

The Department of Human Anatomy
with Topographic Anatomy and Operative Surgery

METHODOLOGICAL GUIDE

OF THE DISCIPLINE

HUMAN ANATOMY – ANATOMY OF THE HEAD AND NECK

the main professional educational program of higher education -
specialty program in the specialty 31.05.03 Dentistry,
(Educational program, partially implemented in English)

2 semester

Part 3

PERIPHERAL NERVE SYSTEM

Student's Full Name _____

Group № _____ Faculty _____

Vladikavkaz

METHODICAL RECOMMENDATIONS TO PRACTICAL EMPLOYMENT AND
METHODICAL RECOMMENDATIONS FOR PERFORMANCE OF OUT-OF-CLASS
INDEPENDENT WORK FOR THE STUDENTS OF 1 COURSE (2 SEMESTER) OF
DISCIPLINE “HUMAN ANATOMY – ANATOMY OF HEAD AND NECK” THE
MAIN PROFESSIONAL EDUCATIONAL PROGRAM OF HIGHER EDUCATION -
SPECIALTY PROGRAM IN THE SPECIALTY 31.05.03 DENTISTRY
(EDUCATIONAL PROGRAM, PARTIALLY IMPLEMENTED IN ENGLISH)

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Semester 2

№	THE NAME OF THE TOPIC
1.	Oral cavity, pharynx. Esophagus, stomach. Small, large intestine. Development, topography, structure, relation to the peritoneum. X-ray anatomy. Ротовая полость, глотка. Пищевод, желудок. Тонкая, толстая кишка. Развитие, топография, строение, отношение к брюшине. Рентгеноанатомия.
2.	Liver and pancreas. Structure and topography of the peritoneum. Печень и поджелудочная железа. Строение и топография брюшины.
3.	Organs of the respiratory system. Nasal cavity. Larynx. Органы дыхательной системы. Полость носа. Гортань.
4.	Trachea, bronchi, lungs. Pleura. Mediastinum. Трахея, бронхи, легкие. Плевра. Средостение.
5.	Urinary organs. Kidneys, topography, structure, blood supply, innervation, lymph drainage. Miraculous kidney network. Мочевые органы. Почки, топография, строение, кровоснабжение, иннервация, лимфоотток. Чудесная сеть почки.
6.	Ureters, urinary bladder. The course of urine. мочеточники, мочевого пузыря. Ход мочи.
7.	Male reproductive organs. Urethra. Male crotch. The membranes of the testis and scrotum. The course of the seed. Мужские половые органы. Мочеиспускательный канал. Мужская промежность. Оболочки яичка и мошонки. Ход семени.
8.	Female reproductive organs. Women's crotch. Женские половые органы. Женская промежность.
9.	THE FINAL LESSON OF THE DIGESTIVE, RESPIRATORY, URINARY AND REPRODUCTIVE SYSTEMS.
10.	A heart. Topography, structure and functions. Сердце. Топография, строение и функции.
11.	Vessels and nerves of the heart. Pericardium. Circles of blood circulation. Features of the fetal circulation. Сосуды и нервы сердца. Перикард. Круги кровообращения. Особенности кровообращения плода.
12.	Arteries of the chest and abdomen. Their branches. Areas of blood supply. Артерии груди и живота. Их ветви. Области кровоснабжения.
13.	Pelvic arteries, their branches. Areas of blood supply. Артерии таза. Их ветви. Области кровоснабжения.
