light cells with round shape nuclei in the uterine mucosa. What are these cells? What are their functions?

3. Placenta is crossed into two parts: maternal and fetal. How can you recognize both of them in histologic specimen?

4. Sometimes implantation may occur in the isthmic part of uterine. The course of early pregnancy stage may be normal but later it will be interrupted. Why? Why is there no possibility for the normal development of fetus in such a position of placenta?

5. In the second half of pregnancy there is a corpus luteum in the ovary that produces the progesteron (hormon which helps to uterine mucosa development). What is the source of progesteron at that period of time?

11. ILLUSTRATIVE MATERIAL

1. Light microscope

2. Tables and slides to the studding topic.

3. Question tasks to the studding topic.

12. SOURCES


AUTHOR: Tverdokhlib Igor Volodymyrovych