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STATE BUDGET EDUCATIONAL ESTABLISHMENT OF HIGHER PROFESSIONAL EDUCATION
"NORTH-OSSETIAN STATE MEDICAL ACADEMY" OF THE MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION

Department of human anatomy
with topographic anatomy and operative surgery

COLLECTION METHODOLOGICAL GUIDES
to practical training and extracurricular independent work
FOR THE DISCIPLINE "ANATOMY"
for 2nd year students of the medical faculty

discipline «Anatomy»
on specialty 31.05.01 «General Medicine»
the main professional educational program of higher education -specialty program in the specialty

31.05.01 General medicine, approved on 24.05.2023

3 semester

THE NERVOUS SYSTEM

(CENTRAL AND PERIPHERAL)

Part 2

Student's Full Name _____

Group №_____ Faculty _____

Collection methodological guides to practical training and extracurricular independent work for 2nd year students (3 semester) of the medical faculty for the discipline «anatomy» on specialty 31.05.01 «General Medicine», developed by the Department Of Human Anatomy With Topographic Anatomy And Operative Surgery Of State Budget Educational Establishment Of Higher Professional Education "North-Ossetian State Medical Academy" Of The Ministry Of Health Of The Russian Federation

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3 semester

	Theme
1.	Anatomy and topography of the spinal cord and its membranes. Formation of spinal nerves. Age features. X-ray anatomy.
2.	A general overview of the brain and its departments. Topography of the roots of the cranial nerves on the basis of the brain. Shells of the brain. Anatomy and topography of the hemispheres of the terminal brain. Shares, furrows and convolutions. The structure of the cerebral cortex. Localization of functions. The olfactory brain. Limbic system. Age features. X-ray anatomy.
3.	Anatomy and topography of basal nuclei. The inner capsule. Anatomy and topography of the corpus callosum. The vault. Lateral ventricles. Anatomy and topography of the diencephalon. III ventricle. Anatomy and topography of the midbrain. The brain drain. Age features. X-ray anatomy.
4.	Anatomy and topography of the isthmus of the rhomboid brain. Bridge. Cerebellum. Anatomy and topography of the medulla oblongata. IV ventricle. Anatomy and topography of the rhomboid fossa. Projection of cranial nerve nuclei. Age features. X-ray anatomy.
5.	Conductive pathways of the brain and spinal cord.
6.	**FINAL LESSON ON PREPARATIONS OF BRAIN AN SPINAL CORD.**
7.	Anatomy and topography of terminal (0), olfactory (I), visual (II), oculomotor (III), block (IV) and abduction (VI) nerves and their branches. Anatomy and topography of the trigeminal (V) nerve. Age features.
8.	Anatomy and topography of the facial (VII) nerve and its branches. Anatomy and topography of the pre-vertebral (VIII) and lumbosacral (IX) nerves and their branches. Anatomy and topography of the additional (XI) and sublingual (XII) nerves and their branches. Age features.
9.	Anatomy and topography of the wandering (X) nerve and its branches. Age features.
10.	Sense organs. Leather. Organ of taste. Olfactory organ. Anatomy and topography of the organ of vision. Eyeball. Auxiliary apparatus of the eye. Anatomy and topography of the anterior-cochlear organ. External and middle ear. Anatomy and topography of the inner ear. Topography of the vessels and nerves in the orbit. Age features.
11.	**FINAL LESSON ON THE PREPARATION OF THE CRANIAL NERVES AND SENSORY ORGANS.**
12.	General anatomy and topography of spinal nerves. Anatomy and topography of the cervical plexus. Age features. Topography of vessels and nerves.
13.	Anatomy and topography of the brachial plexus (short and long branches). Topography of vessels and nerves.
14.	Intercostal nerves. Anatomy and topography of the lumbar plexus. Anatomy and topography of the sacral plexus. Anatomy and topography of the genital and coccygeal plexus. Age features. Topography of vessels and nerves.
15.	The autonomic nervous system. Vegetative innervation of organs. Age features
16.	**FINAL LESSON ON PREPARATIONS OF TRUNK, HEAD AND LIMBS.**

THE PERIPHERAL NERVOUS SYSTEM.

CONTACT WORK

Theme: Anatomy and topography of terminal (0), olfactory (I), visual (II), oculomotor (III), block (IV) and abduction (VI) nerves and their branches. Anatomy and topography of the trigeminal (V) nerve. Age features.

Not only its peripheral structures, which in the anatomical sense represent the cranial nerve, but also other formations in the brainstem, in the subcortical region, the cerebral hemispheres, including certain areas of the cerebral cortex, take part in the formation of the clinical symptom complex in the defeat of any cranial nerve. For medical practice, it is important to determine the area in which the pathological process is located, from the nerve itself to its cortical representation. Knowledge of this topic is necessary when examining neurological patients and for topical diagnosis of sensitive and motor disorders, when studying relevant sections in the course of therapy, surgery, neurology, traumatology and other clinical disciplines.

I.Цели:

Student must know	1) The name, characteristics, number and topography of the nuclei of I-IV, VI, XI, XII pairs of cranial nerves. 2) Places of exit I-IV, V pairs of cranial nerves on the basis of the brain and on the base of the skull 3) The structure of the organ of vision. Auxiliary apparatus of the eyeball (straight and oblique, a muscle lifting the upper eyelid). 4) Classification of the neck muscles - superficial and deep muscles. 5) General structure of the language, departments and muscles. 6) The beginning, attachment and innervation of the muscles of the eyeball: the block (IV) nerve-the upper oblique muscle; the abducent nerve (VI) - the lateral rectus muscle; the oculomotor nerve (III) - the lower line, the lower oblique, the upper straight, the medial straight line, the muscles of the upper eyelid. 7) Topography and the course of the hyoid nerve, the area of innervation - the muscles of the tongue, sternocleidomastoid and trapezius muscles. The formation of the neck loop and the innervation of the muscles below the hyoid bone. 8) Nucleus and course of glossopharyngeal nerve. The areas of innervation are the root of the tongue, the pharynx. 9) Departments of the olfactory brain. Central and peripheral parts of the olfactory analyzer - threads, nerves, bulbs, tracts, triangles, brain, hook. 10) The central and peripheral parts of the visual analyzer are the retina of the eye, the optic nerve, the cross, the visual tract, the subcortical and cortical centers of vision. 11) Place of exit on the basis of the brain and topography of the trigeminal nerve. 12) Localization of the trigeminal nerve nuclei. 13) Topography of the course, branches and area of innervation of the first branch of the trigeminal nerve. 14) Topography of the course, branches and area of innervation of the second branch of the trigeminal nerve. 15) Topography of the course, branch and area of innervation of the third branch of the trigeminal nerve. 16) Formation, topography and branches of the winged node. 17) Topography of nerves in the eye socket.
Student must be able to:	1) To name and show on the native preparations of the base of the brain the sites of the exit of I-IV, VI, XI, XII pairs of cranial nerves. 2) To name and show in the cavity of the orbit II, III, IV, VI pairs of cranial nerves. 3) To call and show on the basis of the brain the optic nerve, the cross, the visual tracts. 4) To name and show subcortical and cortical centers of vision - lateral geniculate bodies and upper dysthonia and spur groove of occipital lobe. 3) Call and show in the cavity of the skull and on the basis of the brain - olfactory bulbs on the trellised bone, olfactory tracts, olfactory triangles and its bundles, hook, vaulted gyrus. 4) Call and show on the base of the brain and in the neck the trunks of the accessory nerve and show the muscles innervated by it 5) Call and show the trunk of the hyoid nerve and the neck loop, show the muscles innervated by it. 6) To name and explain the course of the glossopharyngeal nerve and its branch. 7) To name and show on the native preparation the place of the exit of the trigeminal nerve on the basis of the brain. 8) To name and show on the preparation of the skull the location of the node of the trigeminal nerve and the exit of the branches of the trigeminal nerve from the cranial cavity. 9) On the diamond lozenge scheme, show the localization of the trigeminal nerve cores. 10) To call in Latin and show on the preparation the topography of the course, the branches and the area of innervation of the optic nerve. 11) To call in Latin and show on the preparation the topography of the course, branches and area of innervation of the maxillary nerve. 12) To call in Latin and show on the preparation the topography of the course, the branches and the area of innervation of the mandibular nerve. 13) To call in Latin and show on the preparation the topography and branches of the pterygoid node.
Student must possess	1) Latin terminology 2) The preparation method. 3) The ability to find and determine on native preparations I-IV, V, VI pairs of cranial nerves and their branches. 4) Knowledge of the characteristics of the nuclei of the corresponding craniocerebral nerves (motor, sensory and autonomic).

II. Required level of knowledge:

a) from related disciplines:

a) Phylogeny and ontogeny of the central nervous system.
b) Histological structure of the gray and white matter of the brain.
c) Histological structure of the peripheral nerve.

б) from previous topics:

a) Structure and parts of the brain stem.
b) The structure of the rhomboid fossa.
c) Structure of the cerebral cortex and localization of cortical centers. The olfactory brain.

в) from the current lesson:
1. Topography of the roots of the cranial nerves on the basis of the brain;
2. Topography of nuclei of cranial nerves in a diamond-shaped fossa
3. The base of the skull, holes, cracks and fossa, their contents (roots of the branch of the cranial nerves).
4. Topography of the course and area of innervation of the terminal (0) nerve.
5. Topography of the stroke and area of innervation of the olfactory (i) nerve.
6. Topography of the course and area of innervation of the optic (ii) nerve.
7. Topography of the course, localization of nuclei, area of innervation of the oculomotor (iii) nerve.
8. Topography of the course, localization of nuclei, area of innervation of the block (iv) nerve.
9. Topography of the course, localization of nuclei, area of innervation of the abduction (vi) nerve.
10. Topography of the course, localization of nuclei, area of innervation of the trigeminal (v) nerve

III. Object of study:
Basal surface of the base of the skull. Cranial fossae and their formations: holes, cracks and impressions. The bases of the brain with the roots of the cranial nerves. Sagittal section of the brain with the trunk portion. Places of the exit of roots of cranial nerves.

IV. Informational part:
The terminal nerves - (0 pair) are a pair of small nerves that are closely attached to the olfactory nerves. They contain demyelinated fibers and small groups of bipolar and multipolar nerve cells. The nerve passes along the medial tract, perforates the latticed (perforated) plastic and branches into the mucous membrane of the nasal cavity. The central nerve is directed into the forward perforated space of the septal region. Presumably, this nerve represents the head part of the sympathetic nervous system, which extends to the circulatory system and glands of the mucous membrane of the nasal cavity.

Olfactory nerves (I pair - n.olfactorius) are sensitive, formed by central processes of olfactory cells, located in the mucosa of the olfactory area of the nasal cavity. Nerve trunk olfactory nerves do not form, but gather in 15-20 thin olfactory nerves passing through the holes of the trellis plate and enter the olfactory bulb that continues into the olfactory tract and triangle.

The visual (II pair - n.opticus) is sensitive, it is a thick nerve trunk, consisting of outgrowths of ganglionic neurocytes of the ganglionic layer of the retina of the eyeball. Formed in the region of the blind spot of the retina, where the processes are assembled into a bundle. The optic nerve, perforating the vascular membrane and the sclera (the intraocular portion of the nerve) passes through the orbit (the orbital part) to the visual channel and penetrates through it into the cranial cavity (the intraocular portion of the nerve), and converging with the same nerve on the other side, form an incomplete visual cross-chiasm , chiasma opticum, and then pass into the visual tracts. Approximately in the middle of the orbital part of the nerve, the central artery of the retina enters it from below, which lies in the nerve adjacent to the same vein.

The oculomotor nerve (III para-n.oculomotorius) is a mixed nerve. One part starts from the motor nucleus, and the second from the autonomic (parasympathetic) nucleus, located in the middle brain. Emerging from the same groove on the medial surface of the brain stem, it goes to the upper orbital gap, where it divides into the upper and lower branches before the entrance. The upper branch, r.inferior, motor, innervates the muscle, and the upper rectus muscle - the lower branch, mixed, gives the motor fibers to the lower and medial rectus muscles, and also to the lower oblique muscle.

The nerve block (IV pair - n.trochlearis) is motor, its fibers start from the nucleus localizing in the middle brain. Emerging from the brain material laterally from the bridle of the upper cerebral sail, the nerve traverses the stem of the brain from the lateral side, and then goes ventrally, between the brain stem and the medial surface of the temporal lobe of the cerebral hemisphere. Then, after passing through the cavernous sinus of the dura mater, it enters the orbit through the upper orbital cleft. Located above and lateral to the oculomotor nerve, innervates the upper oblique muscle of the eye.

The trigeminal nerve is a mixed nerve, innervates the skin of the face, the mucous membrane of the nose and sinuses, the oral cavity, the anterior 2/3 of the tongue, teeth, conjunctiva eyes, masticatory muscles, muscles of the oral cavity floor (mandibular, sub choloid, subterranean abdominal abdomen muscle), the muscle that strains the eardrum, and the muscle that strains the palatal curtain. The triple nerve has a motor nucleus and three sensitive nuclei (median brain, bridge and spinal cord). From the brain, the trigeminal nerve emerges with two roots-motor and sensitive-in the region of the bridge's transition to the middle cerebellum pedicle. **The triple node** (semilunar, gasser node) is located in the trigeminal depression on the anterior surface of the temporal bone pyramid, in the cleft of the hard shell of the brain (in the trigeminal cavity**).**

Three large branches extend from the trigeminal nerve: 1) the optic nerve; 2) maxillary nerve; 3) the mandibular nerve. The ocular and maxillary nerves contain only sensitive fibers, the mandibular nerve is sensory and motor.

The optic nerve - the first branch of the trigeminal nerve, passes in the thickness of the lateral wall of the cavernous sinus. Together with the oculomotor, block and leading nerves, it goes to the upper orbital gap. Before entering the eye socket at the level of the Turkish saddle, the ocular nerve receives the joint branches from the periarterial sympathetic plexus of the internal carotid artery. Here the eye nerve gives the tentorial (shell) branch. At the entrance to the upper glandule, the optic nerve is medial to the nerve block, higher and lateral to the oculomotor and lateral to the outgoing nerve. Entering the eye socket, the optic nerve divides into the frontal, but sores and tear nerves.

The frontal nerve passes under the upper wall of the orbit. On the upper surface of the muscle, lifting the eyelid, the frontal nerve is divided into the supraorbital and suprapubic nerves. The supraorbital nerve passes through the supraorbital notch from the orbit and ends in the forehead skin. The supraclavicular nerve rises above the block of the upper oblique muscle and branches into the skin of the nose, the lower forehead and in the medial angle of the eye, in the skin and conjunctiva of the upper eyelid.

The nosocomial nerve passes in the orbit above the optic nerve, between it and the upper rectus muscle of the eye, and then - between the oblique and medial rectus muscles of the eye. Here the nosorozhnichny nerve is divided into its final branches, directed to the conjunctiva of the eye, the skin of the upper eyelid and the mucous membrane of the nasal cavity. In the course of the nosorespheric nerve, a number of branches give out: **connecting branch (with ciliary knot),** long ciliary nerves, posterior latticed nerve, anterior latticed nerve, **subunit nerve .**

The lacrimal nerve initially passes between the lateral and upper rectus muscles of the eye, then lies near the upper-lateral corner of the orbit. Gives branches to the lacrimal gland, the conjunctiva of the upper eyelid and the skin in the region of the outer corner of the eye. A connecting branch from the zygomatic nerve - the branch of the maxillary nerve, carrying the secretory parasympathetic fibers for the lacrimal nerve - approaches the lacrimal nerve.

The maxillary nerve enters the orbit through the lower ophthalmic gap, lies in the infraorbital furrow, which passes into the infraorbital canal. At the level of the infraorbital furrow and canal, the upper alveolar nerves, as well as the anterior, middle and posterior alveolar branches, extend from the infraorbital nerve. They form the upper dental plexus located in the upper bone and in the mucosa of the maxillary sinus. Out of the plexus, the upper dentition branches to the teeth and the upper gingival branches to the gums of the upper jaw. From the maxillary nerve also extend the inner nasal branches to the mucosa of the anterior sections of the nasal cavity.

The infraorbital nerve upon exit from the subacute aperture gives away the divergent lower branches of the eyelid, the outer nasal branches, the upper labial branches ("small goose foot»).

The skull nerve departs from the maxillary nerve in the pterygoid-palatine fossa, it goes to the orbit via the upper orbital fissure. In the orbit gives the parasympathetic branch (from the vascular nodule) to the tearful nerve, which is intended for the secretory innervation of the lacrimal gland. In the orbit, the zygomatic nerve passes near its lateral wall, enters the cheek-eyed orifice, where it divides into the scalophalic and zygomatic branches.

In the pterygo-palatine fossa the maxillary nerve gives to the winged nodule two or three thin nodal branches containing sensitive nerve fibers. A smaller part of the nodular fibers enters directly into the ves- ponent node. A larger amount of these fibers goes near the lateral surface of the node and passes into its branches.

The pterygopalon refers to the parasympathetic part of the autonomic nervous system. It is located in the pterygo-palatine fossa, medially and downward from the maxillary nerve. To the node are suitable (in addition to sensitive, transit branches) preganglionic parasympathetic fibers. They enter the pterygoid node in the form of a large stony nerve (from the facial nerve) and terminate on the neurons that make up the node. The postganglionic sympathetic fibers from the nerve of the winged canal are also suitable for the winged nodule.

The following branches branch out from the vascular nodule:

1) medial and lateral superior posterior nasal branches
2) large palatine nerve
3) small palatine nerves

The mandibular nerve is the largest branch of the trigeminal nerve, it contains both motor and sensitive fibers. From the cranial cavity the mandibular nerve leaves through the oval aperture and is immediately divided into motor and sensitive branches.

Motor branches of the mandibular nerve:

1. the chewing nerve;
2. deep temporal nerves;
3. Lateral and medial pterygoid nerves

These nerves are sent to the chewing muscles.

The motor nerve also includes the nerve of the muscle, which stretches the tympanic membrane, and the nerve of the muscle, which strains the palatal curtain.

Sensitive branches of the trigeminal nerve:

1) meningeal branch or a spinous nerve,
2) the buccal nerve;
3) an ear-temporal nerve, gives a number of branches:
a) articular branches
b) Parotid branches
c) front ear branches
d) the nerves of the external auditory canal (
e) branch of the umbilical membrane
e) superficial temporal veins

Under the oval aperture on the medial side of the temporomandibular joint is a vegetative ear. Preganglionic parasympathetic fibers to the ear node are included in the small stony nerve (from the facial nerve);

4) lingual nerve;
5) the lower alveolar nerve contains sensory and motor fibers and is the largest branch of the mandibular nerve. It enters the mandibular canal through its inlet on the inner surface of the lower jaw. In the mandibular canal, the lower alveolar nerve (passing along with the same artery and vein) gives off branches forming the lower dental plexus. From the plexus to the teeth of the lower jaw, the lower dental branches depart, and to the gums - the lower gingival branches.
6) after exit through the chin aperture, the lower alveolar nerve passes into the chin nerve, which ends in the skin of the chin and lower lip. He gives to them the chin branches, the lower labial branches, and also the branches to the gums.

The abducent nerve (the sixth pair is n.abducens) is formed by the axons of the motor cells of the nucleus of this nerve, which lies in the bridge cover. The nerve leaves the brain substance in the furrow between the bridge and the medulla oblongata, perforates the hard shell of the brain and passes through the cavernous sinus laterally from the internal carotid artery, and then passes through the upper orbital fissure into the orbit. The abducent nerve innervates the rectus muscle of the eye.

V. Practical work:

Task №1. The study of cranial nerves should begin with the assimilation of the principles of the structure of somatic and vegetative reflex arcs: generality and differences in the structure of the afferent and efferent link, the topography of neurons (afferent, intercalary and efferent). It is necessary to assimilate that when complex

and simple reflex arcs, the afferent link of the reflex can be formed by one cranial nerve, and the efferent one by another.

It is necessary to replicate the topography of the cranial nerve nuclei in the brainstem, as well as their functional affinity (motor, sensory, vegetative), since the total number of nuclei gives a functional characteristic of the cranial nerve as a whole-sensitive, motor or mixed. It should be borne in mind that in a single cranial nerve can pass nerve fibers belonging to different cranial nerves.

Task № 2 Name and show the formations located on the upper lateral and lower surfaces of the brain. Take the preparation of the whole brain with the removed shells. When reviewing the upper-lateral surface of the brain, note that the cerebral hemispheres almost completely cover all the other parts of the brain. They are divided by the longitudinal slit of the large brain. Behind between them and the cerebellum is a transverse cleft of the large brain. Surfaces of the hemispheres are cut by furrows and gyruses located between them.

Task № 3 Begin to disassemble the lower surface - the base of the brain from its front end, naming and showing the formation, its components, namely: on the lower surface of the hemisphere lie: olfactory bulbs, olfactory tract and triangle,

Task № 4. Note the structure and role of the terminal nerve (0 pair) in the perception of pheromones by the vomeroneal organ. According to the origin of I and II pairs of cranial nerves are derived (outgrowths) of the anterior cerebral bladder. The remaining (III-XII pairs) have nuclei in the brainstem - the "true" cranial nerves. III, IV, VI pairs of cranial nerves are intended for innervation of the internal and external muscles of the eyeball. These nerves pass through the cavernous sinus and enter the orbit through the upper orbital fissure. Pay attention to the afferent and efferent link of the pupillary (reaction to light) and accommodative reflexes.

Task № 5. Note that behind the olfactory triangle is the front perforated substance, the optic junction, the gray hillock, the funnel on which the pituitary gland is suspended (cut off when the brain is removed from the cranial cavity), the mastoid bodies and the posterior perforated substance, the legs of the brain. On this part of the base, note the location of the roots of the first pair - the olfactory bulb, the II pair - the visual cross, the third pair on the inner side of the brain legs in the area of the intercostal fossa and the IV pair that emerges on the upper surface of the brain on the sides of the bridle of the upper sail, and then descends on the base from the lateral side of the legs of the brain.
Task № 6. Understand that there is a bridge behind the legs of the brain, followed by an oblong brain. Laterally it passes into the middle cerebellar legs, which go to the cerebellum. In the place where the bridge crosses into the legs, there are places for the exit of the roots.
Task № 7. Find the outlet of the cutaneous branches of the trigeminal nerve. At the supraorbital margin under the skin, find the supraorbital nerve, and the infraorbital foramen has an infraorbital nerve that splits into a series of branches that connect to the terminal branches of the facial nerve. In the area of the chin, find under the skin near the chin aperture the chin nerve.
Task № 8. The maxillary nerve is located at the place of its exit into the foveal-palatine fossa through a round hole. Its continuation in the form of the infraorbital nerve is shown at its exit through the infraorbital foramen under the skin of the face. The remaining branches of the maxillary nerve are studied according to the table and by the figures in the atlas.
Task № 9. Find the mandibular nerve in the inframammary fossa and trace the course of its branches. The lingual nerve leads to the tongue, the lower alveolar nerve along with the lower alveolar artery penetrates into the canal of the lower jaw, the auric-temporal nerve encompasses the two middle roots of the middle meningeal artery and accompanies the superficial temporal artery, the buccal nerve is directed to the mucous membrane of the cheek, perforating the buccal muscle. After this, try to find a drum string that fits at an angle to the lingual nerve 1-1.5 cm from the place of its beginning.
Task № 10. On the tables and figures in the atlas consider the parasympathetic nodes associated with the branches of the trigeminal nerve. Mark their connections and functional significance.
Task № 11. In the eye socket, which has the upper and lateral walls opened, find the branches of the optic nerve (from above): the frontal nerve, the largest, occupies the middle position, the lacrimal nerve lies laterally, towards the lacrimal gland, and medially, between the upper oblique and upper straight muscles in depth of the orbit - nasolacrimal nerve. The lower branch of the oculomotor nerve and the ciliary knot are located on the lateral side of the orbit, turning the outer straight muscle of the eye cut in the middle. On its inner surface you will see a suitable nerve to it. The nerve block is seen from above at the top of the orbit where it is directed to the upper oblique muscle. Look at the nerves on the tables and drawings in the atlas. About their functional significance, read the textbook.

VI. Control questions:

1. Tell us how the nerve is constructed and how the nerves are classified (classify) (by function, by location).
2. List all 12 pairs of cranial nerves in order and name them in Latin.
3. Olfactory Triangle
4. The visual pathway
5. Nasal glands of the oculomotor nerve
6. Localization of the nerve block
7. From which roots additional nerve is formed
8. Topography of the olfactory bulb. Its function.
9. Extension nerve branches
10. Muscles innervated by the 6th pair
11. The branches of the oculomotor nerve
12. Anatomical formations that form the spinal roots
13. Localization of the nuclei of the oculomotor nerve
14. Olfactory bulb
15. Location of the nerve block with respect to the cavernous sinus
16. Extension nerve branches
17. Branches of the hyoid nerve
18. Place of exit from the brain of the nerve block
19. Name the branches of the trigeminal nerve. Where (in which area of the head) are each of the branches directed?
20. What nerves formed in the orbit from the first branch of the triple nerve, contain vegetative parasympathetic fibers? Where do these fibers come from and where are they going?
21. Name the muscle innervating the abducent nerve
22. Localization of the nuclei of the accessory nerve

VII. Academic pursuits:

Task №1
The patient has a defective nerve due to trauma. Which violations will be detected in this case?
Answer:
The diverting nerve innervates the lateral rectus muscle of the eye, which ensures the pupil's movement laterally. In connection with the damage of this nerve, this muscle will be paralyzed, but the tone of its antagonist, the medial rectus muscle will increase, which will lead to a pupil shift in the medial aspect (internal strabismus)

Task №2.
The patient showed paralysis of all external muscles of the eye except for the lateral line and the upper oblique. The defeat of which nerve or nerves can be assumed?
Answer:
Muscles of the eyeball are innervated by III, IV, VI cranial nerves. Block and drainage nerves in this case are not involved in pathology, there is an oculomotor nerve that innervates paralyzed muscles.

Task №3.
Patient K. experiences paroxysmal pains in the forehead, in the eyeball, at the inner corner of the orbit. Pressing in the medial part of the supraorbital margin is painful, skin sensitivity is impaired. Which nerve is struck?
Answer:
Skin sensitivity of the forehead, supraorbital margin, as well as the eyeball is provided by fibers of general sensitivity of the optic nerve (I branch of the trigeminal nerve). The optic nerve starts from the Gasser node, after which it passes through the upper orbital fissure into the orbit. Here, the nosorecnic nerve, which passes through the medial wall of the orbit, gives away branches (n.n. ciliares longi) to the capsule

of the eyeball (hence the pain in the eyeball). Another branch of the optic nerve is the supraorbital nerve, innervating the skin of the forehead.

VIII. Control Tests:

1Specify the muscle that the innervation of the nerve block:
1 - the upper oblique muscle of the eye;
2 - the upper rectus muscle of the eye;
3 - medial rectus muscle of the eye
4 - lateral rectus muscle of the eye.
Correct variant:1

2. Specify the muscle that the accessory nerve innervates:
1 - biceps arm muscle;
2 - sternocleidomastoid muscle;
3 - triceps brachialis muscle;
4 - the broadest muscle of the back.
Correct variant:2

3. Specify the cranial nerve that innervates the muscles of the tongue:
1 - the abducent nerve;
2 - the nerve block;
3 - additional nerve;
4 - hyoid nerve.
Correct variant:4

4. Specify a cranial nerve that does not innervate the muscles of the eyeball:
1 - the oculomotor nerve;
2 - the nerve block;
3 - sublingual nerve;
4 - abducent nerve.
Correct variant:3

5. Specify the place of exit from the skull of the oculomotor, block and nerve
1- Upper orbital fissure
2-internal auditory opening
3-ripped hole
4-jugular hole
Correct variant: 1

6. Specify the formation forming the neck loop.
1-diaphragmatic nerve and marginal branch of facial nerve
2-mandibular and distracting nerves
3-trunk of the hyoid nerve and motor branches of cervical segments
4-glossopharyngeal and upper laryngeal nerves
Correct variant:3

7. Specify the exit site of the abducent nerve at the base of the brain.
1- in the intercostal fossa
2- in the region of the middle legs of the cerebellum
3- on each side of the olive
4-on the rear edge of the bridge
Correct variant: 4

8. Indicate which vegetative ganglia are located with the third branch of the trigeminal nerve:
1. The ciliary node (ganglion ciliare)
2. The submandibular jaw (ganglion sumbandibulare)
3. wing-palatine node (ganglion pterygopalatinum)
4. The ear node (ganglion oficum)
Correct variant:2,4

9. Specify which vegetative ganglion is located with the 2nd branch of the trigeminal nerve:
1. an ear node (ganglion oficum)
2. ciliary node (ganglion ciliare)
3. wing-palatine node (ganglion pterygopalatinum)
4. The submandibular jaw (ganglion sumbandibulare)
Correct variant:3

10. Indicate where the sensitive ganglion V of the cranial nerves is located:
1. in the mandibular fossa
2. on the back of the pyramid of the temporal bone
3. on the front surface of the pyramid of the temporal bone
4. deep inside the inner ear canal
Correct variant:3

IX. Anatomical terminology :

	English Name	Latin Name
1	The optic nerve	N. opticus
2	Neck loop	ansa cervicalis
3	The downward branch	r .descendens
4	Language branches	rr.linguales
5	Outer branch	r. externus

6	Spinal roots	radices spinales
7	Cranial roots	radices craniales
8	Upper branch	r. superior
9	Lower branch	r. superior
10	Oculomotor spine	radix oculomotoria
11	Parasympathetic spine	radix parasympatica
12	Visual pathway	tractus opticus
13	Sublingual nerve	n. hypoglossus
14	Additional nerve	n. accessorius
15	Abduction nerve	n. abducens
16	Block nerve	n. trochlearis
17	Oculomotor nerve	n. oculomotorius

X. Preparations and manuals:

1. Sagittal section of the brain.
2. Preparation of the brainstem with a diamond-shaped fossa.
3. The base of the skull.
4.Workbook. Atlas. Tables.

INDEPENDENT WORK

ANATOMY AND TOPOGRAPHY OF OLFACTORY (I), VISUAL (II), OCULOMOTOR (III), TROCHLEAR (IV) И ABDUCENS (VI) CRANIAL NERVES.

I. Questions for checking the initial level:

1. The trunk of the brain and the topography of the nuclei of the cranial nerves.
2. Topography of the roots of the cranial nerves on the basis of the brain.
3. The inner base of the skull.
4. Structure of the eye socket.
5. Localization of cortical centers. The olfactory brain.

II. Targets:

Student should know:	***Literature***:
1. Name I, II, III, IV and VI pairs of cranial nerves (Latin and Russian transcription). 2. The name, characteristics, location in the trunk of the nuclei of III, IV and VI pairs of cranial nerves. 3. Auxiliary apparatus of the eye. Classification, structure and function of the muscles of the eyeball (straight and oblique, muscle lifting the upper eyelid). 4. The exit site of III, IV and VI pairs of cranial nerves from the cranial cavity. 5. Muscles of the eyeball, which innervate the III, IV and VI pairs of cranial nerves. 6. The beginning, attachment and innervation of the muscles of the eyeball: the block (IV) nerve - the upper oblique muscle; the leading (VI) nerve is the lateral rectus muscle; oculomotor (III) - the rest. 7. Start, stroke and location on the basis of the brain of the olfactory analyzer. 8. Start, stroke and location on the basis of the brain of the visual analyzer. The cortical center of view.	1. 1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.
Student must be able to	***Literature***:
1. To name and show the muscles of the eyeball (straight and oblique) and the muscle lifting the upper eyelid. 2. Call and show on the base of the brain, in the cavity of the skull and orbit, nerves (III, IV, VI), suitable for these muscles. 3. Show the upper and lower branches of the III nerve. 4. To name and show in the eye socket and on the basis of the brain the trunk of the optic nerve, the cross, the visual tracts, the lateral geniculate bodies and the upper dystocia, the furrow groove of the occipital lobe of the brain. 5. Call and show in the cranial cavity and on the basis of the brain the olfactory analyzer's sections - olfactory bulbs on the trellised bone, olfactory tracts, olfactory triangles and its bundles, hook the fornicatus gyrus.	1. 1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.

III. Tasks for self-dependent work:

1. Make a scheme of the structure and innervation of the muscles of the eyeball.

2. Which of the listed nerves (I, II, III, IV, VI) are motor, which are sensitive?

_____

_____

3. Determine which nerve comes out of the orbit?

_____

_____

4. Specify which structures form the olfactory brain?

_____

_____

_____

I. Questions for self-control:

5. Determine the topography of III and IV pairs of cranial nerves in relation to the legs of the brain?

_____

_____

6. What muscles are innervated by the oculomotor nerve?

_____

_____

7. Specify the location of the nucleuses of III, IV and VI pairs of cranial nerves.

_____

_____

8. Where do the olfactory nerves lie?

_____

_____

9. What is a "chiasmus"? Name its way.

_____

_____

V. Make a situation on this topic:

10. TASK: *The patient turned to the doctor with complaints about the lower left of the upper eyelid. Give anatomical justification.*

.ANSWER: _____

_____

_____

TASK:
ANSWER:

VI. Make 1-2 tests according to the example:

11. Example: Specify,which roots lie behind the bridge?:

1.visual 2. vagus 3. abducent 4. sublingual

Test№1 _____

_____

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а. _____ *б.* _____ *в.* _____ *г.* _____
Test№2 _____ _____ _____ *а.* _____ *б.* _____ *в.* _____ *г.* _____

VII. Make designations for pictures:

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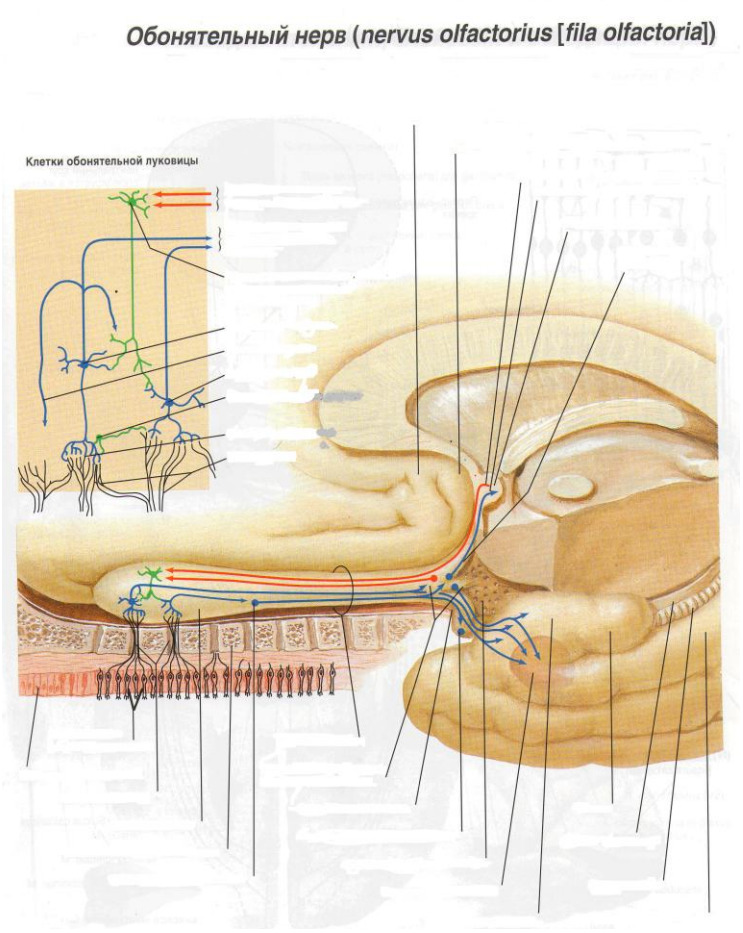

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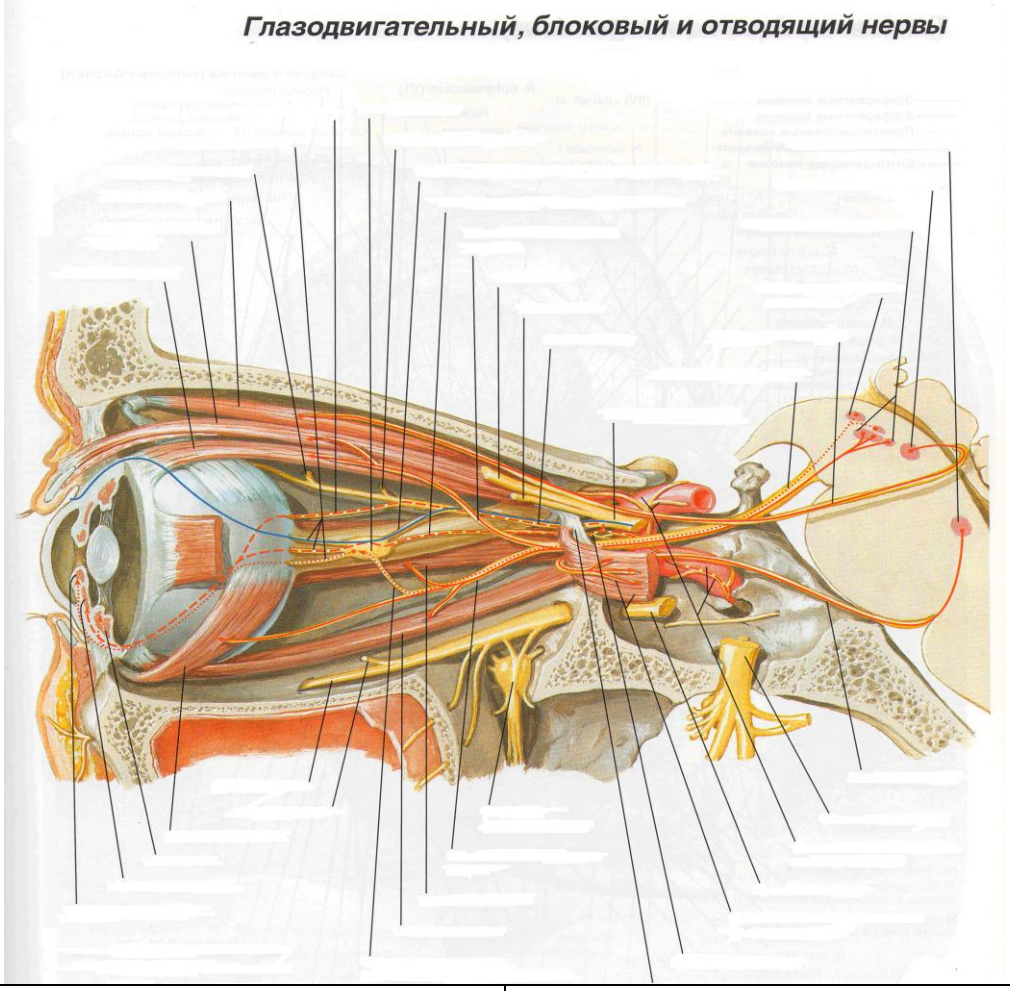

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ANATOMY AND TOPOGRAPHY OF THE TRIGEMINAL NERVE (V PAIR) AND ITS BRANCHES.

I. Questions for checking the initial level:

1. Череп в целом. Крылонебная ямка, глазница, внутреннее основание. Отверстия и сообщения.
2. Стволовая часть мозга.
3. Ромбовидная ямка. Топография и характеристика ядер тройничного нерва.
4. Выход корешков тройничного нерва на основании мозга.

II. Targets:

Student should know	***Literature***:
1. The name V pairs of cranial nerves and its branches (in Latin and Russian transcription). 2. The name, location and characteristics of the trigeminal nerve. 3. Location of the roots of the trigeminal nerve on the base of the brain. 4. Location on the base of the skull of the semilunar ganglion of the trigeminal nerve - Gasser's node (depression at the top of the pyramid of the temporal bone in the cleavage of the solid membrane of the brain). 5. Place of exit from the skull and the area of innervation of branches of the V pair of cranial nerves: a. areas and boundaries of cutaneous innervation; b. innervation of the masticatory muscles. 6. Location of vegetative ganglia along the branches of the trigeminal nerve.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.
Student must be able to:	***Literature***:
1. Show on the preparation the place of the exit of the trigeminal nerve on the basis of the brain. 2. Show a semilunar ganglion on the base of the skull. 3. Show and name each branch emerging from the ganglion. 4. Show and name the exit sites of I, II, III branches of the trigeminal nerve (orifice): the upper orbital branch, round and oval openings. 5. Show on the preparation the course and zones of innervation of the I, II, III branches of the trigeminal nerve: the orbit, the pterygoid fossa and the outer surface of the skull. 6. Show on the preparation a lingual nerve and a drum string. Determine the zone of innervation.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.

