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## METHODOLOGICAL GUIDELINES FOR PRACTICAL CLASSES

Discipline: "Musculoskeletal system and skin in norm"


Discipline code: MSSN 2211

Name and code of the EP: 6B10117 – "Dentistry"

Amount of study hours/credits: 30/1

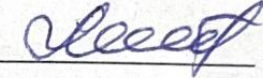
Course and semester of study: 2/3

The volume of the practical lesson: 8 hours

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The guidelines for practical training were developed in accordance with the working curriculum of the discipline (syllabus) "Musculoskeletal system and skin in norm" and discussed at a meeting of the department of "Topographic anatomy and histology"

Protocol No. 1 from "03" 09 2024

Head of the department, c.m.s., acting professor  Murzanova D.A.

## Lesson No. 1

**1. Subject:** Loose unformed fibrous connective tissue. Connective tissues with special properties.

**2. Purpose:** To learn:

- Identify the varieties of connective tissues at the microscopic level.
- Identify structural components (cells and non-cellular structures) in various types of connective tissue at microscopic and ultramicroscopic levels.
- Explain the role of connective tissue in maintaining the constancy of the internal environment of the body and the functions it performs: trophic, mechanical, protective, plastic.
- Explain the functions of connective tissue cells, taking into account their ultramicroscopic structure and cytochemical characteristics.

### 3. Learning objectives:

Connective tissues are quite diverse. They are part of most organs, forming them entirely (tendons, ligaments, bones, cartilage) or forming their stroma (parenchymal organs, muscles, nerves). Knowledge of the morphofunctional features of various types of connective tissues is necessary for doctors of all specialties to understand the processes of vital activity of the body.

### 4. The main issues of the topic:

1. Morphofunctional characteristics of connective tissues.
2. Principles of classification of connective tissues.
3. Cellular elements of loose fibrous connective tissue and their functional significance.
4. Varieties of connective tissue fibers, their functional significance and formation.
5. Chemical composition, functional significance and origin of the amorphous substance.
6. Indicate in the table the differences in the structure of the intercellular substance of various types of connective tissue proper.
7. Name the types of connective tissues with special properties.
8. Draw a cell of white adipose tissue.
9. Draw a cell of brown adipose tissue.
10. Describe the reticular connective tissue.

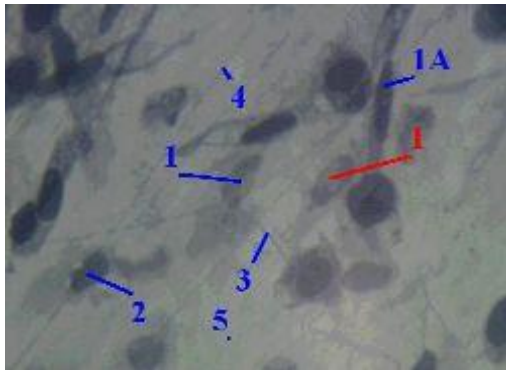
Types of connective tissue	The amount of amorphous substance	Fiber orientation
Loose fibrous unformed		
Dense fibrous unformed		
Dense fibrous decorated		

### Handout material

1. Microscopes

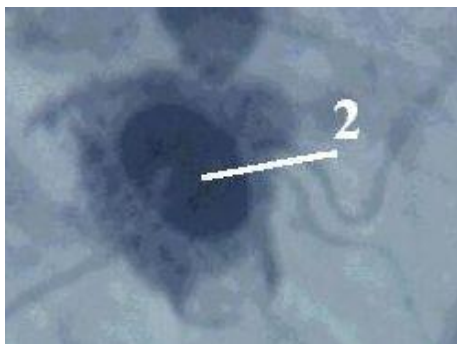
### 2 Micro-preparations for studying and sketching

**Loose fibrous unformed connective tissue. Film preparation.** Staining with iron hematoxylin.



**The drug is loose fibrous unformed connective tissue. Film preparation. Staining with iron hematoxylin.**

1. On this preparation we see:  
two types of cells - fibroblasts (1) and macrophages (2),  
two types of fibers - collagen (3) and elastic (4),  
a matrix located between them(5)



**The drug is loose fibrous unformed connective tissue. Film preparation. Staining with iron hematoxylin.**

In the center of this image is a macrophage (2),

in the cytoplasm of which vacuoles and granules are visible

Function: organ stroma, metabolism, protection.

