


ОҢТҮСТІК ҚАЗАҚСТАН <b>MEDISINA</b> <b>AKADEMIASY</b> «Оңтүстік Қазақстан медицина академиясы» АҚ		 SOUTH KAZAKHSTAN <b>MEDICAL</b> <b>ACADEMY</b> АО «Южно-Казахстанская медицинская академия»
Department of «Topographic anatomy and histology»		52-11
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## LECTURE COMPLEX

Discipline: "Musculoskeletal system and skin in norm"

Discipline code: MSSN 2211


EP name and code: 6B10117 – “Dentistry”

Volume of training hours/credits: 30/1

Course and semester of study: 2/3

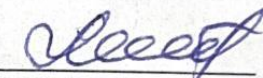
Length of lectures: 2 hours.

Shymkent, 2024

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The lecture complex was developed in accordance with the working curriculum of the discipline (syllabus) "Musculoskeletal system and skin in normal" and discussed at the 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.

## Lecture No. 1.

### 1. Topic: Connective tissues.

**2. Purpose:** Knowledge of the structure and function of various types of connective tissues that make up most organs and accompany blood vessels is necessary to understand the basic processes of vital activity of a healthy organism, because connective tissue takes an active part in metabolic, protective, reparative processes and in maintaining homeostasis.

### 3. Lecture abstracts:

#### 1. Fabric as a system.

Tissue is a historically formed system of cells and non—cellular structures (intercellular substance) that have a common structure and are specialized for performing certain functions

#### 2. The structure of loose fibrous unformed connective tissue, its cellular composition, localization in the body.

Loose fibrous connective tissue is found in all organs, as it accompanies blood and lymph vessels and forms the stroma of many organs. Intercellular substance: It consists of collagen and elastic fibers, as well as a basic (amorphous) substance.

#### 3. The structure of dense, decorated and unformed connective tissue, a feature of the structure of the intercellular substance.

Dense fibrous unformed connective tissue is characterized by the arrangement of bundles of collagen fibers in three different planes, which intertwine with each other, forming a three-dimensional network. The content of the main amorphous substance is small, the cells are few. Such tissue forms capsules of various organs and a deep (mesh) layer of the dermis. Dense fibrous shaped connective tissue contains thick bundles of collagen fibers located parallel to each other (in the direction of the load), and a small amount of the main amorphous substance. The cell content is low; among them, the vast majority are fibrocytes. The described structure has tissue forming tendons, ligaments, fascia and aponeuroses.

#### 4. The main morphofunctional features of skeletal tissues.

Skeletal connective tissues include cartilage and bone tissues combined into a single group based on a number of features: a common function - a support one; a common source of development in embryogenesis (mesenchyma); structural similarities - both cartilage and bone tissues are formed by cells and a predominant intercellular substance having significant mechanical strength, which is functionally leading, since it ensures that these tissues perform a supporting function.


### 4. Illustrative material

- color micrographs of histopreparations
- diagrams, drawings

### 5. 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

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3. Gartner Leslie P. Cell Biology and Histology / Leslie P. Gartner. - 8th ed. - [s. l.] :Wolters Kluwer, 2019. - 436 p. - (BRS. Board Review Series)Переводзаглавия: Клеточнаябиологияигистология

#### **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.
3. Textbook of HumanHistology.With Color Atlas and Practical Guide/8 thEdition.Jaypee Brothers Medical Publishers .2011.-386 p.
4. USMLE Step 1.Lecture Notes 2018.by Kaplan.2018.-425 p/
- 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/>

#### **6. Control questions (feed back):**

1. Definition of tissues?
2. The embryonic beginnings of tissues?
3. Morphological characteristics of histiocytes, plasma cells, and labrocytes?
4. Are the fibers predominant in loose and dense fibrous connective tissue?
5. Morphofunctional characteristics of collagen elastic and reticular fibers?