III. Tasks for self-dependent work:

1. Make a scheme of the structure of the trigeminal nerve.

Complete phrases:

2. The motor branches of the trigeminal nerve are directed

_____

_____

3. The teeth of the upper jaw are innervated

_____

_____

4. The node of the trigeminal nerve lies

_____

_____

5. Make a scheme of innervation of the skin of the face:

IV. Questions for self-control:

6. What are the nucleuses of the trigeminal nerve? Where do they lie?

_____

_____

7. Indicate which branches innervate the teeth of the lower jaw?

_____

_____

8. What innervate the motor fibers of the trigeminal nerve?

_____

_____

9. Which branch branches away from the I branch of the trigeminal nerve? Specify the zone of innervation.

_____

_____

V. Make a situation on this topic:

10. TASK: *Patient after the trauma, violations of sensory innervation of anterior sections of the tongue mucosa, teeth of the lower jaw were revealed. What trauma of a nerve can anatomically explain this situation?*

.

ANSWER: _____

_____

_____

TASK:
ANSWER:

VI. Make 1-2 tests according to the example:

11. Example: Name the hole through which comes out of the cavity of the skull III branch of the trigeminal nerve?:

а. the great foramen б. lacerated foramen в. Oval foramen г. upper optical slit

Test№1 _____

_____

_____

а. _____

б. _____

в. _____

г. _____

Test№2 _____

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а. _____

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VII. Make designations for pictures:

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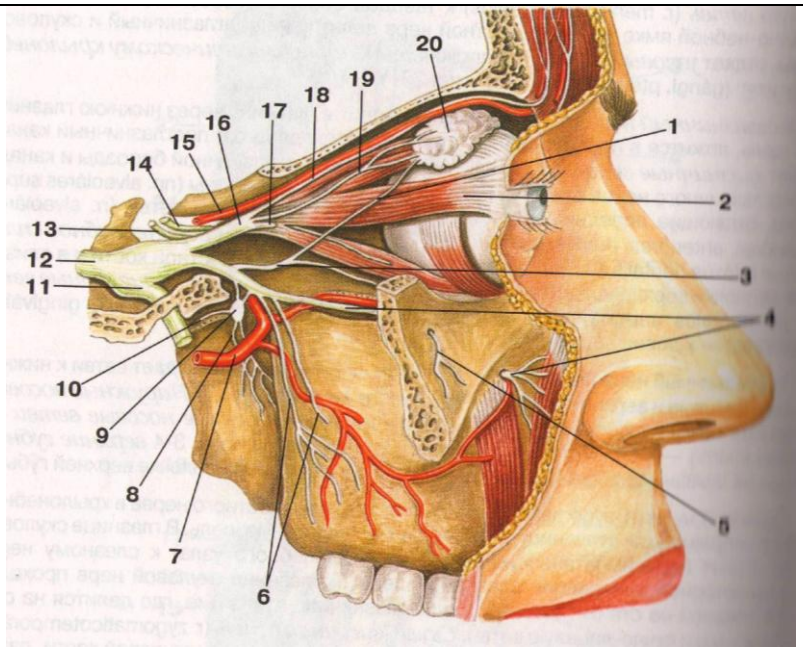	1.
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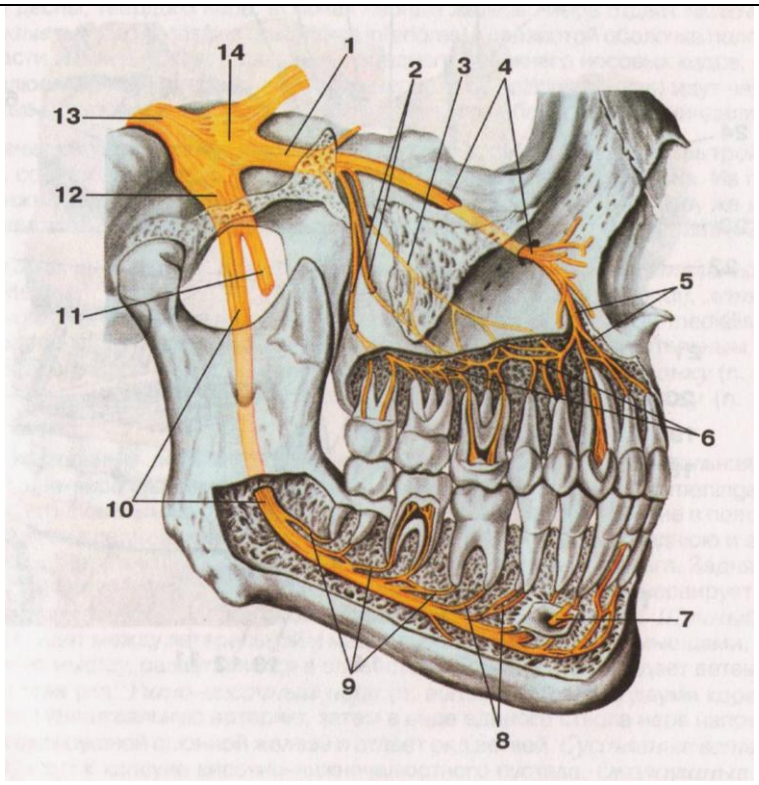
№13	TRIGEMINAL NERVE
	1.
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CONTACT WORK

Theme: Anatomy and topography of the facial (VII) nerve and its branches. Anatomy and topography of the pre-vertebral (VIII) and lumbosacral (IX) nerves and their branches. Anatomy and topography of the additional (XI) and sublingual (XII) nerves and their branches. Age features.

The complexity of the structure and morphological connections of parts of the nervous system requires a particularly careful study of the structure of the brain and spinal cord on drugs, it is important to understand complex reflex arcs that ensure the connection of the human body with the external environment and the regulation of processes inside it. Knowledge of the anatomy of the cranial nerves is necessary not only for the student, but also for the doctor for understanding the etiology, the pathogenesis of many diseases, including the nervous ones, for understanding the physiological and pathological processes in the body. Cranial nerves innervate the skin, muscles, organs of the head and neck, as well as a number of organs of the thoracic and abdominal cavities. Violation of the functions of these nerves at different levels of their lesions is manifested by a clear symptomatology, the analysis of which plays an important role in the formulation of a topical diagnosis of diseases of the nervous system. In addition to syndromes of isolated lesions of individual cranial nerves, there are syndromes in which the nuclei and fibers of the cranial nerves are simultaneously affected and the conductors of the motor, sensitive, extrapyramidal and vegetative systems located side by side in the brain stem. Knowledge of this topic is necessary when examining neurological patients and for topical diagnosis of sensitive and motor disorders, when studying relevant sections in the course of therapy, surgery, neurology, traumatology and other clinical disciplines.

I. Цели:

Student must know	1. The exit of the facial (VII) nerve on the base of the brain and from the cavity of the skull. 2. Topography of the nuclei and the course of the facial (VII) nerve. 3. The branches of the facial (VII) nerve and the region of innervation. 4. Topography of the pre-cochlear (VIII) nerve. Location on the basis of the brain. 5. Parts and nuclei of the pre-vertebral (VIII) nerve. 6. The exit of the glossopharyngeal (IX) nerve on the basis of the brain and from the cavity of the skull. 7. Topography of the nuclei and the course of the glossopharyngeal (IX) nerve. 8. The branches of the glossopharyngeal (IX) nerve and the region of innervation. 9. Output of an additional (XI) nerve on the basis of the brain and from the cavity of the skull. 10. Topography of the nuclei and the course of the additional (XI) nerve. 11. The branches of the extra (XI) nerve and the area of innervation. 12. The exit of the sublingual (XII) nerve on the basis of the brain and from the cavity of the skull. 13. Topography of the nuclei and the course of the hyoid (XII) nerve. 14. Branches of the hyoid (XII) nerve and the region of innervation.
Student must be able to:	1. Call in Latin and show on the native preparation the output of the facial, pre-door cochlear, lingopharyngeal, accessory and sublingual nerves on the basis of the brain and from the cranial cavity. 2. To call in Latin and show on the native preparation the course of the facial nerve, its branches. 3. Call in Latin and show on the native preparation the course of the pre-collateral nerve of the nerve, its branches. 4. To call in Latin and show on the native preparation the course of the glossopharyngeal nerve, its branches. 5. Call in Latin and show on the native preparation the course of the additional nerve, its branches. 6. To name in Latin and show on the native preparation the course of the sublingual nerve, its branches. 7. Show on the preparation of the brain stem the localization of the cranial nerve nuclei (VII, VIII, IX, XI and XII cranial nerves).
Student must possess	1. Medical-anatomical conceptual apparatus; 2. Anatomical knowledge for understanding pathology, diagnosis and treatment. 3. Knowledge of the characteristics of the nuclei of the corresponding cranial nerves (motor, sensory and vegetative).

II. Required level of knowledge:

а) from related disciplines:

a) Phylogeny and ontogeny of the central nervous system.

b) The structure and topography of the gray and white matter of the brain.

б) from previous topics:

a)The structure and parts of the brain stem.

b) The structure of the rhomboid fossa.

c) Structure of the cerebral cortex and localization of cortical centers.

в) from the current lesson:

1. Output on the basis of the brain and from the cranial cavity of the facial (VII), pre-vertebral-cochlear (VIII), lingopharyngeal (IX), additional (XI) and sublingual (XII) nerves.
2. Topography of nuclei and stroke of the facial (VII) nerve.
3. The branches of the facial (VII) nerve and the region of innervation.
4. Topography of the pre-cochlear (VIII) nerve. Location on the basis of the brain.
5. Parts and nuclei of the pre-vertebral (VIII) nerve.
6. Topography of the nuclei and the course of the glossopharyngeal (IX) nerve.
7. Branches of the glossopharyngeal (IX) nerve and the region of innervation.
8. Topography of the nuclei and the course of the additional (XI) nerve.
9. The branches of the extra (XI) nerve and the area of innervation.
10. Topography of the nuclei and the course of the hyoid (XII) nerve.
11. Branches of the hyoid (XII) nerve and the region of innervation.

III. Object of study:

Basal surface of the base of the skull. Cranial fossae and their formations: holes, cracks and impressions. The bases of the brain with the roots of the cranial nerves. Sagittal section of the brain with the trunk portion. Places of the exit of roots of cranial nerves.

IV. Informational part:

The facial nerve combines the facial nerve itself and the intervening nerve. Actually the facial nerve is formed by motor nerve fibers. The intermediate nerve (Vriesberg's nerve) contains sensory and vegetative parasympathetic fibers. Sensitive fibers terminate on the nuclei of the single-path nucleus, motor fibers begin from the cells of the motor nucleus. Vegetative fibers originate from the upper salivary nucleus. The facial nerve emerges at the posterior edge of the bridge, on the side of the draining nerve, lateral to the olive, is directed forward and laterally and enters the inner auditory canal, going transversely in the channel of the facial nerve of the temporal bone relative to the long axis of the pyramid of the temporal bone. At the level of the cleft of the canal of a large umbilical nerve, the facial nerve forms the first curve almost at right angles to the back. Further, a small distance passes in the upper part of the medial wall of the tympanum, then turns downward (the second bend). At the first bend (knee of the facial canal) there is a knot knot. The facial nerve leaves the eponymous canal through the stylophyllary aperture on the base of the skull and gives its branches to the mimic muscles of the head.

In the canal of the facial nerve, several branches leave it: ***1) large stony nerve. 2) the connecting branch (with the plexus plexus) 3) the streminal nerve 4) the drum string***

The facial nerve immediately after exiting from the stylomastoid otverstiya gives back the auricular nerve, a two-abdominal branch and a hypoglossal branch.

Further, the facial nerve enters the thickness of the parotid salivary gland, where its branches exchange fibers, resulting in the formation of the parotid plexus, from which the branches of the facial nerve go up, forward and downward to the mimic muscles. Due to the peculiar arrangement of the parotid plexus and the branches of the facial nerve that depart from it, it is called "a large goose paw".

The branches of the parotid plexus are the temporal, skua, cheek branches, the marginal branch of the lower jaw, the cervical branch.

With the branches of the facial nerve, the fibers from the ear-temporal nerve (behind the articular process of the lower jaw) are connected, from the supraorbital, infraorbital, chin nerves. These connective branches contain sensitive fibers, which pass from branches of the trigeminal nerve to the branches of the facial nerve.

Vestibulocochlear nerve is formed by sensitive nerve fibers, coming from the organs of hearing and balance. On the ventral surface of the brain, the pre-cochlear nerve leaves behind the bridge, laterally from the facial nerve. Further it goes to the inner auditory passage, where it divides into the vestibule and cochlear portion.

vestibular part The vestibulo-cochlear nerve is formed by processes of bipolar neurons of the vestibular node. The peripheral processes of the neurons of the pre-node node form the anterior, posterior and lateral ampullar nerves, elliptical-mesotochal-ampullar nerve and spherical-saccular nerve. The central processes of these neurons form the vestibule of the pre-cochlear nerve, which is directed to the vestibule nuclei of the brainstem. The cochlear part of the anterior-cochlear nerve is formed by the central processes of the bipolar neurons of the cochlear node - the spiral node of the cochlea. The central processes of these neurons are directed to the cochlear nuclei located in the bridge cover. Peripheral processes of neurons of the cochlear node begin with receptors in the spiral organ of the cochlea of the inner ear.

Glossopharyngeal nerve contains sensory, motor and secretory (parasympathetic) fibers. Sensitive fibers terminate on the nuclei of the single-path nucleus, the motor fibers exit from the double core, the vegetative fibers come from the lower salivary nucleus. The tongue-nasal nerve emerges from the medulla oblongata 4-5 roots behind the olive tree, next to the roots of the wandering and extra-nerve nerves. Together with these nerves the glossopharyngeal nerve goes to the jugular opening, to its anterior part. In the jugular aperture the nerve thickens and forms the upper node. Under the jugular hole, in the area of the stony dimple, is the lower node.

After exiting the jugular opening, the glossopharyngeal nerve passes to the lateral surface of the internal carotid artery. Passing further between the internal carotid artery and the internal jugular vein, the glossopharyngeal nerve makes an arcuate bend downward, directed down and forwards between the shillopharynx and stylus muscles to the root of the tongue. The terminal branches of the glossopharyngeal nerve are the lingual branches, which branch out in the mucosa of the posterior third of the tongue. The branches of the glossopharyngeal nerve are the tympanic nerve, as well as the sinus, pharyngeal, shillopharyngeal and other branches.

Accessory nerve or nerve of Willis, is formed by appendages of motor nuclei located in the cover of the prothong brain and in the spinal cord. Cranial roots of the accessory nerve emerge from the posterior lateral groove of the medulla oblongata, behind the olive. The spinal cord appears from the posterolateral groove of the spinal cord, rises through the large occipital opening into the cranial cavity and behind the lobules of the cerebellum hemisphere (the minerals of the cerebellum) connects to the cranial roots. In the exit from the jugular opening, the additional nerve gives the inner and outer branches. The inner branch, thinner, is part of the vagus nerve over its lower node. The outer branch of the accessory nerve follows behind the styloid process of the temporal bone and the muscles starting from it, passes behind the posterior abdomen of the digastric muscle and is directed toward the sternocleidomastoid muscle and enters the anterior margin of the trapezius muscle.

Sublingual nerve formed by the fibers of the motor nucleus, innervates the muscles of the tongue and some muscles of the neck. From the brain, the nerve emerges in the furrow between the pyramid and the olive, is directed forward and laterally into the channel of the nasal lingual nerve of the occipital bone. Coming out of the canal, the sublingual nerve goes down and forth, rounds the vagus nerve and the inner carotid artery from the lateral side. Passing between the internal carotid artery and the internal jugular vein, the nerve is guided under the posterior abdomen of the digastric muscle and under the sylvous tubercle muscle in the submandibular triangle, where it forms an arc convex downward. Then this nerve goes forward and upward into the thickness of the tongue to his muscles.

From the sublingual nerve departs a descending branch, the motor fibers of which are connected with the fibers that depart from the anterior branches of the first and second spinal nerves, forming a cervical loop. The branches of the cervical loop innervate the scapular-hyoid, the sternum-sublingual, the sternum-thyroid and the thyroid-sublingual muscles.

One of the features of age-related changes in the nerves is their myelination. This process is not the same in different nerves: before all the motor nerves are myelinated, then mixed and the latter are sensitive. This applies both to the cranial and spinal nerves; In the latter, the anterior, motor roots are later myelinated, and then sensitive. There are indications that at the time of birth the pre-vertebral-cochlear nerve is most myelinated. In general, the degree of nerve functioning is to a certain extent determined by the intensity of myelin sheath formation. A similar process takes place in the optic nerve, where fiber is strongly myelinated in the first days after birth. After birth, the process of myelination continues, showing some consistency with respect to the motor nerves: facial, sublingual, abduction, the third branch of the trigeminal nerve, oculomotor - and with respect to the sensory nerves: pre-cochlear, cochlear, first and second branches of the trigeminal, wandering, glossopharyngeal, visual. Myelination of the cranial nerves is carried out during the first 3-4 months and ends in the second year of life. Myelination of the spinal nerves lasts up to 3 years.

V. Practical work:

Task №1. The branches of the facial nerve are found at the anterior edge of the parotid gland, in the thickness of which it is divided into its terminal motor branches forming the parotid plexus. The posterior auricular nerve and the two-abdominal branch are very weakly expressed and their finding can cause difficulty. The remaining branches are located radially along the front side face and are found in the subcutaneous fatty tissue. The following branches: temporal, buccal, zygomatic, marginal branch of lower jaw and cervical branch. The latter stretches down and reaches the subcutaneous muscle of the neck.

Task №2. The cheek branch of the facial nerve (one of its large branches) should be sought in the subcutaneous tissue approximately 15 mm below the zygomatic arch and 10 mm anterior to the external auditory canal. After finding a branch, bring under it a thin ligature, and gently sipping on it, follow in the direction to the parotid gland. Go to the bifurcation of the main trunk of the facial nerve. Isolating the branches of the facial nerve, medially from it simultaneously reveals the initial section of the external jugular vein, merging from the superficial temporal and submandibular. The ascending branch of the facial nerve gives rise to the temporal and zygomatic branches. Descend its branch trace to the angle of the lower jaw, where it is divided into the marginal branch of the lower jaw and the cervical branch.
Having completed the study of the branches of the facial nerve in the thickness of the parotid salivary gland, go to the temporal vascular-neural bundle that emerges from under the upper edge of the parotid salivary gland. It lies in front of the tragus of the ear, is superficially located in the subcutaneous tissue and contains an ear-temporal nerve and superficial temporal vessels. The nerve is thin and tender often located between the artery and the vein. Carefully trace its progress upward towards the temple and down to the articular process of the lower jaw, where the branches from the nerve branch off to the facial nerve. Trace simultaneously the course of the superficial temporal vessels. From the initial part of the superficial temporal artery, a transverse artery of the face is projected forward. The trunk of the facial nerve from the bifurcation to its exit from the stylophyllar opening lies behind the outer carotid artery and the external jugular vein. To see it, you must strongly pull back the sternocleidomastoid muscle and bend the earlobe upward. Sometimes here you can find the branches of the facial nerve to the anulic, silo-pharyngeal and silo-hyoid muscles, as well as to the posterior abdomen of the digastric muscle.
Task №3. At the very anus and mastoid aperture, find the posterior auric nerve, which crosses the transverse outer surface of the mastoid process and anastomizes with the large ear nerve from the cervical plexus. Of the two terminal branches n. auricularis posterior one - anterior innervates the posterior ear, the second - the posterior reaches the occipital abdomen of the supracerebral muscle and anastomoses with the posterior branch of the second cervical nerve - n. occipitalis major. The temporal branches, rami temporales, go up and forward, crossing the zygomatic arch, to the anterior and superior ear muscles, to the frontal abdomen of the supracerebral muscle and to the circular muscle of the eye.
Cheek branches, rami zygomatici. located above the excretory protochemistry of the parotid gland, reach the zygomatic and lower part of the circular muscle of the eye, as well as the muscles of the nose and upper lip. The sternal branches anastomose with the infraorbital nerve. The cheek branches, rami buccales, are located below the excretory duct of the parotid salivary gland. Crossing the chewing muscle, they lie on top of the body of the body. The book is anastomosed with the marginal branch of the lower jaw, and circling the fatty body, enter into connection with the buccal nerve. The marginal branch of the lower jaw, ramus marginalis mandibulae, coming out from behind the corner of the lower jaw, reaches the muscles of the chin and lower lip, crossing at the same time the facial vessels. The marginal branch of the lower jaw is anastomosed with the chin nerve (branch of the lower alveolar nerve) emerging from the jaw of the lower jaw. The cervical branch, ramus colli, is the lowest branch of the facial nerve, innervates the subcutaneous muscle of the neck, descending down its deep surface, sometimes anastomosing with the transverse nerve of the neck.
Задание №4. The lingual branch of the glossopharyngeal nerve is located in the interior of the inferior fovea between the shillopharynx and the styloid muscles. Determine the position of the styloid process and go forward between the muscles. Read the material covered in the textbook and compare the preparation with the drawings in the textbook and atlas. The functional significance of the studied nerves will be learned from the textbook of human anatomy.

VI. Control questions:

1. Name the branches of the facial nerve. Which branches move away from this nerve in the thickness of the pyramid of the temporal bone?
2. What fibers consist of a large stony nerve? Where does this nerve originate, where is it going?
3. What are the impulses of the drum string? Where does it begin and where are the fibers that form it?
4. Which motor branches (nerves) move away from the facial nerve? What is the name of each of them and what muscles does it innervate?
5. Name the nerves of the vestibule of the pre-cochlear nerve. Where is the sensitive node of this nerve and what is it called?
6. List the branches of the glossopharyngeal nerve. Which of these branches contains preganglionic parasympathetic fibers to the ocelliose salivary gland? Describe the topography of this branch.
7. Which root has an extra nerve? Name the organs that innervate this nerve.
8. Describe the topographic relationship of the sublingual nerve with the muscles of the neck, the internal carotid artery, the internal jugular vein.

VII. Academic pursuits:

Task № 1. Which nerve is affected, if the patient has a right nasolabial fold, the right ophthalmic cleft is widened (it can not be closed while squinting, because the eyelids do not close), difficulties arise during talking and eating (the food sticks between cheek and teeth)?
Answer:
The right facial nerve is affected, since its motor fibers innervate all the facial muscles of its side, in particular: the circular muscle of the eye (the eyelids do not close), the circular muscle of the mouth (difficulty in speaking and eating).

Task № 2. At the boxer after impact in a parotid site on the left there was a paralysis of mimic muscles on the same party or side. Which nerve is damaged?
Answer:
The innervation of facial muscles is carried out by the motor branches ("large goose paw", pes anserinus major) of the facial nerve that exit the parotid plexus. A blow to the parotid region could cause damage to the plexus of the facial nerve, lying in the thickness of the parotid salivary gland, and as a result - paralysis of facial muscles.

Task № 3. Upon admission to the clinic, examining the patient, it was found that his taste receptors, perceiving bitter, are broken, the sensitivity of the back of 1/3 of the tongue is broken. Which nerve is involved in the pathological process?
Answer:
General and taste sensitivity of the mucosa of the posterior third of the tongue is provided by the glossopharyngeal nerve (IX pair). Bitter taste is perceived on the root of the tongue by the taste receptors of the glossopharyngeal nerve, lying in the papilled papillae.

Task № 4. At the patient at a tongue extension the deviation of its top is observed to the right. The motor innervation of which cranial nerve is broken in this case?
Answer:
The muscles of the tongue are innervated by n. hypoglossus (XII pair CHN). Unilateral impairment of innervation is manifested by paresis or paralysis of the corresponding half of the tongue, which manifests itself when the tongue is extended by deflecting its apex to the affected side.

VI. Control questions:

1. Specify the branches of the facial nerve, departing from it in the ¬ channel channel:

1. The zygomatic branches (r.r. zigomatici)
2. large stony nerve (n. Petrosus major)
3. The drum string (chorda tympanica)
4. Stomach nerve (n. Stapedius)

Keys: 2,3,4

2. Specify the hole through which the drum string leaves the skull:

1. stylomastoid opening (foramen stylomastoideum)
2. rocky-drum slit (fissura petrotympanica)
3. A spinning hole (foramen spinosum)
4. stony-scaly slit (fissura petrosquamosa)

Keys: 2

3. Specify the branches that depart from the glossopharyngeal nerve:

1. pharyngeal branches (rami pharingei)
2. amygdala branches (rami tonsillares)
3. The drum nerve (n. Tympanicus)
4. temporal branches (rami temporales)

Keys: 1,2,3

4. Indicate where the XI pair of cranial nerves come from the brain (cerebral and spinal parts):

1. posterior lateral furrow below vagus nerve (sulcus lateralis posterior below n. Vagus)
2. anterior lateral groove (sulcus lateralis anterior)
3. posterior lateral groove above the vagus nerve (sulcus lateralis posterior above n. Vagus)
4. between the anterior and posterior roots of the spinal nerves (C_2-C_5)

Keys: 1,4

5. Indicate where the XII pair of cranial nerves comes from the skull:

1. The oval hole (foramen ovale)
2. jugular foramen jugulare
3. canalis nerve duct (canalis nervi hypoglossi)
4. round hole (foramen rotundum)

Keys: 3

6. Indicate which muscles the innervation of the cervical loop:

1. 1. the maxillo-hyoid muscle (m. Mylohyoideus)
2. 2. the scapular-hyoid muscle (m. Omohyoideus)
3. 3. sternum-hyoid muscle (m. Sternohyoideus)
4. 4. Sterno-thyroid (m. Sternothyroideus)

Keys: 2,3,4

7. Specify where the VII brain of the cranial nerves comes from the brain:

1. on the medial edge of the brain stem (crus cerebri)
2. along the lateral edge of the cerebral pedicle (crus cerebri)
3. on the trigeminal line (linea trigeminofacialis)
4. in the anterior lateral sulcus (sulcus lateralis anterior)

Keys: 3

8. Name the nucleus of the glossopharyngeal nerve.

1-three sensitive
2- 2 vegetative and 1 motor
3- 1 vegetative, 1 motor, 1 sensitive
4- 2 vegetative and 1 sensitive

Keys: 3

9. Where the nucleus of the hyoid nerve is projected on the rhomboid fossa?

1-in the area of the facial tubercle
2-in the lateral corners of the rhomboid fossa
3- along the elevation on the sides of the median sulcus
4 in the lower corner of the diamond-shaped fovea in the region of the triangle.

Keys:4

10. In the course of which nerve trunks the infection can spread from the inner ear into the cavity of the skull?

1 - In the course of the trigeminal and pre-door-cochlear nerves.
2 - In the course of the facial and vagus nerves.
3 - In the course of the intermediate, facial and pre-cochlear nerves.
4 - In the course of the sublingual and facial nerves.

Keys: 3

IX. Анатомическая терминология:

Nervus facialis	Facial verve
Geniculum (n. facialis)	Kolenza (facial nerve)
N. stapedius	Stremium nerve
R. communicans	Connecting branch
N. auricularis posterior	Posterior auric nerve
R. occipitalis	Occipital branch

R. auricularis	Ear
R. digastricus	The two-abdominal branch
R. stylohyoideus	Shilo-hyoid branch
Plexus parotideus	Parotid plexus
Rr. temporales	The temporal branches
Rr. zygomatici	Cheek branches
Rr. buccales	Genital branches
R. lingualis	Language branch
R. marginalis mandibulae	Edge of mandible
R. colli	Neck branch
Nervus intermedius	Interstitial nerve
Gangl. geniculi [geniculatum]	Knot Assembly
Chorda tympani	Drum string
Ganglion pterygopalatinum	Krylonebny knot
N. canalis pterygoidei	Nerve of the pterygoid canal
Radix facialis	Facial spine
N. petrosus major	Large stony nerve
N. petrosus profundus	Deep stony nerve
Ganglion submandibulare	Podnizhnelchelyustnoy node
R. sympathicus	Sympathetic branch (
Rr. glandulares	The glandular branches
Gangl. sublingual	Sublingual Node
Nervus vestibulocochlearis (VIII)	The pre-vertebral nerve (VIII)
Radix vestibularis (superior)	The vestibule root (upper)
Radix cochlearis (inferior)	The cochlear spine (lower)
Pars vestibularis	Anticipatory part
Gangl. vestibulare	The gateway node
R. communicans trochlearis	Block connecting branch
Pars superior	Top part
N. utriculoampullaris	Elliptical-saccular-ampullar nerve
N. utricularis	Elliptical sieve nerve
N. ampullaris anterior	Anterior ampullar nerve
N. ampullaris lateralis	Lateral ampullar nerve
N. ampullaris posterior	Posterior ampullar nerve
N. saccularis (Pars superior)	Spherical-saccular nerve (upper part)
Pars cochlearis	Cochlear Part
Gangl. cochleare [spirale cochleae]	The cochlear node (spiral node of the cochlea)
Nervus glossopharyngeus (IX)	The glossopharyngeal nerve (IX)
Gangl. superius	Top node
Gangl. inferius	Lower node
N. tyinpanicus	The Drum Nerve
Intumescentia tympanica 369	Drum Thickening
Plexus tympanicus	The Plexus Plexus
R. tubarius	Pipe branch
Nn. caroticotympanici	Sleepy-Drum Nerves
R. communicans (cum r. auriculari n. vagalis)	The connecting branch (with the ear branch of the vagus nerve)
Rr. pharyngei	Pharyngeal branches
R. m. stylopharyngei	Branch of the shihlogochnoy mys¬tsy
R. sinus carotici	Sinus branch
Rr. tonsillares	Mandelike branches
Rr. linguales	Language branches
Ganglion oticum	Ear node,
N. petrosns minor	Lower stony nerve
R. communicans	Connecting branch
Nervus accessorius (XI)	Additional nerve (XI)
Radices craniales [Pars vagalis]	Cranial roots [Wandering part]
Radices spinales [Pars spinalis]	Cerebrospinal roots [Cerebrospinal part]
Truncus n. accessorii	The trunk of the accessory nerve
R. internus	Internal branch
R. externus	Outer branch
Rr. musculares	Muscular branches
Nervus hypoglossus (XII)	The sublingual nerve (XII)
Rr. linguales	Language branches

X. Preparations and manuals:

1. Sagittal section of the brain.
2. Preparation of the brainstem with a diamond-shaped fossa.
3. The base of the skull.
4.Uchebnik. Atlas. Tables.

INDEPENDENT WORK

ANATOMY AND TOPOGRAPHY OF THE FACIAL NERVE (VII PAIR) AND ITS BRANCHES.

I. Questions for checking the initial level:

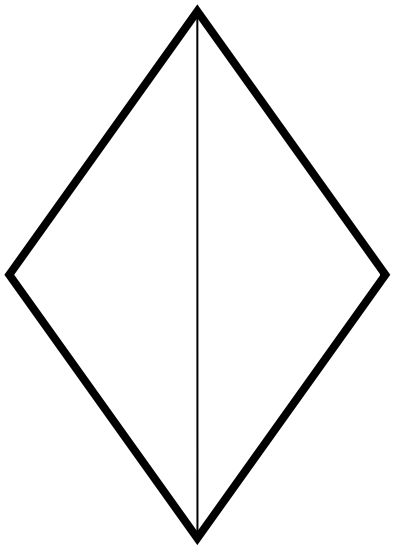
1. The trunk of the brain.
2. The rhomboid fossa. Topography of gray matter. The nucleus of the VII nerve.
3. Topography of the roots of the facial nerve on the base of the brain.
4. The structure of the temporal bone. Channel of the facial nerve (stroke, inlet and outlet).

II. Targets:

Student should know:	***Literature***:
1. The name in Latin and Russian transcription VII pair of cranial nerves and its branches. 2. The name, location, characteristics of the nuclei of the facial nerve. 3. Location of the roots of the facial nerve on the base of the brain. 4. Location and branches of the facial nerve in the canal. 5. The exit point of the facial nerve from the cranial cavity. 6. Branches of the facial nerve and the area of their innervation (drum string, large stony nerve). 7. Location and innervation of the large stony nerve. 8. Location of the drum string. 9. Motor branches of the facial nerve - "Big crow's foot".	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.
Student must be able to:	***Literature***:
1. To name and show on the wet preparation the entry of the roots of the facial nerve into the internal auditory canal. 2. Show on the base of the skull the outlet of the canal of the facial nerve. 3. Show on the preparation "a large goose paw". 4. To name and show on the preparation a tympanic strand woven into the lingual nerve. 5. Show the location on the diamond-shaped fossa of the nuclei of the facial nerve. To characterize their motor, sensitive, vegetative fibers.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.

III. Tasks for self-dependent work:

1. Note on the diagram the topography of the nuclei of the facial nerve.



Complete phrases:

2. The motor branches of the facial nerve emerge from the cavity of the skull through _____.

_____ and innervate _____

_____.

3. The taste sensitivity of the front two thirds of the tongue is ensured by _____

_____

4. The vegetative nucleus of the facial nerve is called _____

IV. Questions for self-control:

5. What innervate branches of the facial nerve?

_____

_____

6. Where the nucleuses of the VII pair of cranial nerves lie?

_____

_____

7. Which node is located along the facial nerve in the facial canal?

_____

_____

8. What branches branch off from the facial nerve inside the pyramid of the temporal bone?

_____

_____

9. What does the concept of "big crow's foot" mean?

_____

_____

V. Make a situation on this topic:

10. TASK:. The patient developed a paralysis of the facial muscles of the right side of the face after hypothermia. About defeat, what kind of nerve can I speak? Give anatomical justification

. ANSWER: _____

_____

_____

TASK:
ANSWER:

VI. Make 1-2 tests according to the example:

11. Example: Patient at inspection the doctor has found out an omission of a corner of a mouth and incomplete closing of eyelids that testifies to defeat:
а- maxillary nerve б- facial nerve в- optical nerve г- vagus nerve

Test№1 _____

_____

_____

а. _____

б. _____

в. _____

г. _____

Test№2 _____

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_____

а. _____

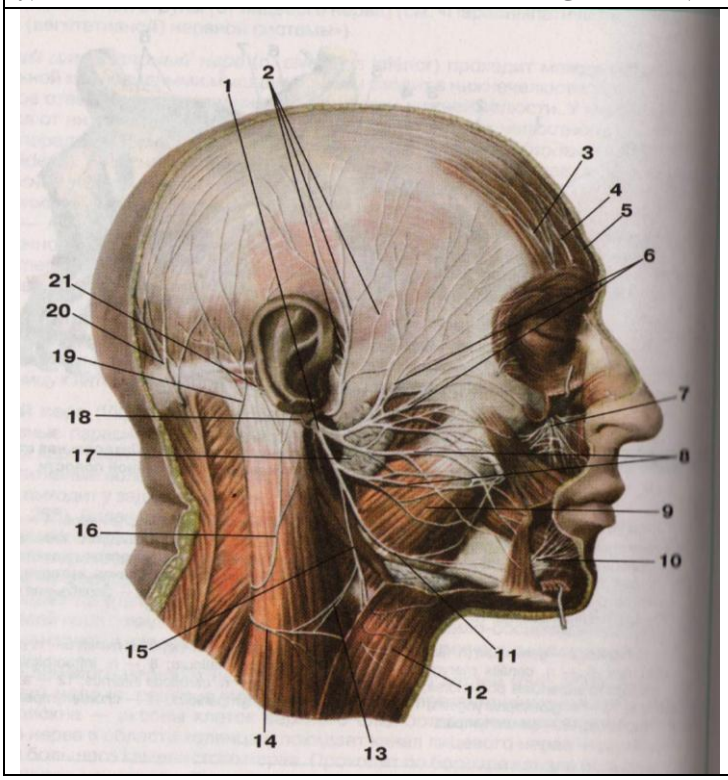
б. _____

в. _____

г. _____

VII. Make designations for pictures:

№12	FACIAL NERVE



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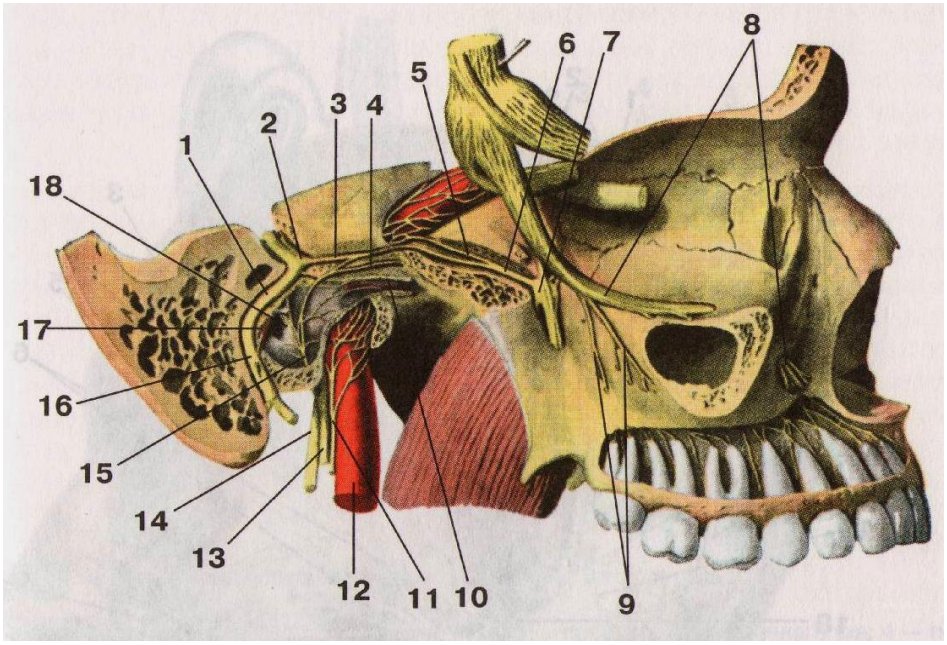
№13	FACIAL NERVE



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ANATOMY AND TOPOGRAPHY OF PRE-COCHLEAR (VIII) AND LUMBOSACRAL (IX) NERVES.

I Questions for checking the initial level:

1. The stem part of the brain.
2. Romboid fossa. Topography of the nuclei of the pre-vertebral and lingopharyngeal nerves.
3. The exit location of VIII and IX pairs of cranial nerves on the basis of the brain.
4. The exit location of VIII and IX pairs of cranial nerves on the base of the skull.

II Targets

Student should know:	***Literature***:
1. Name, topography and characteristics of the nuclei of the anterior-cochlear nerve (VIII) - anterior and posterior cochlear (auditory) nuclei and four pre-vertebral (vestibular) nuclei. 2. The projection of the nuclei of the VIII nerve on the rhomboid fossa is the vestibular field. 3. Arrangement of the roots of the anterior-cochlear nerve on the base of the brain. 4. Arrangement of the roots of the anterior-cochlear nerve on the base of the skull, in the pyramid of the temporal bone (internal auditory canal) and division of the nerve into the cochlear and vestibular parts, respectively, the presence of nodes - cochlear and vestibular. 5. The vestibular apparatus is an analyzer of the position of the body and its direction in space. 6. The course of the cochlear part of the VIII nerve - from the ganglion, the peripheral processes are directed to the corti, and the central processes form a cochlear branch, go to the ventral and dorsal nuclei, to the vestibular field. 7. The processes of the dorsal nucleus form the auditory strips of the rhomboid fossa - they go to the middle line, pass to the opposite side and in the lateral loop terminate in the subcortical centers of hearing. 8. The processes of the ventral nucleus form a trapezoidal body - pass to the opposite side, the cup is interrupted on the cores of the body, form a lateral loop and follow up to the subcortical centers of hearing. 9. Name, characteristics, topography and projection on the rhomboid fossa of the glossopharyngeal nerve (IX). 10. Location of the roots of the glossopharyngeal nerve (IX) on the base of the brain. 11. Location of the glossopharyngeal nerve on the base of the skull. 12. The upper and lower ganglia of the IX nerve, the topography of the nerve in the neck and its branches: sensitive, motor and vegetative.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.
Student must be able to:	***Literature***:
1. Show the vestibular fields on the surface of the rhomboid fovea of the projection of the nuclei of the VIII nerve, and explain their significance. 2. Name and show the location of the projection of the nuclei of the glossopharyngeal (IX) nerves (sensitive, motor and vegetative). 3. Show on the base of the brain the roots of VIII and IX nerves. 4. Explain the course of VIII and IX craniocerebral nerves. 5. Show the trapezoid body on the transverse section of the bridge and tell its course, nuclei and participation in the formation of the lateral loop. 6. Name and show on the preparation subcortical and cortical centers of hearing (medial geniculate body, lower tubercle, quadruple) 7. Name and show the ganglia of the glossopharyngeal nerve (IX). 8. Call the branches of the glossopharyngeal nerve and explain their course. 9. Admit the course of the drum nerve and its branches.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.