**5. The main forms/ methods/ technologies of training to achieve the LO discipline:** work in small groups, checklist of histopreparations, microphotographs

**6. Types of control to assess the level of achievement of the LO discipline:** the checklist for evaluating the practical lesson.

## 7. Literature:

### Main literature


1. Inderbir Singh. Textbook of Human Histology. With Color Atlas and Practical Guide/8th Edition. Jaypee Brothers Medical Publishers .2016.-302 p. Перевод Гистология человека
2. Dudek Ronald W. Embryology / Ronald W. Dudek. - 5th ed. - [s. l.] : Wolters Kluwer, 2014. - 158 p. Перевод заглавия: Эмбриология
3. Gartner Leslie P. Cell Biology and Histology / Leslie P. Gartner. - 8th ed. - [s. l.] : Wolters Kluwer, 2019. - 436 p. - (BRS. Board Review Series) Перевод заглавия: Клеточная биология и гистология

### Additional literature

Textbook of Human Histology. Inderbir Singh /Sixth Edition/ Inderbir Singh 2010.-386 p.  
Перевод Учебник по гистологии человека

### Electronic publications

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5. Zhumabayeva, S.E., Boken, T.S.  
Cytology and histology : Educational-methodical complex. . - Kokshetau: KGU, 2017. - 101 p. <http://rmebrk.kz/>
6. Бородулина, О.В. Цитология и гистология – Cytology and histology : Практикум. / Костанайский гос. педагогический университет им. У. Султангазина. - Костанай: КГПУ им. У. Султангазина, 2020. - 100 с. - <http://rmebrk.kz/>

## 8. Control

### Questions

1. List the main components of the intercellular substance of fibrous connective tissue.
2. Explain the difference in the structural organization of loose and dense fibrous connective tissue by linking structural features with function.
3. List the cellular elements of connective tissue and blood that participate in the body's protective reactions.
4. What kind of special connective tissue forms the stroma of the hematopoiesis organs (lymph nodes, spleen, red spinal cord) and creates a microenvironment for developing cells?
5. Explain the structural and functional differences between white and brown adipose tissue.

### Tests

1. A patient asked a cosmetologist to deprive him of a tattoo on his shoulder. Identify the substance that makes this kind of "painting" possible.
  - A) hyaluronic acid
  - B) fibronectin
  - C) Gamma globulin
  - D) Elastin
  - E) heparin
2. Aging of human skin is characterized by the formation of wrinkles and folds. This condition causes changes in ... .
  - A) an amorphous substance
  - B) collagen fibers
  - C) the epidermis
  - D) elastic fibers
  - E) subcutaneous fat
3. Histamine plays a leading role in the development of clinical manifestations of allergy. It is produced by ... .
  - A) macrophages
  - B) T-lymphocytes
  - C) mast cells
  - D) B- lymphocytes
  - E) plasmocytes
4. During wound healing, a connective tissue scar develops in the area of the tissue defect. This process is provided by :
  - A) fibrocytes
  - B) macrophages
  - C) fibroblasts

D) mast cells

E) melanocytes

5. Identify cells with basophilic metachromatic granularity; histochemically, the granules contain heparin and histamine.

A) tissue basophils

B) fibroblasts

C) macrophages

D) plasmocytes

E) adipocytes

6. After treatment of the damaged achilles tendon, the patient resumed his function. The regeneration of the tendon took place due to ... .

