GUIDELINES
Students' independent work during preparation to practical lesson

Academic discipline	HUMAN ANATOMY
Topic	SPINAL NERVES. CERVICAL PLEXUS.

1. Relevance of the topic:
The knowledge of structures of the peripheral nervous system, particularly cervical plexus and its branches is the base of clinical thinking in terms of differential diagnosis for the doctor of any specialty, but above all a neurologist, vertebroneurologist, traumatologist, dermatologist, general practitioner.

2. Specific objectives of practical lesson
- Analyse the composition of fibres of anterior and posterior roots of spinal nerves.
- Explain the formation of spinal nerve.
- Suggest the definition of spinal nerve.
- Classify spinal nerve branches.
- Explain functional anatomy of thoracic spinal nerve branches.
- Define term "plexus of somatic nerves" including the formation of cervical plexus.
- Draw a scheme of spinal nerve:
    - a - in cervical region of spinal cord (except for the CVIII);
    - b - in thoracic region of spinal cord;
    - c - on the level of SII – SIV.
- Analyse the connection of somatic nerve (thoracic spinal nerve) with ganglia of sympathetic trunk.
- Create the conception of grey and white connecting branches in the functional aspect.

3. Basic level of preparation (interdisciplinary integration) of the student includes knowledge of medical biology and histology of the development of nervous system in phylogenesis and ontogenesis.

Name of previous disciplines	Obtained skills
1. Medical Biology and Histology	Know ontogenesis and phylogenesis of nervous syste The structure of the neuron.
2. Sections of Human Anatomy:	
- osteology - myology	The student should have skills to describe the structu the spine in general, to be able to demonstrate struct features of the cervical vertebrae, their connections v each other and with the bones of the skull. The stude should also be able to describe the muscles of the nec chest, back, abdomen and to demonstrate them on preparations.
- central nervous system	Identify and demonstrate departments of cerebrum a spinal cord and their cavities. Describe the external a internal structure of the spinal cord.

For this practical lesson, a student should know and be able to:

- know the anatomy of the vertebrae and their local structural features.
- to be able to demonstrate all the anatomical structures of the spine in general.
- classify the muscles of the neck, trunk, characterize the diaphragm.
- find mediastinal departments and a list of organs in each of them.
- describe and demonstrate nucleus of grey matter of the spinal cord in the functional terms on the schemes.
- know the placing of segments of the spinal cord.
- determine the morphological basis of reflex arc, that is locked through the spinal cord.
- know types of receptors and varieties receptor sensitivity.
- determine the structure of the spinal cord segments.
- identify and demonstrate on the preparations spinal cord and brain sulci, places of entry and exit of roots, sensitive ganglia of spinal and cranial nerves.
- determine the overall functional characteristics of neurons of posterior, lateral and anterior horns, name the nuclei of horns and determine their individual function.
- determine the overall functional characteristics of anterior, lateral and posterior funiculi of spinal cord, name the pathways they contain.
- compare and draw the peripheral innervation of the skin of the trunk with different colors on schemes.

4. Tasks for independent work during preparation for the classes.

4.1. The list of key terms, parameters, characteristics which the student must assimilate while preparing for lesson

Term	Definition
Spinal nerve	It is a mixed nerve, which carries motor, sensory, and autonomic signals between the spinal cord and the body. In the human body there are 31 pairs of spinal nerves, one on each side of the vertebral column.
Ganglion	It is a group of neurons in the peripheral nervous system. In the somatic nervous system this includes dorsal root ganglia and trigeminal ganglia among a few others. In the autonomic nervous system, there are both sympathetic and parasympathetic ganglia which contain the cell bodies of postganglionic sympathetic and parasympathetic neurons respectively.
Anterior root of the spinal nerve	In anatomy and neurology, the ventral root or anterior root is the efferent motor root of a spinal nerve. At its distal end, the ventral root joins with the dorsal root to form a mixed spinal nerve.
Dorsal root of the spinal nerve	The posterior root of spinal nerve. It is one of two roots which emerge from the spinal cord. It emerges directly from the spinal cord, and travels to the dorsal root ganglion. Nerve fibres with the ventral root

	then combine to form a spinal nerve. The dorsal root transmits sensory information, forming the afferent sensory root of a spinal nerve.
N. occipitalis minor	The lesser occipital nerve or small occipital nerve is a cutaneous spinal nerve arising between the second and third cervical vertebrae, along with the greater occipital nerve. It innervates the scalp in the lateral area of the head posterior to the ear.
N. auricularis magnus	The greater auricular nerve is the largest of the ascending branches. It arises from the second and third cervical nerves, goes around the posterior border of the sternocleidomastoideus, and, after perforating the deep fascia, ascends upon that muscle beneath the platysma to the parotid gland, where it divides into an anterior and a posterior branch.
N. phrenicus	The phrenic nerve (n. phrenicus; internal respiratory nerve of Bell) contains motor and sensory fibres in the proportion of about two to one. It arises mainly from the fourth cervical nerve but receives a branch from the third one and another from the fifth one (accessory phrenic nerves).

