


ОҢТҮСТІК ҚАЗАҚСТАН MEDISINA AKADEMIASY «Оңтүстік Қазақстан медицина академиясы» АҚ		SOUTH KAZAKHSTAN MEDICAL ACADEMY АО «Южно-Казахстанская медицинская академия»
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LECTURE COMPLEX

Discipline: «The musculoskeletal system and skin are normal»

Discipline code: ODAKN 2211.

Name of EP: 6B10117 - «Dentistry»

Number of hours/credits: 60 hours/2 credits

Year and term of the study: Year – II, term– III

Lectures: 4 hours

Shymkent, 2023

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Lecture №1

1. Theme: Subject and tasks of anatomy. General characteristics of tissues, organs, body systems. General anatomy of the musculoskeletal system.

2. Aim: Define anatomy as a science. To study the problems of anatomy. Prove that the anatomy studies the structure of a human taking into account biological patterns. To study the initial stages of human embryogenesis.

3. Theses of the lecture:

Human anatomy is the science about origin and development, the forms and structure of the human body. Anatomy studies the external forms and proportions of the human body and its parts, individual organs, their construction. The tasks of anatomy include the study of the main stages of human development in the process of evolution, the features of the structure of the body and individual organs in different age periods, the formation of the human body in an environment.

To understanding the complex human body in anatomy, are used the following techniques:

- autopsy according to the regional principle;
- embalming of separate organs and whole corpses;
- cuts of body parts (according to N. I. Pirogov) or sections of organs;
- injections of hollow organs with coloring substances and solidifying oils, followed by the manufacture of corrosive preparations;
- manufacture of dry preparations;
- enlightenment of tissues and organs;
- Plastination of organs and whole corpses;
- X-ray anatomy;
- MRI;
- histotopography;
- somatoscopy;
- Experiments.

Normal anatomy is an integral part of the biological sciences. In the biological sciences, two groups of disciplines can be distinguished: morphology and physiology. Morphological sciences include anatomy, histology, embryology, comparative anatomy. These sciences are engaged in studying the shape and structure of living organisms, the laws of their development and interaction with the environment.

Anatomy is a fundamental discipline in the medical education system, as it creates a "foundation" for the subsequent study of clinical disciplines.

The cell is an elementary, structural, functional and genetic unit of tissue.

Cells in the body can not exist in isolation, in conjunction with the intercellular substance they form tissues. There are four main morphofunctional groups of tissues: epithelial, connective, muscular and nervous. Tissues are involved in the construction of organs. From organs added up the systems of organs.

Distinguished the following systems of organs:

1. Musculoskeletal system.
2. The digestive system.
3. Respiratory system.
4. Cardiovascular.
5. Genitourinary system.
6. Endocrine system.
7. The nervous system.

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8. Cover system.

The development of the human embryo in the oviduct and the uterus is conditionally divided into five periods:

1. Fertilization, zygote formation.
2. Cleavage.
3. Gastrulation.
4. Separation of the fetus's body.
5. Development of organs and tissues.

4. Illustrative material: tables, slides, dummies, tablets, skeleton.

5. Bibliography:

In english:

main:

1. Atlas of Human Anatomy: Netter F.N.; Saunders/Elsevier, 2014.
2. Gray's Anatomy for Students. Drake R.L., Vogl A. W., Mitchell A.W.M.; Churchill Livingstone/ Elsevier 2014.

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1. Chumny S. Sinnatamby. Last's Anatomy. Regional and Applied.
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6. Test questions (feedback):

1. What is human anatomy? Give the definition.
2. What does anatomy study?
3. Name the types of anatomy.
4. Types of tissues. What are the functions of each tissue?
5. What is an organ, system of organs, apparatus of organs?
6. What are the periods of embryo development?

Lecture №2

1. Theme: General overview of the head bones. Bones of the brain and facial skull. Anatomy and topography of the skull as a whole. Development of the human skull. Age, gender and typical features of the structure of the human skull.

2. Aim: To study the topography and development of the skull. To get acquainted with the age, sex and typical features of the structure of the skull.