A) synthesis of collagen fibers

B) formation of hyaline cartilage

C) formation of dense unformed connective tissue

D) formation of fibrous cartilage

E) replacement of the rupture with muscle tissue

7. The source of connective tissue development is:

A) myotome

B) splanchnot

C) Mesenchyme

D) ectoderm

E) Endoderm

8. The cell synthesizing the intercellular substance is:

A) fibrocyte

B) plasmocyte

C) fibroblast

D) pericitis

E) fibroclast

9. Once in the connective tissue, the monocyte turns into:

A) histiocyte

B) melanocyte

C) labrocyte

D) adventocyte

E) lipocyte

10. Once in the connective tissue, the B-lymphocyte can turn into:

A) a plasmocyte

B) macrophage

C) labrocyte

D) pericitis

E) fibroclast

11. The difference between dense connective tissue and loose tissue is:

A) low content of cells and amorphous matter

B) a large number of macrophages

C) synthesis of glycosaminoglycans in labrocytes


D) a small number of fibers in the fabric matrix

E) high content of basic amorphous substance

12. Participates in the thermoregulation of the newborn... cloth

A) white fat

B) pigmented

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C) mucous membrane

D) reticular

E) brown fat

13. The mucous connective tissue is part of:

A) The amnion

B) umbilical cord

C) walls of the yolk sac

D) Chorion

E) Alantois

14. The strength of connective tissue is determined by:

A) reticulin fibers

B) elastic fibers

C) components of an amorphous substance

D) connective tissue cells

E) collagen fibers

15. The function of pericyte includes:

A) regulation of vascular wall permeability

B) synthesis and secretion of immunoglobulins

C) phagocytosis

D) synthesis and accumulation of melanin

E) synthesis and secretion of elastin and fibrillin

### Tasks

1. Two preparations are stained with a special dye (Sudan III) to detect lipids. One of them shows that the entire cytoplasm of fatty inclusions of different sizes has been stained with Sudan. What types of adipose tissue do these drugs belong to?

2. Two preparations of special types of connective tissue stained with hematoxylin and eosin are given. In one of them, process-shaped cells connected to each other are revealed, in the other - large cells with a narrow rim of the cytoplasm and a flat nucleus along the periphery of the cell. Name the varieties of special types of connective tissue.

## Lesson No. 2

**1.Topic: Cartilage tissues. Bone tissue.**

**2. Purpose:** To learn:

- Identify the varieties of cartilaginous tissues by the structural features of the intercellular substance and know their histofunctional features.
  - Characterize the main stages of cartilage tissue regeneration.
  - Distinguish lamellar bone tissue from coarse fibrous and know their histofunctional features.
- To characterize the main stages of histogenesis and bone regeneration.

### 3. Learning objectives:

Cartilage tissue plays a formative role in the process of embryogenesis, and then a supporting function in children and adults. The properties of this tissue are related to the structural features of their intercellular substance, which can change under the influence of thyroid and parathyroid hormones, functional loads. A comprehensive study of histogenesis, histophysiology and cartilage regeneration is of great importance for doctors, especially traumatologists.

A comprehensive study of histogenesis, histophysiology and bone regeneration is of great importance for doctors, especially traumatologists.

### 4.The main issues of the topic:

- 1 Formulate and write down in a notebook the main functions of cartilage tissues.
- 2 Give the classification of cartilaginous tissues.
3. Mark in the table with the "+" sign the most characteristic type of fibers for the intercellular substance of cartilaginous tissues

Fabrics	Collagen fibers	Elastic fibers
Hyaline		
Elastic		
Fibrous		

4. Fill in the table reflecting the features of the structural organization of the intercellular substance of various types of bone tissue.

Fabrics	Bone plates	Undirected bundles of fibers
Lamellar		
Coarse fiber		

5. Fill in the table describing the structure, function and source of bone tissue cell development.

Cells	Characteristic organelles	Function	The source of development
Osteocyte			
Osteoblast			
Osteoclast			

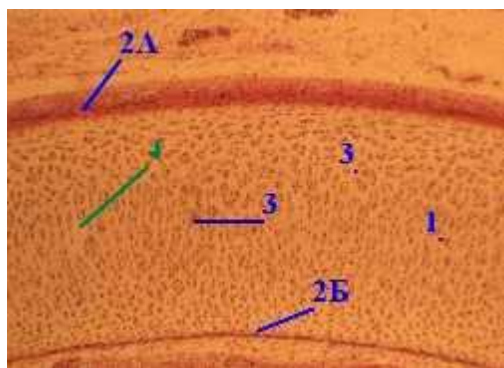
6. Consolidate your knowledge about the structure of the diaphysis of the tubular bone, fill out the table, marking the necessary with a "+" sign.