4.2. Theoretical questions for practical lesson

1. What is the dorsal root of spinal nerve? Its functional characteristics.
2. What is the anterior root of spinal nerve? Its functional characteristics.
3. What is a location of the spinal ganglion?
4. Identify and classify of branches of the cervical plexus.
5. Demonstrate the phrenic nerve.
6. Describe the fibres composition of spinal nerve in functional aspect.
7. Characteristics of dorsal branches of I and II cervical spinal nerves.
8. Characteristics, topography and branches of intercostal nerves, subcostal nerve.
9. Describe cutaneous branches of intercostal nerves.
10. Describe the muscular branches of intercostal nerves. Pleural and peritoneal branches.
11. What cervical plexus is formed from?
12. Topography and classification of branches of the cervical plexus in the functional aspect.
13. Name and show cutaneous branches of the cervical plexus.

14. Name muscular branches of the cervical plexus. What muscle groups do they innervate?
15. Demonstrate and describe cervical loop and muscles that it innervates.
16. Demonstrate and describe the phrenic nerve (right and left).
17. In which visceral plexuses is phrenic nerve present?
18. What is phrenicus symptom?
19. Explain the phenomenon of skin sensitivity disorders (in areas of Zakharyin-Ged) in diseases of the viscera.
20. Explain the difference between peripheral (zonal) and segmental (radicular) innervation of the skin.

5. Materials for self-control

1. How many spinal nerves are going form the spinal cord?
A. 62
B. 64
C. 70
D. 31
E. 30

2. What type of neurons are in the spinal ganglion?
A. Motor
B. Sensory
C. Associative
D. Motor and sensory
E. Sensory and associative

3. What type of fibres are in anterior roots of spinal nerves?
A. Afferent
B. Efferent
C. Cutaneous
D. Sensory
E. Associative

4. What type of fibres are in dorsal roots of spinal nerves?
A. Afferent
B. Efferent
C. Cutaneous
D. Muscular
E. Associative

5. Spinal nerve is _____
A. Mixed
B. Parasympathetic
C. Sympathetic
D. Motor only
E. Sensory only

6. Where does cauda equina usually start?

A. at L5
B. at C3
C. at L1
D. at Th5
E. at Co1

7. What type of neurons is found in the ventral horn of the spinal cord?
A. Motor
B. Sensory
C. Associative
D. Motor and sensory
E. Sensory and associative

8. How many cervical segments does the spinal cord have?
A. 4
B. 6
C. 7
D. 8
E. 5

9. How many thoracic segments does the spinal cord have?
A. 10
B. 13
C. 11
D. 12
E. 5

10. What of the following is not a plexus of spinal nerves?
A. Sacral
B. Cranial
C. Cervical
D. Brachial
E. Lumbar

11. How many cervical ganglia are there along the vertebral column?
A. 6
B. 8
C. 9
D. 10
E. 12

12. What types of branches does cervical plexus have?
A. Muscular and parasympathetic
B. Parasympathetic only
C. Sympathetic only
D. Sympathetic and cutaneous
E. Cutaneous and muscular

13. Ansa cervicalis (cervical loop) is formed from cervical nerves _____

A. C3-Th1
B. C1-C8
C. C1-C3
D. C4-Th1
E. C5-Th2

14. Great auricular nerve innervates:
A. Middle ear and tragus
B. Skin near the ear and external acoustic meatus
C. Inner ear and eardrum
D. Eardrum and external acoustic meatus
E. Skin of ear and stapedius

15. Transverse cervical nerve innervates:
A. Posterior region of the neck
B. Anterior region of the neck
C. Skin above the sternum
D. Skin above the clavicle
E. Muscles of the neck

16. Phrenic nerve belongs to _____ of cervical plexus
A. Sympathetic branches
B. Parasympathetic branches
C. Cutaneous branches
D. Splanchnic branches
E. Muscular branches

17. Lesser occipital nerve innervates _____
A. Skin of the forehead
B. Skin of the posterior surface of the neck
C. Skin of ear
D. Scalp in the lateral area of the head posteriorly to the ear
E. Skin of the face

18. Phrenic nerve innervates _____
A. Diaphragm and pericardium
B. Lungs
C. Trachea
D. Trachea and pharynx
E. Diaphragm and larynx

19. Cervical plexus is formed by
A. middle rami of the first 4 cervical spinal nerves
B. posterior rami of the first 4 cervical spinal nerves
C. superior rami of the first 4 cervical spinal nerves
D. anterior rami of the first 4 cervical spinal nerves
E. inferior rami of the first 4 cervical spinal nerves

20. Supraclavicular nerve innervates
A. skin over the neck

B. platysma
C. clavicular muscle
D. skin above and below the clavicle
E. skin over the scapula

ANSWERS:

1	**A**
2	**B**
3	**B**
4	**A**
5	**A**
6	**C**
7	**A**
8	**D**
9	**D**
10	**B**
11	**A**
12	**E**
13	**C**
14	**B**
15	**B**
16	**E**
17	**D**
18	**A**
19	**D**
20	**D**