III Tasks for self-dependent work.

1. Make a scheme of the structure of the glossopharyngeal nerve.

Complete phrases:

2. Motor fibers of the glossopharyngeal nerve innervate _____.

3. Auditory nerve has _____ nucleuses, which are situated

_____

_____

4. The roots of the auditory (VIII) and lingo-pharyngeal (IX) nerves are located _____

_____.

5. The vegetative nucleuses of the glossopharyngeal nerve are _____.

_____..

IV Questions for self-control.

6. What parts are distinguished in the pre-cochlear nerve?

_____

_____

7. How many nuclei have an 8th pair of cranial nerves and what are the?

_____

_____

8. What innervates IX pair of cranial nerves?_____

_____

V. Make a situation on this topic:

9. TASK: *Why is the break of one lateral loop does not cause complete one-sided deafness, but only a slight decrease in hearing on the side opposite to the damage and some disturbances in recognition of the direction of sound?*

. ANSWER: _____

_____

_____

TASK:
ANSWER:

VI Make 1-2 tests according to the example:

10. Example: Secretory parasympathetic innervation of the parotid salivary gland, sensory and flavoring innervation of the mucous membrane of the posterior third of the tongue is provided by the nerve:

1. Facial 2.Trigeminal 3.Sublingual 4. Glossopharyngeal

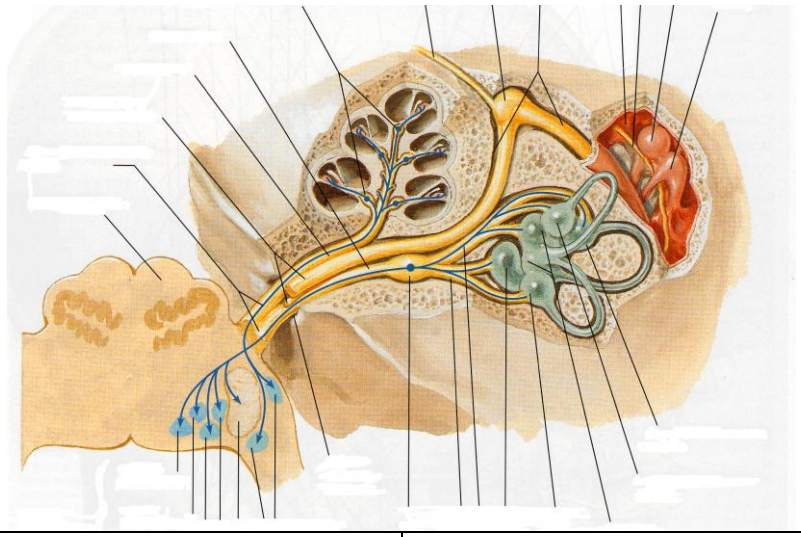
Test№1 _____ _____ _____ _____ *а.* _____ *б.* _____ *в.* _____ _____ *г.* _____
Test№2 _____ _____ _____ *а.* _____ *б.* _____ *в.* _____ *г.* _____ _____

VII Make designations for pictures.

VESTIBULOCOCHLEAR NERVE

Number the picture and sign the notation:

№11



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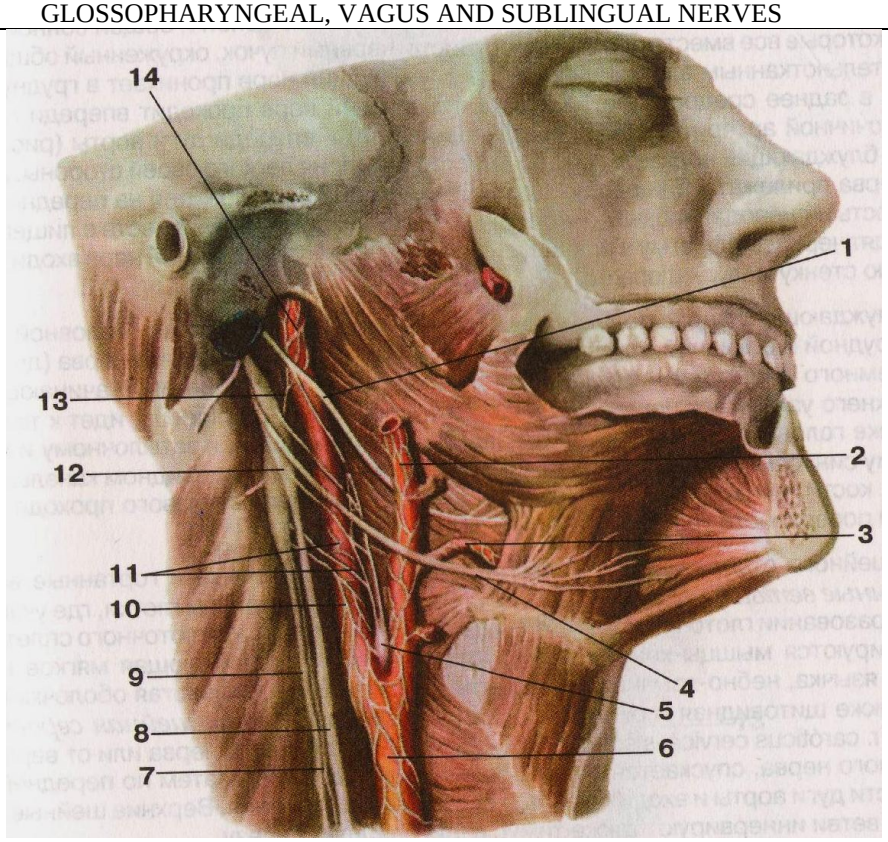
№12 GLOSSOPHARYNGEAL, VAGUS AND SUBLINGUAL NERVES



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CONTACT WORK

Theme: Anatomy and topography of the wandering (X) nerve and its branches. Age features.

Knowledge of the anatomy of the cranial nerves is necessary not only for the student, but also for the doctor for understanding the etiology, the pathogenesis of many diseases, including the nervous ones, for understanding the physiological and pathological processes in the body. Violation of the functions of these nerves at different levels of their lesions is manifested by a clear symptomatology, the analysis of which plays an important role in the formulation of a topical diagnosis of diseases of the nervous system. The wandering nerve supplies the motor fibers of the larynx, pharynx, esophagus, stomach, intestines, blood vessels, heart (inhibit the activity of the heart, regulate blood pressure, etc.), the sensitive fibers innervate the occipital parts of the dura mater, the organs of the neck, stomach, lungs : in many reflex acts (swallowing, coughing, vomiting, filling and emptying of the stomach); in regulation of palpitation, breathing; in the formation of the solar plexus. When the motor nerves of the vagus nerve are damaged, there are disturbances in swallowing, phonation, articulation, respiration, so-called. bulbar disorders. They occur in bulbar paralysis, amyotrophic lateral sclerosis, myelo-encephalitis and other diseases. Knowledge of this topic is necessary when examining neurological patients and for topical diagnosis of sensitive and motor disorders, when studying relevant sections in the course of therapy, surgery, neurology, neurosurgery, traumatology and other clinical disciplines.

I. Objecttives:

Student must know	1. Topography of the vagus nerve exit (X pair) on the basis of the brain and from the skull cavity. 2. Topography of the nuclei of the vagus nerve (X pair) in the trunk of the brain. 3. Topography of the head section of the vagus nerve (X pair). 4. The branches of the head of the vagus nerve (X pair) and the region of innervation. 5. Topography of the passage of the cervical vagus nerve (X pair). 6. Branches of the cervical region of the vagus nerve (X pair) and the region of innervation. 7. Topography of the thoracic section of the vagus nerve (X pair). 8. Branches of the thoracic part of the vagus nerve (X pair) and the region of innervation. 9. Topography of the passage of the abdominal part of the vagus nerve (X pair). 10. Branches of the ventral part of the vagus nerve (X pair) and the innervation region.
Student must be able to:	1. Show and name in Latin the trunk of the vagus nerve on the base of the brain, its exit from the cavity of the skull. 2. To name in Latin and show the localization of the nuclei of the vagus nerve on the rhomboid fossa. 3. Explain on topical preparation the topography of the vagus nerve in the neck, in the thoracic and abdominal cavity. 4. To call in Latin and show on the native preparation the organs topographically connected both by the innervation and innervation of the main stems of the vagus nerve, and also by the neurovascular complexes that make up the vagus nerve or its branches. 5. Show on the moist preparation and call in Latin the branches of the cephalic, cervical, thoracic and abdominal parts of the vagus nerve (X pair).
Student must possess	1. Medical-anatomical conceptual apparatus; 2. Anatomic knowledge for understanding the pathology, diagnosis and treatment of diseases of the upper limb joints. 3. The simplest medical instruments - a scalpel and tweezers. 4. The technique of nerve preparation (under the supervision of the teacher)

II. Required level of knowledge:

а) from related disciplines:

a) Phylogeny and ontogeny of the central nervous system.
b) The structure and topography of the gray and white matter of the brain.

б) from previous topics:

a) Structure and parts of the brain stem.
b) The structure of the rhomboid fossa.
c) Structure of the cerebral cortex and localization of cortical centers.
d) Topography of the skull.
e) Topography of the neck area.

в) from the current lesson:

1. Topography of the vagus nerve exit (X pair) on the basis of the brain and from the skull cavity.
2. Topography of the nuclei of the vagus nerve (X pair) in the trunk of the brain.
3. Topography of the head section of the vagus nerve.
4. Branches of the head of the vagus nerve (meningeal, ear branches), the area of their innervation.
5. Topography of the passage of the cervical vagus nerve (X pair).
6. Branches of the cervical region of the vagus nerve (pharyngeal branches, upper cervical cardiac branches, upper laryngeal nerve, recurrent hindlimb nerve), area of their innervation.
7. Topography of the thoracic section of the vagus nerve (X pair).
8. Branches of the thoracic part of the vagus nerve (thoracic cardiac branches, bronchial branches, esophageal plexus) and the region of innervation.
9. Topography of the passage of the abdominal part of the vagus nerve (X pair).
10. Branches of the ventral part of the vagus nerve (posterior stalking trunk, anterior wandering trunk) and area of innervation.

III. Object of study: The base of the brain is the output of the wandering brain, the vagus nerve in the structure of the neurovascular bundle in the neck region, the thoracic nerve of the vagus, the abdominal part of the vagus nerve

IV. Informational part:

N. vagus, the vagus nerve, which developed from the fourth and subsequent branchial arches, is called so because of its extensive spread. This is the longest of the cranial nerves. The wandering nerve innervates the membranes of the brain, the organs of the neck, the thoracic cavity, most of the organs of the abdomen. The fibers of the vagus nerve are impulses that slow heart rate, narrow the bronchi, increase peristalsis and relax the intestinal sphincters, increase the secretion of glands, etc. The vagus nerve contains sensitive, motor and secretory fibers. The upper node of the vagus nerve is at the level of the jugular aperture, the lower node is slightly lower. The motor fibers of the vagus nerve begin from a double nucleus located in the oblong brain. Vegetative preganglionic parasympathetic fibers originate from the posterior nucleus of the vagus nerve. In the composition of the vagus nerve there are sympathetic fibers, suitable for it in the composition of the connecting branches from the sympathetic trunk.

The wandering nerve emerges from the medulla oblongata with 10-18 roots behind the olive tree, next to the glossopharyngeal and accessory nerves, then they join into one trunk. After leaving the opening, the vagus nerve is initially located behind the glossopharyngeal nerve and anterior to the accessory nerve and internal jugular vein, lateral and anterior to the hyoid nerve. On the neck, the vagus nerve passes between the internal jugular vein and the internal carotid artery, and below - between the same vein and the common carotid artery. Common carotid artery, vagus nerve and internal jugular vein form on the neck a neurovascular bundle, surrounded by a common connective tissue vagina. Then the vagus nerve penetrates into the thoracic cavity, into the posterior mediastinum. The right vagus nerve passes in front of the right subclavian artery, the left vagus nerve is in front of the aortic arch. Below, the vagus nerve goes over the back surface of the lung root of its side. Further, both nerves adhere to the outer surface of the esophagus. The left vagus nerve gradually shifts to the anterior surface of the esophagus, the right one to the posterior surface of the esophagus. Wandering nerves along with the esophagus pass through the diaphragm into the abdominal cavity. The left vagus nerve is located on the front wall of the stomach, right - on the back.

In the structure of the vagus nerve, according to the topographic principle, the head, cervical, thoracic and abdominal divisions are distinguished.

From the head of the vagus nerve (to the level of the jugular opening) the meningeal and auric branches branch out:

Several branches branch from the cervical segment:

1) pharyngeal branches
2) upper cervical cardiac branches
3) the superior laryngeal nerve
4) recurrent laryngeal nerve

In the thoracic region from the vagus nerve branch branches to the internal organs:

1) thoracic cardiac branches
2) bronchial branches
3) esophageal branches

The ventral nerve of the vagus nerve is represented by the anterior and posterior wandering trunks emerging from the esophageal plexus and their branches:

The fibers of the vagus nerve along with sympathetic fibers of the celiac plexus go to the liver, spleen, pancreas, small and large intestine (to the level of the descending colon). The wandering nerve is the conductor of sensations coming from the internal organs, provides sensitivity to the entire respiratory and most of the digestive tract. Even more important are the branches of the vagus nerve in the regulation of cough and vomiting reflexes. A huge role belongs to the vagus nerve in the regulation of the activity of the heart, respiration, stomach, intestines. The importance of this nerve is also important in the regulation of the tone of the blood vessels.

The nuclei of the vagus nerve in the medulla oblongata form early. With their development is associated the formation of some regulatory mechanisms - respiratory, cardiovascular, digestive and other functions. The nuclei of the vagus nerve are revealed from the second month of intrauterine development. By one and a half years of life, the number of cells in the nucleus of the vagus nerve is increasing. In a 7-year-old child, the nuclei of the vagus nerve are formed in the same way as in the adult.

V. Practical work:

Task №1. Consider a diamond-shaped fossa, on the diagram, note the location of the nuclei of the vagus nerve.

Task №2. Wander the nerve between the common carotid artery and the internal jugular vein. From the cavity of the skull, it exits through the jugular opening and gives its branch - the upper laryngeal nerve, which can be detected along the upper laryngeal artery. Then find the right and left recurrent guttural nerves. The left recurrent laryngeal nerve runs around the arch of the aorta, and the right subclavian artery. Further, the left recurrent laryngeal nerve lies in the furrow between the esophagus and the trachea. The upper part of the nerve is called the lower laryngeal nerve. Sublingual

The nerve leaves the cavity of the skull through the same channel of the occipital bone. Further, it can be detected lateral from the internal carotid artery, below the posterior abdomen of the digastric muscle, where it forms an arch facing downwards. At this point, the arc crosses the neurovascular bundle and limits the triangle of Pirogov from above. One of the branches of this nerve (the upper root) descends and connects to the lower branch of the cervical plexus (lower root), forming a neck loop that lies in front of the internal jugular vein and sternocleidomastoid muscle.

Задание №3. When studying the vagus nerves in the thoracic and abdominal cavities, attention should be paid to the differences in the anatomical-topographic relations on the right and on the left. The right vagus nerve passes in front of the right subclavian artery. Here one of the larger branches departs from it: the recurrent guttural nerve, n. laryngeus recurrens. He goes around the artery from below and from behind and rises to the neck area called the lower laryngeal nerve. The left vagus nerve is located anterior to the aortic arch. At this level, a left recurrent laryngeal nerve emerges from it, which traverses the aortic arch from below and behind and just like the right return nerve goes to the neck. Behind the root of the lung, the vagus nerves scatter on a large number of branches to the bronchi (r. Bronchiales), the heart (r. Cardiaci thoracici) and the esophagus (r. Oesophagei). The esophagus branches of the right and left vagus nerves form the anterior and posterior esophageal plexus. In the area of the esophageal aperture of the diaphragm, these plexuses form respectively the anterior and posterior trunks.

VI. Control questions:

1. Where the vagus nerve (X pair) comes out on the base of the brain.
2. How does the vagus nerve leave the skull cavity?
3. A core has a vagus nerve, where they are located.
4. Topography of the head section of the vagus nerve (X pair).
5. Topography of the passage of the cervical vagus nerve (X pair).
6. Branches of the cervical region of the vagus nerve (X pair) and the region of innervation.
7. Recurrent laryngeal nerve, its course, area of innervation.
8. Topography of the thoracic section of the vagus nerve (X pair).
9. Branches of the thoracic part of the vagus nerve (X pair) and the region of innervation.

10. Topography of the passage of the abdominal part of the vagus nerve (X pair).
11. Branches of the ventral part of the vagus nerve (X pair) and the region of innervation.
12. Innervation of the vagus nerves of the tongue, larynx, abdominal organs.

VII. Academic pursuits:

Task № 1.

The ophthalmologist examines the external ear and tympanic membrane and inserts the ear funnel into the external auditory canal. The patient may have a cough, a sensation of a sore throat. How can this be caused? Give anatomical justification.

Answer:

In the innervation of the posterior wall of the external auditory canal, the vagus nerve is involved. The irritation of this zone can reflexively cause the described sensations.

Task № 2.

Why the inflammation of the dura mater is often noted signs of irritation of the vagus nerve. Give anatomical justification?

Answer:

The wandering nerve gives the branch to the dura mater, which starts from its upper node, returns to the cranial cavity through the jugular orifice and innervates the dura mater of the posterior cranial fossa.

VIII. Control Tests:

1. Specify the location of the vagus nerve exit from the cranial cavity:
   A) jugular opening
   B) internal aperture of the ear canal
   B) large occipital opening
   D) lacerated foramen
2. Name the departments of the vagus nerve:
   A) the head part
   B) the neck part
   I) thoracic part
   D) Abdominal part
3. What innervates the upper laryngeal nerve:
   A) mucous membrane of pharynx
   B) the lower constrictor of pharynx
   C) thyroid and parathyroid glands
   D) parotid gland
4. Name the branches of the neck part of the vagus nerve:
   A) upper cervical cord branch
   B) Inferior cervical cord branch
   B) the superior laryngeal nerve
   D) pharyngeal plexus
5. What innervates the lower laryngeal nerve:
   A) laryngeal mucosa below the glottis
   B) posterior caecum perforatum and lateral muscle
   B) perstechecherpalovidnuyu muscle, vocal muscle
   D) oblique laryngeal muscle
6. Indicate areas of innervation of the recurrent laryngeal nerve
   A) esophagus
   B) trachea
   In heart
   D) thymus gland
7. What innervates the tracheal branch
   A) trachea
   B) bronchi
   B) light
   D) Mediastinum
8. Name the areas of innervation by the hepatic branches
   A) liver
   B) the pancreas
   C) gallbladder
   D) Spleen
9. List the organs that are innervated by celiac branches
   A) The pancreas
   B) small intestine
   C) large intestine
   D) Spleen
10. What innervate the kidney branches
   A) kidneys
   B) ureter
   B) bladder
   D) Adrenal glands

Keys

1.А	4.АБВГ	7.АБ	10.А
2.АБВГ	5.АБ	8.АБ	
3.АБВ	6.АБВГ	9.АБВ	

XI. Анатомическая терминология:

Nervus vagus (X)	The wandering nerve (X)
Gangl. superius	Top node
Gangl. inferius	Lower node
R. meningeus	Meningeal branch
R. auricularis	Ear
R. communicans (cum. n. glossopharyngeo)	The connecting branch (with the glossopharyngeal nerve)
Rr. pharyngei	Pharyngeal branches
Plexus pharyngeus	The pharynx plexus
Rr. cardiaci cervieales superiores	Upper cervical cardiac branches
N. laryngeus superior	Upper laryngeal nerve
R. externus	Outer branch
R. internus	Internal branch
R. communicans	The connecting branch (with the lower laryngeal nerve)
Rr. cardiaci cervieales inferiores	Lower cervical cordial branches
N. laryngeus recurrens	Recurrent laryngeal nerve
Rr. tracheales	Tracheal branches
Rr. esophagei	Esophageal branches
N. laryngeus inferior	Lower laryngeal nerve
R. communicans	The connecting branch (with the inner laryngeal branch)
Rr. cardiaci thoraciei	Thoracic cardiac branches
Rr. bronchi ales	Bronchial branches
Plexus pulmonalis	Pulmonary plexus
Plexus esophageus	Esophageal plexus
Trancus vagalis anterior	Anterior wandering trunk
Truncus vagalis posterior	Rear wandering trunk
Rr. gastrici anteriores	Anterior gastric branches
Rr. gastrici posteriores	Hindquarter of the stomach
Rr. hepatici	Hepatic branches
Rr. coeliaci	Ciliary branches
Rr. renales	Kidney branches

X. Preparations and manuals: the skull, the medulla oblongata, the base of the brain, the uncovered corpse. Tables. Textbook. Atlas of human anatomy. Tests and standards of answers to them. Tables. Graphs.

INDEPENDENT WORK

ANATOMY AND TOPOGRAPHY OF THE VAGUS NERVE.

I Questions for checking the initial level.

1. The trunk of the brain. The diamond-shaped fossa.
2. Topography of gray matter of a diamond-shaped fossa.
3. Topography and projection of nuclei of cranial nerves.
4. Call the output of the roots of the cranial nerves on the basis of the brain.

II Targets.

Student should know:	***Literature***:
1. The structure of the rhomboid fossa. 2. The name, location and characteristics of the nuclei of the vagus nerve (X). The location of the projection of the vegetative core. 3. Arrangement of the roots of the vagus nerve on the base of the brain. 4. The exit site of the vagus nerve (X pair) on the base of the skull. 5. Ganglion of the vagus nerve (upper and lower). 6. Course and topographic departments of the vagus nerve-head, cervicothoracic, abdominal. 7. The formation of the neurovascular bundle of the neck. 8. Topography of the branch of each department of the vagus nerve and the region of innervation. a) head - meningeal and auricular branches. b) cervical - pharyngeal branches and plexus; upper cardiac branches; upper laryngeal and recurrent guttural nerves; (cardiac nerves, esophageal, tracheal), lower laryngeal nerve. c) thoracic - esophageal plexus, thoracic cardiac branches, bronchial. d) abdominal - anterior trunk of the vagus nerve - anterior gastric branches, hepatic branches; posterior trunk of the vagus nerve, celiac branches, posterior gastric. 9. The boundary of the zones of innervation of vagus nerves before entering the small pelvis.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.
Student must be able to:	***Literature***:
1. Show the triangle of the vagus nerve on the medication of the rhomboid fossa to explain its meaning. 2. Name and show on the basis of the brain the roots of the vagus nerve (olive). 3. Show the location of the vagus nerve exit (X pair) on the base of the skull - (jugular hole). 4. Call and show the parts of the vagus nerve. 5. Show the vagus nerve in the neck region as part of the neurovascular bundle (jugular vein, carotid artery, nerve). Call its branches - the upper larynx and the lower laryngeal nerves. 6. Show the trunk of the vagus nerve in the thoracic cavity, in the posterior mediastinum, behind the root of the lung and call its branches (the right nerve is located behind the subclavian artery, and the left one is on the front surface of the aortic arch). 7. Show the vagus nerves in the lower parts of the chest cavity along the esophagus - the left nerve - along the front surface of it, and the right one - along the back. 8. Name and show the penetration of vagus nerves from the thoracic cavity into the abdominal cavity in the esophageal aperture of the diaphragm. 9. Conduct an overview of the innervation of the organs by the branches of the vagus nerve.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties..

III Tasks for self-dependent work.

1. Make a scheme of innervation of the larynx.

2. Describe the topographic differences between the left and right vagus nerves.

_____

_____

3. To which part of the tongue the branches of the vagus nerve are directed?

_____

_____

Complete phrases:

4. The vagus nerve innervates _____ to the order of

_____

5. In the course of the vagus nerve lie _____ ganglions.

6. The vagus nerve has the following nucleuses _____

_____

IV Questions for self-control.

7. At what level lie the nucleus of the vagus nerve?

_____

_____

8. What is common for IX and X nerves?

_____

_____

9. Which organs are innervated by the vagus nerve?

_____

_____

10. Specify the opening of the skull through which the vagus nerve passes?

_____

_____

V Make a situation on this topic.

10. *TASK:. When examining the patient for the preservation of the motor functions of the vagus nerves, the doctor asked the patient to say "a" and found that the palatal curtain at the same time flows more noticeably from the left side; there is asymmetry in the location of the soft palate and tongue - the soft sky on the left hangs, and the tongue deviates to the right. Give anatomical justification.*
    ANSWER: _____

_____

_____

TASK:
ANSWER:

VI Make 1-2 tests according to the example:

12. Example:

1. Indicate for which nerves there is a double (unpaired) nucleus?

а) facial б) sublingualis. в) vagus г) trigeminal

2. Specify, the branch of which is the superior laryngeal nerve?

а) sympathetic trunk. б) hypoglossal nerve

в) accessory nerve г) vagus nerve

Test№1 _____

_____

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а. _____

б. _____

в. _____

г. _____

Test№2 _____

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а. _____

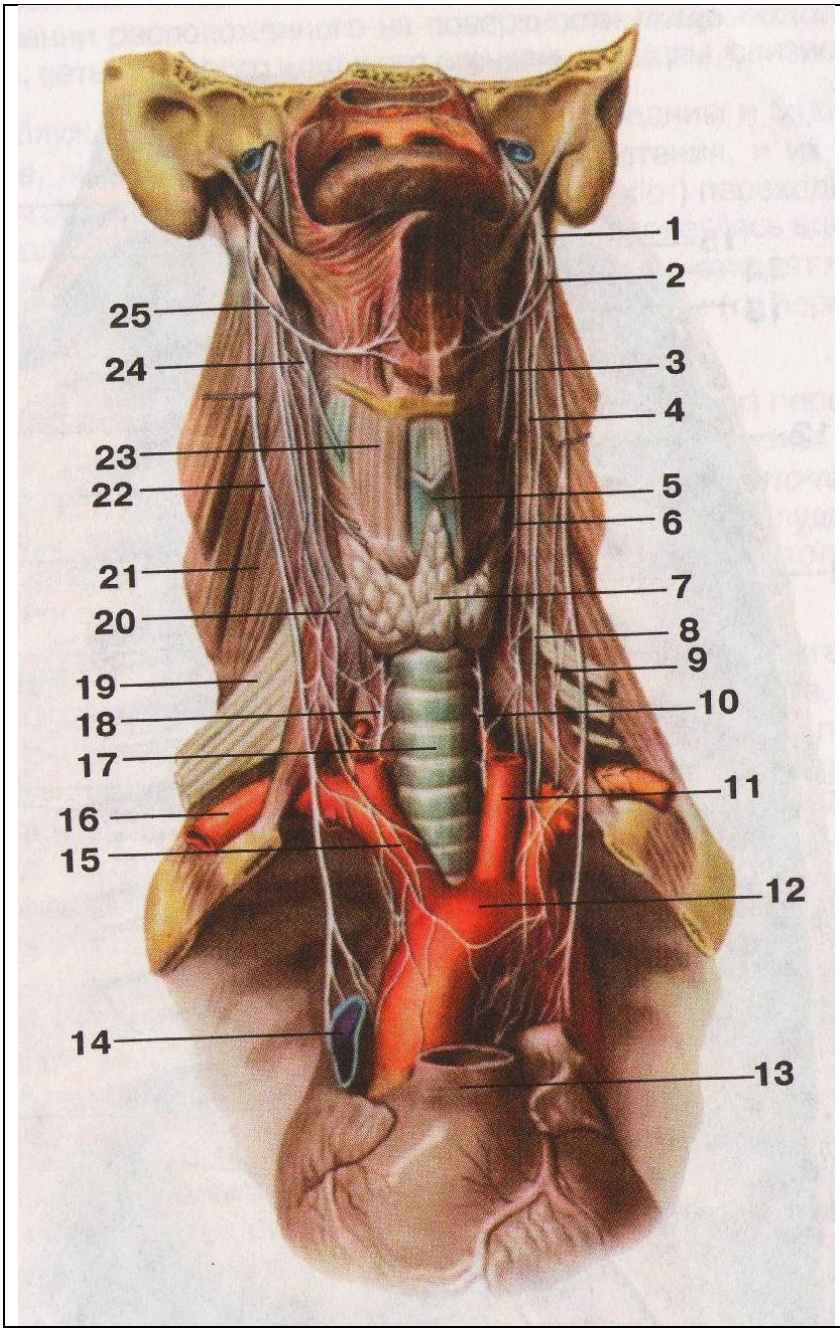
б. _____

в. _____

г. _____

VII Make designations for pictures.

№13 VAGUS NERVE



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ANATOMY AND TOPOGRAPHY OF THE ADDITIONAL AND HYPOGLOSSAL NERVE.

I. Questions for checking the initial level.

1. Muscles and fascies of the neck. Classification.
2.Structure of the tounge. Muscles.
3. Stem of the brain. The rhomboi fossa.
4. Topography and projection of nucleus of cranial nerves on a rhomboid fossa.

II Targets.

Student should know	***Literature***:
1. Superficial and deep muscles of the body. 2.Construction of the muscles of the tongue. 3. The title XI and XII cranial nerves in Russian and Latin transcription. 4. Name, topography and characteristics of the nuclei of the accessory and sublingual nerves. 5. The location and the outlet on the basis of the brain of the root of the accessory nerve (lateral to the olive) in the posterior lateral groove and the sublingual - in the furrow between the pyramid and the olive. 6. Place of exit on the basis of the skull of the cranial and spinal cord roots of the accessory and sublingual nerve. 7.Topografiya additional (XI) and sublingual (XII) nerves in the neck. 8. Additive nerve in the region of the sternocleidomastoid mastoid muscle. 9. The sublingual nerve in front and lateral of the carotid artery, in muscles above the hyoid bone, below the posterior abdomen of the digastric muscle, bounding Pirogov's triangle. 10. The descending branch of the hyoid nerve along the internal jugular vein and its connection with the roots of the cervical plexus. 11. The branch of the cervical loop to the muscles below the hyoid bone.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.
Student must be able to	***Literature***:
1. Show on the wet preparation muscle of the neck muscle. 2. Show the location of the nucleus of the extra and sublingual nerves on the rhomboid fossa. 3. To call and show on the basis of the brain and skull the arrangement of the roots of the accessory and sublingual nerves. 4. Find and show the trunk on a moist supplementary nerve preparation from the inner surface of the sternocleidomastoid muscle. 5. Find and show on the damp preparation the dorsal branch of the accessory nerve. 6. Find and show on the wet preparation the trunk of the sublingual nerve. 7. Characterize its course in the neck, Pirogov's triangle and muscles above the hyoid bone in the direction of the muscles of the tongue. 8. Show the descending branch of the hyoid nerve on the moist preparation and the neck loop and its branches. 9. Conduct an overall overview of the innervation of the neck muscles by the branches of the hyoid and accessory nerves.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.

II Tasks for self-dependent work.

1. Make a scheme of the structure of the hyoid nerve.

Complete phrases:

2. The nucleuses of the additional (XI) and sublingual (XII) nerves are localized in _____.

_____.

3. Neck loop is formed _____.

_____..

4. The branches of the accessory nerve innervate _____

_____.

5. The sublingual nerve in the area of the tongue innervates _____.

_____.

IV Questions for self-control.

6. Indicate what is the peculiarity of the location of the nuclei of the accessory nerve?

_____

_____

7. Indicate what relation to the Pirogov triangle has the hyoid nerve?

_____

_____

8. How is the connection between the sublingual nerve and the branches of the cervical plexus?

_____

_____

V Make a situation on this topic.

9. TASK:. *Patient's speech articulation is broken. At inspection it is revealed, at preservation of gustatory, tactile and temperature sensitivity of language, infringement of its form (flattening), symmetry and movements. Symptoms of which CNS lesions are not detected? Pathology, what or what nerves can be assumed? Give anatomical justification.*

. ANSWER: _____

_____

_____

TASK:
ANSWER:

VI Make 1-2 tests according to the example:

10. Example:

Indicate which cranial nerves pass through the jugular opening of the skull:

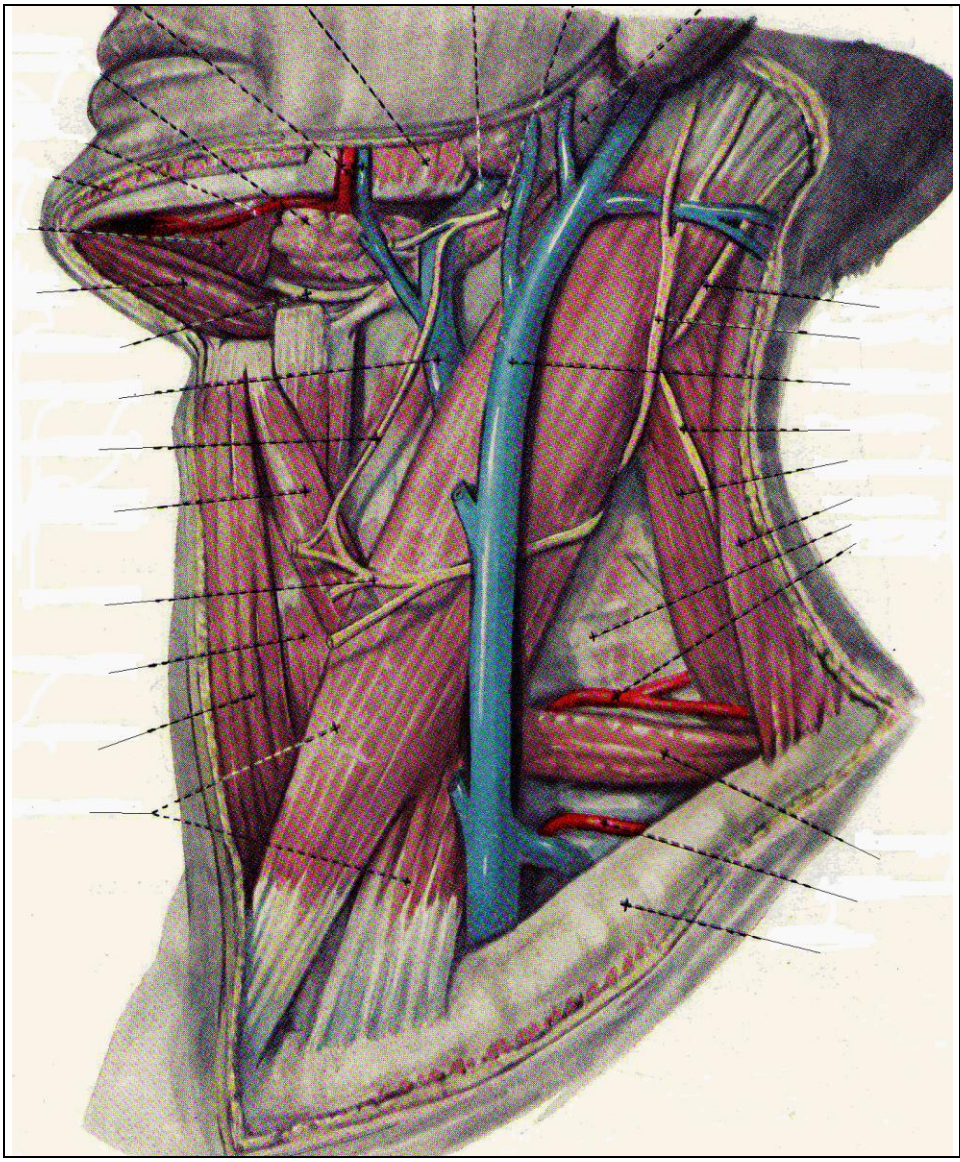
а) facial and vagus *б) hypoglossal and vagus*

в) accessory and vagus *г) glossopharyngeal and facial.*

Test№1 _____ _____ _____ *а.* _____ *б.* _____ *в.* _____ *г.* _____
Test№2 _____ _____ _____ *а.* _____ *б.* _____ *в.* _____ *г.* _____

VII Make designations for pictures.

№11 ***ACCESSORY AND HYPOGLOSSAL NERVES***



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CONTACT WORK

Theme: Sense organs. Leather. Organ of taste. Olfactory organ. Anatomy and topography of the organ of vision. Eyeball. Auxiliary apparatus of the eye. Anatomy and topography of the anterior-cochlear organ. External and middle ear. Anatomy and topography of the inner ear. Topography of the vessels and nerves in the orbit. Age features.

Information from the surrounding world and the internal environment of the body is perceived by complex systems, which are called analyzers. Each analyzer consists of a peripheral section - a sensing device, an intermediate - conducting paths and a central one - a cortical end, where the incoming information is analyzed and a sensation arises. Peripheral departments of analyzers are represented by receptors that transform the energy of external stimulation into a nervous process (nervous excitation, nervous impulse), and are sensory organs.

I. Objecttives:

Student must know	1. Anatomy and topography of the eyeball, ear. 2. The structure of the wall of the orbit, ear. 3. The structure of the auxiliary apparatus of the eye and ear. 4. Shells of the eyeball and ear. 5. The visual and auditory ways. 6. Sources of blood supply. 7. Know the Corti's Organ.
Student must be able to:	1. On the preparation of the eye, show its constituent parts. 2. Open the upper wall of the orbit and show the course of the optic nerve and blood vessels that feed them. 3. Know and show parts of the ear.
Student must possess	1. Latin terminology on this topic. 2. Skills of rational use of the acquired knowledge and the ability of their further application in senior courses.

II. Required level of knowledge:

а) from related disciplines:

1. Phylogeny of the organ of sight and hearing;
2. Ontogeny of the organ of sight and hearing.

б) from previous topics:

1. To know on the skull the structure of the eye socket, ear.

в) from the current lesson:

1. To understand the structure of the eye, ear and related structures.

III. Object of study:

1. Bull's eyes
2. The Skull
3. Saws of the temporal bone
4. Auditory ossicles
5. Tables, textbook and atlas
6. The methodical grant
7. The model of the ear

IV. Informational part:

In the middle of the third week of intrauterine development, depressions appear in the neural plate. As the brain develops, they become ocular vesicles, connected with the anterior brain by hollow stems. As a result of uneven growth of various parts of the eye vesicle, its anterior part is retracted and a double-walled eyeglass appears, in which vessels along the stalk penetrate. From the outer sheet of the eye cup develops pigment epithelium of the retina, and from the inner - the photosensitive nerve part of the retina. The ectoderm, adjacent to the ophthalmic vesicle, goes to the formation on the 4th-5th week of the lens vesicle, which is then inserted into the eye-glass hole and subsequently converted to the lens. At 6 weeks from the mesoderm surrounding the eye cup, the choroid is formed, and later - the sclera and cornea.

The outer epithelial layer of the cornea develops from the ectoderm. Nerve fibers that drain from the ganglion cells of the retina grow along the vessels of the stem of the eye glass and turn into the optic nerve. The vitreous body and the iris are formed from vessels and mesenchyme penetrating into the eye glass.

The transverse-striated muscles of the eyeball originate from the mesenchyme of the primary head somites. The eyelids develop during the 7th week of the intrauterine period in the form of skin areas growing over the cornea that grow together at the end of the 9th week. Lacrimal glands appear at the 9th week of numerous kidneys that arise from conjunctive epithelium of the lateral part of the upper eyelid. In the course of further development, the lacrimal gland is partially divided by the tendon of the muscle that lifts the upper eyelid, into the orbital and secular parts. The nasolacrimal duct develops by closing the nasopharyngeal groove, limited by the lateral nasal and maxillary processes. Violation of the normal development of the elements of the eye leads to various birth defects. So, if the normal proportions of the shape of the eyeball are violated and the eyeball is longer or shorter, then congenital myopia or hyperopia occurs. When a cornea or lens with an irregular curvature of the image on the retina is distorted and ostigmatism develops.