Structural elements	Periosteum	External common plates	Osteons	Insert plates	Internal common plates	Endost
Compact substance						
Spongy						

### Handout

- 1 Microscopes
- 2 Micropreparations for study

**Hyaline cartilage tissue (cross section of the trachea).** Staining with hematoxylin-eosin.

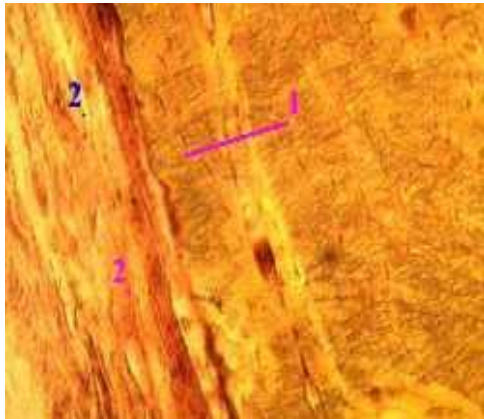


**The preparation is hyaline cartilaginous tissue of the trachea (cross section). Staining with hematoxylin-eosin.**

1. a) On the preparation we see all the membranes of the tracheal wall, including the fibrous cartilaginous membrane (1), covered on all sides with oxyphilic cartilage (2A; 2B).  
b) The basis of this shell is hyaline cartilage.

2. a) The latter contains a large number of chondrocytes (3) - oval cells with a light cytoplasm.  
b) They are enclosed in an intercellular substance (4) of a purple-pink color.

Function: in embryogenesis – formative, supportive.

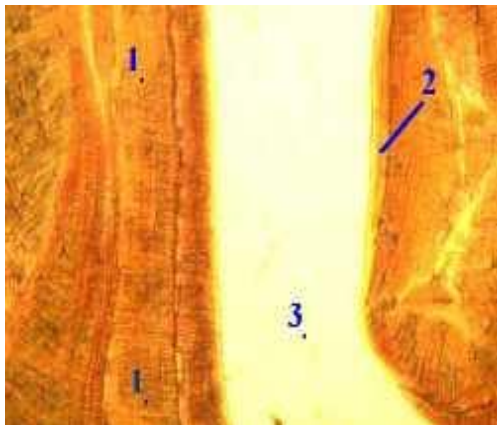


**The preparation is lamellar bone tissue; a cross section of the diaphysis of decalcified tubular bone. Coloring by the Schmorl method.**

Here, the external general plates (1) are in the field of view: they

lie under the periosteum (2) and

surround the bone.

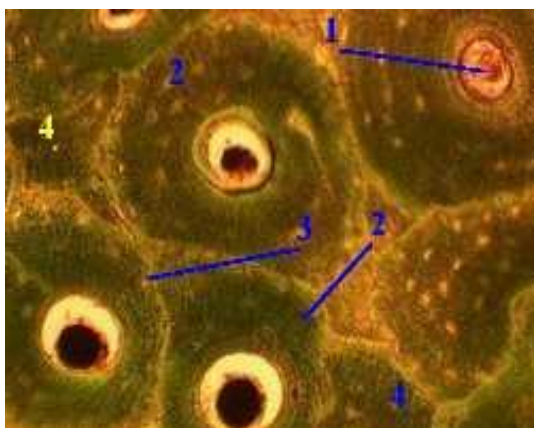


The preparation is lamellar bone tissue; a longitudinal section of the diaphysis of decalcified tubular bone. Coloring by the Schmorl method.

Now we have the internal general plates (1) in front of us. They are

adjacent to the endost (2) and

together with it, they cover the bone marrow cavity (3).



**The preparation is lamellar bone tissue; a cross section of the diaphysis of decalcified tubular bone. Coloring by the Schmorl method.**

1. Now we see the middle, or osteonic, layer of bone.


2. In the center of each osteon is a blood vessel (1) surrounded by several concentric layers of bone plates (2), called osteonic.

3. The osteons are delimited by a resorption (cleavage) line (3).

4. Between the osteons are inset bone plates (4),

which represent the remnants of previous generations of osteons.

Function: Support

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**5. The main forms/ methods/ technologies of training to achieve the LO discipline:** work in small groups, checklist of histopreparations, microphotographs

**6. Types of control to assess the level of achievement of the LO discipline:** the checklist for evaluating the practical lesson.

## 7. Literature:

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## 8. Control


### Questions

1. From what source do cartilage tissues develop?
2. What are the functions of the suprachondria?
3. How are cartilage tissues classified?
4. Draw how cartilage tissues differ from each other.
5. Morphofunctional characteristics, classification.
6. Cellular elements of bone tissue.
7. Intercellular substance of bone tissue, its physico-chemical properties and structure.
8. Coarse-fibrous and lamellar bone tissue.