3. Theses of the lecture:

The skeleton of the head - the cranium (cranium) performs two main functions in the body. It is a container and at the same time a defense for the brain and senses. The skull bones are involved in the formation of the skeleton of the primary divisions of the digestive and respiratory systems. Isolate the brain and facial skull. The human brain includes: unpaired occipital, cuneate,

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frontal and latticed bones and paired temporal and parietal bones. The facial skull includes paired bones (upper jaw, lower nasal concha, palatine, malar, nasal, tearful) and unpaired (vomer, lower jaw, and sublingual). The cavity of the cerebral cranium is a finite extension of the spinal canal, it includes a brain with membranes and vessels. The bones of the roof of the skull develop endemally, i.e. directly from the connective tissue. Bones of the base develop on the basis of cartilaginous locks. The base of the skull in phylogeny passes through three successive stages of development: connective tissue, cartilaginous, bone. Cartilaginous tissue appears only at the base of the skull, near the anterior section of the chord. Sites of cartilage, lying next to the chord, were called parachordal, ahead of the chord - prechordovyh plates and skull rails. These cartilages coalesce into one common plate with a hole for the pituitary and with cartilaginous auditory capsules. Subsequently, the cartilages at the base of the skull are replaced by a bone, except for small areas (synchondrosis).

The facial section of the skull develops from the mesenchyma adjacent to the primary section of the primary gut. In the mesenchyme between the gill pockets are formed cartilaginous gill arches.

The first visceral arch (maxillary) gives rise to two auditory ossicles (a malleus and an anvil) and the so-called Meckelian cartilage. The second visceral arch (sublingual) is the stapes, the styloid process, the small horns of the hyoid bone. Large horns and body are formed from the third visceral (first branchial) arch. Variants and anomalies occur quite often. Each skull has individual features. For individual characteristics of the shape of the skull, it is customary to determine its dimensions: longitudinal, transverse, high-altitude. The shape and size of the head correspond in the process of their growth and development of the individual form of the brain. The external form depends on the development of the muscles, the organ of vision. Sexual differences in the skull are insignificant. No matter how changeable the shape of the human skull, these changes do not affect his mental abilities.

The main difference between an animal and a plant is adaptation to the environment through movement. The movement of the body is carried out by the musculoskeletal system, which in turn consists of 3 organ systems: 1) bones, 2) their joints and 3) muscles with their auxiliary devices. In the process of phylogenesis, 2 types of bone connection developed: the initial one - continuous with a limited range of movements and the later - discontinuous, which made it possible to make extensive movements (joints) of these forms, there is a transition - from continuous to discontinuous or vice versa, which is called half-joint - symphysis.

Continuous compounds are divided into: 1) syndesmosis, 2) synchondrosis and 3) synostosis. In each joint, there are: 1) articular surfaces, 2) articular capsule and 3) articular cavity. In addition to the main ones, auxiliary elements can be found in the joints that provide optimal joint function. The main ones are: intraarticular ligaments, intraarticular cartilage, articular lips, synovial folds, sesamoid bones and synovial bags.

In the joints of the movement, the three main axes (frontal, sagittal and vertical) are made around. The joints are classified according to the following principles: 1) according to the number of articular surfaces; 2) in the form of articular surfaces; and 3) in function.

4. Illustrative material: tables, slides, dummies, tablets, skeleton.

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6. Test questions (feedback):

1. Which bones develop from cartilages of the first and second visceral arches?
2. At what age do the paranasal sinuses begin to form??
3. Anomalies in the development of the skull bones.
4. Name the forms of the skull.
5. What are the differences between the male skull.
6. What signs have appeared at a skull of the human due to vertical position?
7. Types of bone connection.
8. What is syndesmosis?
9. Types of syndesmosis.
10. Types of synchondrosis.
11. What are synovial joints of bones?
12. Types of movement in the joints.
13. Classification of joints by shape, by function, by the number of articular surfaces.

Lecture № 3

1. Theme: Concept of bone joints. Development of connections. Types of bone joints. Classification of bone joints.

2. Aim: Find on the models and study the structure of the joints of the bones of the trunk, vertebral column with skull, temporomandibular joint. To study the structure of the joint of the bones of the upper and lower extremities and find on models.

3. Theses of the lecture:

Classification of joints can be divided: 1) by the number of joint surfaces; 2) in the form and 3) function of articular surfaces.