Eyeball -bulbus oculi, has an irregular globular shape. It distinguishes the front pole, polus anterior, and the back pole, polus posterior.

The eyeball consists of three membranes: fibrous, vascular and internal, bounding cavities, filled with watery moisture, a lens and a vitreous body.

Fibrous membrane of the eyeball, *tunica fibrosa bulbi*, External, is the basis of the eyeball and performs a protective function. It consists of a cornea that occupies the anterior third of the eyeball and sclera located on the other.

Cornea, *cornea* is a transparent, avascular convex - concave connective tissue plate.

Sclera, *sclera* dense opaque connective tissue membrane.

In front, it is covered with a conjunctiva, behind to the sclera are joined the tendons of the muscles of the eyeball.

Vascular membrane of the eyeball, *tunica vasculo* is attached to the fibrous membrane and is divided into 3 parts: the iris, the ciliary body and the choroid.

Iris, *iris* circular muscular-epithelial plate, covered on the inside by a layer of pigment cells, with the outer - endothelium. Muscle cells forming part of the iris form a dilator and a sphincter of the pupil.

Ciliary body, *corpus ciliare*- has a ring shape up to 6.3 mm wide and is projected onto the sclera. In the outer part of the ciliary body is the ciliary muscle. With this muscle, the ciliary body performs the second important function - accommodating - the change in the curvature of the lens.

Actually the choroid, *chorioidea* – occupies the posterior 2/3 of the periphery of the eyeball.

The inner shell of the eyeball, *tunica interna bulbi*, consists of retina, retina, its blood vessels and optic nerve. The retina covers the vascular envelope from the inside to the edge of the pupil. The posterior visual part is proper to the choroid.

The contents of the eyeball are represented by the moisture of the anterior and posterior chambers, the lens and the vitreous body. These formations together with the cornea make up the refractive media of the eye.

Lenticular, *lens* – transparent body refracting light, has the form of a biconvex lens, is located between the iris and the vitreous body. The lens is covered with a capsule; vessels and nerves does not have.

Vitreous body, *corpus vitreum* fills the cavity between the lens and the retina. It consists of a colorless and transparent and elastic colloidal substance, covered with a thin transparent vitreous membrane; vessels and nerves does not. The vitreous body protects the retina, the ciliary body and the lens from displacement, creates favorable conditions for the constancy of intraocular pressure and the shape of the eyeball.

The conductive path of the visual analyzer. The rays of light, passing through the cornea, the anterior chamber, the pupil, the posterior chamber, the lens, the vitreous body fall onto the retina, irritating the rods and cones. Irritation is transmitted through the bipolar (second neuron) and ganglion (third neuron) retinal cells to the optic nerve. In the area of the Turkish saddle, the optic nerve forms an incomplete visual chiasma of the opticum chiasma. The fibers of the optic nerve that cross from the internal parts of the retina cross. After the crossing, the visual path starts, which contains fibers from the inner half of the retina of the opposite eye and from the outer half of the retina of your eye. The visual tract ends in the subcortical centers of vision - in the lateral geniculate body, in the cushions of the thalamus and the upper hills of the midbrain roof. Axons of the lateral geniculate body and thalamus form a visual radiance that passes through the back of the back leg of the inner capsule and terminates in the cortex of the spur groove.

Auxiliary structures of the eye.

External muscles of the eyeball, are represented by 6 transversely striated muscles, of which 4 are straight and 2 are oblique. Straight Muscles: *m. rectus mediales, m.rectus superior, m.rectus inferior, m.rectus lateralis*, верхняя и нижняя косые: *m. obliges superior, m.obligus inferior.*

Eyelids, upper and lower: *palpebrae superior et inferior* – Movable plates, which when closing close the eyeball and protect it from damage.

Conjunctival eyelid, *tunica conjunctiva palpebralis* begins from the posterior edge of the eyelid passes over to the eyeball.

The lacrimal apparatus, *apparatus lacrimalis*, is represented by the lacrimal gland and tear-dropping tracts - tear ducts, a lacrimal sac and a nasolacrimal duct.

An ear.

Development. In the process of ontogenesis of the ear, the ear rudiments of the inner ear first, then of the middle and outer.

The inner ear. Previously, all ear formations at the beginning of the third week of sneaking membranous labyrinth in the form of a thickening of the ectoderm on either side of the neural plate. During the 3rd and 4th weeks, this thickening becomes a auditory fossa and an auditory vesicle with endolymphatic ducts. After 6 weeks in the bubble projections appear - semicircular duct and the otic vesicle are separated on an elliptic spherical and pouches. At 6-8 weeks a cochlear duct is formed. Differentiation of the spiral organ begins on the 3rd month of intrauterine development. Simultaneously with the differentiation process of the membranous labyrinth concentration occurs around the mesenchyme which is converted into cartilage and then bone - bone arises the maze. A perilymphatic space filled with a liquid develops.

Middle ear. At the 2 nd month of development from the distal part of the first gill groove there is a bookmark of the tympanic cavity, and auditory ossicles develop from the proximal auditory tube, from the derivatives of the mandibular and sublingual gill arches.

Outer ear. The development of the auricle, external auditory canal and tympanic membrane occurs on the 2nd month of the intrauterine period. These formations are formed from the mesenchyme surrounding the first gill furrow.

Outer ear.

Outer ear, *auris externa* consists of the auricle, external auditory canal and tympanic membrane.

Auricle, *auricula*, is an oval funnel with unfolded edges, strengthened on the drum part of the temporal bone with ligaments and muscles.

External auditory meatus, *meatus acusticus externus* – a curved channel about 3.5 cm in length, 0.7-0.9 cm in diameter, which blindly ends with a tympanic membrane.

Eardrum, *membrana tympani*, is located on the border of the outer and middle ear. This connective-woven plate of round form 0.9-1.0 cm in diameter 0.1-1.5 mm in thickness.

Middle ear.

Middle ear, *auris media*, includes a cavity filled with air to a volume of about 1 cm3 and an auditory (Eustachian) tube. The cavity of the middle ear communicates with the mastoid cave and mastoid cells located in the thickness of the mastoid process, also related to the middle ear.

tympanum, *cavum tympeni*, is located in the thickness of the pyramid of the temporal bone. This cavity is emitted 6 walls:

1. The upper cover wall, formed by a thin bone plate, separating the tympanic cavity from the cranial cavity.
2. The lower, jugular wall, corresponds to the lower wall of the pyramid in the region of the jugular fossa.
3. The lateral membranous wall, is formed by the tympanic membrane and the surrounding parts of the temporal bone.
4. The medial labyrinth wall, is complicated. It separates the tympanum from the bone labyrinth of the inner ear. On this wall there is a cape projecting towards the tympanum, corresponding to the main curl of the cochlea. Above and somewhat behind the headland is the oval window of the vestibule, leading to the threshold of the bone labyrinth: it is covered by the base of the stirrup. Somewhat higher than the oval window is the transverse projection of the facial canal. Behind and below the cape is a window of a snail (a round window). It is closed by a secondary eardrum separating the drum cavity from the tympanic staircase.
5. Posterior mastoid wall, in the lower part there is a pyramidal elevation, inside of which the stirrup muscle begins. In the upper part of the posterior wall, the tympanic cavity communicates with the mastoid cave into which the mastoid cells of the eponymous process open.

6. The front carotid wall in its lower part separates the tympanum from the carotid canal, in which the internal carotid artery passes. In the upper part of the wall there is a tympanic hole of the auditory tube that connects the drum cavity with the nasopharynx. In the tympanic cavity, the auditory ossicles (hammer, anvil, stapes), as well as ligaments and muscles, are covered with mucous membranes. Auditory ossicles - miniature in size, connected with each other with the help of joints. These bones connect the eardrum of the inner ear with the oval window leading to the vestibule. The joints are strengthened with miniature ligaments. regulate the movements of the bones and prevent them from excessive fluctuations with strong sound, two muscles attached to the auditory ossicles. The muscle that strains the eardrum (m.tensor tympani), is located in the same half-channel of the musculoskeletal canal, its thin and long tendon is attached to the initial part of the hammer handle. This muscle tightens the handle of the malleus, strains the eardrum. The staped muscle (m. Stapedius), starting at the pyramidal elevation, is attached to the posterior stalk of the stapes, near its head, by a thin tendon. With the contraction of the staple muscle, the pressure of the base of the stapes in the window of the vestibule is weakened.

Auditory (Eustachian) tube, *tuba auditiva* average length 35 mm, width 2 mm. The auditory tube consists of bone and cartilaginous (elastic cartilage) parts. On the auditory part of the auditory tube take the beginning of the muscle: straining and lifting the palatal curtain. With their reduction, the lumen of the auditory tube expands and air from the pharynx enters the tympanum.

The inner ear.

The inner ear, *auris interna*, is located in the thickness of the pyramid of the temporal bone, separating from the tympanum cavity by its labyrinthine wall. It consists of bone and inserted in it membranous labyrinths.

Bone labyrinth, *labyrintis osseus*, is formed by the compact substance of the pyramid of the temporal bone. The size of the bone labyrinth along its long axis is about 20 mm. At the bone labyrinth, a vestibule is distinguished, a snail lies anterior to it, semicircular canals.

The Vestibule, *vestibulum*, It is a cavity of small dimensions, irregular in shape. On the lateral wall of the bone labyrinth there are two windows - oval and round. The oval communicates the vestibule with the drum cavity, from which the base of the stirrup covers it. The second window of the cochlea, round, it is located between the drum cavity and the spiral canal of the cochlea (staircase of the vestibule). This window is closed by an elastic secondary eardrum. On the back wall of the vestibule, 5 small holes are visible, which open semicircular canals (channels) in the vestibule. On the front wall of the vestibule there is a fairly large opening leading to the canal of the cochlea. On the medial wall of the vestibule is a crest of the vestibule, which separates two pits from each other. The anterior one of round shape was called the spherical depression. The posterior fossa is elongated, it lies closer to the semicircular canals. This is an elliptical groove. In the elliptical depression there is a hole in the aqueduct of the vestibule.

Snail, *cochea*, is the front part of the bone labyrinth. It is a meandering spiral canal of the cochlea (canalis spiralis ossea), which forms around the axis of the cochlea two and a half turns. The base of the cochlea is turned medially towards the internal auditory canal; apex - dome of the cochlea directed towards the anterior part of the tympanum. The axis of the cochlea, which lies horizontally, is the bony rod. Around the core, a bone spiral plate encircles, which does not completely block off the coiled channel of the cochlea. The core of the cochlea is permeated with thin longitudinal channels, in which the fibers of the cochlear section of the pre-collateral nerve cochlea are located. At the base of the bone spiral plate is an extension - the spiral canal of the stem, where the nervous cochlear node (spiral node of the cochlea) lies. At the base of the cochlea, at the beginning of the tympanic staircase there is an internal opening of the canal.

Bone semicircular canals, *canals semicircular*, are three arcuate curved thin (up to 2 mm in diameter) tubes located in three mutually perpendicular planes.

1. The anterior (sagittal upper) semicircular canal is oriented perpendicular to the longitudinal axis of the pyramid.
2. The rear (frontal) semicircular canal runs parallel to the back surface of the pyramid.
3. The lateral (horizontal) semicircular canal forms a projection of the lateral semicircular canal on the lateral wall of the tympanic cavity.

Three semicircular canals open on the threshold of 5 holes, as adjacent bony legs of the anterior and posterior semicircular canals merge into a common bone leg. The remaining 4 legs of the semicircular canals open in the vestibule independently.

Webbed labyrinth, *labyrinthus membranaceus*, is located inside the bone labyrinth and basically repeats its outlines. Between the inner surface of the bone labyrinth and the membranous labyrinth there is a narrow gap - a perilymphatic space filled with liquid (perilymph). From this space along the perilymphatic duct, passing in the canal cochlea, the perilymph can flow into the subarachnoid space on the lower surface of the pyramid of the temporal bone. The membranous labyrinth is filled with endolymph. Through the endolymphatic duct running in the aqueduct of the vestibule, the endolymph can drain the endolymphatic sac lying in the thick of the dura mater on the posterior surface of the pyramid. In the membranous labyrinth, elliptical and spherical sacs are distinguished, three semicircular ducts and a cochlear duct. An oblong elliptical sac (martha) is located in the eponymous depression of the vestibule, and the spherical pouch occupies a spherical depression in the pear-shaped form. Elliptical and spherical sacs communicate with each other by means of a thin duct. In elliptical and spherical sacs, as well as on the inner surface of the walls of membranous ampullae of semicircular ducts, there are coatings of a jelly-like substance. In elliptical and spherical sacs, this is an off-white maculae spot. Stains in which, with the oscillation of the endolymph, the hair cells perceive the statistical positions of the head and rectilinear movements. In membranous ampullae of semicircular ducts there are in the form of transverse folds the ampullar scallops, catching the turns of the head in various directions.

The webbed labyrinth of the cochlea is a cochlear duct, *ductus cochelaris*, begins blindly in the run-up, behind the confluence of the connecting duct, and continues forward inside the spiral channel of the cochlea. In the area of the tip of the cochlea, the cochlear duct ends blindly. On the cross-section, it has a triangular shape. The outer wall of the cochlear duct fuses with the wall of the cochlear duct of the cochlea. Another - the drum (lower) wall of the cochlear duct (spiral membrane) is an extension of the spiral bone plate. The third (upper) pre-wall of the cochlear duct (pre-membrane) extends from the free edge of the osseous spiral plate obliquely upward to the outer wall of the cochlear duct. The cochlear duct occupies the middle part of the cochlear spiral canal of the cochlea and separates part of it - a tympanic staircase bordering the spiral membrane, from the upper staircase of the vestibule adjacent to the vestibular membrane. In the area of the dome of the cochlea, both ladders communicate with each other using the aforementioned hole in the cochlea. At the base of the snail, the drum staircase ends at the round window closed by the secondary eardrum. The staircase of the vestibule communicates with the perilymphatic space of the vestibule, the oval window of which is closed by the base of the stirrup. Inside the cochlear canal on the spiral membrane is the auditory spiral organ (corti), organus spirales. The base of the spiral organ is the basilar plate (membrane), which contains up to 24,000 thin collagen fibers (strings). Oscillations of the basilar plate, endolymph and cover membrane irritate the waxy sensory cells (receptor). In these cells, mechanical effects are transformed into a nerve impulse. The impulse is perceived by the endings of bipolar cells whose bodies lie in the cochlear node (spiral node of the cochlea), and their central processes form the cochlear part of the pre-collateral nerve cochlear. The pre-cochlear nerve, through the internal auditory canal, impulses into the brain toward the anterior (ventral) and posterior (dorsal) cochlear nuclei, which lie in the region of the vestibular field of the rhomboid fossa. The processes of the cells of the anterior nucleus are directed to the opposite side, forming a bundle of nerve fibers, called the trapezoid body. Axons of the posterior nucleus emerge on the surface of the rhomboid fossa in the form of the cerebral strips of the IV ventricle and are directed to the median groove of the rhomboid fossa, they sink into the substance of the brain and join the hair of the trapezoid body. On the opposite side of the bridge, the fibers of the trapezoidal body form a bend to the lateral side, giving rise to the lateral loop, followed by the subcortical centers of hearing - the medial geniculate body and the lower hillock (tubercle) of the quadruple plate. The processes of the cells of the subcortical centers (the medial geniculate center and the lower hillock) pass through the posterior capsule to the auditory center of the cortex of the hemispheres - the

cortex of the upper temporal gyrus (Gehsl's convolution), where a higher analysis of the impulses arriving from the sound receiving apparatus is carried out. From the nucleus of the lower hillock, a cover-spinal cord leads to the motor nuclei of the anterior horns of the spinal cord.

Skin, organs of smell and taste.

Skin, *cutis*, forms a common veil of the human body. It contains sensitive nerve endings (receptors) and skin derivatives: sweat, sebaceous, mammary glands, hair and nails.

Skin receptors perceive pain, temperature, textile irritations, as well as a sense of pressure and vibration, and transmit them along the corresponding sensitive nerves in the dorsal (brain) brain and further into the cerebral cortex.

Along with the receptor function, the skin performs protective, excretory functions, regulates water balance and salt metabolism, heat exchange and is a depot of blood.

The skin consists of 2 layers: superficial - epidermis and internal - dermis (actually skin).

Epidermis, epidermis, is represented by a multilayered flat keratinizing epithelium. The dermis or the skin proper is formed mainly by a dense connective tissue, collagen fibers, as well as elastic fibers, as well as a small number of smooth muscle cells. In actual skin, a more superficial papillary layer and a deeper mesh layer are isolated. On the face in this layer weave facial muscles.

The sweat glands are located in the reticular layer on the border with the subcutaneous base, especially on the palm, sole and axilla. They excrete the excretory function and output with a certain amount of heat afterwards, participate in maintaining a constant body temperature.

Sebaceous glands lie on the border of papillary and reticular layers. Glandular ducts open into the hair follicle, and in places where there are no hair - on the surface of the skin.

Olfactory organ.

The human olfactory organ is laid on the 4th week of intrauterine development in the form of paired ectoderm thickens lining the paired olfactory fossa. As the head develops, the olfactory fossa deepen, converge, take part in the formation of the nose. The ear of the olfactory organ is shifted into the mucosa of the nasal cavity.

Sensitive cells of the olfactory fossa are connected to the olfactory bulbs by means of processes.

The organ of smell, organum olfactorium, in an adult is represented by olfactory neurosensory cells embedded in the mucosa of the superior nasal shell and the corresponding part of the nasal septum. These cells constitute the receptor of the olfactory analyzer. Their specific irritant is gaseous substances inhaled with air. Neurons of olfactory cells are combined into 20-40 olfactory filaments that pass through the holes of the trellis plate of the trellis and end in the olfactory bulbs. In the olfactory way, irritation is transmitted to the cerebral cortex, reaches the cortical end of the olfactory analyzer, which is in the hook of the para-hippocampal gyrus.

Body of taste.

The bookmark of the taste buds in a person appears in the papillae of the tongue at the 8th week of development in the form of cell bundles derived from embryonic neuroglia. By 4 months, their connection with nerve fibers is established, and by 6 months the taste buds are detached from the surrounding tissues, taste pores are formed in them.

The organ of taste, organum gustatotium, is the taste bud. The total number of taste buds is 2000. They are located mainly in the mucous membrane of the tongue. Lonely taste buds are localized in the mucous membrane of the sky, epiglottis, posterior pharyngeal wall. Flavored buds contain taste cells provided with nerve endings of taste fibers VII, IX, X pairs of cranial nerves. On the fibers of the drum string IX, X nerves, the stimulation is transmitted by the cells of the sensory nodes of VII, IX, X pairs of cranial nerves, where the bodies of the first neuron that conducts the pathways of the taste analyzer are located. The bodies of the second neuron lie in the medulla oblongata in the nucleus of a single path. The bodies of the third neuron are located in the thalamus. The cortical end of the taste analyzer is laid in the cages of the hook, the para-hippocampal gyrus.

Age features of the ear.

In newborns and children of the first years of life, the drum cavity communicates with the cavity of the middle cranial fossa through a gap between the pyramid of the temporal bone. This explains the occurrence of cerebral symptoms in acute inflammation of the middle ear in children. In newborns, the auditory tubes are straight, the cartilaginous part is weakly developed, the isthmus is absent.

V. Practical work:

Task № 1 On the model of the organ of vision, consider the structural formation of the eye. On the eye preparation, to study the structure of the eyeball, to know and show the membranes: fibrous, vascular and internal, bounding cavities filled with watery moisture, a lens and a vitreous body. Find the fibrous membrane and show its parts, cornea and sclera. Prepare the choroid and its components: the iris, the ciliary body and the vasculature itself. Find in the iris pupillary and ciliary edges. At the back of the iris, find the lens, the ciliary body. On the outside of it there is a ciliary muscle. Find on the preparation itself chorioidea, which occupies the posterior 2/3 of the periphery of the eyeball. Show on the preparation the inner shell of the eyeball, consisting of the retina, its blood vessels and the optic nerve. Find the location of the optic nerve exit and its disc. The contents of the eyeball are represented by the watery moisture of the anterior and posterior chambers, the lens and the vitreous body. These formations together with the cornea form refractive media. Find the lens and vitreous.

Task № 2 On the sagittal dissection of the head, open the upper wall of the orbit, dissect and show the muscles of the eyeball, the optic nerve. Show the periosteum of the orbit. Find on the preparation a lacrimal gland, a lacrimal apparatus, eyelids.

Task № 3 On the model of the hearing organ, consider the structural formations of the ear. On the pyramid of the temporal bone, find the parts of the middle and inner ear. To know the peripheral parts, the outer and middle ear and their function, the inner ear - the cochlear labyrinth, contains a receptor apparatus that perceives sound stimuli. In the vestibular apparatus are the receptors of the body of equilibrium and maintaining equilibrium and the orientation of the body in space. What parts of the outer ear consists of: the auricle, the external auditory canal. eardrum. The middle ear includes: a drum cavity, auditory ossicles, joints and muscles of auditory ossicles, an auditory tube. Know and show the auditory ossicles, their location. Show the auditory tube what it says. What muscles start from the auditory part of the tube. Where the inner ear is located and how it is formed. What parts are excreted in the bone labyrinth? What is a snail? Where is the webbed labyrinth? What is represented by the vestibular labyrinth, what is represented by the cochlear labyrinth?

VI. Control questions:

1. What anatomical structures are included in the fibrous membrane of the eyeball?
2. Tell the path of the visual analyzer.
3. What is related to the auxiliary structures of the eye?
4. Which walls of the tympanum are known to you?
5. In what cavities are the semicircular canals located? What is their function?
6. What does the webbed labyrinth consist of?
7. How is the path of the auditory analyzer?

VII. Academic pursuits:

Task №1

A 45-year-old patient, turned to the doctor with complaints about the loss of the ability to distinguish the color that appeared after the electric trauma. After examining the retina of the eye, a lesion of the receptors is revealed, which are responsible for this kind of sensitivity. What are these receptors?

Answer:

The cones. The functional specialization of photoreceptors (cones and sticks) of the eye is different. The cones are responsible for the perception of the subtle details of the object and the perception of color, and the sticks for the perception of weakly illuminated objects (twilight vision).

Task №2

The patient of 18 years has addressed in hospital with complaints to noise and painful sensations in an ear. Objectively, the patient has an acute respiratory disease, rhinitis. Through which hole in the throat the infection got into the tympanum and caused its inflammation?

Answer:

A pharyngeal opening of the auditory tube. The tympanic cavity communicates with the pharynx cavity with the aid of an auditory tube, which opens on the lateral wall of the nasopharynx with a pharyngeal opening. In acute respiratory disease, an infection from the nasopharynx through its pharyngeal opening can enter the auditory tube, and then along it into the tympanic cavity.

Task №3

In the patient, the walls of the external auditory canal (external otitis) are inflamed. Soreness increases sharply with chewing movements. Than from the point of view of anatomy it is possible to explain it?

Answer:

The temporomandibular joint is adjacent to the anterior wall of the external auditory canal. In this regard, with the chewing movements of pain can be amplified.

Task №4

In connection with the fact that because of the weightlessness in space, the conditions for the action of the vestibular analyzer change, is the ability of the cosmonaut to realize the position of his body in space to some extent?

Answer: *Yes, it does. Under normal conditions, the position of the body in space is accurately estimated based on the analysis of the central nervous system, a complex of visual proprioceptive and vestibular signals, as well as skin sensitivity. In conditions of weightlessness, information disappears only from the side of the vestibular analyzer*.

VIII. Control Tests:

1. Specify the refractive media of the eyeball:
   a) iris
   b) ciliary body
   c) vitreous body
   d) sclera
2. What shells are secreted from the eyeball:
   a) fibrous
   b) Vascular
   c) retina
   d) superovascular
3. What the inner core of the eye consists of:
   a) vitreous
   b) the crystalline lens
   c) watery moisture
   d) the petite channel
4. List the details of the structure of the auditory tube:
   a) bone part
   b) the cartilaginous part
   c) isthmus
   d) pharyngeal opening
5. What muscles start from the cartilaginous part of the Eustachian tube:
   a) the neoclubic
   b) the chin-lingual
   c) Muscle stretching palatine
   d) muscle of the tongue
6. Indicate the blood vessels and nerves passing through the internal auditory meatus:
   a) the oculomotor nerve
   b) anterior-cochlear nerve
   c) jugular vein
   d) external carotid artery
7. List the details of the structure of the auditory tube:
   a) bone part
   b) the cartilaginous part
   c) isthmus
   d) pharyngeal opening
8. Specify the anatomical formations that are in the tympanum:
   a) labyrinth
   b) staped muscle
   c) auditory ossicles
   d) the muscle that stretches the eardrum

9. Specify anatomical entities that receive parasympathetic innervation:
   a) the mucosa of the tympanum
   b) Stenoconstrictor muscle
   c) ciliary muscle
   d) the sphincter of the pupil
10. Specify the location of the inner opening of the cochlea of the cochlea:
   a) the back wall of the vestibule
   b) front wall of the vestibule
   c) dome of the cochlea
   d) the main snail

Keys:

1	2	3	4	5	6	7	8	9	10
В	А,Б	А,Б,В	А,Б,В	В	Б	А,Б,Г	А,Б,В	А,Б,В	А,Б,В,Г

Latin Name	**English Name**
Cutis	Skin
Epidermis	Epidermis
Corium (dermis)	Leather
Papillae cutis	Skin papilla
Tela subcutanea	The subcutaneous tissue
Pilus	Hair
Ungues	Nails
Matrix	Nail bed
Auris externa	Outer ear
Auricular	Auricle
Helix	Curl
Anthelix	Antiviral
Tragus	Tragus
Antitragus	Antiblock
Meatus acusticus externus	External auditory meatus
Membrane tympani	Eardrum
Cerumen	Earwax
Umbo membranae tumpani	Umbilicus umbilicus
Auris media	Middle ear
Cavitas tympanica	Drum cavity
Paries membranaceus	Lateral wall of the tympanum
Recessus membranae tympani superior	Upper domed widened part of the tympanum
Paries labyrinthicus	Labyrinthine drum cavity
Fenestra cochlea	Window of the cochlea
Fenestra vestibuli	Window of the vestibule
Ostium tympanicum tubae auditivae	Internal Hole Pipe
Paries tegmentalis	The upper wall of the tympanum
malleus	hammer
Incus	Anvil
Stapes	Stirrup
Tuba auditiva	Auditory, or eustachian, trumpet
Labyrinthus osseus	Bone labyrinth
Vestibulum	The Vestibule
Cochlea	Snail
Labyrinthus membranaceus	Webbed labyrinth
Ductus cochlearis	Cochlear duct
Organon spirale	Spiral organ
Lamina basilaris	
Organum visus	Body of sight
Oculus	Eye
Bulbus oculi	Eyeball
Tunica fibrosa bulbi	Fibrous membrane
Sclera	Sclera
Cornea	Cornea
Tunica vasculosa bulbi	Vascular membrane of the eyeball
Choroidea	Actually the choroid
Corpus ciliare	Ciliary body
Iris	Iris
Papilla	Pupil
Retina	Retina
Corpus vitreum	Vitreous body
Lens	Lenticular
Camera anterior bulbi	Anterior chamber of the eyeball
Tunica conjunctiva	The connective membrane of the eye

Glandula lacrimalis	Lacrimal gland
Saccus lacrimalis	Lacrimal sac
Organum gustus	Importance of taste organ
Organum olfactus	Olfactory organ

INDEPENDENT WORK

ANATOMY AND TOPOGRAPHY OF THE ORGAN OF VISION. EYEBALL. AUXILIARY EYE APPARATUS.

I Questions for checking the initial level.

1. The structure of the walls and the connections of the eye.
2. General characteristics of the organ of vision.
3. Muscles and fascia of the eyeball.
4. Accessory apparatus of the eye. Ways of deducing tears.

II Targets

Student should know	***Literature***:
1. The general outline of the structure of the organ of vision is the eyeball, with the optic nerve and auxiliary apparatus. 2.Coloration of the eyeball-poles, axes (internal, optical) -shells. (fibrous, vascular, retina) and the nucleus (watery moisture, crystalline lens and vitreous body) 3.Coloration and functions of the fibrous membrane department - the cornea and sclera, the border between them. 4. The structure, topography and divisions of the choroid - the vasculature itself, the ciliary body (the ciliary circle, the ciliary ring, the ciliary muscle) and the iris (pupil, pupillary margin, ciliary margin, muscles narrowing and dilating the pupil). 5. The erosion (layers), topography and sections of the retina of the eyeball (the most part-visible, containing sensitive cells-rods and cones and the smaller part-the blind, devoid of sensitive cells, the border between them is a chisel edge) 6. In the posterior part of the retina, the optic nerve disk is the location of the exit of the optic nerve-the impression of the spot on the retina located in the center of the central artery. 7. The location of the lateral disc of the yellow heel (macula) with the central "pit" - the place of the best vision. 8. Strochenie, message and location of the eye chambers-anterior and posterior- and iris-corneal angle. 9.Stroeniya, topography and function of the elements of the core of the eyeball-watery moisture, the lens, the vitreous. 10.Construction and function of the auxiliary apparatus of the eye (muscles, teardrops, fat body, eyelashes, eyelids). 11. Conjunctivitis and conjunctival sac. 12. The refractive medium of the eye. 13. Course of the visual path, cortical and subcortical centers of vision.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.
Student must be able to:	***Literature***:
1. Call and show on the preparation the component parts of the organ of vision an eyeball and an auxiliary apparatus (muscles, fascia, lacrimal pathways). 2.On the opened preparation of the eyeball, show its membranes (fibrous, vascular and retina) and nucleus. 3.On the opened preparation of an eye to name and show a vitreous body, a lens of an eye chamber, a ciliary body, a pupil with an iris, a central fossa and a blind spot. 4. Call and show the place of exit of the optic nerve from the eyeball and from the eye sight. 5. Name and show on the preparation the visual crossover and the visual pathway. 6. Name and show on a preparation of a brain subcortical and cortical centers of vision. 7. Explain and draw the course of the visual pathway. 8. Call and show on a preparation a cornea, vaults, a conjunctiva.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.

III Tasks for self-dependent work.

1. Make a diagram of the structure of the organ of vision.

2. Specify the functions of the straight and oblique muscles of the eyeball.

_____

_____

3. Make a scheme of the structure of the layers of the retina.

Complete phrases.

4. Light refractive environ of the eyes are _____

_____

5. The vascular membrane of the eye has the following divisions

_____

_____

6. The ciliary body consists of muscles _____.

_____

7. The cornea represents _____ part _____ membranes of the eye.

8. The retina of the envelope is _____.eye membrane.

9. In the thickness of the iris are muscles _____.

IV Questions for self-control.

10. How many membranes has the eyeball? What kind they are?

_____

_____

11. Which formations are refractive environments?

_____

_____

12. Where is the blind spot located?

_____

_____

13. Where lies the place of the best vision?

_____

_____

14. Indicate what is responsible for color and light perception?

_____

_____

V Make a situation on this topic.

15. TASK: The patient has a displacement of the pupil inside, the movement of the eye from the outside is impossible (a converging strabismus). The defeat of which nerve can make a guess. Give anatomical justification..OTBET:

_____

_____

_____

TASK:

ANSWER:

VI Make 1-2 tests according to the example.

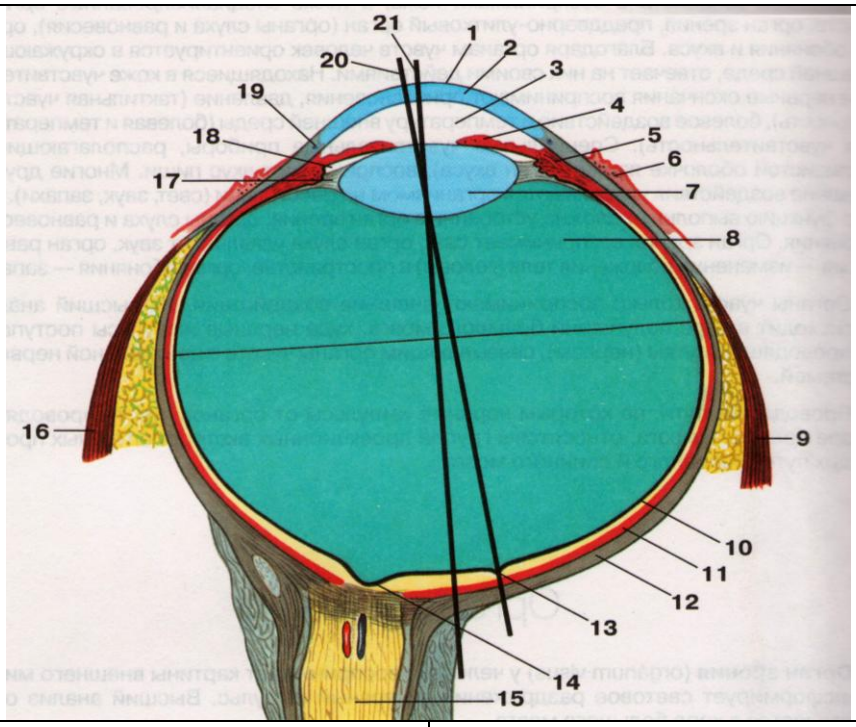
16. Example: Specify the shells that make up the eyeball?

а) mucous б) fibrous в) retina г) serous

est№1 _____ _____ _____ *а.* _____ *б.* _____ *в.* _____ *г.* _____
Test№2 _____ _____ _____ *а.* _____ *б.* _____ *в.* _____ *г.* _____

I. ***Make designations for pictures:***

№17 EYE BALL



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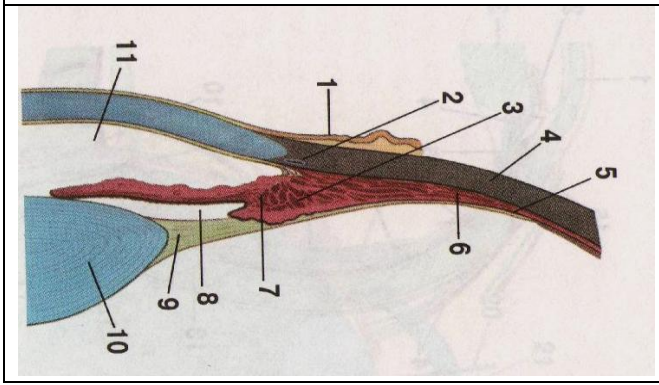
№18 CILIARY BODY



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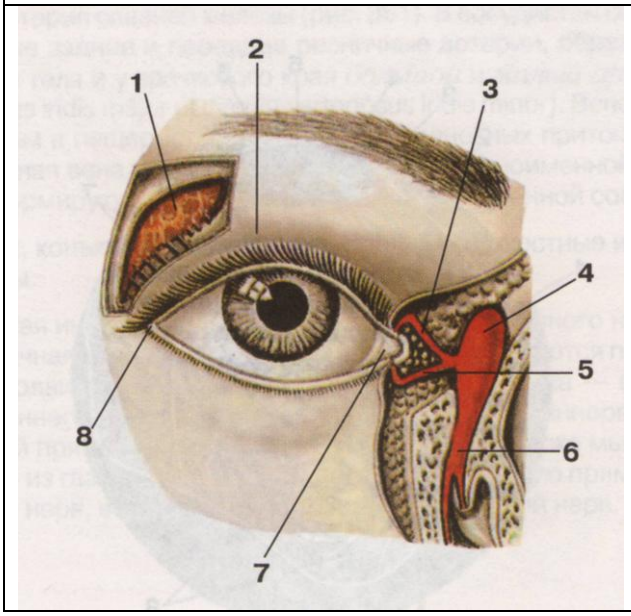
№19 PATHWAYS OF TEARS CLEARANCE



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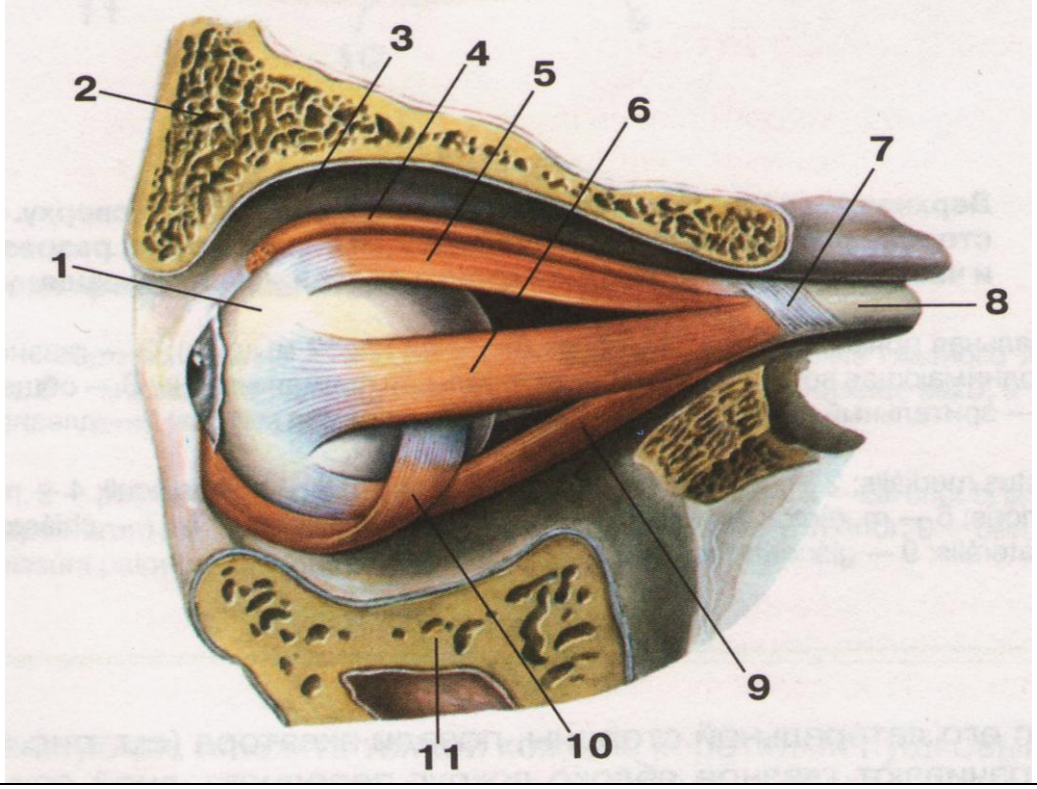
№20 EYE MUSCLES, SIDE VIEW



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ANATOMY AND TOPOGRAPHY OF THE HEARING ORGAN, EXTERNAL, MIDDLE AND INNER EAR.

I Questions for checking the initial level.

1. General plan of the structure of the ear (pre-door and cochlear organ), its departments.
2. Connections of the wall of the tympanum.
3. Structure and channels of the pyramid of the temporal bone.
4. The structure of the external ear.

II Targets.

Student should know:	***Literature***:
1. Topography and location of the organ of hearing. 2. Compound departments of the hearing organ - external, middle, inner ear. 3. The structure and parts of the outer ear - the auricle, the external auditory canal (cartilaginous and bony parts and tympanic membrane). 4. Structure of the middle ear: a) the structure of the walls of the tympanum (upper, lower, anterior, posterior, medial and lateral) and communication with the nasopharynx and cave. b) structure of auditory ossicles - hammer, anvil and stapes. (hammer head and handle with processes, anvil-body with articular surface and two legs-short and long, stapes-head, two legs and bases.) c) topography and connections of auditory ossicles joints and ligaments - an anvil, a hammer joint and an anvil - a stent ligament joint. d) muscles of the middle ear- 1) the muscle that strains the tympanic membrane. 2) Stenoconstrictor muscle. 5. The structure of the inner ear - bone and membranous labyrinths. a) Bone labyrinth - a snail (base, dome, rod, washing plate and washing channel) vestibule and semicircular canals (anterior, posterior, lateral), their ampules and legs. b) membranous labyrinth - elliptical and spherical sacs of their ducts, semicircular canals and cochlear duct, with spiral - Corti organ (integument membrane, hair and supporting cells) 6. Semicircular canals, pouch and dome refer to the equilibrium organ, the cochlear duct belongs to the hearing organ. 7. Perilymphatic and endolymphatic spaces. The value of the peri - and endolymph. 8. Mechanism of catching and conducting sound. 9. The structure of the tympanic membrane is a relaxed and strained part. 10. Age features of the organ of hearing.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.
Student must be able to:	***Literature***:
1. Show the departments of the hearing organ on the damp preparation - the outer, middle and inner ear. 2. To name and show on the structure the structural elements of the auricle - curl, anticoagulant, tragus, antigrone, scaphoid and triangular fossa, lobe and muscles of the auricle. 3. To name, show and explain the structure of the external auditory canal, its parts - bone and cartilaginous. 4. On the saws of the temporal bone, on the tables and the preparation, show and name the drum cavity of the wall and its messages. 5. Show, name and explain the structure and connections of auditory ossicles - a hammer, an anvil, stapes. 6. On the sagittal dissection of the head, show and name the pharyngeal opening of the auditory tube. 7. To name and show on the bone preparation the constituent parts of the inner ear-the vestibule, the snail, the semicircular canals. 8. Explain the principle of the Corti's organ and the system of sound perception and sound.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.