### Tests

1. Electron microscopic examination of hyaline cartilage reveals cells with a well-developed granular endoplasmic reticulum, the Golgi complex. These cells perform the function of:

- A) formation of intercellular substance
  - B) destruction of the intercellular substance of cartilage
  - C) glycogen deposition
  - D) fat deposition
  - E) trophies of cartilage tissue
2. Elderly people have a decrease in the amount of bone tissue, which indicates the development of osteoporosis. The development of this disease is activated:
- A) osteoblasts
  - B) osteoclasts
  - C) macrophages
  - D) tissue basophils
  - E) osteocytes
3. Isogenic groups of cells are detected on the histological preparation of cartilage tissue. The primary ones in the formation of these groups are:
- A) Type I chondrocytes
  - B) chondroblasts
  - C) prechondroblasts
  - D) Type II chondrocytes
  - E) Type III chondrocytes
4. Articular cartilage, as is known, does not have an epiglottis. During the regeneration process, there is... growth of these cartilages.
- A) does not regenerate
  - B) Appositional
  - C) by superimposing
  - D) Appositional and interstitial
  - E) Interstitial
5. Diagnose a tissue in which cells are placed singly and in isogroups, and fibrous structures are not visible in the intercellular substance.
- A) hyaline cartilage
  - B) smooth muscle
  - C) Epithelial tissue
  - D) fibrous cartilage
  - E) bone
6. The growth of the tubular bone in length is due to:
- A) the epiphyseal plate
  - B) endost
  - C) periosteum
  - D) overgrowing osteons
  - E) articular cartilage
7. The leaching of calcium from the bone matrix enhances:
- A) parathyroid hormone
  - B) calcitonin
  - C) Vitamin D3
  - D) estrogens
  - E) somatotropic hormone
8. A monocyte, getting into the bone tissue, can turn into:
- A) The reticular cell
  - B) Osteocyte
  - B) Osteoblast

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D) Chondroclast

E) Osteoclast

9. Osteocytes. That's right, except:

A) Actively synthesize the intercellular substance

B) Are formed from osteoblasts

B) Receive nutrients from the tissue fluid of the tubules of the bone cavities

D) Are not capable of division

E) Are located in the lacunae of the intercellular substance

10. Osteoclasts. That's right, except:

A) Formed from monocytes

B) Have receptors for parathyroid hormone

B) Emit CO<sub>2</sub> in the area of the corrugated rim

D) Contain many cores

E) Contain a lot of lysosomes and mitochondria

### Tasks

1. Three cartilage tissue preparations have been proposed for study (two are stained with hematoxylin and eosin, one with orsein). What fibers and in what kind of cartilage tissue will be detected with these staining methods? What functional properties of cartilage tissue do they determine?

2. A preparation of hyaline cartilage stained with hematoxylin and eosin has been proposed for study. In the peripheral zone of the organ, two layers are clearly expressed: a denser outer layer and a less dense inner layer. Where are the poorly differentiated progenitor cells of chondrocytes? What histochemical reaction would help to assess the intensity of chondrocyte differentiation?

3. Two bone tissue preparations are given. In one of them, concentric bone plates are clearly visible, in the other there are no bone plates. Determine the types of bone tissue and the location of their localization.

4. An electron micrograph shows a bone tissue cell with an intensively developed granular cytoplasmic network in its cytoplasm. What are the functions of such an ultrastructure of a cell and what is the name of this cell?

5. An electron micrograph shows one of the cells of bone tissue. A large number of lysosomes are observed in the cytoplasm of this cell. What functions is associated with such a structural feature of the cell? What kind of cage is this?

### Lesson No. 3

**1. Topic: Muscle tissue.**

**2. Purpose:**

Learn:

- To give morphofunctional characteristics of muscle tissues.
- Identify smooth and striated muscle tissue.

Explain the structural differences in the organization of slow and fast muscle fibers.

**3. Learning objectives:**

Various forms of movement of the body and its functions are associated with muscle tissues: movement of the body in space, heart contractions and blood circulation through blood vessels, promotion of food masses through the intestines, urination, childbirth, etc.

In addition, muscle tissues deposit energy material. In case of violation of the structure and function of muscle tissues, severe diseases of individual organs or organ systems may occur.