14.	Veins of the chest, abdomen and pelvis. Вены груди, живота и таза.
15.	Porto-caval and cava-caval anastomoses. Порто-кавальные и каво-кавальные анастомозы.
16.	Lymphatic vessels, ducts and nodes of the chest, abdomen and pelvis. Лимфатические сосуды, протоки и узлы груди, живота и таза.
17.	Lymphatic vessels, ducts and nodes of the upper and lower extremities. Лимфатические сосуды, протоки и узлы верхней и нижней конечностей.
18.	Arteries of the upper limb. Артерии верхней конечности
19.	Arteries of the lower limb. Артерии нижней конечности
20.	Veins of the upper limb. Вены верхней конечности.
21.	Veins of the lower limb. Вены нижней конечности.
22.	FINAL LESSON ON THE TOPIC: "VESSELS OF THE CHEST, ABDOMEN, UPPER AND LOWER LIMB"
23.	General anatomy and topography of the spinal nerves. Общая анатомия и топография спинномозговых нервов.
24.	Anatomy and topography of the cervical plexus. Age features. Topography of the course of vessels and nerves. Анатомия и топография шейного сплетения. Возрастные особенности. Топография хода сосудов и нервов.
25.	Anatomy and topography of the brachial plexus (short branches). Topography of the course of vessels and nerves. Анатомия и топография плечевого сплетения (короткие ветви). Топография хода сосудов и нервов.
26.	Anatomy and topography of the brachial plexus (long branches). Topography of the course of vessels and nerves. Анатомия и топография плечевого сплетения (длинные ветви). Топография хода сосудов и нервов.
27.	Intercostal nerves. Anatomy and topography of the lumbar plexus. Межреберные нервы. Анатомия и топография поясничного сплетения.
28.	Anatomy and topography of the sacral plexus. Anatomy and topography of the genital and coccygeal plexuses. Topography of the course of vessels and nerves. Анатомия и топография крестцового сплетения. Анатомия и топография полового и копчикового сплетений. Топография хода сосудов и нервов.
29.	Innervation of the upper limb. Иннервация верхней конечности.
30.	Innervation of the lower limb. Иннервация нижней конечности.
31.	Vegetative innervation of organs. Age features. Вегетативная иннервация органов. Возрастные особенности.
32.	Autonomic and somatic nerves of the chest, abdomen and pelvis. Автономные и соматические нервы груди, живота и таза.
33.	Sympathetic trunk. Симпатический ствол.
34.	Thoracic and abdominal parts of the vagus nerve. Грудная и брюшная части блуждающего нерва.
35.	Sacral division of the parasympathetic system. Сакральный отдел парасимпатической системы.
36.	Autonomous plexuses of the chest, abdomen and pelvis. Автономные сплетения груди, живота и таза.
37.	FINAL LESSON ON THE TOPIC: "NERVES OF THE CHEST AND ABDOMEN".
38.	FINAL LESSON ON THE TOPIC: "NERVES OF THE UPPER AND LOWER LIMB".