III Tasks for self-dependent work:

1. Make a scheme of the structure of the organ of hearing.

2. Draw a scheme of the structure of the bone and membranous labyrinths.

Complete phrases:

3. Auditory ossicles are located in _____.

4. The tympanum refers to _____ and has _____ walls.

5. The upper wall of the tympanum is represented by _____

6. To the inner ear belong _____

7. The muscles that provide movement of the auditory ossicles include _____

_____

IV <u>Questions for self-control</u>:

8. What is the external ear?

_____

_____

9. What is the function of the auditory ossicles?

_____

_____

10. What is formed by the lower and lateral walls of the tympanum?

_____

_____

11. What formations form the inner ear?

_____

_____

12. What is the perceiving apparatus of the auditory analyzer?

_____

_____

<u>V Make a situation on this topic.</u>

12. *TASK*: *The child was on inpatient treatment for inflammation of the middle ear, after 4-5 days after the treatment there was soreness after the auricle. The child became restless. When palpation, the doctor found a sharp soreness in the region of the mastoid process. Explain the possible cause of such a complication. Give anatomical justification.*
ANSWER: _____

_____

_____

TASK:
ANSWER:

VI. <u>Make 1-2 tests according to the example</u>:

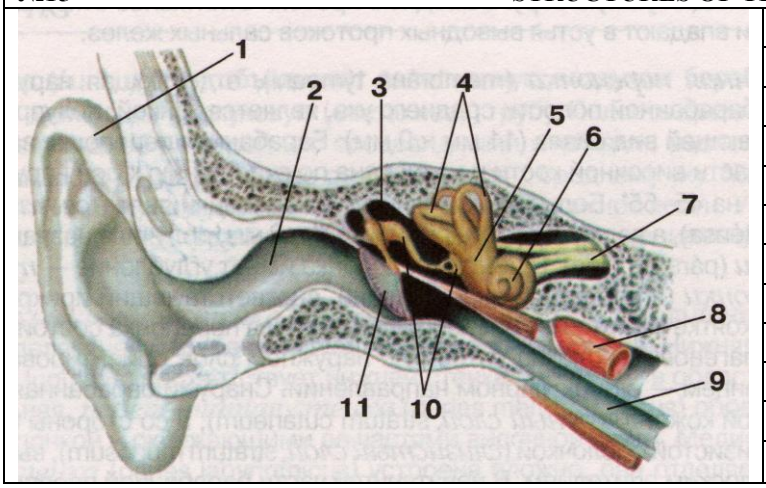
14. Example: 1. The hearing organ is located in:

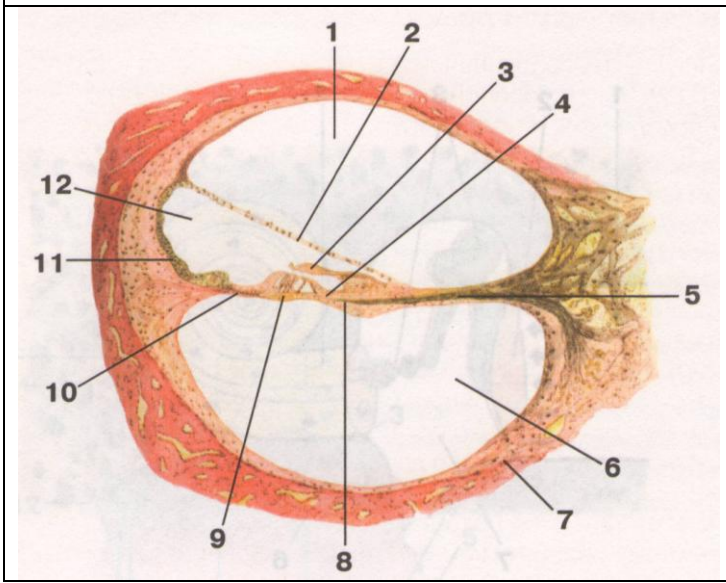
а) in the body of the sphenoid bone. б) in the pyramid of the temporal bone.
в) along the sigmoid sinus. г) in the mastoid process.

2. Indicate how many walls the drum cavity has - the middle ear?
а) 3 walls б) 4 walls в) 5 walls г) 6 walls

Test№1 _____ _____ _____ *а.* _____ *б.* _____ *в.* _____ *г.* _____
Test№2 _____ _____ _____ *а.* _____ *б.* _____ *в.* _____ *г.* _____

VII Make designations for pictures.

№15	**STRUCTURES OF THE HEARING ORGANS**
	1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.

№16	INNER EAR
	1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.

Theme: **FINAL LESSON ON THE PREPARATION OF THE CRANIAL NERVES AND SENSORY ORGANS.**

Questions for the lesson:

1. Drum cavity, walls, communication.
2. The block nerve.
3. Branches of the head and cervical divisions n. vagus.
4. Branches of thoracic and abdominal divisions n. vagus.
5. Branches coming from the facial nerve in canalis facialis.
6. Age features of the organ of vision.
7. Age features of the organ of hearing.
8. Oculomotor nerve.
9. Additional nerve, topography, nuclei and branching area.
10. Innervation of the larynx.
11. Innervation of the teeth of the upper and lower jaw.
12. Innervation of mimic and chewing muscles.
13. Innervation of the soft palate and pharynx.
14. Innervation of the tongue.
15. Blood supply to the eye.
16. Pterygoid node, topography, branches.
17. Facial nerve, nucleus, exit site on the basis of the brain and from the cranial cavity, topography of the stroke in the facial canal.
18. Muscles of the eyeball, their innervation.
19. External ear.
20. Nerves of the eye socket.
21. Olfactory (I) and visual (II) nerves.
22. The abducent nerve.
23. Sublingual nerve, topography, branching area.
24. Pre-vertebral nerve.
25. Retin A
26. The lacrimal apparatus of the eye.
27. Vascular membrane of the eye.
28. The middle ear.
29. The structure of semicircular canals.
30. The structure of the cochlea.
31. Topography of the vagus nerve.
32. Topography of the nuclei of the vagus nerve.
33. Ternary nerve, topography, nucleus. The second branch.
34. Ternary nerve, topography, nuclei. The first branch.
35. Ternary nerve, topography, nucleus. Third branch.
36. Fascia of the orbit.
37. Fibrous membrane of the eye
38. The formation of the parotid plexus, its branches.
39. The glossopharyngeal nerve

CONTACT WORK

Theme: General anatomy and topography of spinal nerves. Anatomy and topography of the cervical plexus. Age features. Topography of vessels and nerves.

The main symptoms of nerve damage are loss or disruption of the motor or sensory function of individual segments or the entire limb, vasomotor, secretory and trophic changes in the zone of impaired innervation. If the cervical plexus is damaged, the motor and sensory innervation of the muscles and skin of the corresponding side of the neck and partly of the head is disturbed. Damage to the upper V and IV roots of the cervical plexus causes the so-called Erba-Duchen paralysis (restriction of shoulder lifting and flexion of the forearm and a violation of sensitivity only in the area of the outer surface of the forearm). The obtained knowledge is important in the examination of neurological patients and for topical diagnosis of sensitive and motor disorders. Knowledge of this topic is necessary when studying the relevant sections in the course of therapy, surgery, neurology, traumatology and other clinical disciplines.

I. Objecttives:

Student must know	1. Definition of the spinal nerve. 2. Principle of formation of the spinal nerve, its general characteristic. 3. Characterization of the posterior branches of the spinal nerves 4. Characterization of the anterior branches of the spinal nerves. 5. Formation and topography of the cervical plexus. 6. Classification of the branches of the cervical plexus by the nature of innervation. 7. Diaphragmatic nerve, movement topography, branches, area of innervation 8. Topographic-anatomical relationships between the course of blood vessels and branches of the cervical plexus.
Student must be able to:	1. Call and show on the corpse cutaneous branches of the cervical plexus. 2. To name and show on the corpse the muscular branches of the cervical plexus. 3. To name and show on the corpse a "neck loop". Explain the mechanism of education and the area of innervation. 4. Call and show on the corpse and follow the course of the diaphragmatic nerve. 5. Explain the significance of the gray connecting branches for muscle function.
Student must possess	1) Medical-anatomical conceptual apparatus; 2) Anatomical knowledge for understanding pathology, diagnosis and treatment 3) The simplest medical instruments - a scalpel and tweezers. 4) The technique of preparation of the cervical plexus and its branches (under the supervision of the teacher).

II. Required level of knowledge:

а) from related disciplines:

1. Phylogeny of the nervous system
2. Histological structure of the nervous tissue.
3. Development and histological structure of nerve fibers.
4. Links of the reflex arc, their functional significance.

б) from previous topics:

1. The structure of the spinal column.
2. The muscles of the neck, the belt of the upper limb and the free upper limb.
3. Topography of vessels in the neck, in the areas of the upper extremity belt and free upper limb.
4. Structure of the spinal cord.

в) from the current lesson:

1. Definition and principle of formation of the spinal nerve, its general characteristic.
2. Characteristics of the posterior branches of the spinal nerves
3. Characteristics of the anterior branches of the spinal nerves.
4. The principle of plexus formation.
5. Formation and topography of the cervical plexus.
6. Classification of the branches of the cervical plexus by the nature of innervation.
7. Formation of the neck loop.
8. Diaphragmatic nerve, movement topography, branches, area of innervation
9. Topographic-anatomical relationships between the course of blood vessels and branches of the cervical plexus.

III. Object of study:

Cervical plexus: muscle branches, cutaneous branches of the cervical plexus (transverse nerve of the neck, large auricular nerve, small occipital nerve, supraclavicular nerves). Neck loop. Neck branch of facial nerve. Diaphragmatic nerve.

IV. Informational part:

Spinal nerves are paired, located metamerically nerve trunks. A person has 31 pairs of spinal nerves: 8 pairs of cervical, 12 pairs of pectoral, 5 pairs of lumbar, 5 pairs of sacral and 1 pair of coccygeal corresponding to 31 pairs of segments of the spinal cord.

The spinal nerve begins with the motor and sensitive roots. The anterior (motor) spine is formed by axons of motor neurons, whose bodies are in the middle horns of the spinal cord. The posterior (sensitive) spine is formed by the central processes of pseudo-unipolar cells, the bodies of which form a spinal node.

At the exit through the intervertebral foramen from the vertebral canal, the anterior and posterior roots are joined, forming the trunk of the spinal nerve. Each spinal nerve contains both motor and sensitive fibers. In the composition of the anterior roots, leaving the VIII cervical, all the thoracic and upper two lumbar segments, there are always vegetative (sympathetic) preganglionic fibers coming from the neurons of the lateral horns of the spinal cord.

The spinal nerve after the exit from the intervertebral opening is divided into several branches: the anterior, posterior, meningeal, and also the white connecting branch (in the thoracolumbar section). White connective branch is only with VIII cervical in II lumbar spinal nerves. The anterior and posterior branches of the spinal nerves are mixed. White connective branches contain preganglionic sympathetic fibers reaching the nodes of the sympathetic trunk.

To all spinal nerves from the sympathetic trunk are gray connective branches. They are represented by sympathetic nerve fibers coming from all nodes of the sympathetic trunk. In the composition of all spinal nerves and their branches postganglionic sympathetic fibers are directed to the blood and lymphatic vessels, skin, skeletal muscles and other tissues, which ensures their functions and metabolic processes (trophic innervation).

The posterior branches of the spinal nerves give lateral and medial branches that innervate the deep (own) muscles of the back, the muscles of the occiput and the skin of the posterior surface of the head and trunk. Distinguish the branches of cervical, thoracic, lumbar, sacral and coccygeal nerves.

The posterior branch of the first spinal nerve is called the suboccipital nerve. It goes back between the occipital bone and the atlas, passes along the upper surface of the back arc of the atlant. This nerve is almost entirely motor, it innervates the upper and lower oblique muscles of the head, the posterior large and small rectus muscles of the head. A small amount of sensitive fibers in its composition innervates the joints between the atlas and the axial vertebra, as well as the capsule of the atlanto-occipital joint. There is a constant connection of the suboccipital nerve with the posterior branch of the second cervical spinal nerve.

The posterior branch of the second cervical spinal nerve - the large occipital nerve - is thick, moving away from the second cervical spinal nerve at the lower edge of the lower oblique muscle (head). This nerve gives short muscle branches and a long cutaneous branch. Muscular branches innervate the semi-long and long muscles of the head, the waist muscles of the head and neck. A long branch of the nerve perforates the seminal head muscle and trapezius muscle, accompanies the occipital artery and innervates the skin of the occipital region. The posterior branches of the remaining cervical spinal nerves innervate the skin of the posterior region of the neck. The posterior branches of the spinal nerves branch out in the muscles and skin of the back, which they innervate. The posterior branches of the lumbar spinal nerves innervate the deep back muscles and the skin of the lumbar region. Three upper lateral branches go downward and lateral to the skin of the lateral half of the gluteal region and a large trochanter, circulating the upper nerves of the buttocks.

The posterior branches of the four upper sacral spinal nerves pass through the dorsal sacral orifices, branch off to the sacroiliac joint, innervate the skin of the posterior surface of the sacrum, and form the middle nerves of the buttocks. These nerves perforate the gluteus maximus and innervate the skin in the middle and lower gluteal regions.

The anterior branches of the spinal nerves innervate the muscles and skin of the anterior and lateral divisions of the neck, chest, abdomen and extremities. The median branches of the cervical, lumbar, sacral and coccygeal spinal nerves form plexuses. These plexuses are formed by joining together the neighboring spinal nerves. In the plexuses, there is an exchange of fibers belonging to neighboring segments of the spinal cord. Due to the redistribution of sensitive fibers in the interlacing, the relationship of one part of the skin with the neighboring segments of the spinal cord is established. Allocate the cervical, brachial, lumbar, sacral and coccygeal plexus.

The cervical plexus is formed by the anterior branches of the four upper cervical spinal nerves. The anterior branch extends between the anterior and lateral rectus muscles of the head, the remaining anterior branches - between the anterior and posterior intervertebral muscles, behind the vertebral artery.

The cervical plexus has connections with the sublingual nerve with the help of the anterior branches of the first and second cervical spinal nerves, with the additional nerve, with the brachial plexus (through the anterior branch of the fourth cervical spinal nerve), with the upper cervical node of the sympathetic trunk.

Muscular branches that innervate the long muscles of the head and neck, the stair muscles, the lateral and anterior rectus muscles of the head, the muscle that lifts the scapula, as well as the trapezius and sternocleidomastoid muscle, leave the cervical plexus. The cervical plexus gives fibers that form the lower root of the neck loop. The upper rootlet of this loop is formed by the descending branch of the hyoid nerve. Fibers emerging from the cervical loop innervate the superficial muscles of the neck located below the hyoid bone.

Sensitive branches of the cervical plexus are the occipital occipital nerve, the large auric nerve, the transverse nerve of the neck and the supraclavicular nerves. These nerves move away from the plexus, around the posterior edge of the sternocleidomastoid muscle and come out from under it into the subcutaneous tissue. The longest nerve of the cervical plexus is the diaphragmatic nerve.

The small occipital nerve is formed mainly by the branches of the second and third cervical spinal nerves. It goes under the skin at the back edge of the sternocleidomastoid muscle, it goes up and back and innervates the skin behind the auricle and above it.

The large auricle consists mainly of fibers of the third and to a lesser extent the fourth cervical spinal nerves. The projection of the exit of this nerve on the neck occurs at the border between the upper and middle third of the posterior margin of the sternocleidomastoid muscle. The large auricle is divided into the anterior and posterior branches, which are directed upwards. The posterior branch goes vertically upward and innervates the skin of the posterior and lateral surfaces of the auricle, the skin of the ear lobe. Some fibers perforate the cartilage of the auricle and innervate the skin of the external auditory canal. The anterior branch of the large ear nerve goes obliquely forward and innervates the skin of the face in the region of the parotid salivary gland.

The transverse nerve of the neck consists of the fibers of the anterior branch of the third cervical spinal nerve. The nerve emerges from under the posterior edge of the sternocleidomastoid muscle, moves forward, gives the upper and lower branches, which penetrate the subcutaneous muscle of the neck and go to the skin of the anterior sections of the neck. The transverse nerve of the neck is anastomosed with the cervical branch of the facial nerve, the fibers of which come to the neck to innervate the subcutaneous muscle of the neck.

Supraclavicular nerves are formed predominantly by the branches of the fourth and partly fifth cervical spinal nerves. Supraclavicular nerves appear on the surface of the subcutaneous muscle of the neck at the level of the middle of the posterior edge of the sternocleidomastoid muscle, go down, fan out and innervate the skin above the key and in the upper front region of the chest (to the level of the 3rd rib). Correspondingly, the medial, intermediate and lateral supraclavicular nerves are distinguished.

The diaphragmatic nerve is formed predominantly by the anterior branches of the third and fourth cervical spinal nerves, descending vertically down the front surface of the anterior staircase, passes into the thoracic cavity between the subclavian artery and the vein, medial to the inner thoracic artery. Next, the nerve goes next to the dome of the pleura, from the root of the lung, under the median pleura. The right diaphragmatic nerve passes along the lateral surface of the superior vena cava, adjacent to the pericardium, is located anterior to the left diaphragmatic nerve. The left diaphragmatic nerve crosses the aortic arch in the front and penetrates the diaphragm at the border of the tendon center and the rib part of it. The motor fibers of the diaphragm nerves innervate the diaphragm, the sensitive fibers go to the pleura and pericardium (pericardial branch). Part of the branches of the diaphragmatic nerve - the diaphragmatic-abdominal branches passes into the abdominal cavity and innervates the peritoneum that lines the diaphragm. The right diaphragmatic nerve passes in transit (without interruption) through the celiac plexus to the peritoneum covering the liver and gallbladder.

V. Practical work:

Task № 1. Before proceeding to study the superficial and deep nerves of the neck, it is necessary to repeat on the muscular corpus vessels of the muscle and fascia of the neck, as well as the topography of this region. Then proceed to study the topic.

Task № 2. On the prepared corpse under the subcutaneous muscle of the neck, find the transverse nerve of the neck and pay attention to its connection with the neck branch of the facial nerve. After this, find a large ear nerve, which rises up toward the auricle and external auditory canal. Both of these nerve exit from the lateral edge of the sternocleidomastoid muscle, and just above and behind the large ear nerve, find the small occipital nerve. After that, find the supraclavicular nerves that go down and innervate the skin above the large thoracic and deltoid muscles. Then look for the lower root of the neck loop that goes down in front of the inner jugular vein under the sternocleidomastoid muscle and at this point connects to the upper spine that goes to the hyoid nerve, forming a neck loop, the branches of which go to the muscles located below the hyoid bone.

Task № 3. Find the diaphragmatic nerve that lies on the front surface of the anterior staircase and trace its path to the entrance to the chest cavity. In the chest cavity it passes between the subclavian artery and the vein, medial to the inner thoracic artery, and then goes next to the dome of the pleura, from the root of the lung, under the mediastinal pleura. Find the right diaphragm nerve, it passes along the lateral surface of the superior vena cava and abuts the pericardium. Select the left diaphragmatic nerve, it crosses the front of the aortic arch and penetrates the diaphragm at the border of the tendon center and the rib part.

VI. Control questions:

1. From what roots are spinal nerves formed?
2. Which branches share the spinal nerve?
3. What are the names of the posterior branches of the spinal nerves in different parts of the body? What organs are they innervating?
4. What is called a plexus of nerves? How is the plexus formed?
5. How is the cervical plexus formed?
6. Name the nerves of the cervical plexus and the areas where they split up.

VII. Academic pursuits:

Task № 1

In the patient as a result of injury, cutaneous branches of the cervical plexus are damaged.

1. Which branches of the cervical plexus refer to cutaneous plexus?
2. What is the area of innervation of these branches?

Answer:

1. The dermal branches of the cervical plexus include the small occipital, large ear, supraclavicular nerves, and the transverse nerve of the neck.

2. The small occipital nerve innervates the skin of the lateral part of the occipital region; a large auric nerve innervates the auricle and an external auditory canal; the transverse nerve of the neck - the skin of the anterior surface of the neck; supraclavicular nerves - the skin above the large thoracic and deltoid muscles.

Task № 2

The patient, after suffering a trauma, violated the innervation of the neck muscles located below the hyoid bone.

1. What is the innervation of this group of muscles?
2. What is the basis for the formation of this anatomical entity?

Answer:

1. The group of subluxal muscles is innervated by the cervical loop.

2. The neck loop is formed by the anterior branches of the cervical spinal nerves CII-CIII and the descending branch of the hyoid nerve.

VIII. Control Tests:

1. Which anatomical formations are related to the peripheral nervous system:

1. lateral intermediate in the lateral columns of the spinal cord
2. spinal nerves
3. nerves of the sympathetic part of the autonomic nervous system
4. nodes of the spinal nerves

2. Indicate what spinal nerves are formed:

1. processes of the neurons of the anterior horns of the spinal cord
2. processes of neurons of the cortex of the cerebral hemispheres
3. Spines of spinal ganglion cells
4. sprouts of neurons of the nuclei of the brainstem

3. Specify the nerve fibers that are present in the spinal nerves:

1. parasympathetic
2. Sensitive
3. sympathetic
4. motor

4. Specify the anatomical formations to which the posterior branches of the spinal nerves are suitable:

1. deep back muscles
2. skin of the dorsal surface of the trunk
3. gluteal region skin
4. hamstrings

5. Specify the branches of the cervical plexus:

1. large auricularis (n. Auricularis magnus)
2. The transverse nerve of the neck (n. Transversus colli)
3. small occipital nerve of the neck (n. Occipitalis minor)
4. supraclavicular nerves (nn. Supraclaviculares)

6. Specify the nerves, the branches of which are involved in the formation of the neck loop:

1. facial nerve (n. Facialis)
2. additional nerve (n. Accessorius)
3. cervical plexus (plexus cervicalis)
4. Sublingual nerve (n. Hypoglossus)

7. Specify the anatomical formations that innerviruet diaphragmatic nerve:

1. pericardium

2. peritoneum
3. liver
4. The pleura

8. Specify anatomical formations that innerviruet transverse nerve of the neck:
1. trapezius muscle
2. sternocleidomastoid muscle
3. the skin of the front region of the neck
4. skin of the lateral region of the neck

9. Specify the area of innervation of the supraclavicular nerves:
1. skin over the deltoid muscle
2. skin over the large pectoralis muscle
3. skin of the back region of the neck
4. the skin of the front region of the neck

16. The largest cutaneous branch of the cervical plexus is:
1) transverse nerve of the neck
2) small occipital nerve of neck
3) supraclavicular nerves
4) large auricular nerve

Keys:

1	2,3,4
2	1,3,4
3	2,3,4
4	1,2,4
5	1,2,3,4
6	3,4
7	1,2,3,4
8	3
9	1,2
10	4

IX. Anatomical terminology :

English Name	Latin Name
1. The cervical plexus	1. plexus cervicalis
2. The neck loop	2. ansa cervicalis
3. Upper spine	3. radix superior
4. lower root	4. radix inferior
5. large auricular nerve	5. n. auricularis magnus
6. small occipital nerve	6. n. occipitalis minor
7. transverse nerve of the neck	7. n. transversus colli
8. supraclavicular nerves	8. nn. supraclaviculares
9. medial, intermediate and lateral supraclavicular nerves	9. nn. supraclaviculares mediales, intermedii et laterals
10. the diaphragmatic nerve	10. n. phrenicus
11. the pericardial branch	11. r. pericardiacus
12. diaphragmatic peritoneal branches	12. rr. phrenicoabdominales

Literature:

1. 1. Sapin M.R., Bilich G.L. Human anatomy. Textbook in 3 volumes. T.3 Moscow, "GEOTAR-Media", 2009
2. 2. Pryves MG, Lysenkov NK, Bushkovich VI Human anatomy. SPb, 2010.
3. 3. Sinelnikov RD, Sinelnikov Ya.R., Sinelnikov A.Ya. Atlas of human anatomy. T.3 - 344 s. M.: The New Wave: Publisher of Umerenkov, 2010
4. 4. Sapin MR, Nikityuk DB, Shvetsov EV .. Atlas of normal human anatomy, 4th edition. Moscow. MEDPress-Inform, 2009
5. 5. Electronic library of medical high school www.Studmedlib.ru
6. 6. Material of lectures on anatomy.

X. Preparations and manuals:

1. Prepared corpse.
2.Tutorial of human anatomy.
3. Atlas. Counts.
4. Level II tests and standards of answers to them.

INDEPENDENT WORK

ANATOMY OF THE SPINAL NERVES. ANATOMY AND TOPOGRAPHY OF THE CERVICAL PLEXUS. NERVES OF THE WALLS AND ORGANS OF THE THORACIC CAVITY.

I. Questions for checking the initial level.

1. General structure of spinal nerves. Reflex arc. Formation of the cervical plexus, its skeleotopia.
2. Topography of the anterior and posterior roots of the spinal nerves.
3. Formation of the plexus of the spinal nerves.
4. Neck section of the sympathetic trunk. Gray connecting branches, their topography and significance.

II. Targets.

Student should know:	***Literature***:
1. Education and skeletal surgery of the branches of the cervical plexus (cutaneous, muscular, mixed). 2. The diaphragmatic nerve, its innervation zone. 3. Connections of the branches of the cervical plexus to the cranial nerves. 4. Functional significance of the nerves of the cervical plexus. Gray connecting branches. 5. The exit site of the cutaneous branches of the cervical plexus.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.
Student must be able to:	***Literature***:
1. Call and show on the corpse cutaneous branches of the cervical plexus. 2. Name and show on the corpse the muscular branches of the cervical plexus 3. Name and show on the corpse a "neck loop". Explain the mechanism of its formation and the area of innervation. 4. Call and show on the corpse and follow the course of the diaphragmatic nerve. 5. Explain the significance of the gray connecting branches for muscle function.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.

III. Tasks for self-dependent work.

1. Make a scheme of the formation of the "neck loop". Determine the zone of innervation.

Complete phrases:

2. The cervical plexus is formed _____ segments.

3. To the dermal branches of the cervical plexus belongs _____

_____

4. What innervates the diaphragmatic nerve _____

_____

IV. Questions for self-control.

5. How from the roots of the spinal cord is formed the spinal cord nerve?

_____

_____

6. Which segments form the cervical plexus? His topography.

_____

_____

7. Which nerve of the cervical plexus is mixed? Its course and topography.

_____

_____

8. What muscles are innervated by the motor branches of the cervical plexus?

_____

_____

9. How does the neck segment form a small occipital nerve?

_____

_____

V. <u>Make a situation on this topic</u>.

Example:

10. TASK:. What disorders can the patient have with a spinal cord injury at the C3-C4 level?

ANSWER: _____

_____

_____

TASK:
ANSWER:

<u>VI. Make 1-2 tests according to the example.</u>

11. Example: Which branch gives the spinal nerve:

а) Upper and low б) Lateral and medial

в) Anterior and posterior г) Median and inner

Test№1 _____

_____

_____

а. _____

б. _____

в. _____

г. _____

Test№2 _____

_____

_____

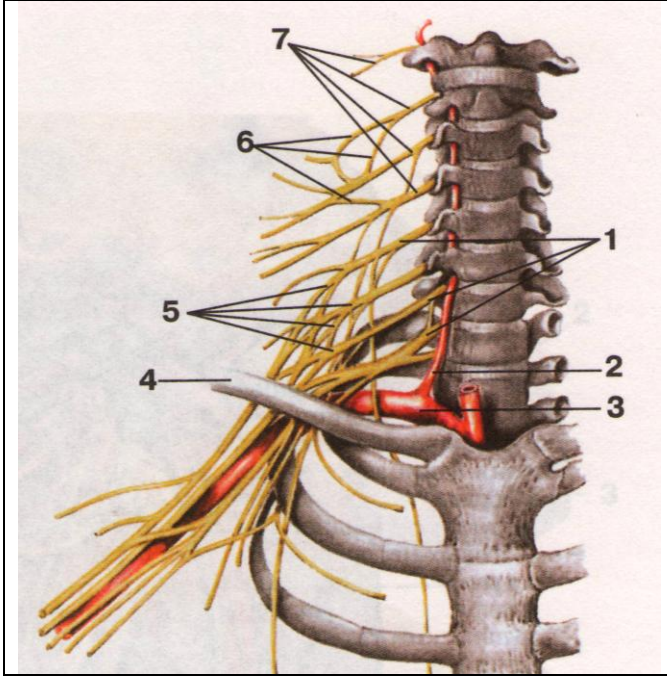
а. _____

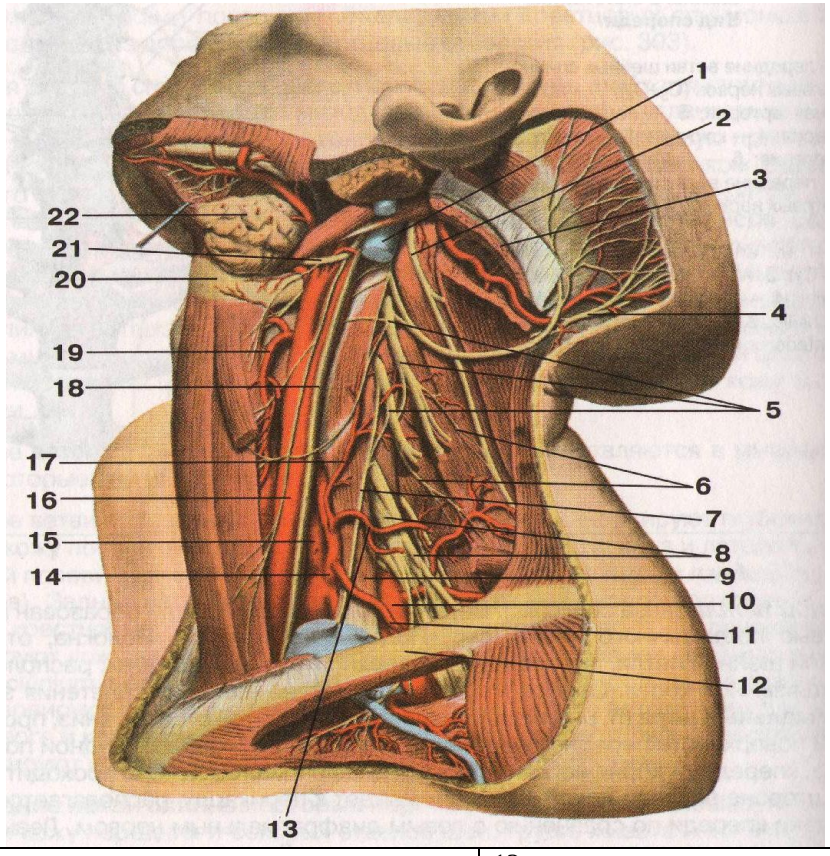
б. _____

в. _____

г. _____

VII. Make designations for pictures.

№12	CERVICAL PLEXUS
	1.
	2.
	3.
	4.
	5.
	6.
	7.

№13	CERVICAL PLEXUS, PHERNIC NERVE
	

1.	12.
2.	13.
3.	14.
4.	15.
5.	16.
6.	17.
7.	18.
8.	19.

9.	20.
10.	21.
11.	22.

CONTACT WORK

Theme: Anatomy and topography of the brachial plexus (short and long branches). Topography of vessels and nerves.

Nerves of extremities have a mixed motor and sensory function, their complete or partial damage is accompanied by both motor and sensitive disorders. Damage to the brachial plexus causes the flaccid paralysis of the entire upper limb and the loss of skin sensitivity in it, except for the inner surface of the shoulder, cyanosis and cold extremity, a violation of sweating, in some cases - Horner's syndrome. If the upper or lower pairs of roots of the brachial plexus (primary stems) are damaged, individual movements of the upper limb fall out and local sensitivity disorders occur, and damage to the lower primary trunk causes a violation of flexion of the hand and fingers, removal and reduction of the fingers, a sensitivity disorder in the innervation zone of the ulnar nerve and the inner surface of the limb. Knowledge of this topic is necessary when examining neurological patients and for topical diagnosis of sensory and motor disorders, as well as in studying relevant sections in the course of therapy, surgery, neurology, traumatology and other clinical disciplines.

I. Objecttives:

Student must know	1) Formation and topography of the brachial plexus. 2) Short branches of the brachial plexus, the topography of the stroke and the area of innervation. 3) Long branches of the brachial plexus 4) Musculo-cutaneous nerve, the topography of the stroke and the area of innervation. 5) The median nerve, the topography of the course and the area of innervation. 6) The radial nerve, the topography of the stroke and the area of innervation. 7) The medial cutaneous nerve of the shoulder and the medial cutaneous nerve of the forearm, the topography of the stroke and the area of innervation. 8) The ulnar nerve, the topography of the stroke and the area of innervation. 9) Innervation of the skin of the hand.
Student must be able to:	1) Show on the native preparation and name the brachial plexus in Latin. 2) Show on the native preparation and name in Latin short branches of the brachial plexus. 3) Show on the native preparation and name in Latin long branches of the brachial plexus.
Student must possess	1) Medical-anatomical conceptual apparatus; 2) Anatomical knowledge for understanding pathology, diagnosis and treatment 3) The simplest medical instruments - a scalpel and tweezers. 4) The technique of preparation of the brachial plexus and its branches (under the supervision of the teacher).

II. Required level of knowledge:

а) from related disciplines:

1. Phylogeny of the nervous system
2. Histological structure of the nervous tissue.
3. Development and histological structure of nerve fibers.
4. Links of the reflex arc, their functional significance.

б) from previous topics:

1. Bones and joints of the upper limb.
2. The muscles of the upper extremity belt and the free upper limb.
3. Topography of the vessels in the areas of the upper extremity belt and free upper limb.
4. The structure of the spinal cord.
5. Formation of spinal nerves and plexuses.
6. Topography of the cervical plexus.

в) from the current lesson:

1) The formation and topography of the brachial plexus.
2) Short branches of the brachial plexus, the topography of the stroke and the area of innervation.
3) Long branches of the brachial plexus
4) Musculo-cutaneous nerve, topography of the course and area of innervation.
5) The median nerve, the topography of the course and the area of innervation.
6) Radial nerve, the topography of the course and the area of innervation.
7) The medial cutaneous nerve of the shoulder and the medial cutaneous nerve of the forearm, the topography of the stroke and the area of innervation.
8) The ulnar nerve, the topography of the stroke and the area of innervation.
9) Innervation of the skin of the hand.

IV. Informational part:

The brachial plexus is formed by the anterior branches of the four lower cervical spinal nerves. In the composition of the plexus the topographic feature distinguishes the supraclavicular and subclavian. In the interstitial space (supraclavicular part), the brachial plexus is represented by the upper, middle and lower trunks of the brachial plexus. At the level of the clavicle and below, the trunks of the brachial plexus form three bundles (the subclavian part) surrounding the axillary artery in the axillary cavity - the medial, lateral and posterior fascicles. From the brachial plexus depart short and long branches. Short branches are mainly from the supraclavicular part of the brachial plexus. They innervate the bones and soft tissues of the shoulder girdle. Long branches of the brachial plexus depart from the subclavian part of the brachial plexus and innervate the free part of the upper limb.

Short branches of the brachial plexus. - are:

1. Dorsal nerve of scapula
2. The long thoracic nerve
3. The subclavian nerve
4. Suprathinial nerve
5. The subscapular nerve

6. Stomatous nerve
7. Lateral and medial pectoral nerves.

2. **Axillary nerve**

Long branches of the brachial plexus. Long branches of the brachial plexus depart from the lateral, medial and posterior fascicles of the subclavian part of the brachial plexus. These include:

Musculo-cutaneous nerve - is formed by the middle branches of the fifth-eighth cervical spinal nerves. At the level of the elbow joint, lateral to the terminal section of the biceps tendon of the shoulder, the musculocutaneous nerve perforates the fascia of the shoulder and continues into the lateral cutaneous nerve of the forearm. The lateral cutaneous nerve of the forearm innervates the skin of this area up to the elevation of the thumb.

1. **The median nerve** departs from the fusion of the lateral and medial bundles of the brachial plexus formed by the fibers of the anterior branches of the sixth to the eighth cervical and the first thoracic spinal nerves. On the shoulder, the median nerve passes first in one fascial case with the brachial artery, lateral to it. The median nerve often has a connecting branch with the musculocutaneous nerve. In the lower part of the foreleg, the median nerve is located between the tendon of the radial flexor of the wrist medially and the long palmar muscle laterally. On the palm, the nerve passes through the wrist canal. On the shoulder and in the ulnar fossa, the median nerve of the branches does not give. On the forearm from it go the muscle branches to the round and square pronators, the superficial flexor of the fingers, the long flexor of the thumb of the hand, the long palmar muscle, the radial flexor of the wrist, the deep flexor of the fingers (towards the lateral part). The median nerve innervates all the muscles of the anterior group of the forearm, except for the medial part of the deep flexor of the fingers and the ulnar flexor of the wrist. The largest branch of the median nerve on the forearm is the anterior interosseous nerve. At the level of the radiocarpal joint from the median nerve, the palmar branch recedes. It penetrates the fascia of the forearm and is directed further between the tendons of the radial flexor of the cusp and the long palmar muscle. The palatal branch of the median nerve innervates the skin of the lateral half of the wrist and part of the skin of the thumb's elevation.

2. On the wrist, the median nerve innervates the short muscle that removes the thumb; the muscle that opposes the thumb of the hand, the superficial head of the short flexor of the thumb, the 1st and 2nd wormlike muscles. Under the palmar aponeurosis, the median nerve is divided into three common palmar fingertips. These nerves pass along the first, second and third interstitial spaces and innervate the skin of three and a half fingers on the palmar side of the hand. The first common palmar nerve innervates the first vermiform muscle and gives off three skin branches - its own palmar finger nerves. Two of them pass along the radial and ulnar sides of the thumb, the third - along the radial side of the index finger. The second and third common palmar nerves give away two of their own palmar fingertips. These nerves go to the skin of the sides of the first, second and third fingers facing each other and to the skin of the back sides of the distal and middle phalanges of the 2nd and 3rd fingers. The second common palmar finger nerve also innervates the 2nd vermiform muscle. The median nerve innervates the wrist joints and the first four fingers.

The ulnar nerve departs from the medial bundle of the brachial plexus. It consists of the fibers of the anterior branches of the eighth cervical - the first thoracic spinal nerves. Initially, the ulnar nerve is located next to the median nerve and slightly medial to the brachial artery. In the middle third of the shoulder, the nerve deviates into the medial side, then pro¬bonday the medial intermuscular septum of the shoulder and goes down to the back surface of the medial epicondyle of the humerus. On the shoulder, the elbow nerve does not give branches. Closer to the head of the elbow bones from the ulnar nerve is its back branch. On the forearm, the muscular branches of the nerve innervate the elbow flexor of the wrist and the medial part of the deep flexor of the fingers.

The back branch of the ulnar nerve nerves the skin of the rear of the hand from the ulnar side, the skin of the proximal phalanges IV, V and the ulnar side of the third finger.

The palmar branch of the ulnar nerve, along with the ulnar artery, passes into the palm through the gap in the medial part of the flexor retainer, on the lateral side of the pea-bones. Near the hook-shaped process of the hook-shaped brachium, the palmar branch is divided into a superficial and a deep branch.