**4. The main issues of the topic:**

1. Give a classification of muscle tissues.
2. Name the structural and functional units of muscle tissues, fill in the table

Muscle tissue	Structural and functional unit	The number of cores in a structural and functional unit	Localization of nuclei (in the center, on the periphery)
Smooth			
Skeletal			
The heart			

Handout:

1. Microscopes
2. Micro-preparations for studying and sketching

**Striated skeletal muscle tissue, a section of the tongue.** Staining with iron hematoxylin



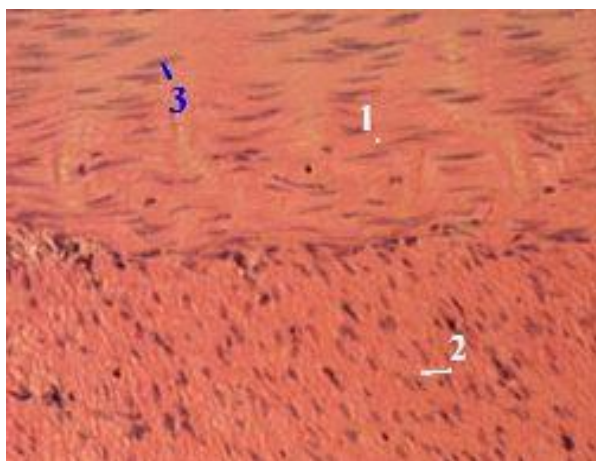
The preparation is striated skeletal muscle tissue, a section of the tongue. Staining with iron hematoxylin.

1. For longitudinally cut fibers, we see transverse striation and

peripheral position of the nuclei (1).

Function: reduction

**Smooth muscle tissue.** Staining with hematoxylin-eosin.



The drug is smooth muscle cells of the small intestine. Staining with hematoxylin-eosin.

1. Bundles of longitudinally (1) and transversely (2) cut smooth myocytes are visible.

2. a) The latter lack transverse striation.

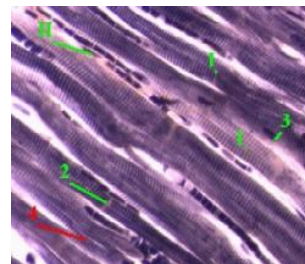
b) The cores (3) occupy a central position.

Function: reduction

**A slice of the myocardium.** Staining with iron hematoxylin.

The drug is a slice of the myocardium. Staining with iron hematoxylin.

1. This picture shows the histological structure of the myocardium with normal coloration.



Function: reduction

**5. The main forms/ methods/ technologies of training to achieve the LO discipline:** work in small groups, checklist of histopreparations, microphotographs

**6. Types of control to assess the level of achievement of the LO discipline:** the checklist for evaluating the practical lesson.

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## 8. Control

### Questions

1. What is the structural and functional unit of striated somatic, cardiac and smooth muscle tissues?

2. What is the structural and functional unit of muscle fiber?
3. List the main proteins that form thick and thin myofilaments.
4. Write the sarcomere formula.
5. What is the "triad" of striated muscle fiber and what is its significance in its vital activity?
6. List the functions of smooth muscle cells.

### Tests

1. In a clinical setting, the patient was diagnosed with a lower leg muscle injury. The tissue regenerates slowly due to:
  - A) mitotic division of myosatellitocytes
  - B) division of the nuclei of muscle fibers
  - C) division and differentiation of fibroblasts
  - D) increasing the number of myofibrils
  - E) an increase in the amount of sarcoplasm
2. A patient with muscle damage of the lower extremities was taken to the trauma center. Reparative regeneration of muscle fibers is possible due to ...
  - A) satellite cells.
  - B) myoepithelial cells.
  - C) myofibroblasts.
  - D) fibroblasts
  - E) myoblasts
3. Identify the tissue, the main structural unit of which is the fiber, which consists of a simplast and satellite cells covered with a common basement membrane:
  - A) skeletal striated muscle
  - B) smooth muscle
  - C) cardiac muscle
  - D) loose connecting
  - E) reticular
4. In the phase of myocardial contraction (systole), the concentration of calcium ions in the sarcoplasm of cardiomyocytes increases sharply. Specify the structures depositing calcium ions:
  - A) L-system
  - B) Lysosomes
  - C) ribosomes
  - D) T - system
  - E) nucleoli
5. The figure schematically shows the sarcomere. At maximum contraction, the H-zone of the sarcomere ...
  - A) disappears
  - B) does not change.
  - C) it is doubled.
  - D) it is halved.
  - E) occupies the entire sarcomere.