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 Erb-Duchenne 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. Objectives:

<u>Student must know</u>	<ol style="list-style-type: none"> 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.
<u>Student must be able to:</u>	<ol style="list-style-type: none"> 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.
<u>Student must possess</u>	<ol style="list-style-type: none"> 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:

a) 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 innervate diaphragmatic nerve:

1. pericardium
2. peritoneum
3. liver
4. The pleura
 8. Specify anatomical formations that innervate 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 laterales
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.

INDIVIDUAL WORK OF A STUDENT

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 skeletopia.
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.

<u>Student should know:</u>
<ol style="list-style-type: none"> 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.
<u>Student must be able to:</u>
<ol style="list-style-type: none"> 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.

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. Make a situation on this topic.

Example:

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

ANSWER: _____

TASK:

ANSWER:

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

11. Example: Which branch gives the spinal nerve:

- a) Upper and low б) Lateral and medial
в) Anterior and posterior г) Median and inner

Test№1 _____

a. _____

б. _____

в. _____

г. _____

Test№2 _____

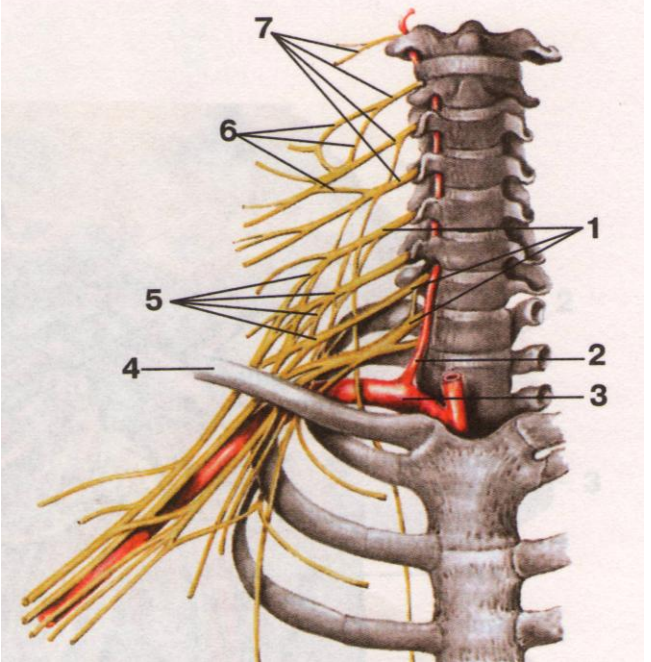
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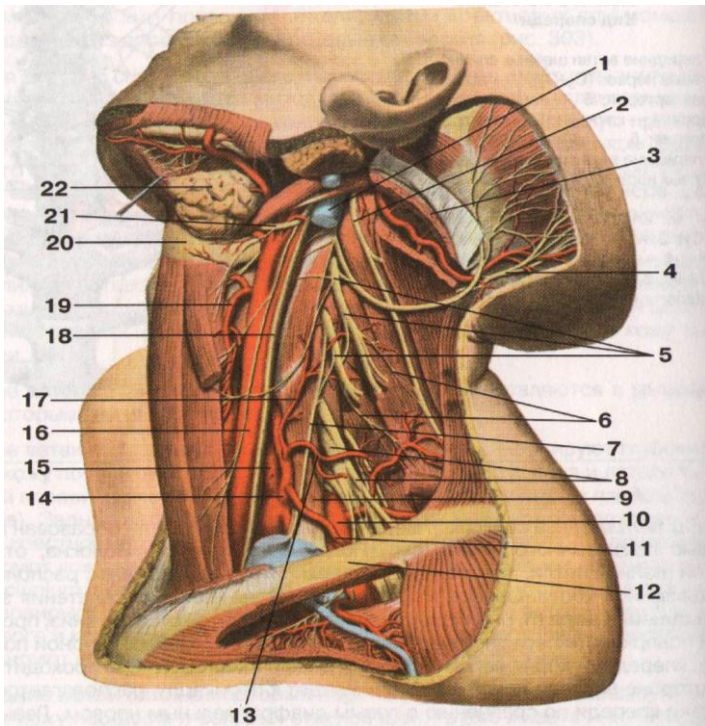
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VII. Make designations for pictures.

№12	CERVICAL PLEXUS
	1.
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№13		CERVICAL PLEXUS, PHERNIC NERVE	
			
1.		12.	
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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. Objectives:

<u>Student must know</u>	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.
<u>Student must be able to:</u>	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.
<u>Student must possess</u>	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:

a) 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. Suprathoracic 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 and 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 suprathoracic 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 supratorpical 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 nerve.

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 innervate 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 superficialis)
 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 innervate 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 innervate 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 supraclavicularis
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. thoracicus 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. cutaneus antebrachii lateralis
22. The median nerve	22. n. medianus
23. Common palmar nerves	23. nn. digitales palmares communes
24. Own palmar finger nerves	24. nn. digitales palmares 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 antebrachii 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.

INDIVIDUAL WORK OF A STUDENT

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 skeletopia.
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.

<u>Student should know:</u>
<ol style="list-style-type: none">1. Number and structure of spinal segments. Components of the reflex arc.2. Formation of the brachial plexus, its skeletopia (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.
<u>Student must be able to:</u>
<ol style="list-style-type: none">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.