A deep branch of the ulnar nerve accompanies a deep branch of the ulnar artery. Then the deep branch deviates to the side, it goes obliquely between the bundles of the muscle that removes the little finger, under the distal sections of the flexor tendons of the fingers, located on the interosseous palmar muscles. The deep branch of the ulnar nerve innervates all the muscles of the exaggeration of the little finger (the short flexor of the little finger, the detached and opposing little finger of the muscle), the back and palmar interosseous muscles, and the leading thumb muscle of the hand and the deep head of the short flexor of the thumb of the hand. and 4th worm-like muscles, bones, joints and ligaments of the hand.

The medial cutaneous nerve of the shoulder is formed by the fibers of the anterior branches of the eighth cervical and first thoracic spinal nerves, departs from the medial bundle of the brachial plexus and accompanies the brachial artery. At the base of the axillary cavity, the medial cutaneous nerve of the shoulder is connected to the lateral cutaneous branches of the second and third intercostal nerves and is called the intercostal-brachial nerve.

The medial cutaneous nerve of the forearm consists of the fibers of the anterior branches of the eighth cervical ñ the first thoracic spinal nerves. Exit from the medial bundle of the brachial plexus and is attached to the brachial artery. Initially, the nerve is located deep on the shoulder, then perforates the fascia of the shoulder at the point where the medial subcutaneous vein enters the arm in one of the shoulder veins. The branches of the medial cutaneous nerve of the forearm innervate the skin of the medial side of the lower part of the shoulder and the posterior medial side of the forearm.

The radial nerve is an extension of the posterior fasciculus of the brachial plexus. It consists of fibers of the front branches of the fifth cervical - the first thoracic spinal nerves. It begins at the level of the lower edge of the small pectoral muscle. Initially, the nerve goes behind the submaxillary artery, then between the lateral and medial head of the triceps arm muscle passes into the shoulder (spiral) canal. Before entering this channel from the radial nerve, the posterior cutaneous nerve of the shoulder drains, which goes back, perforates the long head of the triceps brachii muscle and the fascia of the shoulder next to the tendon of the deltoid muscle. The nerve innervates the skin of the posterolateral surface of the shoulder.

In the scapular canal from the radial nerve, the posterior cutaneous nerve of the forearm departs, emerges on the back of the forearm and innerves the skin of the posterior side of it to the level of the wrist joint. On the shoulder, the radial nerve innervates the triceps muscle of the shoulder and the ulnar muscle.

Coming out of the shoulder cannula, the radial nerve perforates the lateral intermuscular septum of the shoulder and descends between the brachial and the beginning of the brachial muscle. At the level of the elbow joint, the radial nerve is divided into a superficial and a deep branch. It passes between the superficial and deep layers of muscles on the rear of the forearm, innervates the interosseous membrane and located nearby muscles

V. Practical work:

1. Study the short branches of the brachial plexus. A long thoracic nerve passes along the outer surface of the anterior jagged muscle. The suprathiopathic nerve is accompanied by the suprapular artery in the lower part of the neck. The medial and lateral thoracic nerves enter the large and small pectoral muscles from their inner surface. The subscapular nerve, in the form of several short branches,

enters the subscapularis muscle and gives the pectoral spinal nerve, which, together with the same-named artery, enters the broadest muscle of the back. The subclavian nerve and the dorsal nerve of the scapula on the training material are not always visible. The axillary nerve, along with the posterior artery circumscribing the humerus, passes through the quadrilateral opening.

2. Study the long branches of the brachial plexus. From the medial bundle of the brachial plexus depart: the ulnar nerve is located in the medial groove of the biceps muscle, then it is directed to the posterior surface of the medial epicondyle into the channel of the ulnar nerve (no branches on the shoulder). The medial cutaneous nerve of the shoulder and the medial cutaneous nerve of the forearm are also located in the medial groove of the biceps muscle. The musculocutaneous nerve leaves the lateral bundle of the brachial plexus. He perforates the beak-muscular muscle, and then lies between the biceps arm muscle and the shoulder muscle. From the medial and lateral bundles of the brachial plexus, the median nerve leaves in two portions. It is located in the medial groove of the biceps muscle. The extension of the posterior fasciculus is the radial nerve, which, together with the deep artery of the shoulder, leaves into the cannibal canal.

3. On the ulnar side of the anterior surface of the forearm, find the branches of the medial cutaneous nerve of the forearm. Along the radial edge of the forearm, along the anterior surface of the forearm, we find the lateral cutaneous nerve of the forearm (continuation of the musculocutaneous nerve); on the posterior surface of the forearm, we find the posterior cutaneous nerve of the forearm (from the radial nerve). Spread the brachial and brachial muscles and in the area of the anterior lateral ulnar groove find the radial nerve. Show two of its branches: deep, perforating instep and superficial, which follows the radial artery in the radial groove of the forearm. At the level of the lower third of the forearm, the superficial branch passes under the tendon of the brachial muscle to the posterior surface and descends to the rear of the hand, giving back dorsal nerves. In the lower third of the forearm between the superficial and deep extensors of the fingers, we find the posterior interosseous nerve, which accompanies the posterior interosseous artery. The ulnar nerve on the forearm passes along with the same artery and veins in the ulnar fissure, and then passes through the ulnar canal of the wrist and gives off two branches: the superficial one, which is divided into the common palmar finger nerve (located under the palmar aponeurosis) and its own palmar nerve, and also a deep branch that passes between the flexor and the distal muscle of the muscles and accompanies a deep palmar arc. The median nerve on the forearm passes between the superficial flexor of the fingers and the radial flexor of the wrist in the median sulcus. Its branch - the anterior interosseous nerve follows along with the anterior interosseous artery on the anterior surface of the interosseous membrane to the square pronator. Above the radiating joint, the median nerve gives a thin palmar branch. Together with the tendons of the long flexors, the median nerve through the wrist canal penetrates the wrist, where it gives the common palmar finger nerves, which are divided into their own palmar finger nerves.

4.. Disassemble the innervation of the muscles of the shoulder girdle. The muscles of the shoulder girdle receive innervation from the short branches of the brachial plexus. The dorsal nerve of the scapula innervates the muscle, lifting the scapula and the rhomboid muscles. The long thoracic nerve is the anterior dentate muscle, and the supratemporal nerve is the supraspinatus and subacute muscle, as well as the capsule of the shoulder joint. The medial and lateral thoracic nerves innervate the large and small pectoral muscles, the subclavian nerve - the subclavian muscle, the subscapular nerve - the scapular muscle, and the chest-spinal nerve - the widest muscle of the back. The axillary nerve innervates the deltoid and small round muscle and the skin above them.

5.The skin of the shoulder is innervated by the following nerves: the medial cutaneous nerve of the shoulder, the lateral cutaneous nerves of the shoulder (from the axillary and radial nerve), the posterior cutaneous nerve of the shoulder (from the radial nerve). The posterior group of the shoulder muscles receives innervation from the radial nerve, and the anterior one from the musculocutaneous nerve.

6.The skin of the forearm is innervated by the following nerves: the medial cutaneous nerve of the forearm, the lateral cutaneous nerve of the forearm (from the musculocutaneous), the posterior cutaneous nerve of the forearm (from the radial nerve). The posterior group of muscles of the forearm is innervated by the deep branch of the radial nerve, the anterior group of muscles of the forearm is innervated by the deep branch of the radial nerve, the anterior group (except the ulnar flexor of the wrist and half of the deep flexor of the fingers) - the median nerve, the ulnar flexor of the wrist and the half of the deep flexor of the fingers - the ulnar neurus.

7. Skin of the brush gets innervation as follows. The skin of the palmar surface of I, II, III and the radial half of the IV fingers innervates the median nerve, the ulnar half of the IV and V fingers - the ulnar nerve (own palmar nerves). The skin of the back surface of the hand, I, II and the radial half of the third finger innervates the radial nerve. The ulnar halves of the III, IV and V fingers are the ulnar nerve. The short muscle that leads the thumb, the muscle that opposes the thumb, the superficial head of the short flexor of the thumb of the wrist I and II, the vermicular muscles innervates the median nerve. All other muscles of the palmar surface of the hand innervate the ulnar nerve. The rear interosseous muscles also innervate the ulnar nerve.

VI. Control questions:

1) Segments forming the brachial plexus.
2) List the trunks and bundles of the brachial plexus. Where are each of these beams located?
3) List short branches of the brachial plexus. What each of them innervates?
4) What are branches branching into the skin of the shoulder and in the skin of the forehead? What nerves are involved in the innervation of the skin of the hand? Which fingers innervate each of these nerves?
5) List the long branches of the brachial plexus.
6) Which muscles on the forearm and on the hand innervate the median nerve?
7) Which muscles on the forearm and on the hand innervate the ulnar nerve?
8) Which muscles on the forearm and the hand innervate the radial nerve?

VII. Academic pursuits:

1. The patient after dislocation of the head of the humerus noted the inability to withdraw the upper limb. Indicate the likely mechanism of the symptom from the anatomical point of view.
2. The patient has paralysis of the biceps arm muscle, the coracoid-brachial and brachial muscles and the absence of sensory innervation of the skin in the anterolateral surface of the forearm. What kind of nerve damage does this symptom? Give anatomical justification.

Answers:

№1. The shoulder is removed mainly by the deltoid muscle, it is innervated by the axillary nerve, a short branch of the brachial plexus. The nerve is adjacent to the capsule of the shoulder joint and, when the head of the shoulder is displaced, it can be impaired, which will be accompanied by dysfunction of the deltoid muscle.

№ 2.

These muscles constitute the anterior muscle group of the shoulder, innervated by one of the long branches of the brachial plexus by the musculocutaneous nerve. He, by means of his terminal branch, the lateral cutaneous nerve of the forearm, carries out a sensitive innervation of the skin in this area of the forearm.

VIII. Control Tests:

1. Specify the nerves that refer to the short branches of the brachial plexus:

1. The long thoracic nerve (n. Thoracicus longus)
2. Axillary nerve (n. Axillaris)
3. Lateral and medial pectoral nerves (nn. Pectorales medialis et lateralis)
4. The medial cutaneous nerve of the shoulder (n. Cutaneus brachii medialis

2. Specify the muscles that innervate the subscapular nerve:

1. deltoid muscle (m. Deltoideus)
2. large round muscle (m. Teres major)
3. small round muscle (m. Teres minor)
4. Subscapular arm muscle (m. Subscapularis)

3. Specify the muscles that innervate the dorsal nerve of the scapula:

1. posterior staircase (m. Scalenus posterior)
2. the muscle that lifts the scapula (m. Levator scapulae)
3. The rhomboid muscle (m. Rhomboideus)
4. Deltoid muscle (m. Deltoideus)

4. What anatomical formation innervates the axillary nerve:

1. large round muscle
2. small round muscle
3. deltoid muscle
4. Shoulder joint capsule

5. Specify the nerves that originate from the medial bundle of the brachial plexus:

1. 1. The ulnar nerve (n. Ulnaris)
2. 2. radial nerve (n. Radialis)
3. 3. musculocutaneous nerve (n. Musculocutaneus)
4. 4. The medial cutaneous nerve of the shoulder (n. Cutaneus brachii medialis)

6. Specify the anatomical formations that innerviruet musculocutaneous nerve:

1. Shoulder joint capsule
2. subscapularis muscle
3. elbow joint capsule
4. The coracoid-brachial muscle

7. Specify the areas of the forearm that innervate the lateral cutaneous nerve of the forearm:

1. area of anterior-medial surface of forearm
2. area of the anterolateral surface of the forearm
3. area of the posterior surface of the forearm
4. area of the back surface of the hand

8. Specify the anatomical structures that innervate the ulnar nerve:

1. superficial flexor of the fingers (m. Flexor digitorum super ficialis)
2. The elbow flexor of the hand (m. Flexor carpi ulnaris)
3. The medial part of the deep flexor of the fingers (pars medialis m. Flexor digitorum profundus)
4. elbow joint (art. Cubiti)

9. Specify the anatomical formations that innerviruet the median nerve:

1. elbow joint (art cubiti)
2. short muscle that removes the thumb of the hand (m. Abductor pollicis brevis)
3. short flexor flexus (m. Flexor digiti minimi brevis)
4. capsule of the elbow joint (capsula art. cubiti)

10. What anatomical entities innervates the radial nerve:

1. The coracoid-brachial muscle
2. Shoulder Muscle
3. elbow muscle
4. elbow joint capsule

Keys:

1	123
2	24
3	23
4	234
5	14
6	4
7	2
8	234
9	12
10	34

IX. Anatomical terminology :

Brachial plexus.	
English Name	Latin Name
1. Brachial plexus	1. plexus brachialis
2. Upper trunk	2. truncus superior
3. medium trunk	3. truncus medius
4. lower trunk	4. truncus inferior
5. supraclavicular part	5. pars supraclauicularis
6. The subclavian part	6. pars infraclavicularis
7. The medial bundle	7. fasciculus medialis

8. Lateral beam	8. fasciculus lateralis
9. Back beam	9. fasciculus posterior
10. dorsal nerve of scapula	10. n. dorsalis scapulae
11. The long thoracic nerve	11. n. thordcicus longus
12. The subclavian nerve	12. n. subclavius
13. Suprathibular nerve	13. n. suprascapularis
14. subscapular nerve	14. n. subscapularis
15. The thoracic nerve	15. n. thoracodorsalis
16. Lateral and medial pectoral nerves	16. nn. pectorales lateralis et medialis
17. Axillary nerve	17. n. axillaris
18. upper lateral cutaneous nerve of the shoulder	18. n. cutaneus brachii lateralis superior
19. musculocutaneous nerve	19. n. musculocutaneus
20. Muscular branches	20. rr. musculdres
21. Lateral cutaneous nerve of the forearm	21. n. cutdneus antebrachii lateralis
22. The median nerve	22. n. medianus
23. Common palmar nerves	23. nn. digitdles palmdres communes
24. Own palmar finger nerves	24. nn. digitdles palmdres proprii
25. The ulnar nerve	25. n. ulnaris
26. the back branch	26. r. dorsalis n. ulnaris
27. The palmar branch of the ulnar nerve	27. r. palmaris n. ulnaris
28. superficial branch	28. r. superficialis
29. deep branch	29. r. profundus
30. Rear finger nerves	30. nn. digitales dorsales
31. own palmar finger nerve	31. n. digitalis palmaris proprius
32. The medial cutaneous nerve of the shoulder	32. n. cutaneus brachii medialis
33. intercostal-brachial nerves	33. nn. Intercostobrachiales
34. the medial cutaneous nerve of the forearm	34. n. cutaneus antebrdchii medialis
35. Radial nerve	35. n. radialis

Literature

1. Sapin M.R., Bilich G.L. Human anatomy. Textbook in 3 volumes. T.3 Moscow, "GEOTAR-Media", 2009
2. Pryves MG, Lysenkov NK, Bushkovich VI Human anatomy. SPb, 2010.
3. Sinelnikov RD, Sinelnikov Ya.R., Sinelnikov A.Ya. Atlas of human anatomy. T.3 - 344 s. M.: The New Wave: Publisher of Umerenkov, 2010
4. Sapin MR, Nikityuk DB, Shvetsov EV .. Atlas of normal human anatomy, 4th edition. Moscow. MEDPress-Inform, 2009
5. Electronic library of medical high school www.Studmedlib.ru
6. Material of lectures on anatomy.

X. Preparations and manuals:

1. Prepared corpse with removed trunks and their branches.
2. Tables depicting the brachial plexus.
3. Textbook of human anatomy. Atlas. Counts.
4. Tests of level 2.

INDEPENDENT WORK

ANATOMY AND TOPOGRAPHY OF THE BRACHIAL PLEXUS. NERVES OF THE ARMPIT, SHOULDER, FOREARM AND HAND. OVERVIEW OF INNERVATION OF THE SKIN AND MUSCLES OF THE UPPER LIMB.

I. Questions for checking the initial level.

1. General structure of spinal nerves. Reflex arc. Formation of the brachial plexus, its skeleotopia.
2. Functional muscle groups and topographic formations of the upper limb (pits, canals, furrows).
3. General anatomy of the autonomic nervous system. Neck section of sympathetic trunk, gray (postganglionic connecting branches - meaning and function).

II. Targets.

Student should know:	***Literature***:
1. Number and structure of spinal segments. Components of the reflex arc. 2. Formation of the brachial plexus, its skeleotopia (C5-C8 T1-T2) (supraclavicular and subclavian parts, their topography). 3. The relationship of the bundles of the brachial plexus to the blood vessels. 4. Topography of branches of the brachial plexus in gaps, furrows, canals, pits. 5. Projection lines of long branches of the brachial plexus. 6. Functional significance of the nerves of the brachial plexus. 7. Innervation of the skin and muscles of the upper limb of the corresponding areas.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.
Student must be able to:	***Literature***:
1. Name and show on the corpse parts of the brachial plexus and their branches. 2. Name and show on the corpse the medial, lateral and posterior bundles of the brachial plexus. Show their connections with the axillary artery. 3. Name and show the nerves coming from the lateral bundle. Zone of innervation. 4. Name and show on the corpse a medial bundle and its nerves. Mark their innervation. 5. Name and show the nerves emerging from the back beam, the zone of their innervation. 6. Show the median nerve and explain its formation. Zone of innervation. 7. Call and show the nerves of the brush. Explain the word "UMRU" as applied to the brush.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.

III. Tasks for self-dependent work.

1. Make a scheme of the formation of spinal nerves.

Complete phrases:

2. Brachial plexus is formed _____ segmets.

3. Radial nerve when leaving the canal is divided into _____

_____brances.

4. In the region of the brush, the median nerve innervates the following nerves _____

_____

5. Draw the projection lines of the long branches of the brachial plexus.

IV. Questions for self-control.

6. What parts are distinguished in the brachial plexus?

_____

_____

7. What nerves gives rise to the posterior fascicle?

_____

_____

8. What short branches branch off from the brachial plexus?

_____

_____

9. What innervates the median nerve.

_____

_____

V. Make a situation on this topic.

Example:

10. TASK: *Patient showed paralysis of the biceps brachii muscle, the beak-brachial and brachial muscles, and the absence of sensible innervation of the skin in the anterolateral surface of the forearm. What kind of nerve damage does this symptom?*

. ANSWER: _____

_____

_____

TASK:
ANSWER:

VI. Make 1-2 tests according to the example.

11. Example: The skin of the posterior surface of the shoulder is innervated by the posterior cutaneous nerve that extends from:

а) The median nerve б) The radial nerve в) The posterior fasciculus of the brachial plexus г) The ulnar nerve

Test№1 _____ _____ _____ *а.* _____ *б.* _____ *в.* _____ *г.* _____
Test№2 _____

_____

_____

а. _____

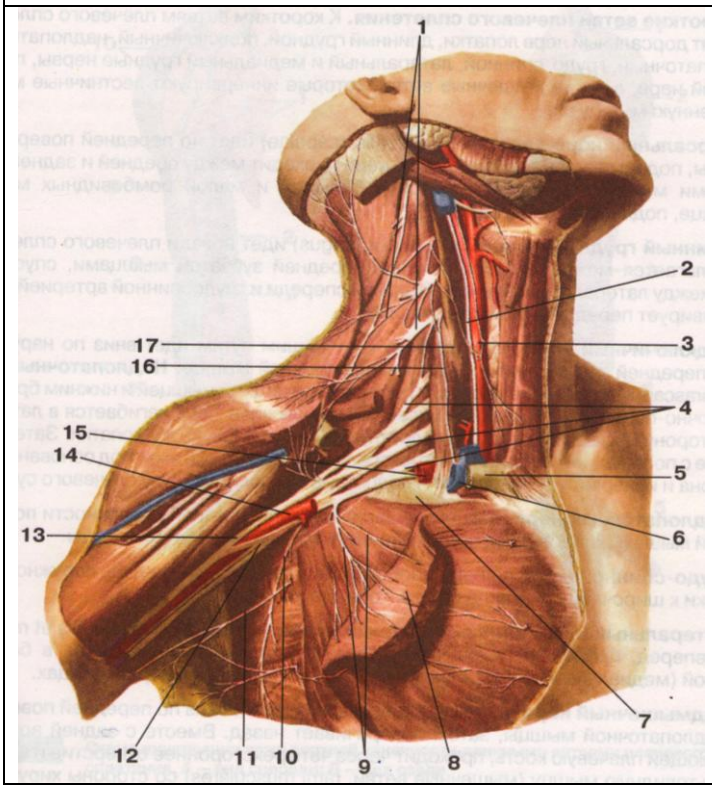
б. _____

в. _____

г. _____

VII. Make designations for pictures.

№12 CERVICAL PLEXUS



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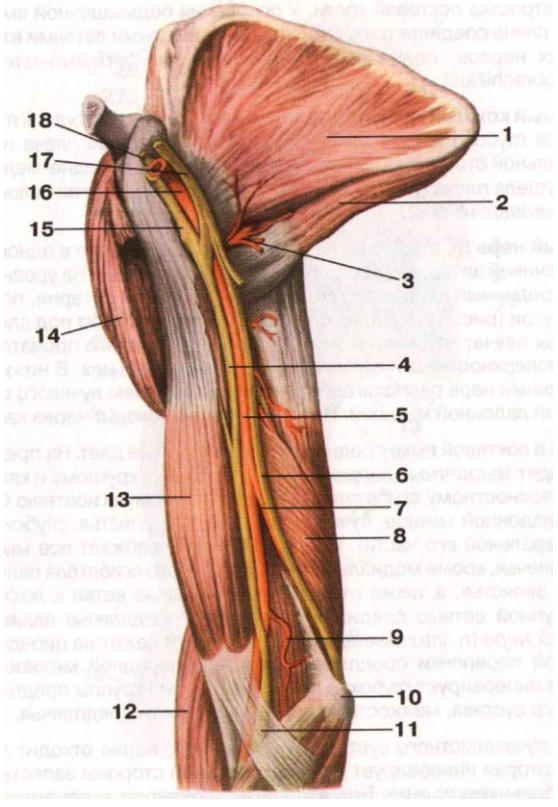
№13 MEDIAN AND ULNAR NERVES IN SHOULFER REGION



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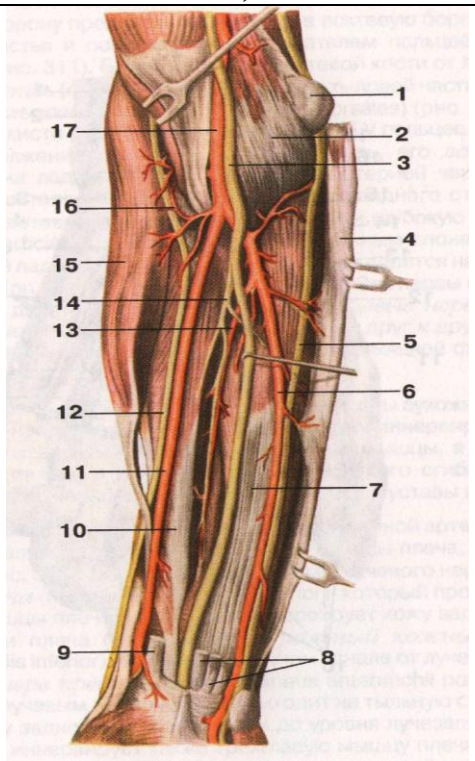
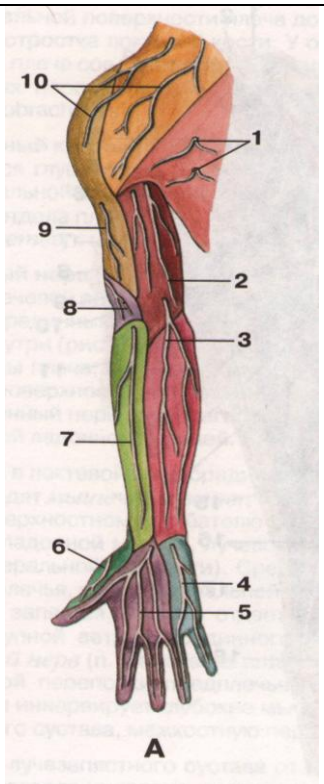
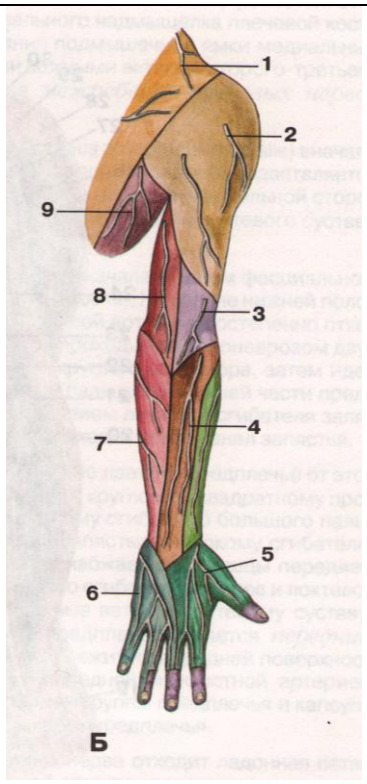
№14 MEDIUM, ULNAR AND RADIAL NERVES UN FOREARM REGION	
	1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18.

№15 INNERVATION OF UPPER LIMB'S SKIN	
	
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CONTACT WORK

Theme: Intercostal nerves. Anatomy and topography of the lumbar plexus. Anatomy and topography of the sacral plexus. Anatomy and topography of the genital and coccygeal plexus. Age features. Topography of vessels and nerves.

Nerves of extremities have a mixed motor and sensory function, their complete or partial damage is accompanied by both motor and sensitive disorders. In the lesion of the lumbar and sacral plexus, the clinical picture varies depending on the localization of the pathological process, for example, when the lower lumbar plexus is involved, paresis of the quadriceps muscle of the thigh, gluteus, twin muscles is observed, which disrupts walking, makes it difficult to extend the shin; the knee reflex decreases or disappears. Sensitivity is disturbed on the front surface of the thigh, the inner surface of the shin and foot. When lesions of individual branches of the lumbar plexus occur, hypoesthesia occurs in the lower parts of the anterior abdominal wall, anesthesia on the external surface of the thigh or painful paresthesia, hypoesthesia in the scrotum and upper thigh, etc. The defeat of the sacral plexus is manifested by an impairment of the sciatic nerve function by atrophic, paralysis of the muscles of the posterior femur, tibia and foot, the decrease or disappearance of the Achilles reflex, an anesthesia of the hamstring, shin and foot, vegetative trophic disorders on the shin and foot. The defeat of the genital and coccygeal plexuses is accompanied by a violation of the functions of the sphincters of the bladder and rectum (incontinence of urine and feces), hypoesthesia on the inner half of the buttock, the crotch and anus, the posterior surface of the genital organs. Knowledge of this topic is necessary when examining neurological patients and for topical diagnosis of sensory and motor disorders, as well as in studying relevant sections in the course of therapy, surgery, neurology, traumatology and other clinical disciplines.

I. Objecttives:

Student must know	1. The principle of formation of the intercostal nerve. 2. Topography of the intercostal nerve and the region of innervation. 3. Formation of lumbar plexus. 4. Topography and branches of the lumbar plexus. 5. Topography of the course and area of innervation of the ilio-hypogastric nerve. 6. Topography of the course and area of innervation of the ilio-inguinal nerve. 7. Topography of the stroke and the innervation area of the femoral-genital nerve. 8. Topography of the course and area of innervation of the lateral cutaneous nerve of the thigh. 9. Topography of the course and area of innervation of the occlusal nerve. 10. Topography of the course and area of innervation of the femoral nerve. 11. Formation of the sacral plexus. 12. Topography and branches of the sacral plexus. 13. Topography of the course and area of innervation of short branches of the sacral plexus 14. Topography of the course and area of innervation of the posterior cutaneous nerve of the thigh. 15. Topography of the course and area of innervation of the sciatic nerve. 16. Topography of the passage, branches and area of innervation of the tibial nerve. 17. Formation, topography, branches of the genital and coccygeal plexus.
Student must be able to:	Explain and show on the preparation the skeleton of segments of the spinal cord involved in the formation of intercostal nerves, lumbar and sacral plexus; Call in Latin and show intercostal nerves on the preparation; Call in Latin and show on the preparation branches of the lumbar plexus; Call in Latin and show on the preparation branches of the sacral plexus (short and long); Explain the formation of lumbar, sacral, genital and coccygeal plexuses; Show on the preparation and explain the zones of cutaneous innervation by the branches of the lumbar, sacral, genital and coccygeal plexuses;
Student must possess	1. Medical-anatomical conceptual apparatus; 2. Anatomical knowledge for understanding pathology, diagnosis and treatment 3. The simplest medical instruments - a scalpel and tweezers. 4. Technique of preparation of lumbar, sacral, sexual and coccygeal plexus plexus and their branches (under the supervision of the teacher).

II. Required level of knowledge:

а) from related disciplines:

1. Phylogeny of the nervous system
2. Phylogeny of the lower extremities
3. Histological structure of the nervous tissue.
4. Development and histological structure of nerve fibers.
5. Links of the reflex arc, their functional significance.

б) from previous topics:

1. Bones and joints of the pelvis and lower limb.
2. Muscles of the belt of the lower limb and free lower limb.
3. Topography of the vessels in the areas of the lower extremity belt and the free lower limb.
4. The structure of the spinal cord.
5. Formation of spinal nerves and plexuses.

в) from the current lesson:

1. The principle of formation of the intercostal nerve.
2. Topography of the intercostal nerve and the region of innervation.
3. Formation of lumbar plexus.
4. Topography and branches of the lumbar plexus.
5. Topography of the course and area of innervation of the ilio-hypogastric nerve.
6. Topography of the course and area of innervation of the ilio-inguinal nerve.
7. Topography of the stroke and the innervation area of the femoral-genital nerve.
8. Topography of the course and area of innervation of the lateral cutaneous nerve of the thigh.

9. Topography of the course and area of innervation of the occlusal nerve.
10. Topography of the course and area of innervation of the femoral nerve.
11. Formation of the sacral plexus.
12. Topography and branches of the sacral plexus.
13. Topography of the course and area of innervation of short branches of the sacral plexus
14. Topography of the course and area of innervation of the posterior cutaneous nerve of the thigh.
15. Topography of the course and area of innervation of the sciatic nerve.
16. Topography of the passage, branches and area of innervation of the tibial nerve.
17. Formation, topography, branches of the genital and coccygeal plexus.
18. Innervation of the gluteal region.
19. Innervation of the pelvic organs.
20. Innervation of the thigh.
21. Innervation of lower leg and foot.

III. Object of study:

Intercostal nerves. lumbar plexus (ilio-hypogastric nerve, ilio-inguinal nerve, femoral-genital nerve, lateral cutaneous nerve of thigh, occlusive nerve, femoral nerve), sacral plexus (short and long branches), genital and coccygeal plexus.

IV. Informational part:

Front branches, rr. ventrales (anteriores), of thoracic spinal nerves (ThI - ThXI) retain the metameric (segmental) structure and in the amount of 12 pairs go laterally and forward in intercostal spaces. Eleven upper pairs of anterior branches are called intercostal nerves, as they are in the intercostal spaces, and the right and left under the XII rib is called the subcostal nerve. The anterior branches of the lumbar and sacral spinal nerves, connecting with each other, form the lumbar and sacral plexus. The connecting link between these plexuses is the lumbosacral trunk, as a result, these two plexuses are united under the name of the lumbosacral plexus lumbosacralis.

Intercostal nerves, nn. intercostales, pass in intercostal spaces between the external and internal intercostal muscles. They go in the furrow at the lower edge of the rib along with the artery and the vein. Upper 6 intercostal nerves reach the sternum and under the name of anterior cutaneous branches, rr. cutanei anteriores, terminate in the skin of the anterior thoracic wall between the inner oblique and transverse abdominal muscles and, perforating the vaginal wall of the rectus abdominis, innervate them.

Each intercostal nerve gives:

a) lateral cutaneous branch, r. cutaneus lateralis (pectoralis et abdominalis)

b) anterior cutaneous branch, r. cutaneus anterior (pectoralis et abdominalis), innervating the skin of the breast and abdomen.

In women, lateral branches IV, IV, VI, as well as anterior branches of II, III and IV intercostal nerves innervate the mammary gland: lateral and medial branches of the mammary gland, r. mammarii laterals et mediales.

Поясничное сплетение: plexus lumbalis, is formed by the branches of the three upper lumbar (LI-LIII), part of the anterior branch of the XII thoracic (ThXII), as well as the anterior branch of the IV lumbar spinal nerves (LIV). The other part of the anterior branch IV of the lumbar spinal nerve descends into the pelvic cavity, forming, together with the anterior branch V of the lumbar nerve (LV), the lumbosacral trunk.

Branches of lumbar plexus:

a) Muscular branches, rr. The musculares, short, start from all the front branches and innervate the square muscle of the waist, the large and small lumbar muscles and the interdigitous lateral muscles of the lower back

b) ilio-hypogastric nerve, n. iliohypogastricus (ThXII-LI), innervates the rectus and transverse muscles of the abdomen, as well as the skin in the upper-lateral part of the buttock region, the upper-lateral region of the thigh, where its lateral cutaneous branch is directed, r. cutaneus lateralis. Anterior cutaneous branch, r. cutaneus anterior, perforates the anterior wall of the vagina of the rectus abdominis in its lower part and innervates the skin of the anterior abdominal wall above the pubic region.

c) ilio-inguinal nerve, n. ilioinguinalis, (ThXII - LIV), goes almost parallel to the ilio-hypogastric nerve, lying downward from the latter. It is located between the transverse and internal oblique muscles of the abdomen, then enters the inguinal canal, which lies anterior to the spermatic cord or round ligament of the uterus (in women). Going out through the external opening of the inguinal canal, the nerve ends in the pubic cord, the scrotum is the front scrotal nerves, nn. scrotales anteriores, or large lips - front labial branches, nn. labials anteriores (in women). The nerve innervates the skin of the root of the penis and anterior parts of the scrotum (the skin of the large labia).

d) femoral-genital nerve, n. geniofemoralis (LI-LII), perforates the large lumbar muscle and appears on the anterior surface of the lumbar vertebra. In the thickness it is divided into 2 branches:

a) the sexual branch, which is located in front of the external iliac artery, then enters the inguinal canal, where it passes behind the spermatic cord or round ligament of the uterus. In men, this branch innervates the muscle that lifts the testicle, the skin of the scrotum and the fleshy membrane, the skin of the upper median surface of the thigh. In women, the branch is located in the round ligament of the uterus, the skin of the large labia and the area of the subcutaneous fissure (outer ring) of the femoral canal.

b) the femoral branch passes to the thigh through the vascular lacuna, located on the anterolateral surface of the femoral artery, and innervates the skin of the upper part of the femoral triangle.

e) lateral cutaneous nerve of the thigh, n. cutaneus femoris lateralis (LI-LII), emerges from under the lateral edge of the lumbar muscle, perforating it lies on its front wall, follows, located under the fascia iliaca, along the front surface of the m. iliacus to spina iliaca anterior superior and passes medial to the latter under the inguinal ligament on the thigh, then extends under the skin and divides into terminal branches. One branch of the lateral subcutaneous nerve of the thigh innervates the skin of the posterior surface of the gluteal region, the other skin of the lateral surface of the thigh to the level of the knee joint.

6. Obstruction nerve

It is the second largest branch of the lumbar plexus. The nerve descends down along the medial edge of the large lumbar muscle, crosses the anterior surface of the sacroiliac joint, goes forward and outward into the cavity of the small pelvis, joins the occlusion artery, above it. Together with the same artery and vein passes through the occlusion channel to the thigh, lies between the adductor muscles, giving to them the muscle branches, rami musculares, and is divided into the terminal branches:

a) anterior branch, r. anterior, innervating the short and long adductor muscles, as well as the comb and fine muscles, and gives the skin branch to the skin of the medial thigh, r. cutaneus.

b) Rear branch, r. posterior, goes behind the short adductor muscle of the thigh and innervates the outer blocking, large muscle-driving and capsule of the hip joint.

7. Femoral nerve, n. femoralis

The largest branch of the lumbar plexus. It usually begins with three roots, which in the beginning go in the thickness of the large lumbar muscle. At level V of the lumbar vertebra, these roots merge and form the trunk of the femoral nerve. Further down the femoral nerve is located under the ileal fascia in the furrow between the large lumbar and iliac muscles. On the thigh, the nerve leaves through the muscle gaps, then in the femoral triangle is lateral to the femoral joints, being covered with a deep leaf by the wide fascia of the thigh. Somewhat below the level of the inguinal ligament the nerve is divided into terminal branches:

a) Muscular, rr. musculares, innervate m. sartorius, m. quadriceps femoris, m. pectineus.

b) Anterior cutaneous, rr. cutanei anteriores, in an amount of 3 to 5 perforate the wide fascia of the thigh and innervate the skin of the anterior medial surface of the thigh.

c) Subcutaneous nerve, n. saphenus, is the longest branch of the femoral nerve. In the femoral triangle, the nerve is located laterally from the femoral artery, and then passes to its anterior surface and, together with the artery, enters the leading channel. On his way n. saphenus gives the following branches:

• Connective branches in the area of the medial surface of the knee with cutaneous nerve branches

• The podnakolennikovaya branch, r. infrapatellaris, departs from the nerve trunk at the level of the medial epicondyle of the thigh, penetrates the fascia under the skin and branches into the patellar region, the medial surface of the knee and the upper parts of the shin.

• Medial cutaneous branches of the lower leg, rr. cutanei cruris mediales, a series of thin branches that extend throughout n. saphenus to the medial surface of the lower leg; part of them passes into the skin of the anterior and posterior region of the tibia. On the foot, the nerve passes along its medial margin.

Sacral plexus:

The sacral plexus, plexus sacralis, is formed by the anterior branches of the lumbar, upper 4 sacralis and part of the anterior branch of the IV lumbar spinal nerves. The anterior branches 4 and 5 of the lumbar spinal nerves form the lumbosacral trunk, truncus lumbosacralis, the sacral plexus is located between the 2 connective tissue plates. Behind the plexus lies the fascia of the pear-shaped muscle, and in front - the upper pelvic fascia. Branches of plexus sacralis are divided into short and long.

Short branches:

a) Internal blocking nerve, n. obturatorius internus

b) Pear-shaped nerve, n. piriformis

c) Nerve of the square thigh muscle, n. musculi quadrati femoris, is directed to the muscles of the same name through a podrushevidnoe aperture.

d) Upper gluteal nerve, n. gluteus superior, exits from the pelvic cavity through the periembeloid aperture, together with the upper gluteal artery and next to the same vein in the buttock region, where it passes between the small and middle gluteus muscles. It innervates the middle and small gluteus muscles, as well as the muscle, which strains the wide fascia of the thigh.

e) Inferior gluteal nerve, n. gluteus inferior (LV, SI-SII), is the longest nerve among the short branches of the sacral plexus. From the pelvic cavity, this nerve leaves through the podrugushevdnoe hole, along with the same-named artery and next to the vein, sciatic nerve, posterior cutaneous nerve of the thigh, and the genital nerve of the thigh.

e) Genital nerve, n. pudendus, leaves the pelvic cavity through a podrushevidnoe aperture and through a small sciatic hole enters the sciatic-rectum fossa, where it gives the following branches:

• Lower rectal nerves, nn. rectales inferiors, going to the external sphincter of the anus and to the skin in the anus

• The perineal nerves, nn. perinealis, innervate mm. ischiocavernosus, bulbospongiosus, transversi perinei, perineal skin, as well as the skin of the posterior surface of the scrotum in men - posterior scrotal branches, nn. scrotales posteriores, or large labia, posterior labial nerves, nn. labiales posteriores in women. The final branch of the genital nerve is the dorsal nerve of the penis (clitoris), n. dorsalis penis (clitoridis), along with the dorsal artery of the penis (clitoris) passes through the urogenital diaphragm and follows the penis (clitoris).

Long brances:

a) Hind femoral cutaneous nerve, n. cutanei femoris posterior, is a sensitive branch of the sacral plexus. Leaving the cavity of the pelvis through the podrushevidnoe opening, the nerve is sent down and comes out from under the lower edge of the gluteus maximus, where it gives the following branches:

• The lower nerves of the buttocks, nn. clinium iferiores, innervate the skin of the gluteal region

• Crotch branches, rr. perineales, are directed to the skin of the perineum

b) sciatic nerve, n. ishiadicus, is the largest nerve of the human body, is formed from the anterior sacral branches and the two lower lumbar nerves.