Classification by number of articular surfaces:

1. A simple joint, with only 2 articular surfaces, for example interphalangeal joints;
2. A complex joint having more than two articulating surfaces, for example an elbow joint; A complex joint consists of several simple joints in which movements can be made separately; the presence in the complex joint of several joints determines the commonality of their ligaments;
3. The complex joint containing the intraarticular cartilage, which divides the joint into 2 chambers, divides into chambers or completely if the articular cartilage has the shape of a disk (for example, in the temporomandibular joint), or incompletely if the cartilage takes the form of a semilunar meniscus (for example, in the knee joint);
4. The combined joint is a combination of several joints isolated from each other, located separately from each other, but functioning together; for example, both temporomandibular joints, proximal and distal ray-elbow joints, etc;

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The function of the joint is determined by the number of axes around which movements in the joint are made. The number of axes depends on the shape of its articulating surfaces. Consequently, between the number of axes and the form of the articulating surfaces there is a complete correspondence: the shape of the articular surfaces determines the character of the joint movements, and vice versa, the character of the movements of this joint causes its shape. Proceeding from this, it is possible to outline the following single anatomical and physiological classification of joints.

Uniaxial joints.

1. **Cylindrical joint**, *art. trochoidae*. Cylindrical articular surface, the axis of which is located vertically, provides movement around one vertical axis - rotation, *rotatio*.
2. **Block joint**, *gynglymus* (example-interphalangeal joints of fingers).

Biaxial Joints.

1. **Ellipsoidal joint**, *articulatio ellipsoidae*. The articulated surfaces are segments of an ellipse; one of them convex, oval in shape with unequal curvature in two directions, the other, respectively, concave.
2. **Condylar joint**, *articulatio condylaris* (example - the knee joint). The condylar joint has a convex articular head in the form of a protruding, rounded process closely resembling an ellipse called the condyle, from which the name of the joint. The condyle corresponds to a depression on the junction surface of another bone, although the difference in magnitude between them may be significant.
3. **Saddle joint**, *art. sellaris* (example, carpometacarpal joint of the first finger). This joint is formed by two saddle joints, sitting on top of each other, one of which moves along and across the other.

Multi-axe joints

1. **Spherical joint**, *art.spheroidae*. In this joint: 1) around the front axis is committed flexion, *flexio*, and extension, *extensio*; 2) around the sagittal axis is committed abduction, *abductio*, and adduction, *adductio*; 3) around the vertical axis is committed rotation, *rotatio*, inwards, *pronatio*, and out, *supinatio*.

2. **Flat joints**, *art.plana*, have almost flat articular surfaces.

Toughest joints-amphiarthroses, under this name a group of articulations with a different form of articular surfaces is distinguished, but similar in other characters.

The connection of the vertebral column to the skull is a combination of several joints, allowing movement around the three axes, as in the globular joint.

Atlanta-occipital joint, *articulatio atlantooccipitalis*, refers to condylar; it is formed by two condyles of the occipital bone and the upper articular fossa of the atlas.

In this joint there is movement around two axes: frontal and sagittal. Around the frontal axis, nodding movements occur; flexion and extension of the head forward and backward, and around the second axis - head inclinations to the right and left.

Temporomandibular joint, *articulatio temporomandibularis*, is formed: *caput mandibula*, *fossa mandibularis* and *tuberculum articulare*. The articulating surfaces are supplemented by the interarticular fibrous cartilage lying between them, *discus articularis*, which by its edges fuses with the capsule of the joint, divides the joint cavity into 2 separate sections. The joint capsule is attached along the edge of the fossa mandibularis to the fissura petrotumpanica, enclosing the tuberculum articular, and below covers the collum mandibulae.

Connections of the bones of the trunk:

1. **Sterno-clavicular joint**, *articulatio sternoclavicularis*, is formed by the sternal end of the clavicle and clavic notch of the sternum

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In the joint cavity is located an articular disc, *discus articularis*.

The joint capsule is strengthened with ligaments: in front and behind *ligg.sternoclavicularis* *anterior* and *posterior*, from below - *ligg.costoclaviculare* and from above - *ligg. Interclaviculare*. The joint resembles a globular articulation.