#### **Lecture No. 2.**

##### **1. Topic: Skin and its derivatives.**


##### **2. Purpose:**

- To give an idea of the structure, development and functional significance of the receptor cells of the skin and its derivatives

##### **3. Lecture abstracts**

The general plan of the skin structure the skin consists of two parts: the epidermis is a multilayer flat keratinizing epithelium. This epithelium is of the epidermal type, i.e. it develops from the cutaneous ectoderm. The second part is the dermis. The dermis is a connective tissue that develops from dermatomes of mesoderm somites. There are two layers in the dermis: papillary - it is a loose fibrous connective tissue located immediately under the epidermis and extending in the form of connective tissue papillae into the epithelium. Deeper is the mesh layer of the dermis, dense unformed connective tissue. The dermis creates a mechanical support in the skin, ensures its extensibility and thickness. Under the dermis is subcutaneous adipose tissue or hypoderma - white adipose tissue that provides skin mobility. 2 According to the thickness and localization, human skin is divided into thick and thin.

The spiked layer of the epidermis consists of spiked keratinocytes arranged in several rows (10 or more in thick skin). Keratinocytes of this layer have a polygonal shape and are connected to each other by desmosomes located in the area of "spikes" - protrusions of

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plasmolemmas of cells of the thorny layer. In the cytoplasm of keratinocytes of this layer, compared with basal cells, the number of melanosomes and polyribosomes increases, and keratin tonofilaments form more powerful bundles - tonofibrils.

The stratum corneum is the thickest layer of the epidermis. It is represented by the most differentiated keratinocytes – horny scales, which can be considered as post-cellular structures since they do not contain nuclei and ordinary organelles and are almost completely filled with keratin filaments. The horny scales have the shape of 14 facets; they are densely packed in columns; surrounded by a very thick and dense cell membrane 15 nm thick, which ensures the resistance of cells to the action of chemical agents, and also indicates complete keratinization of the epithelium.

**Melanocytes** The second largest cells of the epidermis are melanocytes (10-25%). Melanocytes - alien cells - are embedded in the neural crest, migrate to the epithelial layer and are embedded in it. Melanocytes have a process-like shape, their rounded bodies are located in the basal layer 5 of the epidermis, and the processes extend into the spiny layer, forming contacts with keratinocytes of the spiny layer. The specific function of melanocytes is associated with the synthesis of the pigment melanin, which is contained in numerous structures surrounded by a membrane - melanosomes.

There are three types of glands in the skin: sweat, sebaceous and lactic. 7 Sweat glands There are 2 types of sweat glands: 1. Merocrine - up to 3 million, found in almost all areas of the skin. 2. Apocrine - have a certain localization (armpits, anogenital area, skin of the eyelids, external auditory canal). Merocrine Sweat Glands The merocrine sweat gland is a simple unbranched tubular gland. The terminal part of it is twisted in the form of a glomerulus and is located on the border with the hypoderm. The excretory duct, twisting, opens onto the surface of the epidermis. The terminal section of such glands consists of 3 types of cells. 1 type. Light - they have a well-developed smooth EPS, the cytoplasm contains a lot of lipids.

Hair is distinguished by long, bristly, fluffy hair. The hair consists of a root and a shaft. The root is a part of the hair located in the thickness of the skin. The visible part of the hair is the shaft. The hair root consists of epithelial cells organized in three layers: 1) the medulla forming the central part is represented by large vacuolated cells; 9 2) the cortical substance forming the peripheral part is represented by cubic cells undergoing the process of keratinization; 3) the cuticle is a very thin outer layer of the hair, represented by flat epithelial cells.

**Nails.** Nails are keratinized plates located on the posterior surfaces of the distal phalanges. The nail plates consist of 2 parts:

- 1) the nail body is the visible part of the nail
- 2) the nail root is an invisible part of the nail, hidden by a skin fold, which is an ordinary epidermis. The stratum corneum of this fold forms the nail skin or cuticle. The nail plate consists of densely packed, interdigitating, nucleoleless and ordinary organelles of horn cells – corneocytes. The nail plate is located on the nail bed, represented by a continuation of the 12 basal and spiny layers of the epidermis and the underlying well-vascularized dermis. The proximal part of this epithelium is the nail matrix.


#### **4. Illustrative material**

- color micrographs of histopreparations
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#### **5. Literature:**

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#### **6. Control questions (feed back):**

1. Identify the sources of development and the general plan of the skin structure.
2. To interpret the features of the structural organization of the skin in various parts of the body.
3. Interpret the structural foundations of the realization of the protective function of the skin.
4. To interpret the structural foundations of the receptor function of the skin.
5. To determine the structural manifestations of age-related skin changes, the possibilities of physiological and reparative regeneration.