In the gluteal region from the pelvic cavity, the nerve enters through the sub-necklet, then is directed downward at the beginning under the large gluteus muscle, then between the large adductor muscle and the long head of the biceps femoris. In the lower part of the thigh the nerve is divided into 2 branches:

• Lying medially larger branch - tibial nerve, n. tibialis, in the popliteal fovea the tibial nerve is located in the middle, behind the popliteal vein, directly under the fascia. At the lower corner of the popliteal fossa, it goes between the medial and lateral heads of the gastrocnemius muscle, together with the posterior tibial artery and the vein passes under the tendon arch of the soleus muscle and is directed to the knee-popliteal channel, going down behind the medial malleolus and dividing into its terminal branches:

The medial plantar nerve, n. plantaris medialis, more than lateral, passing in the medial plantar furrow together with the same artery. At the base of the metatarsal bones gives:

A) The first intrinsic plantar solitary nerve, n. digitalis plantaris proprius

B) Three common digital nerves, n. digitalis plantaris communis.

Lateral plantar nerve, n. lateralis plantaris, passes in the lateral plantar sulcus, together with the same artery. At the proximal end of the fourth intercellular gap, this nerve is divided into superficial and deep branches.

Medial cutaneous nerve of the calf, n. cutaneus surae medialis, departs from the tibial nerve in the popliteal fossa, innervates the skin of the lateral region of the heel area, the lateral margin of the rear of the foot and the skin of the lateral side of the little finger.

Common peroneal nerve, n. peroneus communis, separating from the sciatic nerve in the lower part of the thigh descends, and in the popliteal fossa gives the lateral cutaneous nerve of the calf, n. cutaneus surae lateralis, innervating the skin of the lateral side of the shin. Gives the following branches:

• Superficial peroneal nerve, n. peroneus superficialis.

• Deep peroneal nerve, n. peroneus profundus, innervates only the skin of the facing sides of the first and second toes of the foot

sexual plexus (plexus pudendus) is a separate part of the sacral plexus lying in a small basin on the anterior surface of the sacrum at the lower edge of the pear-shaped muscle. It is formed mainly from the anterior branches of S2-4 spinal (sacral) nerves, connects with the sacral and coccygeal plexuses, as well as with the sympathetic trunk.

Its branches are: 1. Muscular branches innervate muscles that raise the rectum and coccygeal muscle.

2. The internal branches (rr. Splanchnici) are sensitive, start from the receptors of the pelvic organs (uterus, vagina, bladder, rectum, prostate gland and seminal vesicles).

3. The sexual nerve (n. Pudendus) - the longest and branched branch of the sexual plexus, is located in the cell of the ischial-rectum fossa. It enters the pelvis through the foramen infrapiriformis. Branches of the sexual nerve:

a) the perineal nerve (n. perinealis) mixed, in addition to the motor fibers, contains fibers that contact the receptors of the back surface of the skin of the scrotum or skin of the large labia, an anus. The motor nerves innervate the superficial transverse muscle of the perineum, the sciatic-cavernous and sciatic-onion muscles;

b) the back nerve of the penis (n. dorsalis penis), the back nerve of the clitoris in women (n. dorsalis clitoridis) together with a. and v. dorsalis penis (clitoridis) after leaving the perineum give branches for innervation of the deep transverse muscle of the perineum, the external sphincter of the urethra. A large number of receptors of the back nerve is present in the head, the body of the penis and the urethra or in the clitoris (in women). Fibers of the sensory nerve gather on the back of the body of the penis or clitoris, accompanying a. and v. dorsales penis, then penetrate into the root of the penis and the perineum, where they combine with the motor branches of the back nerve. In women, the back nerve is somewhat thinner. Motor fibers innervate the same muscles as in men. Sensory nerve receptors are located in the head of the clitoris, the mucous membrane of the labia minora, the entrance to the vagina and the cavernous tissue that surrounds the initial section of the vagina, urethra and clitoris. Nerve fibers in the clitoris are located on its rear, then through its root penetrate into the perineum, where it connects with motor and sensitive fibers of the vagina, small labia and cavernous tissue in the back nerve. With compression of the nerve, persistent aching pains occur in the anogenital zone and light sphincter disorders.

Coccygeal plexus:

The coccygeal plexus, plexus coccygeus, is formed by the anterior branches of the sacral and coccygeal nerves. The plexus is located in the cavity of the small pelvis on the coccygeal muscle and the sacro-osteous ligament. The anal-coccygeal nerve, n. anococcygei, innervates the skin in the region of the coccyx and anus.

V. Practical work:

Task № 1. Find the intercostal nerves, which are located in the intercostal spaces below the intercostal veins and arteries (seen from the back). Note that the intercostal nerves are the anterior (ventral) branches of the thoracic spinal nerves.

Task № 2. Beginning to study the lumbar plexus, find the location of its location in the thickness of the large lumbar muscle, orientate, with the branches of the lumbar plexus, on the subcostal nerve and the lateral edge of the large lumbar muscle. Parallel to the subcostal nerve (feel the last rib), find the ilio-hypogastric nerve, and below and parallel to it is the ilio-inguinal nerve. A little lower iliac muscle is crossed by the lateral cutaneous nerve of the thigh. On the large lumbar muscle passes the femoral-genital nerve, consisting of two branches: the medial (sexual) and lateral (femoral).

Task № 3 In the small pelvis, locate the obturator nerve, which is accompanied by the same artery and vein. Lateral to and from the large lumbar muscle is a femoral nerve. Pay attention to the fact that the vessels of the retroperitoneal space are braided with a network of nerve fibers - vegetative plexuses.

Task № 4 Find the nerves of the gluteal region. These are short branches of the sacral plexus. The largest of these are the upper and lower gluteal nerves. The first goes into the gluteal region through the nadgus-shaped aperture, and the lower gluteal nerve - through the subgranular aperture. The sexual nerve emerges through the same opening, and then through the small sciatic enters the rectum-sciatic fossa. Hip nerves are derived from two plexus - lumbar and sacral. Nerves of the lumbar plexus: femoral nerve (exits to the thigh through the muscle lacuna along with the ilio-lumbar muscle) dates the muscle branches and the front dermal nerves of the thigh from the bottom as you enter the thigh. Its longest branch, the subcutaneous nerve, follows along the femoral artery, then penetrates into the leading channel and leaves it through the anterior opening together with the descending knee artery. The occlusion nerve enters the thigh through the occlusion channel. Detect the nerve can be between the adductor muscles of the thigh. The lateral cutaneous nerve of the thigh perforates the fascia of the superior anterior iliac spine and branches in the anterolateral area of the femur. The nerve of the sacral plexus: the posterior cutaneous nerve of the femur appears on the thigh from under the middle of the lower edge of the gluteus maximus (exits through the sub-necklet) and the sciatic nerve is the largest nerve in the person (exits through the sub-neckful orifice) that passes between the muscles of the posterior femoral group, gives numerous muscular branches along the way and divides into the tibial and common peroneal nerves at the level of the popliteal fossa.

Task № 5 Find the subcutaneous nerve (branch of the femoral nerve), which follows the large saphenous vein of the leg along the medial surface of the shin. The nerves of the lower leg and the feet are the terminal branches of the sciatic nerve. The tibial nerve is located in the shin-popliteal canal with the posterior tibial artery and veins, then passes behind the medial malleolus and divides into two nerves on the sole: the lateral and medial plantar nerves. They pass along with the same arteries and veins in the lateral and medial plantar furrows. In the proximal part from the tibial nerve, the medial cutaneous nerve of the calf, located on the posterior surface of the calf, departs. The common peroneal nerve lies laterally. Here, the lateral cutaneous nerve of the calf, lying on the posterior surface of the calf, departs from it. On the border between the middle and lower throat third they are connected to the medial cutaneous nerve of the calf. In this case, the calf nerve is formed. Further, the common peroneal nerve enters the upper muscular-peroneal canal and is divided into two nerves: the superficial peroneal and deep peroneal nerves. The superficial peroneal nerve emerges from the canal and perforates the fascia over the lateral muscles of the tibia at about mid-calf level and descends to the rear of the foot with two branches. The deep peroneal nerve passes next to the anterior tibial artery between the muscles of the anterior group. On the foot, he accompanies the back artery of the foot and ends in the first interdigital space. Correctness of finding the listed nerves is monitored by consulting with the teacher, and also referring to the textbook and the atlas.

Task № 6. The skin of the thigh receives innervation from the obturator nerve - the medial cutaneous branches of the thigh (medial surface), the femoral nerve - the front (front surface), the lateral cutaneous nerve of the thigh (antero-lateral surface), the posterior cutaneous nerve of the hip (posterior surface). The anterior group of muscles of the thigh is innervated by the femoral nerve, the medial group by the obturator, and the posterior group by the sciatic nerves. The shin is innervated by the following nerves: the subcutaneous nerve (medial and anterior surface), the lateral and medial cutaneous nerves of the calf (posterior and lateral surface, the gastrocnemius nerve (from below the posterior surface), the superficial peroneal nerve (anterolateral surface) .The anterior muscle group the lower leg is innervated by the deep peroneal nerve, the posterior shank muscle group is innervated by the tibial nerve, and the lateral group of the leg muscles is innervated by the superficial peroneal nerve. (the middle part) except for the first interdigital space and the contiguous sides of the first and second fingers, which innervate the deep peroneal nerve and the gastrocnemius nerve (lateral margin) .The skin of the plantar surface of the foot is innervated by the lateral and medial plantar nerves. The muscles of the foot innervate the following nerves: a short extensor of the fingers - a

deep peroneal nerve.Muscles of the elevation of the small finger, all the interosseous muscles, the square plantar muscle, III and IV h The anterior muscles, the muscle that leads the thumb and the lateral head of the short flexor of the thumb are the lateral plantar nerve. The muscle that withdraws the thumb, the medial head of the short flexor of the thumb, the short flexor of the fingers, and also the I and II vermicular muscles innervate the medial plantar nerve. Draw a diagram of the listed nerves and designate their Russian and Latin names. Correctness of finding, studied nerves, monitor, consulting with the teacher.

VI. Control questions:

1. How are the intercostal nerves in relation to the ribs? List the branches of these nerves and name their distribution zones.
2. Tell us how the lumbar plexus is formed. What nerves are the branches of this plexus?
3. In what places and through what holes are the locking and hip nerves coming out from the pelvis cavity to the thigh?
4. Name the branches of the femoral nerve and the area of their distribution.
5. Name the nerves involved in the formation of the sacral spleen. Where is this plexus located?
6. Name the short branches of the sacral plexus. Where does each of these nerves branch?
7. List the branches that move away from the sciatic nerve in the hip area. Which organs are these branches directed to?
8. Name the nerves, branched in the skin of the thigh and lower leg. What nerves are involved in the innervation of the skin of the rear and the sole of the foot?
9. What branches give on the lower leg and on the foot of the tibial and deep peroneal nerves?

VII. Academic pursuits:

Task №1.

As a result of the transferred poliomyelitis, the motoneurons of the upper lumbar segments of the spinal cord involved in the formation of the femoral nerve were affected in the patient. How will this be manifested clinically? Give anatomical justification.

Answer:

The femoral nerve provides the motor innervation of the anterior group of hip muscles. With the defeat of these motoneurons, it will be impossible first of all to unbend the lower limb in the knee joint, the main action of this muscle group.

Task №2.

When examining the patient, there was a lack of sensitivity on the plantar surface of the foot. What kind of nerve should a doctor think? How can you confirm the assumption? Give anatomical justification.

Answer *The skin of this area is innervated by the branches of the tibial nerve - the medial and lateral plantar nerves originating from the main trunk behind the medial malleolus. Since no symptom is indicated on the part of the tibia, it is just the damage to the end of the tibial nerve or its listed terminal branches at the site of their origin, since not both.*

VIII. Control Tests:

1. Indicate what anatomical formations innervate the upper gluteal nerve:
    1. the gluteus maximus (m. Gluteus maximus)
    2. hip joint (art. Coxae)
    3. Middle gluteus muscle (m. Gluteus medius)
    4. The muscle that strains the wide fascia of the thigh (M. tensor fasciae latae)

    Keys: 3,4
2. Specify the calf muscles that innervate the nerve:
    1. anterior tibialis muscle (m. Tibialis anterior)
    2. posterior tibial muscle (posterior tibialis m.)
    3. The long flexor of the toes (m. Flexor digitorum longus)
    4. The long flexor of the big toe (m. Flexor hallucis longus)

    Keys: 2,3,4
3. Name the branches of the sciatic nerve:
    1. to the hamstrings of the hip
    2. to the medial muscles of the thigh
    3. to the long head of the biceps femoris
    4. to the short head of the biceps femoris

    Keys: 1,3
4. The lumbar plexus is formed by:
    1. the anterior branches of the 3 upper lumbar nerves and the upper part of the 4th same nerve
    2. anterior branches of all lumbar nerves
    3. anterior branches of the 3 upper and posterior 2 lower lumbar nerves
    4. anterior branches of the 3 lower lumbar and 2 upper sacral nerves

    Keys: 1,2,3,4
5. The sacral plexus is formed:
    1. anterior branches of all sacral nerves
    2. posterior branches of all sacral nerves
    3. anterior branches of the 2 lower lumbar and 2 upper sacral nerves
    4. anterior branch of the 4th lumbar (lower part) and 5th lumbar nerve and anterior branches of the 4 upper sacral nerves

    Keys:4
6. Indicate which nerves pass through the foramen suprapiriforme:
    1. femoral nerve
    2. the sexual nerve (n.pudendus)
    3. Upper gluteus nerve (n. Gluteus superior)
    4. sciatic nerve (n. Isehiadicus)

    Keys:3
7. After a thigh injury, the patient is noted to have a dyskinesia disorder on the front surface of the thigh and the medial surface of the shin, it is impossible to unbend the leg in the knee joint, the patellar looseness. Damage to which nerve can be assumed?

    A. Femoral.

B. The prohibitory.
C. The ischium.
D. Upper gluteal.
E. The lower gluteal.

8. With a pelvic injury (a fracture of the pelvic bones on the right after autotransmission), there is no skin sensitivity of the lower part of the medial side of the thigh, the inability to bring the right lower limb to the midline. Which nerve is injured?

A. N. ischiadicus.
B. N. emoralis.
C. N. obturatorius.
D. N. genitofemoralis.
E. N. ilioinguinalis.

Keys: C

9. The patient of 30 years has addressed to the doctor - to the neuropathologist with the complaint to loss on the right of sensitivity of a skin of a back site of an anticnemion of an average and its bottom third. The defeat of a nerve was diagnosed by a doctor?

A. The posterior cutaneous branch of the sacral plexus.
B. The latent nerve.
C. The branches of the nerve.
D. Scalpper nerve.
E. The gastrocnemius.

Keys: E

10. In the patient with a cut wound of the tibia, there is no skin sensitivity in the posterior-lateral and posterior medial regions of the tibia, the posterior and plantar surface of the foot. Indicate the alleged site of nerve trunk damage.

A. Popliteal fossa.
B. Under the patella.
C. Above the ankle.
D. Middle third of tibia in front
E. Lower third of tibia posterior.

Keys:A

IX. Anatomical terminology :

English Name	Latin Name
Intercostal nerves	nn. Intercostales
anterior cutaneous branches	rr. cutanei anteriores
lateral cutaneous branch	r. cutaneus lateralis
lateral and medial branches of the breast	rr. mammarii laterales et mediales
adipose nerve	n. subcostalis
muscle branches	rr. musculares
lumbosacral plexus	plexus lumbosacralis
lumbar plexus	plexus lumbalis
ilio-hypogastric nerve	n. iliohypogastricus
ilio-inguinal nerve	n. ilioinguinalis
anterior scrotal nerves	nn. scrotales anteriores
anterior labial nerves	nn. labiales anteriores
femoral-genital nerve	n. genifofemoralis
sexual branch	r. genitalis
femoral branch	r. Femoralis
lateral cutaneous nerve of hip	n. cutaneus femoris lateralis
occlusal nerve	n. obturatorius
anterior branch	r. anterior
posterior branch	r. posterior
cutaneous branch	r. cutaneus
femoral nerve	n. femoralis
anterior cutaneous branches	rr. cutaneus anteriores
subcutaneous nerve	n. saphenus
podadnikolnikovaya branch	r. infrapatellaris
medial cutaneous branches of lower leg	rr. cutanei cruris mediales

Literature

1. Sapin M.R., Bilich G.L. Human anatomy. Textbook in 3 volumes. T.3 Moscow, "GEOTAR-Media", 2009
2. Pryves MG, Lysenkov NK, Bushkovich VI Human anatomy. SPb, 2010.
3. Sinelnikov RD, Sinelnikov Ya.R., Sinelnikov A.Ya. Atlas of human anatomy. T.3 - 344 s. M.: The New Wave: Publisher of Umerenkov, 2010
4. Sapin MR, Nikityuk DB, Shvetsov EV .. Atlas of normal human anatomy, 4th edition. Moscow. MEDPress-Inform, 2009
5. Electronic library of medical high school www.Studmedlib.ru
6. Material of lectures on anatomy.

X. Preparations and manuals:

Prepared corpse. Sagittal incision of the pelvis. Skeleton. Tables showing the nerves of the thoracic wall and mediastinum. Tables showing the nerves of the anterior abdominal wall, the upper floor of the abdominal cavity, lymph nodes of the middle and lower divisions of the abdominal cavity. Textbook of anatomy. Atlas. Counts. Tests of Level 2 and standards of answers to them.

INDEPENDENT WORK

NERVES OF THE WALLS OF THE THORASIC CAVITY. ANATOMY AND TOPOGRAPHY OF THE LUMBAR PLEXUS.

I. Questions for checking the initial level:

1. Muscles and fascia of the back and walls of the thoracic, abdominal cavities: their structure, classification and topography.
2. Muscles of the lower limb.
3. The structure of the spinal segments and the formation of spinal nerves and their plexuses.
4. Intercostal muscles.

II. Targets:

Student should know:	***Literature***:
1. Muscles of the chest, abdomen and back. 2. Channels, pits, lacunae of the abdominal wall, their connections. Triangles of the thigh. 3. Intercostal nerves are their topography, the zone of innervation and branches are cutaneous, anterior, posterior and branches of the mammary gland. 4. Sources of formation of the lumbar plexus and the course of its branches. 5. Nerves of the lumbar plexus, their topography and area of innervation (ilio-hypogastric, ilio-inguinal, lateral, femoral-genital, blocking, femoral nerves). 6. Innervation of functional muscle groups and individual muscles. 7. Know all the nerves in the Latin transcription. 8. The course of the lateral cutaneous nerve of the thigh. 9. Muscular branches to the square muscle of the waist, large and small lumbar muscles, interdigitic muscles.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.
Student must be able to:	***Literature***:
1. Name and show on the posterior thoracic wall intercostal nerves in the structure of the neurovascular bundle in the groove of the ribs, explain their course. 2. Name and show in the abdominal cavity in the course of the large lumbar muscle port of the lumbar plexus (explain the zone of their innervation). 3. Name and show on the side wall of the small pelvis the occlusive nerve, its exit through the eponymous channel to the thigh area to the muscles of the medial group. 4. Name and show cavities of the pelvis, femoral nerve, its exit through the muscular lacuna in the region of the thigh, the region of the femoral (Scarpian) triangle. 5. Name and show the motor branches and 6. Name and show a large branch of the femoral nerve-the subcutaneous nerve-in the femoral triangle, in the femoral-popliteal canal, in its anterior opening and on the antero-medial surfaces of the tibia and foot. 7. Determine the zones of innervation by the branches of the lumbar plexus and show each of its nerve. 8. Name and show the course of the lateral nerve on the anterior surface of the ilio-lumbar muscle of the lateral part of the inguinal ligament of the thigh, the exit of the nerve and its branches through the wide fascia under the skin of the thigh and its terminal branches.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.

III. Tasks for self-dependent work:

1. Make a scheme of the structure of the lumbar plexus.

Complete phrases:

2. In the inguinal canal passes _____ nerve of lumbar plexus.

3. The skin of the anterior abdominal wall is innervated _____ nerves.

4. The rectus abdominis muscle and its vagina are innervated _____ nerves.

5. In the muscular lacuna passes _____ nerve.

6. Name what nerves of the lumbar plexus lie in the region of the thigh?

_____

_____

_____

IV. Questions for self-control:

7. What innervates the femoral-genital nerve?

_____

_____

8. Than the lumbar plexus is formed?

_____

_____

9. Which nerve innervates the skin and muscle of the medial thigh group?

_____

_____

V. Make a situation on this topic:

Example:

10. TASK: *As a result of the transferred poliomyelitis, the motoneurons of the upper lumbar segments of the spinal cord involved in the formation of the femoral nerve were affected in the patient. How will this be manifested clinically? Give anatomical justification.*

. ANSWER: _____

_____

_____

TASK:
ANSWER:

VI. Make 1-2 tests according to the example:

11. Example: Specify the nerve that passes through the inguinal canal:

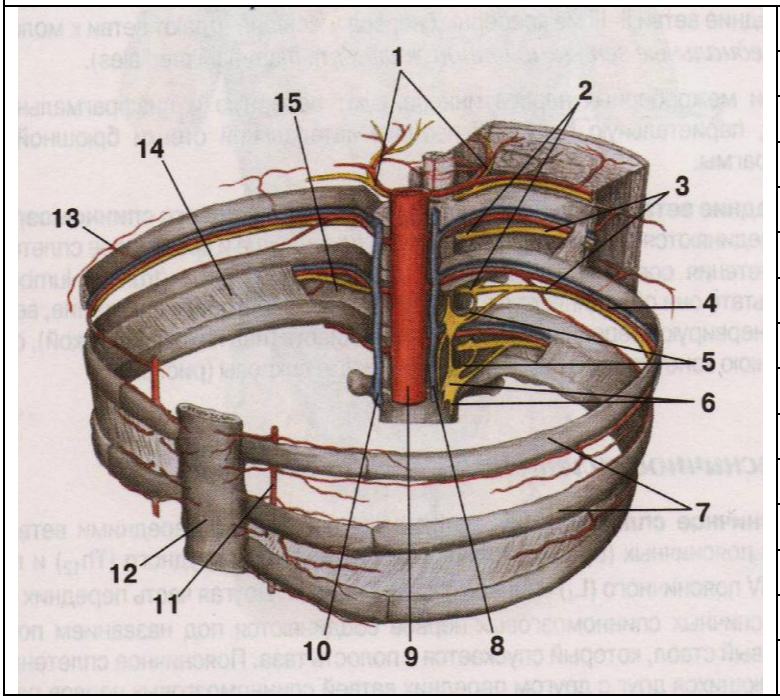
а) obturator nerve *б) lateral cutaneus nerve of thigh*

в) ilioinguinal nerve. *г) femoral nerve.*

Test№1 _____
а. _____
б. _____
в. _____
г. _____
Test№2 _____
а. _____
б. _____
в. _____
г. _____

VII. Make designations for pictures:

№12 INTERCOSTAL NERVES



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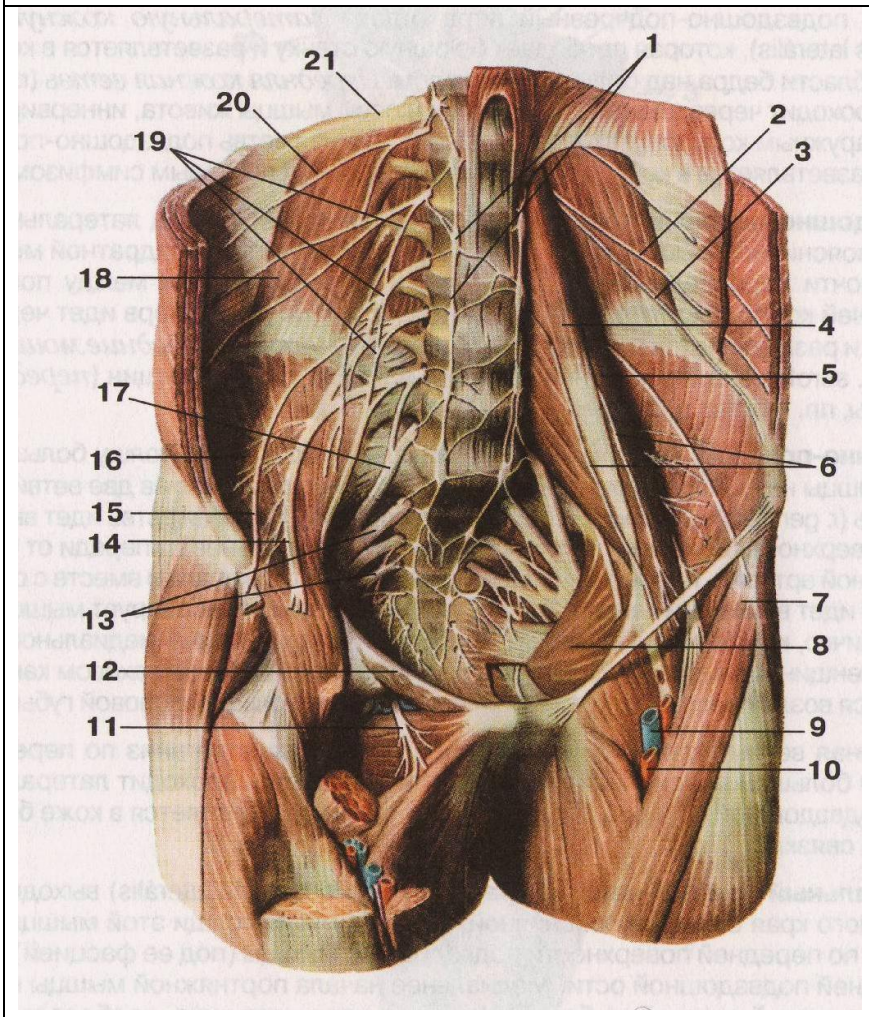
№13. LUMBAR AND SACRAL PLEXUSES



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ANATOMY AND TOPOGRAPHY OF THE SACRAL PLEXUS.

I. Questions for checking the initial level:

1. Formation of the sacral plexus.
2. Long and short branches of the sacral plexus.
3. Topographic formations of the pelvis.
4. Channels, fossas, fissures on the lower limb.

II. Targets:

Student should know:	***Literature***:
1. Topographic formation of the pelvis and free lower limb (canals, lacunae, grooves, fossae). 2. General characteristics and topography of the sacral plexus. 3. Short branches of the sacral plexus - upper and lower genital nerve and its branches. Gluteal nerves, sexual nerve, blocking, pear-shaped, nerve of a square muscle, their topography and areas of innervation. 4. Long branches of the sacral plexus - sciatic and posterior bone nerve of the thigh. 5. Stroke and branch of the sciatic nerve - peroneal, tibial nerves. 6. Direction, location of the pyloric nerve - the lower part of the thigh, popliteal fossa, golenopodkolenny channel (grubber) area of the medial malleolus (behind) the foot-and its branches: cutaneous nerve, lateral and medial plantar nerves. 7. Direction, location of the peroneal nerve - popliteal fossa, fibula head, long fibular muscle - and its branches dermal nerve superficial and deep peroneal nerves. 8. Mutual relations of the nerves of the sacral plexus to the blood vessels. The formation of the neurovascular bundles of the lower leg and the foot. 9.Knat complex innervation of the skin and pelvic muscle and free lower limb ..	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.
Student must be able to:	***Literature***:
1. Name and show on the muscle the muscles of the lower limb. 2. Name and show in the cavity of the small pelvis the main nerves of the trunk of the sacral plexus. 3. Name and show on the preparation short branches of the sacral plexus-the upper and lower gluteal nerves, respectively, in the super-tubular and subgranular apertures. 4. Name and show in the sub-neck aperture the sciatic, sexual, posterior bone nerve. 5. Show the sciatic nerve and its muscle branches on the back of the thigh. 6. Show the location of the sciatic nerve on the tibial and peroneal nerves. 7. Name and show the tibial nerve on the lower leg along the course of the bristled canal and its branches to the muscles of the posterior group, superficial and deep. 8. Show the terminal branches of the tibial nerve on the plantar surface of the foot-the lateral and medial plantar nerves. 9. Show the peroneal nerve on the tibia, and its branches - superficial and deep, respectively, to the muscles of the lateral and anterior groups, as well as the lateral cutaneous nerve of the shin. 10. Digest and present in oral forms an overview on the innervation of the skin of the lower limb.	1. Human anatomy. Textbook in 2 volumes. Volume 2. Edited by M.R. Sapin. M.Meditsina, 2001 2. Human anatomy. Textbook edited by M.G. Gain. M.Meditsina, 1985 3. Atlas of human anatomy. In 3 volumes. Volume 2.3. Edited by RD Sinelnikov. M.Meditsina, 1983 4. Educational and methodological development for students of the I-II year of lectures, ped., Med.-prof. and stomatitis. faculties.

III. Tasks for self-dependent work:

1. Make a scheme of the structure of the sacral plexus.

Complete phrases:

2. The tibial nerve passes to the tibia in _____ and near the medial malleolus is divided into terminal branches _____.

_____

3. The skin of the anterior and posterior surface of the lower leg bones is innervated _____

_____ nerves.

4. Short branches of the sacral plexus innervate the following muscles _____

_____

5. Through a hypopiriform aperture from a pelvic cavity leave _____ nerves.

IV. Questions for self-control:

6. Indicate which nerve lies behind the tibia.

_____

_____

7. How the sacral plexus is formed?

_____

_____

8. What muscles innervate the superficial peroneal nerve.

_____

9. What muscles innervate the lower gluteal nerve?

_____

V. Make a situation on this topic:

10. TASK: During examination of patient, was revealed paralysis of all muscles of the soles of the foot and inability to stand on the toes. What nerve's involvement can we make a guess? Give anatomical justification.

ANSWER: _____

_____

_____

TASK:
ANSWER:

VI. Make 1-2 tests according to the example:

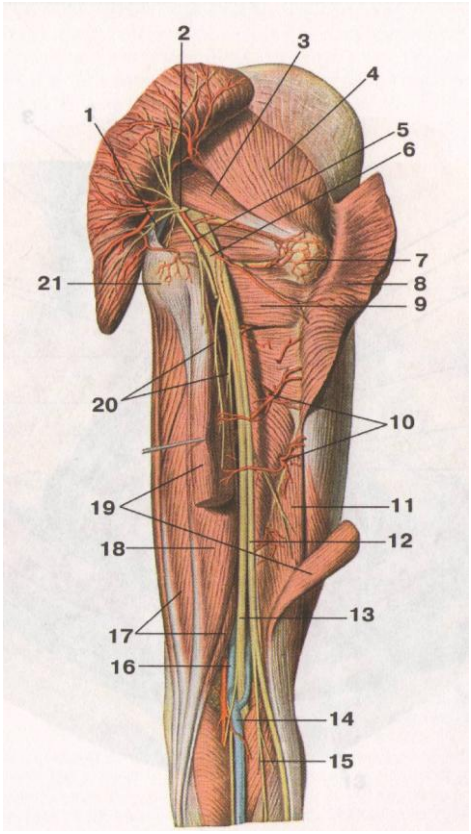
11. Example: Indicate which nerve innervates the muscles of the anterior group of the lower leg?

а) femoral nerve. б) lateral plantar.

в) tibial nerve. г) profound fibular nerve.

Test№1 _____ _____ _____ *а.* _____ *б.* _____ *в.* _____ *г.* _____
Test№2 _____ _____ _____ *а.* _____ *б.* _____ *в.* _____ *г.* _____

VII. Make designations for pictures:

№12	NERVES OF GLUTEAL REGION AN OF THIGH
	1.
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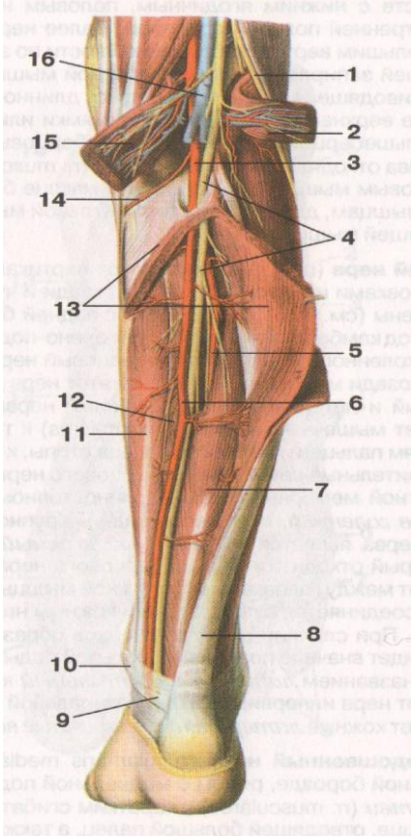
№13	NERVES OF SHIN
	1.
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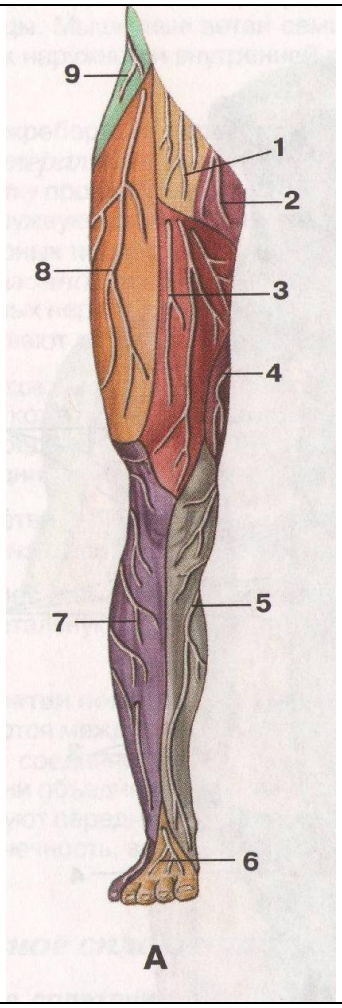
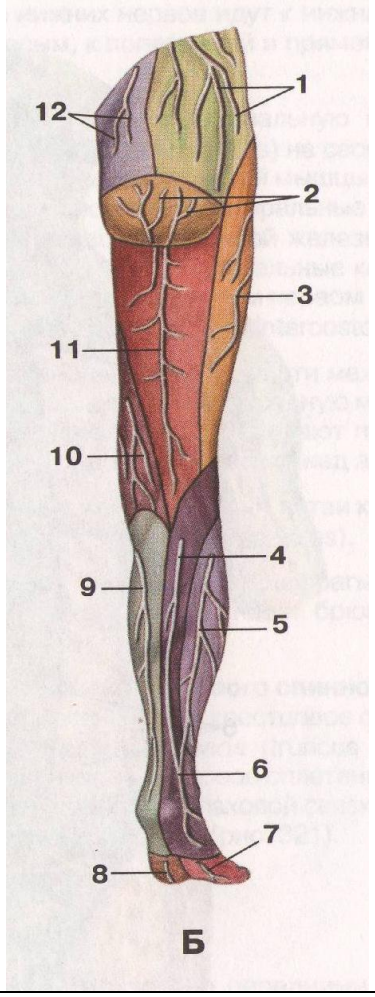
№14	INNERVATION OF LOWER LIMB'S SKIN
	
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CONTACT WORK

Theme: The autonomic nervous system. Vegetative innervation of organs. Age features.

Knowledge of the development and anatomical structure of the autonomic (autonomic) nervous system is a fundamental concept in the study of both functioning and studying the regulation of metabolic processes of the whole organism. The autonomic nervous system provides innervation of all internal organs and has in its composition a smooth muscle tissue. At the same time, it takes part in the innervation of the musculature, regulating the metabolism in the muscles.

I. Objecttives:

Student must know	1. General characteristics of the autonomic nervous system and its departments, its differences from the somatic 2. Anatomical structure of the autonomic nervous system. 3. The structure of the sympathetic department of the autonomic nervous system, the central and peripheral parts: the nucleus of the large horn, the sympathetic trunk, the ganglia of 1 and 2 pairs of plexuses. 4. Structure of the parasympathetic department of the autonomic nervous system, central and peripheral departments 5. Differences sympathetic from the parasympathetic department. 6. Vegetative innervation of the organs of the head, neck, thoracic and abdominal cavity, pelvis.
Student must be able to:	1. Explain the functions of the autonomic nervous system and its differences from the somatic. 2. Draw a reflex arc of the somatic and autonomic nervous system. 3. Show on the cadaveric material sympathetic trunk its departments, and call its branches. 4. To name and show on the native preparation the vagus nerve and its departments. 5. Show on the preparation a rhomboid fossa and a projection of parasympathetic nuclei, cranial nerves. 6. Show on the cadaveric material large and small celiac nerves. 7. Show the projection of the additional nucleus on the mid-brain section. 8. On the diagrams and tables show the departments of the autonomic nervous system and explain their functions, features of the structure and location.
Student must possess	1. Medical-anatomical conceptual apparatus; 2. Anatomical knowledge for understanding pathology, diagnosis and treatment. 3. The simplest medical instruments - a scalpel and tweezers.

II. Required level of knowledge:

а) from related disciplines:

1. Mielein and moth-free nerve fibers.
2. Cstruction of the cerebral cortex.
3. Topography and blood supply of internal organs.

б) from previous topics:

1. Difference of smooth muscle tissue from transversely striated.
2. Internal structure of the spinal cord. Gray matter.
3. Romboid fossa, topography of nuclei of cranial nerves, structure.
4. Classification of the nervous system.

в) from the current lesson:

1. Sections of the nervous system.
2. Strengthening of the autonomic nervous arc.
3. Gray and white connecting branches.
4. Parasympathetic nuclei of III, VII, IX, X craniocerebral nerves.

III. Object of study:

The autonomic nervous system, its structure and structure. Reflex arc. Effect on the function of various organs and systems.

IV. Informational part:

Sympathetic centers are laid compactly in the lateral horns of the spinal cord, forming an intermediate-lateral tract, which can be traced from the VIII cervical to the III lumbar segment. Parasympathetic centers are represented by separate nuclei, which lie in the brain stem and sacral segments of the spinal cord.

Sympathetic ganglia are located near the vertebral column (paravertebral and prevertebral ganglia). Parasympathetic ganglia are located next to the innervated organs or in the organs themselves (para-organ and intragroup ganglia).

In view of these differences in the localization of ganglia, preganglionic sympathetic fibers are relatively short, and postganglionic fibers are relatively long. For example, postganglionic fibers to vessels, muscles and the skin of the foot originate in the lumbar ganglia. Parasympathetic fibers have opposite relationships: preganglionic fibers are longer, and postganglionic fibers are shorter. For example, preganglionic parasympathetic fibers of the vagus nerve go from its nucleus in the medulla oblongata to the transverse colon, and postganglionic fibers are located within this part of the intestine.

It should be noted and such a feature that sympathetic postganglionic fibers, as a rule, form plexuses around the arteries and in the composition of these plexuses spread along the arteries to the innervated organs.

In functional terms, the sympathetic and parasympathetic parts of the nervous system are distinguished by an opposite effect on the innervated organs. We confine ourselves to two examples. Sympathetic nerves tend to contract the heart, and the parasympathetic slows down the heart contractions. Sympathetic fibers innervate the pupil dilator, their irritation leads to the dilatation of the pupil, and the parasympathetic fibers innervate the pupil sphincter, and with their irritation the pupil narrows. On this basis, Langley once spoke of the dual antagonistic innervation of organs, but it is more correct to regard the relationship of sympathetic and parasympathetic nerves not as antagonism, but as their joint participation in the regulation of functions.

Now let's move on to a more detailed examination of the sympathetic and parasympathetic parts of the nervous system.

Sympathetic part. As already mentioned, the sympathetic nuclei form an intermediate-lateral tract of the gray matter of the spinal cord. Many believe that the neurons embedded in these nuclei are analogous to intercalary neurons of somatic reflex arcs. Here the preganglionic sympathetic fibers originate; they emerge from the spinal cord as part of the anterior roots of the spinal nerves. Their upper border is the anterior roots of the VIII cervical nerve, and the lower border is the anterior roots of the third lumbar nerve. From the anterior roots, these fibers pass into the trunks of nerves, but soon leave them, forming white connecting branches, g. communicantes albi. The latter

approach the sympathetic trunk. Accordingly, the localization of sympathetic nuclei, white connective branches are present only in the thoracic and lumbar spinal nerves.