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 brachialis and brachioradialis 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:

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

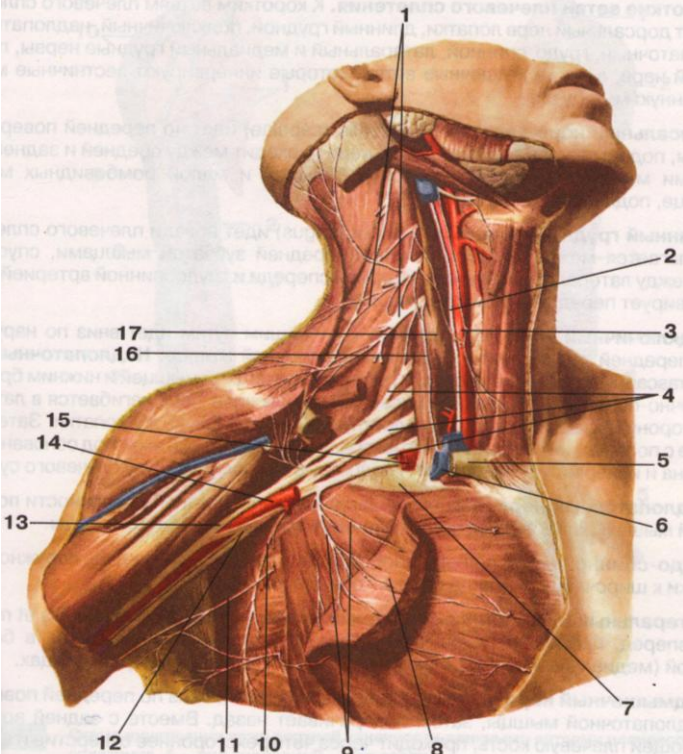
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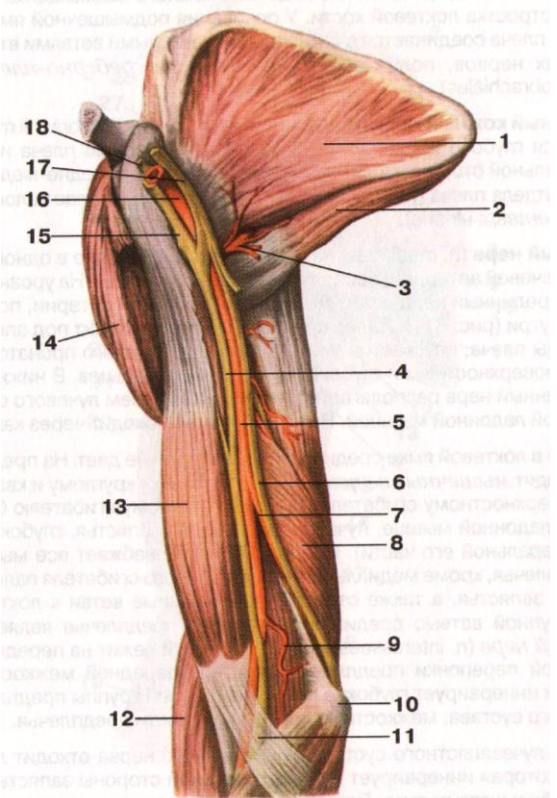
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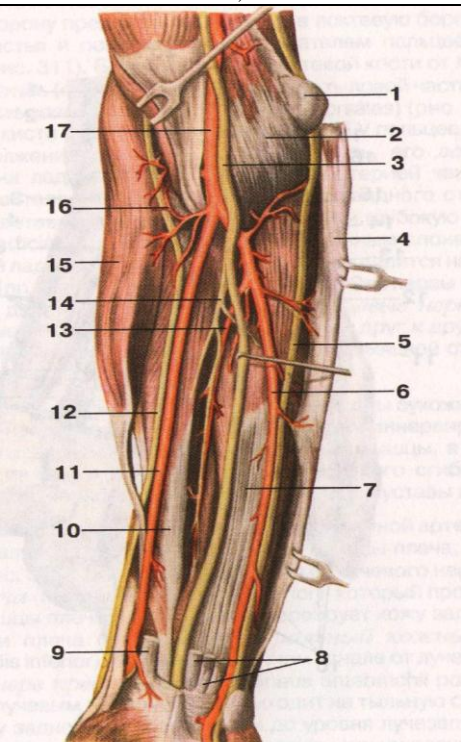
Test №2