2. Acromioclavicular joint, *articulatio acromioclavicularis*, connects the acromion and acromial end of the clavicle, which touch each other ellipsoidal surfaces, which are often separated by an articular disc, *discus articularis*. The joint capsule is reinforced, *lig. acromioclaviculare*, and all the articulation is a powerful *lig. coracoclaviculare*, stretched between the lower surface of the clavicle and *processus coracoideus scapulae*. In the deepening of the ligament, made of loose fiber, often there is a synovial bag.

3. Ligament bundles: The scapula has three proper ligaments that are not related to the joints. One of them, the coracoid-acromial ligament, *lig. coracoacromiale*, is stretched in the form of the arch over the shoulder joint from the anterior edge of the acromion to the *processus coracoideus*, the other, the superior transverse ligament of the scapula, *lig. transversum scapulae superius*, stretches above the scapula, turning it into a hole, and the third ligament, *lig. transversum scapulae inferius*, weaker, comes from the base of the acromion through the neck of the scapula to the posterior margin of the cavity; under it passes *a.suprascapularis*.

Shoulder joint, *articulatio humeri*, connects the humerus, and through it - the entire free upper limb with a belt of the upper limb, in particular with the scapula. The head of the humerus, which participates in the formation of the joint, has the shape of a ball. Articulated with her articular cavity of the scapula is a flat fossa. On the circumference of the cavity is the cartilaginous labrum, *labrum glenoidale*, which increases the volume of the cavity without decreasing mobility, and also softens tremors and shocks during the movement of the head.

Elbow joint, *articulatio cubiti*. In the elbow joint, 3 bones are articulated: the distal end of the humerus and the proximal ends of the ulna and radius bone. Articulating bones form 3 joints, enclosed in one capsule.

- *Art.humeroulnaris*.
- *Art.humeroradialis*.
- *Art.radioulnaris proximalis*.

Connections of the forearm bones with each other. These bones are connected at the ends by combined joints - *art.radioulnaris proximalis* and *art.radioulnaris distalis*. For the rest of the length they are connected by an interosseous membrane. *Arth.radioulnaris proximalis* is included in the elbow joint capsule. *Art.radioulnaris distalis* formed by *circumferentia articularis* the head of the ulna and *incisura ulnaris radius*. In the formation of this articulation also takes part the cartilaginous plate of triangular shape, the articular disc, *discus articularis*, which is broadly attached to the lower edge of the *incisura ulnaris*, and the apex - to the elongated process of the ulna. The distal radiovolume joint belongs in shape to the cylindrical ones with a vertical axis of rotation and is functionally combined with the same proximal joint as a single combined joint.

The interosseous membrane, *membrana interossea*, is a strong fibrous glossy plate. In the upper part of the membrane there is a hole, where passes *a. interossea posterior*, and in the lower part passes *a. interossea anterior*.

Connections of the pelvic bones. Individual bones connected by cartilage merge into a single bone formation - the pelvic bone, so that *synchondrosis* passes into *synostosis*. However, *synchondrosis* at the junction of both pubic bones does not go into *synostosis*, but becomes *symphysis*.

1. **The sacroiliac joint**, *articulatio sacroiliaca*.
2. **Pubic symphysis**, *sympphysis pubica*.

3. lig. sacrotuberale and lig. sacrospinale

4. Obturatoric membrane, membrana obturatoria

Hip Joint, art. coxae, is formed from the side of the pelvic bone with a hemispherical acetabulum, acetabulum, more precisely its facies lunata, into which the femoral head enters.

Knee-joint, art. genus, is the largest and, at the same time, the most difficult of all articulations. This is due to the fact that it is in this place that the longest levers of the lower limb that make the greatest movement when walking are articulated. His formation involves the distal end of the femur, the proximal end of the tibia and the patella.

Joints of the lower leg bones.

Both bones of the shin are connected to each other: proximally by the joint, and distally by the connective tissue fusion (syndesmosis). The rest of the bone is also connected by syndesmosis. *The interosseous membrane, membrana of the interossea cruris, is stretched between the margo interossea of both bones. Closing almost entirely the entire space between the bones, the interosseous membrane has in its upper part an opening for the vessels and nerve.*

Joints of the bones of the lower leg with the foot and between the bones of the foot.