6. As a result of myocardial infarction, a section of the heart muscle was damaged, which is accompanied by mass death of cardiomyocytes. Replacement of the formed defect in the structure of the myocardium will provide...

- A) fibroblasts
- B) cardiomyocytes
- C) Myosatellite cells
- D) Epithelial cells
- E) smooth myocytes

7. In the study of striated muscle fiber after mechanical injury, the destruction of thick myofilaments is observed. Pathological changes will be localized in ...

- A) half of disk A
- B) disk A and in disk I
- C) half of the disk I
- D) Disk A
- E) Disk I

8. Skeletal muscle tissue develops from:

- A) myotomes of somites
- B) sclerotomes of somites
- C) dermatomes of somites
- D) splanchnotoma
- E) mesenchyma

9. Myocardial regeneration in an adult occurs due to:

- A) intracellular regeneration
- B) myoblasts
- C) myosatellites
- D) cardiomyocytes
- E) stem cells

10. Caveoles of the smooth myocyte cytolemma perform the function of:

- A) depositing  $Ca^{2+}$  ions
- B) attachment of myosin filaments
- C) fastening of actin filaments
- D) Troponin C fasteners
- E) transmission of excitation between smooth muscle cells

11. Cardiac muscle tissue develops from:

- A) visceral splanchnotome leaf
- B) sclerotoma of somites
- C) dermatoma of somites
- D) myotoma of somites
- E) mesenchyma

12. Regeneration of skeletal muscle tissue occurs due to:

- A) division of myosatellitocytes
- B) division of the nuclei of symplasts

C) stem cell endomysium

D) Perimysium stem cells

13. A sarcomere is a section of the simplast between:

A) two telophragmas

B) two anisotropic disks

C) two isotropic disks

D) two mesophragmas

E) anisotropic and isotropic disks

### Tasks

1. Two muscle tissue preparations are given. In one, oxyphilic fibers with a large number of nuclei under the shell are well visible, and in the other, spindle-shaped cells with an elongated rod-shaped nucleus located in the center of the cell. What kind of fabrics are these?

2. An electronic micrograph of the peripheral portion of the muscle fiber is given, in which a small cell is found located between the plasmolemma and the basement membrane. What is the name of this cell and what is its function?

3. Determine the type of tissue: a) a layer of cells, each of which is surrounded by a basement membrane, b) a layer of cells lying on the basement membrane.

4. Two electron micrographs are given: on one - cells closely adjacent to each other and interconnected by desmosomes, on the other - cells closely adjacent to each other, separated by a basement membrane, but interconnected by nexuses.

5. On one electronic microphotograph of a section of striated muscle fiber, the following picture is shown: thin myofilaments; on another photo, rather wide I-discs are visible in sarcomeres. Explain the functional state of the muscle fibers in both photos.

### Lesson No. 4

#### 1. Theme : Skin. The glands of the skin.

#### 2. Purpose:

- Know the microscopic and ultramicroscopic structure of the skin and its derivatives

#### 3. Learning objectives:

- Learn to identify the structural elements of the skin under a microscope
- Understand the structural features of the skin and its derivatives in various topographic zones
- Have an idea about the structure of hair, skin glands and nails

#### 4.The main issues of the topic:

Complete tasks

1.Specify the tissue composition of the various layers of the skin in the table.

The structure of the skin	Fabric composition
Epidermis Dermis: Papillary layer The mesh layer	

2. Write down the differons of the epidermis cells, indicate the source of their development and function.

Differons of the epidermis	The source of development	Functional value
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3. Mark in the table the structural features of keratinocytes in various layers of the epidermis.

Layers of the epidermis	Features of keratinocytes
Basal Spiky Grainy Sparkly Horn	

4. Write down in a notebook the distinctive features of the structure of "thick" and "thin" skin.

5. Write down the functional value of the listed hair structures in the table.

Hair Structures	functional value
Hair Follicle The hair papilla Hair Root The muscle that lifts the hair	

#### **Handout material**

Microscopes

Micropreparations for study

2. Finger skin. Staining with hematoxylin-eosin

3. The skin of the scalp. Staining with hematoxylin-eosin

**5. The main forms/ methods/ technologies of training to achieve the LO discipline:** work in small groups, checklist of histopreparations, microphotographs

**6. Types of control to assess the level of achievement of the LO discipline:** the checklist for evaluating the practical lesson.