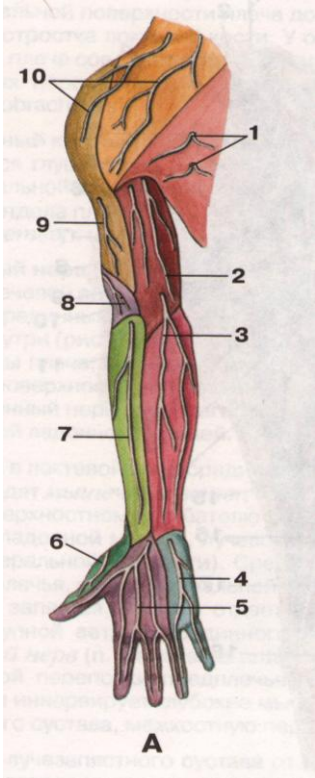
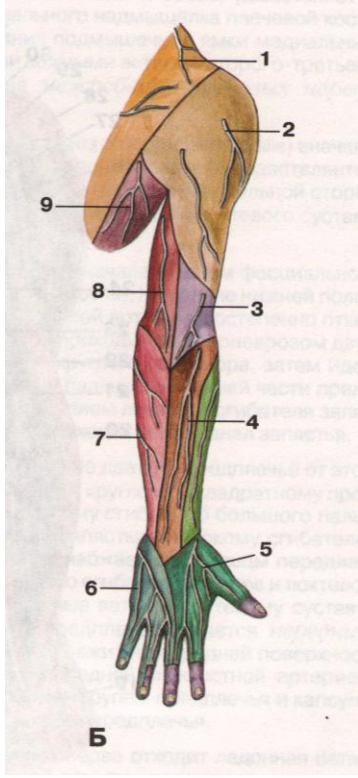
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VII. Make designations for pictures.

№12 CERVICAL PLEXUS	
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№13 MEDIAN AND ULNAR NERVES IN SHOULDER REGION	
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№14 MEDIUM, ULNAR AND RADIAL NERVES UN FOREARM REGION	
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№15 INNERVATION OF UPPER LIMB'S SKIN	
 <p style="text-align: center;">A</p>	 <p style="text-align: center;">Б</p>
pic A:	pic B:
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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. Objectives:

<u>Student must know</u>	<ol style="list-style-type: none"> 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.
<u>Student must be able to:</u>	<p>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;</p>
<u>Student must possess</u>	<ol style="list-style-type: none"> 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:

a) 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.

b) 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.

c) 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 iliac 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 perimbeloid 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 podrushevidnoe 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 inferiores, 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 branches:

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 inferiores, 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 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 plexus. 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 antenemion 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. genitofemoralis
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.

NERVES OF THE WALLS OF THE CHEST 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:

<u>Student should know:</u>	<u>Literature:</u>
<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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.
<u>Student must be able to:</u>	<u>Literature:</u>
<ol style="list-style-type: none"> 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 part 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. 	<ol style="list-style-type: none"> 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:

- a) obturator nerve б) lateral cutaneous nerve of thigh
в) ilioinguinal nerve. з) femoral nerve.