1. Ankle joint, *art. talocruralis*
2. In the articulations between the bones of the tarsus, the 4 joints:
 - a) Subtalar joint, *art. subtalaris*,
 - б) Tar-calcaneus-navicular joint, *art. talocalcaneonavicularis*,
 - в) Heel-cube joint, *art. calcaneocuboidea*;
 - г) Clynoid-like joint, *art. cuneonavicularis*.
3. Tarsus-metatarsal joints, *artt. tarsometatarsae*.
4. Articulation of the bones of the fingers.
 - a) metatarsophalangeal articulations, *artt. metatarsophalangeae*.
 - б) interphalangeal joints, *art. interphalangeae pedis*.

Foot as a whole. The foot is arranged and functions as an elastic, movable arch. In the general structure of the foot, 5 longitudinal arches and 1 transverse are distinguished. The longitudinal arches start from one point of the calcaneus and diverge forward along the convex upward radii corresponding to the five rays of the foot.

4. Illustrative material: tables, slides, dummies, tablets, skeleton.

5. Bibliography:

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2. Gray's Anatomy for Students. Drake R.L., Vogl A. W., Mitchell A.W.M.; Churchill Livingstone/ Elsevier 2014.

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6. Test questions (feedback):

1. List the bends of the spinal column.
2. What are the connections of the vertebrae with each other.
3. What are the shapes and sizes of the chest.
4. List the features in the structure of the temporomandibular joint.
5. What movements are possible in the temporomandibular joint?
6. What bones are the clavicle and shoulder blade connected to?
7. What are the structural features of the shoulder joint that allow you to perform various movements.
8. What are the sizes of the large and small pelvis. What practical significance is attached to these sizes?
9. What are the arches of the foot.

Lecture №4

1. Theme: General myology. Muscle as an organ. Classification of muscles. Accessory apparatus of muscles. Biomechanics of muscles.

2. Aim: To study the structure, development, classification and biomechanics of skeletal muscles. To study the structure, development, classification and biomechanics of the muscles of the head, neck, body. To study the structure, development, classification and biomechanics of the muscles of the upper and lower extremities.

3. Theses of the lecture:

In the body of higher vertebrates and humans, there are two types of muscle tissue: smooth (undistorted) and striated (striated). The past includes the skeletal and cardiac. Smooth muscle tissue is a part of the walls of the vessels and most internal organs, forming a muscle shell in them.

Skeletal (transversely striated) muscles are an active part of the musculoskeletal system, they attach to the bones, drive them, participate in the formation of the walls of the body cavities, are part of the walls of some internal organs (pharynx, upper part of the esophagus, larynx), are among auxiliary eye organs (eyeball muscles), exert an effect on the auditory ossicles in the tympanic cavity.


Muscular bundles form the fleshy part of the organ - the abdomen, the venter, which passes from two sides into the tendon. There is no unified classification of skeletal muscles. Muscles are divided according to their position in the human body, in shape, direction of the muscle fibers, functions, in relation to the joints, in size. Muscles contracting, perform their functions with the participation of auxiliary apparatus. These include fascia, vagina of tendons, synovial bags and muscle blocks.

The structural and functional unit of the muscle is the striated muscle fiber. The latter is covered externally by a shell (sarcolemma), inside it contains nuclei, sarcoplasm, various organelles of general use and special contractile elements - myofibrils.

The action of the muscles is carried out according to the type of levers, since the bones are joined together by joints. There are three kinds of levers: the lever of balance, the lever of force and the lever of speed.

By function and location of the head muscles are divided into: chewing, mimic and the muscles of the cranial vault.

Muscles of the cranial vault. Almost the entire cranial vault is covered with a thin supracranial muscle, m.epicranius, having an extensive tendon part in the idea of a tendon helmet, or

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supracranial aponeurosis, galea aponeurotica, and muscular, disintegrating into three separate muscular abdomens: 1) the front, or frontal abdomen, starts from the skin eyebrows, 2) the posterior, or occipital, abdomen begins from linea nuchae superior; 3) the lateral abdomen is divided into three small muscles, suitable for the ear: front-

m.auricularis anterior, on top - m.auricularis superior, and behind - m.auricularis posterior. Function: raises an eyebrow to the top, making it arch-shaped, and forms transverse folds on the forehead.

Mimic muscles, in contrast to the skeletal, do not have a double attachment on the bones, but necessarily with two or one end are woven into the skin or mucous membrane. The facial muscles are thin and small muscle bundles that are grouped around the natural openings: mouth, nose, eye socket and ear, taking part in the closure or, conversely, the widening of these holes. Closures, sphincters are usually located around the outlets in an annular manner, and dilators, dilators - radially.