#### **7. Literature:**

##### **Main literature**

1. Inderbir Singh. Textbook of Human Histology. With Color Atlas and Practical Guide/8th Edition. Jaypee Brothers Medical Publishers. 2016. - 302 p. Перевод Гистология человека
2. Dudek Ronald W. Embryology / Ronald W. Dudek. - 5th ed. - [s. l.] : Wolters Kluwer, 2014. - 158 p. Перевод заглавия: Эмбриология
3. Gartner Leslie P. Cell Biology and Histology / Leslie P. Gartner. - 8th ed. - [s. l.] : Wolters Kluwer, 2019. - 436 p. - (BRS. Board Review Series) Перевод заглавия: Клеточная биология и гистология

##### **Additional literature**

Textbook of Human Histology. Inderbir Singh / Sixth Edition / Inderbir Singh 2010. - 386 p. Перевод Учебник по гистологии человека

##### **Electronic publications**

1. ATLAS OF HISTOLOGY with Functional Correlations. Thirteenth Edition, Wolters Kluwer. 2017. - 1102 p.
2. Theory and practice of Histological techniques. Eighth edition. Elsevier Limited. 2019. - 554 p.

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## 8.Control

### Questions

1. Morphofunctional characteristics of the skin and its derivatives
2. Sources and course of embryonic development
3. The general outline of the structure and tissue composition of the skin
4. Skin receptors
5. Skin glands: sweat, sebaceous
6. The structure of the hair and nail

### Tests

1. Receptor functions are possessed by:
  - A) epithelial cells (ciliated)
  - B) goblet cells
  - C) neurosecretory cells
  - D) endocrine cells
  - E) Clara cells
- 2.Epithelial cells connect to each other using:
  - F) desmosis
  - G) adhesion
  - H) a semi-cosmos
  - I) insert discs
  - J) synapse
- 3.In the epidermis, stem cells are located in the ... layer.
  - A. basal
  - B. spiny
  - C. granular
  - D. shiny
  - E. horny
4. Type of secretion of sebaceous glands of the skin:
  - A. holocrine
  - B. eccrine
  - C. microapocrine
  - D. macroapocrine
  - E. merocrine

5. Myoepithelial cells are found in ... glands
  - of A. mesodermal endocrine
  - B endodermal exocrine
  - B ectodermal endocrine
  - D ectodermal exocrine
  - D endodermal endocrine
6. The cosmetologist was approached by the patient with a request to deprive him of a tattoo on his shoulder. Determine the substance that makes this kind of "painting" possible.
  - A. hyaluronic acid
  - B. fibronectin
  - C. gamma globulin
  - D. elastin
  - E. heparin
7. Aging of human skin is characterized by the formation of wrinkles and folds. This condition causes changes in ... .
  - A. amorphous substance
  - B. collagen fibers
  - C. epidermis
  - D. elastic fibers
  - E. subcutaneous fat
8. On the histopreparation, the terminal sections of the glands formed by cells with a centrally placed round nucleus and basophilic cytoplasm are determined. Determine the type of terminal sections.
  - A. Sebaceous
  - B. Mucous
  - C. Mixed
  - D. Serous (protein)
  - E. Seromucous

### Tasks

1. Microscopic analysis of two biopsies of the hand skin was performed. In one, five distinct layers of the epidermis and simple glands in the dermis were found; in the other, the epidermis was thin, the layering was poorly traced, the dermis contained hair roots, hair follicles and two types of simple glands. Which areas of the skin were analyzed? What information is missing to determine the glands and clarify the morphological diagnosis of biopsies?
2. Under the influence of ultraviolet rays, most of the skin of Europeans turns brown. Upon termination of the action of ultraviolet light, it brightens after a while, with the exception of certain areas (around the nipple of the breast, scrotum, etc.). What determines the skin color that changes under ultraviolet irradiation? Which cells are involved in this?
3. Which area of the skin should the researcher take to study the glands with apocrine and holocrine secretion? What morphological features are characteristic of these glands?
4. In a comparative analysis of the structure of the skin of the finger and the scalp, it was noted that the skin of the finger has more developed granular, shiny and horny layers of the epidermis, as well as the dermis. Can this be explained by the functional features of the skin of various parts of the body and how?