The sympathetic trunk, truneus sympathicus, consists of ganglia joined by longitudinal, and in some departments and transverse interstitial branches, rr. interganglio-nares. The sympathetic trunk includes 3 cervical ganglia, 10-12 thoracic, 2-4 lumbar and 3-4 sacral ganglia. Caudal the whole chain is closed by the unpaired (coccygeal) ganglion, gangl. impar. In the ganglia of the sympathetic trunk, most of the preganglionic sympathetic fibers end; to the cervical ganglia they go in the ascending direction, and to the sacral ganglia in the descending direction. A part of the preganglionic fibers passes through the sympathetic trunk in transit, without interruption in it; they go further, to the prevertebral ganglia. From the efferent neurons of the sympathetic trunk, postganglionic fibers originate. Part of these fibers from the sympathetic trunk returns to the spinal nerves along the gray connective branches, gg. communicantes grisei. The latter differ from the white connecting branches not only in the quality of the fibers, but also in that they go from all the ganglia of the sympathetic trunk to all spinal nerves, and not only to the thoracic and lumbar spines, like white branches.

Another part of postganglionic fibers enters the visceral branches of the sympathetic trunk, which form plexus and innervate the intestines.

There are different opinions on the origin of sympathetic ganglia. Most embryologists believe that the rudiments of sympathetic neurons are formed in the neural crest from which spinal ganglions develop. At the 5th week, a part of the cells of the neural crest migrates along the posterior root of the spinal nerves, leaves their trunks and forms clusters laterally and posteriorly from the aorta. These clusters are joined in longitudinal cords, in which there are segmental thickenings - primary autonomic ganglia. Neuroblasts of primary ganglia differentiate into neurons. At the 7th week a sympathetic trunk is formed, its upper ganglia move in the cranial direction, forming the neck part of the trunk. The formation of prevertebral ganglia occurs at the 8th week of the embryonic period. Some of the neuroblasts from the primary ganglia migrate further, forming terminal ganglia of the organs of the chest, abdomen and pelvis.

Now let's look at some sympathetic ganglia.

Upper cervical ganglion, gangl. cervicale sup., located at the level of the transverse processes of II-III cervical pozvonkov. A whole series of branches departs from it: 1) the jugular nerve, the jugularis; 2) internal carotid nerve, etc. caroticus int .; 3) external carotid nerves, paras. carotid ext .; 4) upper cervical cardiac nerve, etc. cardiacus cervicalis sup .; 5) throat-pharyngeal nerves, paras. laryngopharyngei; 6) connecting branches to I-IV cervical spinal nerves.

The jugular nerve approaches the ganglia of the pharyngeal and vagus nerves, its fibers spread along the branches of these nerves to the pharynx, larynx and other organs of the neck.

The internal carotid nerve goes to the eponymous artery, forming around it an internal sleep plexus, plexus caroticus int. This plexus continues into the cavity of the skull and diverges along the branches of the internal carotid artery, providing sympathetic innervation of cerebral vessels; separate twigs go from it to the trigeminal ganglion, pituitary gland, drum plexus, lacrimal gland. One of the branches of the inner carotid plexus joins the ciliary ganglion, forming its sympathetic root, radix sympathicus; it contains fibers that innervate the dilator pupil. Therefore, if the upper cervical ganglion is affected, the pupil is narrowed on the side of the lesion. From the inner carotid plexus originates also a deep stony nerve, P. petrosus profundus, which conducts sympathetic fibers to the wing-palatine ganglion; further they go to the vessels and glands of the mucous membranes of the nasal cavity and the sky. In the ciliary, wing-palatine and other ganglions of the head sympathetic fibers are not interrupted.

External carotid nerves give rise to a plexus around the outer carotid artery, plexus caroticus ext., Which extends to the common carotid artery in the form of plexus caroticus communis. From the outer carotid plexus innervation of the brain envelope, large salivary glands, thyroid gland.

The upper cervical cardiac nerve descends into the thoracic cavity, taking part in the formation of the cardiac plexus.

The throat and pharyngeal nerves supply sympathetic fibers to the larynx and pharynx.

Middle cervical ganglion, gangl. cervicale medius, lies at the level of the transverse process of the sixth cervical vertebra; it is small and may be missing. From it branches to the general sleep plexus and the middle cervical cardiac nerve, etc. cardiacus cervicalis medius. The latter, like the upper cervical cardiac nerve, is part of the heart plexus. The structure of this plexus was considered in a lecture on the heart.

The lower cervical ganglion in most cases (75-80%) merges with one or two upper thoracic. As a result, the cervicothoracic ganglion, gangl, is formed. cervicothoracicum; this ganglion is often called stellate, gangl. stellatum, since branches branch out from it in all directions. The cervical-thoracic node is located between the transverse process of the VII cervical vertebra and the neck of the first rib. It connects to the middle cervical ganglion with two interstitial branches that span the subclavian artery. This formation was called the subclavian loop, ansa subclavia.

Branches of the cervicothoracic ganglion are: 1) lower cervical cord nerve, etc. cardiacus cervicalis inf .; 2) vertebral nerve, vertebralis, which forms a vertebral plexus around the same artery, plexus vertebtalis; 3) branches to the subclavian artery forming the plexus subclavius; 4) gray connective branches to VII-VIII cervical and I-II thoracic spinal nerves. On the connecting branches of the cervicothoracic and two other cervical ganglia, small intermediate ganglia (ganglia intermedia) can be detected.

The subclavian plexus has a vast innervation area. It gives branches to the thyroid, parathyroid, thymus and mammary glands and extends to all arteries of the upper limb, giving sympathetic innervation to the vessels of the limb, skin and skeletal muscles. Sympathetic fibers are predominantly vasoconstrictive, i.e. vasoconstrictive. With regard to sweat glands, they act as secretory nerves. In addition, sympathetic innervation has muscles that lift hair; when they contract on the skin appear small elevations ("goosebumps»).

The thoracic part of the sympathetic trunk has in its structure 10 or 11, rarely 12 ganglia. From the upper thoracic ganglia, 2-3 thoracic cardiac nerve, nn. cardiaci thoracici, as well as the branches forming the thoracic aortic plexus, plexus aorticus thoracicus. From this plexus there is a secondary esophageal plexus, plexus oesophageus, and pulmonary branches originate, rr. puimonates involved in the formation of the pulmonary plexus, plexus pulmonalis. The latter is located on the anterior and posterior surface of the main bronchi and continues along their branches in the lung, as well as through the pulmonary vessels. Sympathetic nerves cause bronchial dilatation and narrow the pulmonary vessels. In the pulmonary plexus a lot of afferent fibers, the end of which is especially numerous in the visceral pleura; in the central direction, these fibers go through the cervico-thoracic nodes.

The lower thoracic ganglions give rise to a large and small internal nerves. Large thoracic internal nerve, n. splanchnicus thoracicus major, departs from V-IX, and minor thoracic internal nerve, n. splanchnicus thoracicus minor, from the X-XI ganglia. Both nerves pass through the gap dividing the legs of the diaphragm into the abdominal cavity, where they participate in the formation of the celiac plexus.

The renal branch, renalis, supplies the kidney from the last thoracic ganglion.

Finally, it must be remembered that all the thoracic ganglions are associated with the spinal nerves through the white and gray connective branches.

Lumbar sympathetic ganglia are variable in number. Each side can be from two to four. The lumbar ganglia are joined not only by longitudinal, but also by transverse inter-node branches. On the connecting branches of the lumbar part of the sympathetic trunk, as in its neck part, intermediate ganglia are often found. The visceral branches of the lumbar ganglia participate in the formation of autonomic

plexuses of the abdominal cavity. From the two upper ganglia there are lumbar internal nerves, nn. splanchnici lumbales, to the celiac plexus, and the branches of the lower ganglia form the abdominal aortic plexus.

The celiac, or solar, plexus, plexus coeliacus s. solaris, is the most powerful of the autonomous plexuses. It is located on the front surface of the abdominal part of the aorta, in the circumference of the celiac trunk. In the formation of this plexus involved large and small chest internal nerves from the chest sympathetic ganglia, lumbar internal nerves from the lumbar ganglia, as well as branches of wandering and diaphragmatic nerves. In the celiac plexus there are ganglia: celiac, ganglia coeliaca, and aortic, ganglia aortorenalia. The latter are located at the beginning of the right and left renal arteries. The ganglion of the celiac plexus is interconnected by a multitude of interstitial branches, and its branches diverge in all directions like the sun's rays, and therefore the plexus was called sunny earlier. According to A.N. Maksimenkov, there are two extreme forms of the celiac plexus - dispersed, with a large number of small ganglia and strongly developed interstitial branches, and concentrated, in which the ganglia merge.

The celiac plexus gives rise to a series of secondary plexuses that continue along the branches of the celiac trunk to the organs they supply. There are hepatic, splenic, gastric, pancreatic, punctate and adrenal plexuses. At the bottom, the celiac plexus continues into the superior mesenteric plexus, plexus mesentericus sup., Extending along the branches of the same-named artery to the small and large intestine to the transverse colon inclusive. At the beginning of the superior mesenteric plexus is the superior mesenteric ganglion, gangl. mesentericum sup., which, like the ganglia of the celiac plexus, belongs to the number of prevertebral plexuses. Here there is a break in the sympathetic fibers innervating the ventral internals. Sympathetic nerves inhibit the motor function of the gastrointestinal tract, weaken peristalsis and cause the closure of sphincters. They also depress the secretion of the digestive glands and narrow the blood vessels of the intestine.

The abdominal aortic plexus, plexus aorticus abdominalis, forms around the abdominal part of the aorta below the celiac plexus. Secondary plexuses also begin from it: the inferior mesenteric, the ovary (ovarian). The lower mesenteric plexus, plexus mesentericus inf., Surrounds the artery of the same name and participates in the innervation of the descending and sigmoid colon and upper rectum. In the course of the plexus, there is an inferior mesenteric ganglion, gangl. mesentericum inf., related to prevertebral. Its value is similar to that of the superior mesenteric ganglion. The upper and lower mesenteric plexuses are interconnected by interbridge plexus, plexus intermesentericus; the latter plays an important role in providing nerve connections between different parts of the digestive tract. In the autonomous plexuses of the abdominal cavity, transverse connections are revealed, due to which bilateral innervation of the organs takes place. The testicle plexus, plexus testicularis, and the ovarian plexus, plexus ovaricus, accompany the corresponding arteries and give sympathetic innervation to the sex glands.

Continuation of the abdominal aortic plexus is the paired iliac and unpaired upper hypogastric plexus. The iliac plexus, plexus iliacus, surrounds the common and external iliac arteries and, in turn, passes into the femoral plexus, plexus femoralis. This plexus continues on all the arteries of the lower limb, it contains sympathetic fibers that innervate the blood vessels as well as skeletal muscles and skin. The functional significance of these fibers was shown when it was a question of the innervation of the upper limb by the subclavian plexus.

The upper hypogastric plexus, plexus hypogastricus sup., Is a direct extension of the abdominal aortic splan- culation into the cavity of the small pelvis. The branches that enter into its composition often merge into a single trunk located on the pelvic surface of the sacrum. This trunk, having a woven structure, is called the pre-sacral nerve, the pseudacralis. In the pelvic cavity, the upper hypogastric plexus passes into the lower hypogastric plexus, the plexus hypogastricus inf., Also called the pelvic plexus, plexus pelvicus. In the formation of the inferior hypogastric plexus, the visceral branches of the sacral sympathetic ganglia are involved - the sacral internal nerves, nn. splanchnici sacrales. The lower hypogastric plexus is paired, it is located along the internal iliac artery, laterally from the rectum, cervix and bladder. Secondary plexuses depart from it - the middle and lower rectal, the prostate, the plexus of the vas deferens, the uterine-vaginal, the urinary, and the cavernous nerves of the penis and clitoris. All these plexuses reach the innervated organs along the branches of the internal iliac artery, supplying these organs. Sympathetic nerves cause relaxation of the musculature of the bladder, narrowing of the vessels of the pelvic organs. On the contrary, they have a stimulating effect on the musculature of the uterus. Therefore, if the uterus at birth reduces less strongly, use drugs that increase the tone of sympathetic nerves.

Parasympathetic part. This part of the nervous system is divided according to the localization of its nuclei to the mid-cerebral, bridge, bulbar and sacral areas.

The mid-cerebral part is represented by the additional nucleus of the oculomotor nerve, nucl. accessorius n. oculomotorii (also called the pupillary nucleus, the Edinger-Westphal nucleus or the Yakubovich nucleus in honor of the authors who described it). Preganglionic fibers go in the oculomotor nerve and pass through the radix oculomotoria to the ciliary ganglion located in the orbit, gangl. ciliare, where the fiber break occurs. Postganglionic fibers from ciliary ganglion cells enter the eyeball as part of short ciliary nerves, nn. ciliares breves; they innervate the muscle - the pupil dilator, as well as the ciliary muscle, which ensures the accommodation of the eye. When the nuclei of the oculomotor nerve are damaged or when atropine is injected into the eye, which blocks the transmission of impulses along the parasympathetic nerves, the pupil dilates and the accommodation of the eye is disturbed.

The bridge section includes parasympathetic nuclei of the facial nerve - tearful, nucl. lacrimalis, and the upper salivary, nucl. salivatorius sup. From the lacrimal nucleus the preganglionic fibers go with the facial nerve to the ganglion of the knee; here they pass into the large stony nerve, which ends in the pterygoid ganglion, ganglion pterygopalatinum. Hence the postganglionic fibers along the palatine nerves reach the glands of the soft and hard palate, along the posterior nasal nerves they approach the glands of the mucosa of the nasal cavity. Part of postganglionic fibers from the gullet extends into the maxillary nerve, then into the malar nerve and from it along the anastomotic branch to the tear nerve. These fibers innervate the lacrimal gland, being secretory for it.

The upper salivary nucleus innervates the submandibular and sublingual salivary glands. Preganglionic fibers first go in the facial nerve, then go to the drum string, which joins the lingual nerve; together with the latter they reach the submaxillary ganglion, gangl. submandibulare. Postganglionic fibers from this ganglion are sent to the submaxillary and sublingual salivary glands.

The bulbar section also contains two parasympathetic nuclei. Lower salivary nucleus, nucl. salivatorius inf., is located next to the double core. Preganglionic fibers come out with the glossopharyngeal nerve, continue into the tympanic nerve and its terminal branch - a small stony nerve that ends in the ear ganglion, gangl. oticum. Postganglionic fibers enter the mandibular nerve and then approach the parotid gland via the ear-temporal nerve. Parasympathetic nerves are secretory for the salivary glands, when they are irritated, a large amount of liquid saliva is separated.

Thus, we see that the parasympathetic fibers that come out of the cerebral trunk together with the facial and glossopharyngeal nerve, subsequently become part of the branches of the trigeminal Hepiea, with which the vegetative ganglions of the head are connected. This connection is not only anatomical; in embryonic development, the neuroblasts of these ganglia migrate from the primary trigeminal ganglion. In addition to the four main parasympathetic ganglia, numerous microganglia of the same nature are found on the head, located around the main ones, as well as along the course of the blood vessels and nerves.

Dorsal nucleus of the vagus nerve, nucl. dorsalis n. vagi, gives rise to parasympathetic fibers that, in the composition of this nerve, go to most of the viscera. They innervate the pharyngeal mucosa, larynx, trachea and bronchi, thyroid, parathyroid and thymus glands, esophagus, lungs, heart, stomach and intestine to the descending colon. The wandering nerve gives a parasympathetic innervation of the

liver, pancreas, spleen, adrenal glands, kidneys and ureters. The break of parasympathetic fibers occurs in the terminal ganglia, mainly intraorganically.

In the wall of the digestive tract, the parasympathetic nerves together with the sympathetic nerves form the intestinal plexus, the plexus entericus, which extends from the beginning of the esophagus to the internal sphincter of the anus. The intestinal plexus is subdivided into submucous, plexus submucosus, intestinal-muscular, plexus myentericus, and subspecies, plexus subserosus. In all parts of the intestinal plexus there are many neurons forming aggregations - intramural ganglia. The cells entering into their structure come from the prevertebral ganglia. Here there are efferent neurons on which preganglionic fibers of the vagus and pelvic nerves terminate, as well as their own afferent neurons. Therefore, the digestive tract, especially the intestine, has a good ability to self-regulate its activities. In more detail, the morphology of the intestinal plexuses is presented in a course of histology.

The wandering nerve is the causative agent of the secretion of the digestive and bronchial glands, it strengthens the motor function of the stomach and intestines, causes a reduction in the small bronchi. On the heart, the vagus nerve exerts a retarding effect, reduces the frequency and strength of myocardial contractions, and slows the holding of pulses by the atrioventricular conduction system. The wandering nerve does not innervate the vessels of the abdominal internals.

The sacral section of the parasympathetic part of the nervous system is represented by sacral parasympathetic nuclei, nuclei parasymipathici sacrales, which are localized in the whole substance of the spinal cord according to the I-III sacral segments. Preganglionic fibers come out with the anterior roots of the sacral spinal nerves and enter the sacral plexus, but then branch off from it in the form of pelvic internal nerves, nn. splanchnici pelvini. These nerves join the pelvic plexus, spreading further along its branches. The area of their innervation captures the organs of the genitourinary system located in the small pelvis. It is believed that parasympathetic fibers from the pelvic plexus pass into the lower mesenteric plexus and in its composition pass to the sigmoid and descending colon. The break of fibers from the sacral parasympathetic nuclei occurs in the intragroup ganglia. Parasympathetic nerves increase the movement of the distal parts of the intestine, cause a contraction of the bladder, dilate the blood vessels of the genital organs, increase the blood filling of the cavernous bodies of the penis and the clitoris, contributing to their erection.

V. Practical Work:

1. Draw a somatic reflex arc and mark the locations of I, II and III neurons.

2. On the transverse section of the spinal cord and on the tables, find the locations of sympathetic centers of the lateral horns of the spinal cord of the thoracic and lumbar regions. Further sympathetic trunks lying on the sides of the spinal column in the form of a chain of nodes connected by interstitial branches. Select them in the cervical, thoracic, and lumbar, sacral and coccygeal divisions. In the cervical region there are 3 nodes, thoracic - 10-12 knots, lumbar - 4, sacral - 4, coccygeal one unpaired node, lying on the front surface of the coccyx. Remember that in the nodes of the sympathetic trunk motor neurons of the sympathetic reflex arc are located, here the pulse is switched from the central neuron (II) to the motor neuron (III). In the chest cavity, find the gray connective branches that extend from the nodes of the sympathetic trunk to the intercostal nerves - the anterior branches of the spinal nerves. The connecting branches indicate the connection between the autonomic nervous system and the somatic.

3.. Find in the chest cavity large and small internal nerves that penetrate the abdominal cavity through the diaphragm and approach the nodes of the celiac plexus.

4.. Make a simple reflector sympathetic arch, mark the locations of the sensory (I), central (II) and motor neurons (III), white and gray connecting branches

5. On the sagittal section of the brain, find the location of the parasympathetic nuclei. On the table with the image of the parasympathetic reflex arc, determine the location of the effector neurons - in the nodes located either in the walls of the organs (intramural) or near the organs (for the lacrimal and salivary glands). Further on the tables and drawings of the atlas, consider the course of preganglionic fibers that, in the vagus nerve, are directed to the organs of the thoracic and abdominal cavities, switching to the postganglionic neuron in the intramural nodes.

6. Find the vagus nerve in the neurovascular bundle of the neck (next to the common carotid artery and internal jugular vein). Trace both the vagus nerves, descending down the back of the root of the lung and accompany the esophagus (right - descends on the back surface, and the left - on the front). Both nerves form plexuses on the walls of the esophagus and penetrate the abdominal cavity through the esophageal opening of the diaphragm.

7. Disassemble the formation of the heart plexuses, through which the innervation of the heart.

8. Pulmonary plexuses innervating the lungs are formed due to the pulmonary branches of the thoracic region of the sympathetic trunks and bronchial branches of the vagus nerves. In connection with the small size of the nerves of these plexuses, it is only possible to show them on the corpse only partially. Note for yourself that the plexus is formed by sensitive sympathetic and parasympathetic fibers.

9. Using the textbook of anatomy and drawings in the atlas, study in more detail the anatomy of the autonomic nervous system, the formation of the plexus of the thoracic cavity, the innervation of the heart, lungs and esophagus.

VI. Control questions:

1.What departments allocate to the ANS? What is their functional difference?

2. What are the differences between the autonomic reflex arc and the somatic arches?

3.Explain why the vagus nerve got that name?

4. Describe the structure and position of the sympathetic trunk.

5. From which nodes of the sympathetic trunk postganglionic sympathetic fibers to the heart depart?

6. What branches of visceral plexus are involved in the branches that extend from the lower thoracic, lumbar and sacral nodes of the sympathetic trunk?

7. Where is the ciliary knot located? Where do postganglionic fibers go?

8. Where are the sublingual and earplugs located? Where do postganglionic fibers lie from them?

9.What are visceral nerve plexuses present in the pelvic cavity? The innervation of which organs is carried out from these plexuses?

VII. Academic pursuits:

Task № 1.

Explain why when washing the stomach patient is asked to press on the root of the tongue?

Answer: *The root of the tongue and stomach have a common innervation (X-nerve) and on this the vomitive reflex is based.*

Task № 2.

In the patient, the upper cervical node of the sympathetic trunk on the right is involved in the tumor process. Which of the following symptoms will occur?

Answer: *Persistent narrowing of the right pupil. When the right cervical node of the sympathetic trunk is damaged, the sympathetic innervation of the corresponding eyeball is violated against the background of the predominance of parasympathetic influence, which will lead to paralysis of the dilating pupil muscle and persistent contraction of the muscle of the narrowing pupils of the right eyeball.*

Task № 3.
With gradually increased pressure on the eyeballs (eye-cardiac reflex) for 20-30 seconds, the patient undergoes a slowing of the pulse by 10-12 beats / min. The irritation of which nerve is caused by such a reaction?
Answer: *Wandering, its vegetative part. The examination of the eye-cardiac reflex is determined by the excitability of the parasympathetic part of the autonomic nervous system. As a result of pressing on the eyeball (irritation of the first branch of the V pair), a reflex transmission of excitation from the trigeminal nerve to the vagus nerve (from the spinal cord (sensitive V pair) to the posterior nucleus of the vagus (parasympathetic X pair) occurs in the immediate vicinity, as if within a single metamer), which is characterized by these symptoms.*

VIII. Control Tests:

1. Specify the branches that extend from the thoracic nodes of the sympathetic trunk:
   1 - vertebral nerves;
   2 - lumbar internal nerves;
   3 - sacral internal nerves;
   4 - thoracic cardiac nerves.
   Keys: 4
2. Specify the formation of the sympathetic part of the autonomic nervous system:
   1 - sympathetic trunk;
   2 - the nucleus of Yakubovich;
   3 - ciliary node;
   4 - earplug.
   Keys:1
3. Specify the vegetative node from which the postganglionic nerve fibers are directed to the ciliary muscle and the sphincter of the pupil:
   1 - winged node;
   2 - the ciliary knot;
   3 - submandibular junction;
   4 - earplug.
   Keys:2
4. Specify the vegetative node from which secretory fibers are sent to the lacrimal gland:
   1 - winged node;
   2 - celiac node;
   3 - submandibular junction;
   4 - earplug.
   Keys:1
5. Specify anatomical formation, which refers to the peripheral part of the autonomic nervous system:
   1 - sympathetic trunk;
   2 - dorsal nucleus of the vagus nerve;
   3 - oculomotor nucleus;
   4 - intermediate-lateral nuclei in the spinal cord.
   Keys:1
6. Specify the location of the celiac plexus:
   1 - around the internal carotid artery;
   2 - around the inferior vena cava;
   3 - around the celiac trunk;
   4 - around the external carotid artery.
   Keys:3
7. Specify the nerve, the parasympathetic part of which narrows the pupil:
   1 - the oculomotor nerve;
   2 - facial nerve;
   3 - additional nerve;
   4 - vagus nerve.
   Keys:1
8. Specify the nerve, the parasympathetic part of which innervates the submandibular salivary gland:
   1 - the oculomotor nerve;
   2 - pre-cochlear nerve;
   3 - the facial nerve;
   4 - the vagus nerve.
   Keys:3
9. What nerve is crossed with vagotomy, used in the surgical treatment of peptic ulcer disease?
   1 - the vagus nerve;
   2 - glossopharyngeal nerve;
   3 - additional nerve;
   4 - the trigeminal nerve.
   Keys:1

IX. Анатомическая терминология:

	English Name	Latin Name
1	The autonomic nervous system	Systema nervozum automaticum
2	Sympathetic Center	Nuclei intermediolateralis

3	Sympathetic trunk	Truncus sympaticus
4	The nodes of the sympathetic trunk	Ganglia trunci sympatici
5	Front root	Radix ventralis
6	Preventive fibers	Fibrae preganglionares
7	Post-nodular fibers	Fibrae postganglionares
8	Neck part of sympathetic trunk	Pars cervicalis trunci sympatici
9	Sacral parasympathetic nuclei	nuclei parasymipathici sacrales
10	Middle cervical node	Ganglion cervicale medium
11	Vertebral cervical node	Ganglion vertebrale
12	The vertebral plexus	Plexus vertebral is
13	Abdominal part of sympathetic trunk	Pars abdominalis trunci sympathici
14	Swollen plexus	Plexus celiacus
15	The ciliated ganglion	Ganglion ciliare
16	Upper cervical ganglion	Ganglion. cervicale sup.
17	Dorsal nucleus of the vagus nerve	nucl. dorsalis n. Vagi
18	Intestinal Plexus	plexus entericuы

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FINAL LESSON ON PREPARATIONS OF TRUNK, HEAD AND LIMBS.

Questions for final lesson:

1. Short branches of the brachial plexus.
2. Innervation of the skin of the thigh.
3. The median nerve, its topography, branching region.
4. Innervation of the muscles of the anterior surface of the tibia.
5. Muscles of the shoulder, their innervation.
6. Topography of the sciatic nerve.
7. Innervation of the muscles of the hand.
8. The muscles of the back of the hip group, their innervation.
9. Muscles of the anterior surface of the forearm, their innervation.
10. Innervation of the anterior group of calf muscles.
11. Long branches of the brachial plexus.
12. Short branches of the sacral plexus, branching area.
13. Muscles of the posterior arm group, their innervation.
14. Innervation of the skin of the thigh.
15. Ophthalmic nerve, zones of innervation.
16. The sympathetic nervous system.
17. Cervical plexus, motor branches.
18. Innervation of the muscles of the anterior abdominal wall.
19. Muscles of the anterior surface of the thigh, their innervation.
20. Muscles of the anterior group of the shoulder, their innervation.
21. Obstruction nerve, its topography, zones of innervation.
22. Radial nerve, branching area.
23. The cerebrospinal nerve, its structure, branches, formation of plexuses.
24. Innervation of the diaphragm.
25. Border sympathetic trunk, structure and branches.
26. The ulnar nerve, the branching region.
27. Parasympathetic Department of the Autonomic Nervous System.
28. Innervation of the skin of the forearm.
29. Features of the structure of the vegetative and somatic nervous system.
30. Innervation of the muscles of the foot.
31. Cutaneous branches of the cervical plexus.
32. Short branches of the sacral plexus.
33. Muscles of the posterior group of the shoulder, their innervation.
34. Short branches of the sacral plexus, branching region.
35. Long branches of the brachial plexus.
36. Innervation of the skin of the thigh.

QUESTIONS FOR PRACTICAL SKILLS

(To show on preparations and give correct Latin Name)

CNS

1. The third ventricle
2. IV ventricle (on the sagittal section)
3. Basilar groove (bridge)
4. Pale ball.
5. Wandering nerve (exit site).
6. Lateral ventricle
7. Lateral ventricle, posterior horn.
8. Lateral ventricle, lower horn.
9. Lateral ventricle, anterior horn.
10. The lateral cord of the spinal cord
11. Furrows of the hippocampus
12. Furrows of the corpus callosum
13. Bumps of thin and sphenoid nuclei.
14. Cushion of corpus callosum
15. Upper mound roofs of the midbrain
16. Upper stony sine
17. Upper cerebral sail
18. Upper sagittal sinus (dura mater)
19. Upper temporal furrow
20. Upper frontal furrow
21. Upper cerebellar pedicle
22. Upper temporal groove
23. Upper temporal gyrus
24. Upper frontal sulcus
25. Upper frontal gyrus
26. Upper cerebellar pedicle
27. Upper parietal lobule
28. Vestibular field (rhomboid fossa)
29. The temporal lobe
30. The inner capsule and its parts.
31. Intralight groove
32. Water pipe of the brain.
33. Municipal Medium Waterway
34. Funnel III of the ventricle
35. Hypothalamic furrow
36. Hypothalamus.
37. The hippocampus.
38. The groove of the eye
39. The head of the caudate nucleus
40. Additional nerve (exit site).
41. The Tree of Life of the Cerebellum
42. Rear perforated substance
43. Back roots of spinal nerves.
44. Posterior cord of spinal cord
45. Posterior horn of spinal cord (incision)
46. Rear foot of inner capsule
47. Posterior median fossa of the spinal cord
48. Back of the bridge
49. The back leg of the inner capsule
50. The posterior middle slot of the spinal cord
51. The midbrain midbrain
52. Occipital-temporal furrow
53. Occipital lobe
54. The optic nerve.
55. Visual crossover
56. The visual pathway
57. Toothed nucleus (on a cut of the cerebellum)
58. The gyrations of an islet
59. Cords of the spinal cord.
60. Wedge
61. The beak of the corpus callosum
62. Knee of inner capsule
63. The knee of the corpus callosum
64. Collateral groove
65. Ponytail.
66. The end thread
67. The cerebral cortex
68. Cereal bark
69. Red core (on the midbrain)
70. The roof of the midbrain (plate of quadruple)
71. The roof of the midbrain
72. Hook
73. The lateral groove of the cerebral hemisphere
74. Lateral occipital-temporal gyrus
75. Lateral fovea of the large brain
76. The lateral geniculate body.
77. Lateral groove
78. Lateral pocket (IV ventricle)
79. Facial tubercle (rhomboid fossa)
80. Facial nerve (exit site).
81. Frontal lobe
82. Medial occipital-temporal gyrus
83. Medial elevation (rhomboid fossa)
84. The medial geniculate body.
85. Interventricular orifice.
86. Mezhdozhkovaya fossa (middle brain)
87. Metatalamus.
88. Brain cone
89. Cerebral striae (rhomboid fossa)
90. Cerebellum
91. The corpus callosum and its parts.
92. The bridge
93. The marginal gyrus
94. Nemetha of the cerebellum.
95. Outer capsule (terminal brain)
96. Lower hills of the roof of the midbrain
97. Lower cerebral sail
98. The lower horn of the lateral ventricle
99. Lower sagittal sinus
100. The lower mound
101. Lower temporal furrow
102. Lower temporal gyrus
103. Lower frontal furrow
104. Lower frontal gyrus
105. Lower cerebellum pedicle
106. Lower temporal furrow
107. Lower temporal gyrus
108. Inferior frontal sulcus
109. Lower frontal gyrus
110. Lower cerebellar pedicleНижняя теменная долька

1. The brain leg.
2. Leg arch
3. The olfactory groove
4. Olfactory bulb.
5. Olfactory tract.
6. Olfactory Triangle
7. Fencing
8. Olive of the medulla oblongata
9. Ostrovkovaya for the big brain (islet)
10. The abducent nerve (exit site).
11. Parigypocampal convolution
12. Parigypocampal furrow
13. Parigypocampal gyrus.
14. Paracentral lobe
15. Anterior cord of spinal cord
16. Anterior perforated substance
17. Anterior cord of the spinal cord (on the cut or on the whole brain)
18. Anterior horn of the lateral ventricle
19. Anterior horn of the spinal cord (in the section)
20. Anterior branch of lateral groove.
21. The front leg of the inner capsule
22. Front solder.
23. The anterior middle slot of the spinal cord
24. Front of the bridge
25. The front leg of the inner capsule
26. Anterior spike (brain)
27. The anterior middle slot of the spinal cord
28. The anterior part (base) of the midbrain
29. Crossing the Pyramids
30. Isthmus isthmus
31. The cavernous sinus

32. Pyramid of the medulla oblongata
33. Pyramids and the cross of the pyramids.
34. Roof plate
35. Leashes and their soldering.
36. Border groove (diamond-shaped fossa)
37. Cover of the midbrain.
38. The cerebral hemispheres
39. Hemispheres and worm of the cerebellum.
40. The hemispheres of the cerebellum
41. Transverse cleft of the large brain
42. Transverse temporal gyrus.
43. Transverse sinus.
44. Postcentral groove
45. Postcentral convolution
46. Waist groove
47. Waist gyrus
48. Lumbosacral thickening of the spinal cord.
49. Waist groove
50. Waist gyrus
51. Pre-vertebral nerve (exit site).
52. Precipitation
53. The precentral groove
54. Precentral gyrus
55. The medulla oblongata
56. Longitudinal cleft of the large brain
57. Transparent septum (brain)
58. Intermediate brain.
59. Direct convolution
60. Straight Sine.
61. Direct gyrus.
62. The rhomboid fossa
63. Handle of the upper mound
64. Handle of the lower mound
65. The outer capsule (the terminal brain)
66. Brainstem
67. The vaulted gyrus and its parts.
68. Serpus of the Great Brain
69. The gray mound
70. Sigmoid sinus
71. Shell
72. The vascular plexus.
73. Plain bodies.
74. Spikes of the large brain.
75. Spike the leash
76. The cerebrospinal node.
77. Median furrow (rhomboid fossa)
78. The midbrain
79. Middle temporal gyrus
80. Middle frontal gyrus
81. The middle cerebellum pedicle
82. The middle temporal gyrus
83. Average frontal gyrus
84. Middle cerebellar pedicle
85. The corpuscle of the corpus callosum
86. Stocks of sines.
87. The pillar of the arch
88. Talamus.
89. Hard shell of the spinal cord.
90. The body of the arch
91. The body of the caudate nucleus
92. The occipital fissure
93. The dark share
94. Terminal thread.
95. Trapezoid body.
96. Third ventricle.
97. Triangle of the hyoid nerve (rhomboid fossa)
98. Triangles of the sublingual and vagus nerves.
99. Ternary nerve (exit site).
100. The angular gyrus
101. Tail of caudate nucleus
102. The horsetail nucleus
103. Central fissure of cerebral hemisphere
104. The central part of the lateral ventricle
105. The central part of the ventricle
106. The Worm of the Cerebellum
107. Black matter
108. The fourth ventricle
109. Lentil nucleus
110. Neck thickening of the spinal cord.
111. Pineal body
112. The furrow groove
113. Epithalamic adhesion (posterior spike of the diencephalon)
114. Epithalamus
115. The glossopharyngeal nerve (exit site).
116. Language convolution

Peripheral Nervous System

1. The femoral-genital nerve.
2. The femoral nerve
3. Femoral nerve (in the abdominal cavity)
4. Femoral nerve (on the thigh).
5. The block nerve (IV pair)
6. The wandering nerve (X pair)
7. The wandering nerve (on the neck).
8. Tibial Nerve
9. Large internal nerve.
10. The large auricular nerve.
11. The superior mesenteric plexus.
12. The upper hypogastric plexus.
13. The maxillary nerve
14. Upper laryngeal nerve.
15. Upper gluteal nerve.
16. Recurrent laryngeal nerve
17. The optic nerve
18. Oculomotor nerve (III pair)
19. Deep peroneal nerve
20. Deep branch of the radial nerve.
21. Thoracic department of the sympathetic trunk.
22. The thoracic nerve.
23. The diaphragmatic nerve
24. The diaphragmatic nerve (in the chest cavity).
25. The diaphragmatic nerve (on the neck).
26. The long thoracic nerve.
27. Additional nerve (XI pair)
28. Rear wandering trunk
29. Posterior cutaneous nerve of the thigh.
30. The posterior fasciculus of the brachial plexus.
31. Obstruction nerve
32. Obstruction nerve (in the pelvis).
33. Obstruction nerve (on the thigh).
34. The optic nerve (II pair)
35. The calf nerve.
36. Lateral cutaneous nerve of hip
37. Lateral cutaneous cutaneous nerve.
38. Lateral cutaneous nerve of the forearm.
39. Lateral plantar nerve.
40. Lateral bundle of the brachial plexus.
41. Facial nerve
42. Frontal nerve
43. The ulnar nerve (on the shoulder).
44. The ulnar nerve (on the forearm).
45. Radial nerve
46. Radial nerve (on the shoulder).
47. Small internal nerve
48. Small occipital nerve.
49. Medial cutaneous nerve of the lower leg.
50. Medial cutaneous nerve of the shoulder.
51. Medial cutaneous nerve of the forearm.
52. Medial plantar nerve
53. Medial bundle of the brachial plexus.
54. Intercostal nerve.
55. Interdigital branches of the sympathetic trunk
56. Musculo-cutaneous nerve
57. Supraorbital nerve.
58. Supraclavicular nerves.
59. Suprathinus nerve.
60. The mandibular nerve
61. Lower alveolar nerve
62. The lower gluteal nerve.

63. Nosoreshnichny nerve
64. Common peroneal nerve
65. The abducent nerve (VI pair)
66. Brachial plexus.
67. Surface branch of the radial nerve.
68. Superficial peroneal nerve
69. The chin nerve.
70. The ilio-inguinal nerve.
71. The ilio-hypogastric nerve.
72. The infraorbital nerve.
73. The subcutaneous nerve.
74. Axillary nerve
75. Axillary nerve
76. The sublingual nerve (XII pair)
77. Transverse nerve of the neck.
78. The sciatic nerve
79. Sympathetic trunk
80. Connective branches of the sympathetic trunk
81. The median nerve
82. The median nerve (on the shoulder).
83. The median nerve (on the forearm).
84. The triple nerve (V pair)
85. The tee node
86. Nodes of the sympathetic trunk
87. Ear and temporal nerve
88. Celiac nodes (celiac plexus)
89. The celiac trunk.
90. Cervical plexus.
91. Neckline.
92. The glossopharyngeal nerve (IX pair)
93. The lingual nerve

1. The tympanic membrane
2. The Drum Cavity
3. The upper eyelid
4. Upper conjunctival sac
5. The Eustachian Trumpet
6. Yellow spot
7. Curl of the auricle
8. The pupil
9. Tragus
10. The bone labyrinth
11. The lateral rectus muscle of the eye
12. Earlobe
13. External auditory meatus
14. Lower eyelid
15. The lower conjunctival sac
16. Nasolacrimal canal
17. Semicircular canals
18. The threshold of the bone labyrinth
19. Countercuts
20. Anti-gingival
21. Iris (on the cut of the eyeball)
22. A ciliary body (on a cut of an eyeball)
23. Cornea
24. Retina (on the cut of the eyeball)
25. Sclera of the eyeball
26. Lacrimal gland
27. Vitreous body (on the cut of the eyeball)
28. The snail of the inner ear
29. Lens (on the cut of the eyeball)
30. The upper oblique muscle of the eye
31. Upper rectus muscle of the eye

Sense organs

Literature:

Перечень основной и дополнительной учебной литературы,
необходимой для освоения дисциплины «Анатомия»
для иностранных студентов, обучающихся по специальности
31.05.01 General medicine (educational program, partially implemented in English)

Основная учебная литература:

п/№	*Наименование*	Автор (ы)	Год, место издания	Кол-во экземпляров	
				в библиотеке	на кафедре
1	Textbook of human anatomy : For medical students. In 2 volumes-	Sapin M.R., Kolesnikov L.L., Nikitjuk D.B.	M.: New Wave Publishing Aqency, 2015	Vol.1 -35 Vol.2 - 35	-
2	Textbook of human anatomy: For medical students. In 2 volumes-	Sapin M.R., Kolesnikov L.L., Nikitjuk D.B.	M.: New Wave Publishing Agency, 2015	VoM -40 Vol.2-40	-
3	Атлас анатомии человека в 4 Т.	Синельников Р.Д. Синельников Я.Р. Синельников А.Я.	М.: Новая волна : Издатель Умеренков. 2007-2017	Т.1 - 25 Т.2 - 19 Т.3 - 17 Т.4 - 15	1

Дополнительная учебная литература:

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				в библиотеке	на кафедре
1	Атлас анатомии человека: учсб. пособие	Неттер Ф.	М.: ГЭОТАР-Медиа. 2003, 2007. 2015	22	1
2	Human developmental anatomy	Kurt E. Johnson.	Baltimore: Williams & Wilkins, 1991	1	
3	Clinically oriented anatomy	Moore K.	Baltimore: Williams & Wilkins. 1992	1	