Chewing muscles. The four chewing muscles on each side are connected genetically (they originate from one branchial arch - mandibular), morphologically (they all attach to the lower jaw, which is moved by the appropriated abbreviations) and functionally (they perform chewing movements of the lower jaw, which determines their location).

Neck muscles. The muscles of the neck include muscles of different origin: 1) derivatives of the gill arches, 2) autochthonous muscles of the neck. The autochthonous muscles of the neck are the remains of the ventral musculature, the distribution of which was influenced by two important factors: the reduction of the ribs and the reduction of the body cavity. As a result, a part of the autochthonous muscles of the neck of a man disappeared and only the stair, pre-invertebrate and chin-hyoid muscle were preserved. Accordingly, they are innervated by the anterior branches of the cervical spinal nerves.

Topographically, the neck muscles are divided into the following groups: superficial, middle or muscle, hyoid bone and deep muscles.


The muscles of the back are numerous. The main part of them is formed by autochthonous musculature, which originated from the dorsal parts of the myotomes of the trunk, on which the muscles are shifted to the back from the head and from the upper limb, as a result of which they are located in two layers - a shallow and deep.

The muscles of the chest are divided into muscles that begin on the surface of the chest and go from it to the waist of the upper limb and to the free upper limb, and to the muscles of the chest that are part of the walls of the chest cavity. In addition, we describe here the diaphragm, which limits the chest cavity from below and separates it from the abdominal cavity.

Diaphragm, is a thin muscle, domedly arched, separating the thoracic and abdominal cavities. Her muscle beams, starting all around the lower aperture of the chest, converge into a thickened tendon stretch. In the muscular part of the diaphragm, the lumbar, rib and sternum parts.

The abdominal muscles occupy the gap between the lower aperture of the thorax and the upper edge of the pelvis. They surround the abdominal cavity, forming its walls. There are lateral, anterior and posterior muscles. The lateral muscles are three broad muscle layers lying on top of each other, the tendon stretching of which, forming a vagina for the rectus abdominis muscle, connects in front of the abdomen along a so-called white line.

The muscles of the upper limb carry out the movement of the hand necessary to perform its function as an organ of labor. The musculature of the upper extremity belt attaches it to the skeleton of the trunk, forming a muscular junction of bones and rushing to its bones as the center on all sides - from the head, chest and back.

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Muscles of the upper limb.

Accordingly, the spherical shape of the shoulder joint and its movements in all directions (multi-axial joint) of the muscles that serve it, attached to the humerus, are rapolated along all sides. They are divided topographically into the rear and front groups.

Muscles of the shoulder. The muscles of the shoulder retain in the simplest form the initial arrangement of the musculature of the limbs and are divided according to the classically simple scheme: two flexors in the front surface and two extensors on the posterior surface.

Muscles of forearm. In their function they are divided into flexors and extensors. In addition, there are still pronators and insteps that produce the corresponding movements of the radius. According to the situation, all these muscles fall into two groups: the anterior one, which includes flexors and pronators, and the back, which consists of extensors and insteps. Each group consists of a surface and a deep layer. The superficial layer of the muscles of the anterior group originates in the region of the medial epicondyle of the shoulder, the surface layer of the posterior group in the region of the lateral epicondyle. The deep layer of both groups in its main part no longer finds an attachment site on the epicondyle, but originates on the bones of the forearm and the interosseous membrane. The final attachments of the flexor and extensor are located on the bases of the metacarpal bones, and the same muscles reaching the fingers are attached to the phalanx, with the exception of the long finger-extending muscle that attaches to the first metacarpal bone. The pronosers and arch supports are attached to the radial bone. The muscles of the forearm closer to the body consist of fleshy parts, whereas in the direction of the brush they become long tendons, so that the forearm has the shape of a cone, flattened from front to back.

Muscles of hand. In addition to the tendons of the muscles of the forearm, passing on the back palmar side of the hand, the latter also has its own short muscles that begin and end in this section of the upper limb. They are divided into three groups. Two of them, located along the radial and ulnar edges of the palm, form the eminence of the thumb, thenar, and the rose of the little finger, the hypothenar, the third group lies respectively in the palmar basin, palma manus. In man, the muscles of the hand, representing the most important part of the upper limb, the organ of labor, achieve the greatest perfection.