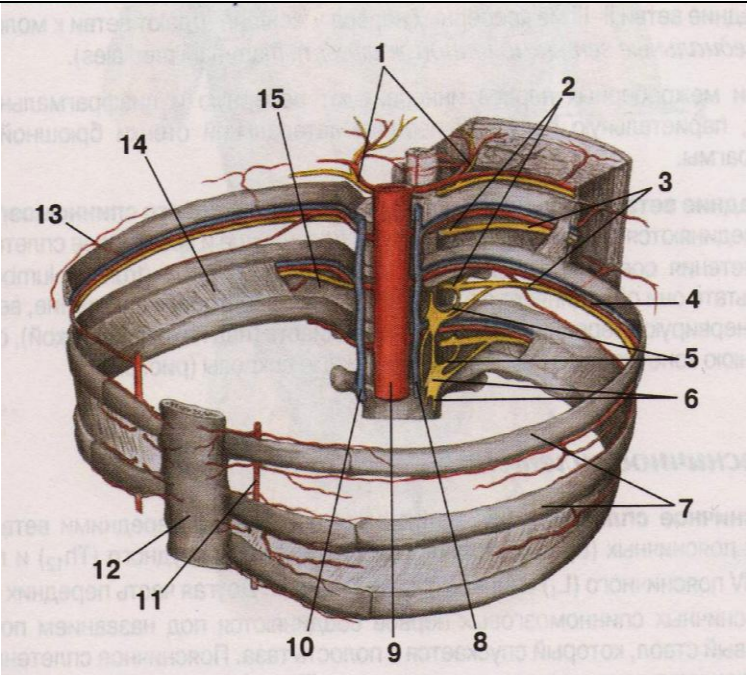
Test№1 _____

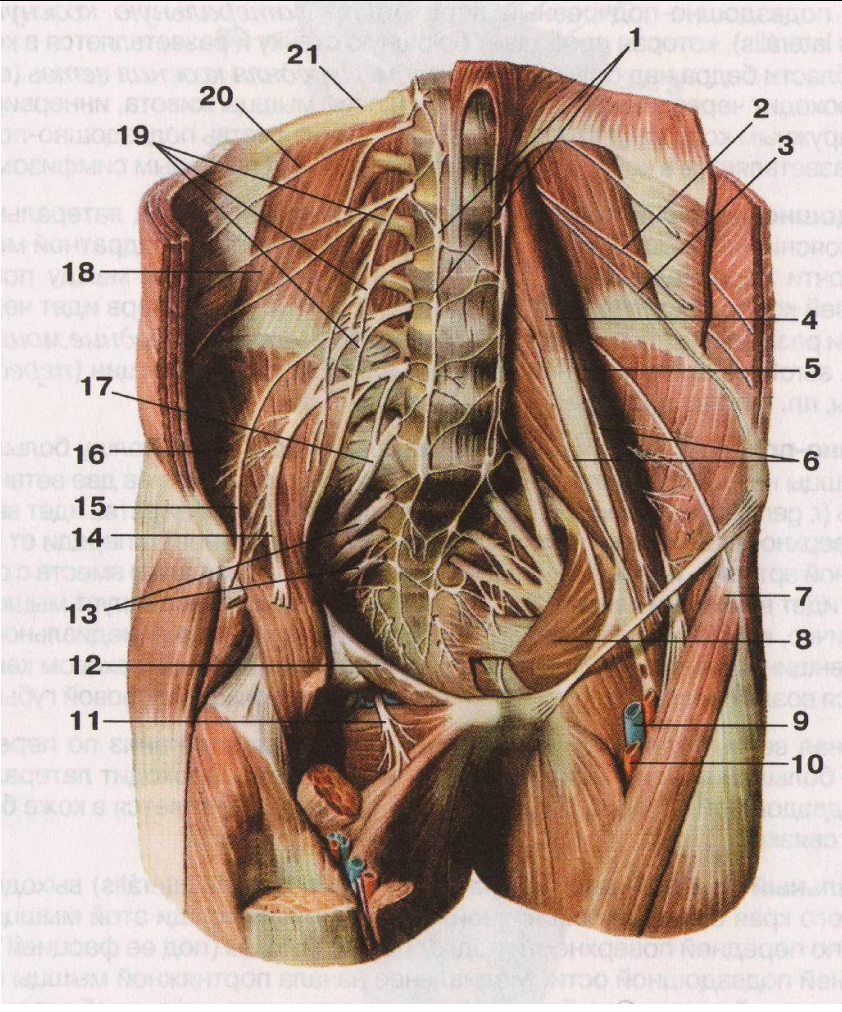
- a. _____
б. _____
в. _____
з. _____

Test№2 _____

- a. _____
б. _____
в. _____
з. _____

VII. Make designations for pictures:

№12 INTERCOSTAL NERVES	
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	15.