The muscles of the lower limb are divided into the muscles of the lower extremity belt, the muscles of the thigh, the lower leg, and the foot.

The muscles of the lower extremity belt run from the pelvis to the upper end of the femur and produce movements in the hip joint around all three of its major axes. They are located on all sides of the joint and perform all kinds of movements. By attachment points on the thigh and the main function, they are divided into the front and rear groups.

The thigh muscles participate in the straight passage and support of the body in an upright position, resulting in the movement of long bony levers. In this regard, they become long and fuse into powerful masses with one common tendon, forming multi-headed muscles. The muscles of the thigh are divided into 3 groups: anterior (extensor), posterior (flexors), and medial (leading). The latter group acts on the hip joint, and the first two also, and predominantly, on the knee, producing a movement mainly around its frontal axis, which is determined by their position on the front and back surfaces of the thigh and attachment to the tibia. From the lateral side, the anterior and posterior muscle groups are separated from each other by the lateral intermuscular septum of the femoral fascia attached to the lateral lip, and from the medial side between them is a wedge of the leading muscles.

The calf muscles drive the distal part of the limb - the foot - are adapted like the thigh muscles to keep the body in a vertical position and move it along the ground. Therefore, there is no fine

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specialization of individual muscles as it is observed on the forearm in connection with the function of the hand as an organ of labor, but on the contrary, the large muscle masses fuse together and get a common tendon, combining their efforts to maintain a vertical position when walking. Corresponding to movements around the front axis of the ankle joint and the finger joints, most of the muscles on the anterior and posterior surfaces of the tibia, between both tibial bones in front and behind. According to the movements of the foot around the sagittal axis, the muscles lie on the side, along the fibula.

In its origin, the first and third groups refer to the dorsal muscles of the lower limb, and the second group to the ventral. The posterior group is developed more strongly than the others and consists of two layers: superficial and deep. All the muscles of the lower leg go in the longitudinal direction and are attached to the foot, with one of them having attachment points on the tarsal bones and on the bases of the metatarsal bones, and others on the phalanges of the fingers. The fleshy parts of the muscles are placed in the proximal part of the shin, the distal muscles in the direction of the foot are transferred to the tendons; as a result, the shin has a conical shape. As for the function, the front muscles produce an extension of the foot, and those that go to the fingers extend the legs. Flexion of the foot is performed by the posterior and lateral muscles, the tendons of which approach the foot behind or from the sole. In addition, some of the hind muscles flex their fingers. Pronation and supination of the foot are mainly performed by those muscles of the lower leg that have attachments on the medial or lateral margin of the foot.

Muscles of the foot. The foot, as well as the brush, except for the tendons belonging to the long muscles running down from the leg, has its own short muscles, these muscles are divided into the rear and plantar.

4. Illustrative material: tables, slides, dummies, tablets, skeleton.

5. Bibliography:

In english:

main:

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4. Репозиторий ЮКМА <http://lib.ukma.kz/repository/>
5. Республиканская межвузовская электронная библиотека <http://rmebrk.kz/>
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7. Ашық кітапхана [https:// kitap.kz/](https://kitap.kz/)

6. Test questions (feedback):

1. Types of muscle tissue.
2. What are the components of the muscles.
3. What is related to muscle auxiliaries?
4. Tell us about the classification of muscles.
5. What are the types of levers.
6. What determines muscle strength? What are the anatomical and physiological muscle diameters?

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7. What types of muscle work are distinguished in functional anatomy?
8. Which muscles lift and which lower jaw muscles?
9. What groups of neck muscles are divided by origin and location?
10. Name the triangles of the front and back of the neck.
11. How are the anterior and posterior vaginal walls of the rectus abdominis muscle constructed?
12. What are the weak points in the front wall of the abdomen and the wall of the inguinal canal.
13. What are the "weak" places of the diaphragm. Where are they located and what are their limitations?
14. Which muscles lift and which lower the ribs.
15. What groups of the back muscles are divided by origin and depth?
16. What groups are the muscles of the upper limb divided by location, function and development?
17. What are the walls of the axillary cavity. What muscles is it formed?
18. What groups are the pelvic muscles divided into?

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