№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:

<u>Student should know:</u>	<u>Literature:</u>
<ol style="list-style-type: none"> 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. Knot complex innervation of the skin and pelvic muscle and free lower limb .. 	<ol style="list-style-type: none"> 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.
<u>Student must be able to:</u>	<u>Literature:</u>
<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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?

- a) femoral nerve. б) lateral plantar.
в) tibial nerve. г) profound fibular nerve.

Test№1 _____

a. _____

б. _____

в. _____

г. _____

Test№2 _____

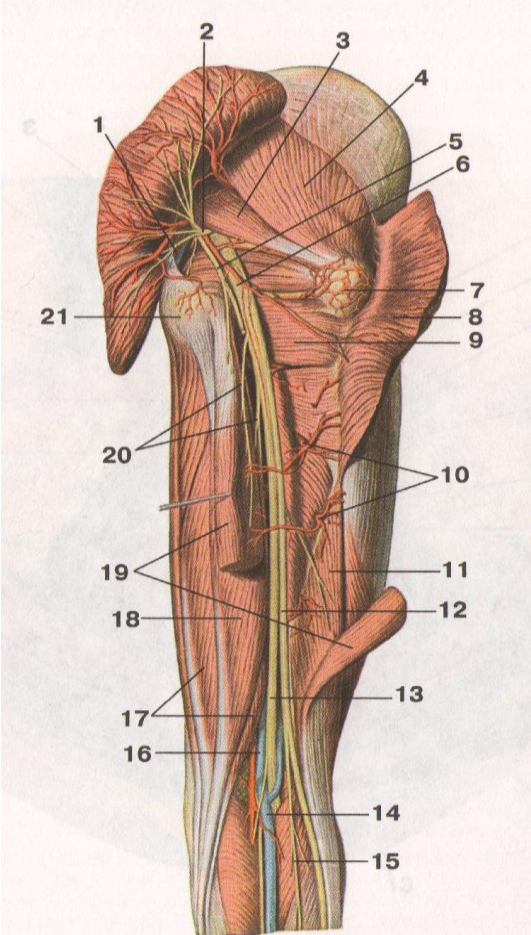
a. _____

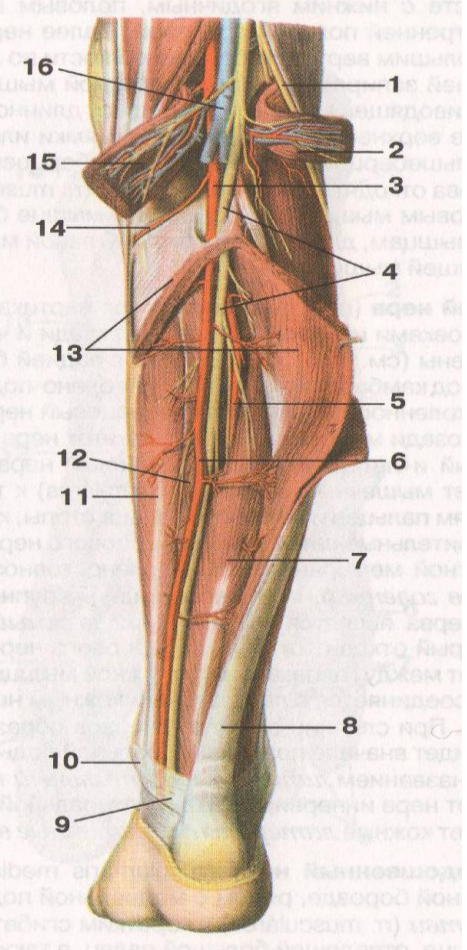
б. _____

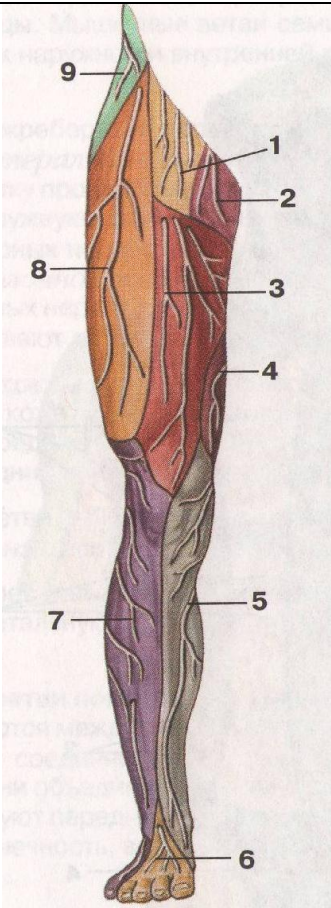
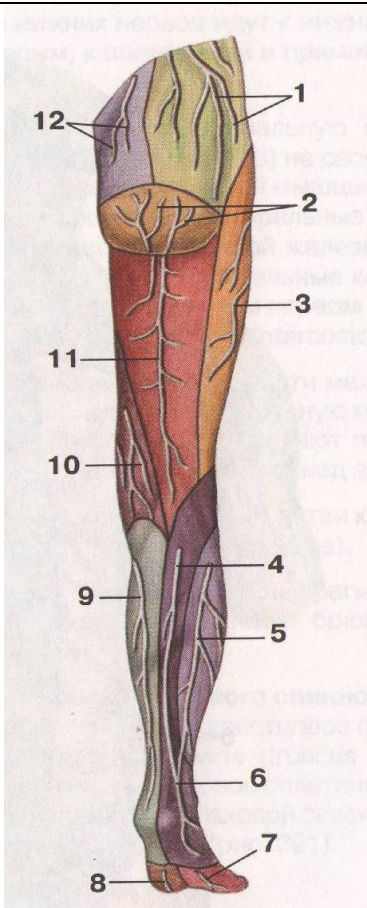
в. _____

г. _____

VII. Make designations for pictures:

№12		NERVES OF GLUTEAL REGION AN OF THIGH	
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	5.		
	6.		
	7.		
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	19.		
	20.		
	21.		

№13		NERVES OF SHIN	
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	13.		
	14.		
	15.		
	16.		

№14 INNERVATION OF LOWER LIMB'S SKIN	
 <p style="text-align: center;">A</p>	 <p style="text-align: center;">Б</p>
рисунок А:	рисунок Б:
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
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	11.
	12.

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. Objectives:

<u>Student must know</u>	<ol style="list-style-type: none"> 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.
<u>Student must be able to:</u>	<ol style="list-style-type: none"> 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.
<u>Student must possess</u>	<ol style="list-style-type: none"> 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:

a) 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, *truncus 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 vertebalis*; 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. pulmonates* 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 pelvici. 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 parasympathici 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 nervosum automaticum
2	Sympathetic Center	Nuclei intermediolateralis
3	Sympathetic trunk	Truncus sympathicus
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 sympathici
9	Sacral parasympathetic nuclei	nuclei parasympathici sacrales
10	Middle cervical node	Ganglion cervicale medium
11	Vertebral cervical node	Ganglion vertebrale
12	The vertebral plexus	Plexus vertebralis
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 entericus

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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.

Tema: FINAL LESSON OF PRACTICAL SKILLS

QUESTIONS FOR FINAL LESSON OF PRACTICAL SKILLS

(To show on preparations and give correct Latin Name)

CNS

- | | |
|---|---------------------------------|
| 1. The third ventricle | 3. Basilar groove (bridge) |
| 2. IV ventricle (on the sagittal section) | 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. Cerebral 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. Mezhdzhkovaya 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 доля
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

Sense organs

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

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