Bogomolets National Medical University
Department of human anatomy

GUIDELINES

Academic Subject Matter	HUMAN ANATOMY
Module №	2
Content module №	9
The theme of the lesson	The pathways of CNS
Course	I
Amount of hours	3

2017

1. Relevance of the topic: From conducting tracts the cerebral cortex receives proprioceptive impulses, este-and interoceptive sensitivity for afferent synthesis, they provide backward and forward linkages between different parts of the cerebral cortex, the pyramidal and extra pyramidal system. Pyramidal paths provide the function of the motor analyzer or integrative-starting system targeted volitional movements, providing start-up and control of motor activity, the implementation of behavioral acts. Extrapyramidal paths provide the regulation of tonus and coordination of movements of muscles-flexor and muscles-extensor upper and lower extremities, coordination of movements of the respiratory muscles, liaises extrapyramidal and pyramidal systems.

Studying of pathways of the CNS is the basis of clinical thinking in the conditions of the differential diagnosis for a doctor of any specialty, but first and foremost a neurologist, neurosurgeon, neonatologist, surgeon. Doctors fixed attention on the characteristics of the location of receptors, the location of the sensing nodes, the characteristics of the fibre composition of the spinal nerve roots, the location of the bodies of neurons, axons of neurons in the part of roots and in the spinal cords of the brain, their level of overlap, the particular location of the nuclei and nerve fibers in the brain stem, finding representation in the cerebral cortex. Demonstration of anatomical structures on specimens of the brain, body, the skeleton, and solution of situational tasks and tests while studying the topic as much as possible approaches the students to the specific clinical situation.

2. Specific objectives:

After classes the student should know and be able to:

2.1. To determine the morphological basis for the reflex arc, which closes through the brain.

2.2. To determine the classification of the ascending pathways.

2.3. Define the concept of "lemniscate system". Which paths belong to this system?

2.4. To define structures that refer to ekstralemniscate paths of conscious sensitivity.

2.5. Explain the function of the long afferent pathways.

2.6. Describe the basic structure of the afferent paths of conscious sensitivity: localization of receptors, the way through the peripheral nervous system, localization of the bodies I, II, III neurons, the level and location of the crossroads II neuronal path in the brain stem to thalamic translucid nuclei, topography of the white matter from thalamus to cerebral cortex, corresponding to the cortical representation.

2.7. To draw the scheme of ascending and descending pathways.

2.8. To determine the general regularities of structure and function of the motor analyzer (I. P. Pavlov) or integrative-starting system targeted

volitional movements, which provides start-up and control of motor activity, the implementation of behavioral acts.

2.9. To define and show on preparations of the brain and spinal cord site of origin of the pyramidal paths, their position in the internal capsule, brain stem, and also places of overlap in the white matter of the brain stem and white matter of the spinal cord.

2.10. To define and show on preparations of brain sections of the cerebral cortex and brain structures, which are related to the idea of the movement and the movement itself.

2.11 To identify the conducting tracts, which the cerebral cortex receives afferent synthesis and exteroceptive impulses of proprioceptive sensitivity from and paths, which provide backward and forward linkages between different departments of the pyramidal system.

2.12. To determine the general regularities of structure and function of the extrapyramidal system, which provides automatic (unconscious) regulation of muscle function, maintaining muscle tone, coordination of movements.

2.13 To show on preparations of brain and spinal cord the centers and ways of the extrapyramidal system, to determine their role in:

1) the redistribution of muscle tone during movement;

2) the implementation as unconditional-reflex protective and friendly movements as memorized, stereotyped, automated (including professional skills);

3) the integrative mechanisms of the higher nervous activity (especially in the mechanisms of emotional-affective reactions).

2.14. To identify the structural mechanisms of interaction of the pyramidal and extrapyramidal systems, through which runs a complex purposeful movement while maintaining balance and orientation in space.

3. **Basic training level (interdisciplinary integration)** of the student includes knowledge of medical biology and histology on the development and structure of CNS in organogenes. Before class the student should know and be able to:

3.1. To determine the morphological basis for the reflex arc closes via the spinal cord.

3.2. To classify the neurons and glial cells in structure, function, and other neurotransmitter.

3.3. To know the types of receptors and species sensitivity.

3.4. To determine the structure of the segment of spinal cord and skeletopy segments of various departments. To explain the Shipo's rule.

3.5. To determine and show on preparations of brain and spinal cord the furrows, places of entry and exit roots, the sensitive nodes of the

spinal and cranial nerves.

3.6. To determine the formation of the spinal nerve. To explain what formed the sensitive node of a spinal nerve, what is the difference between the anterior and posterior roots (structurally and functionally), what is the “horse tail” (cauda equine) and why is it formed?

3.7. To identify common functional characteristics of neurons in the posterior, lateral and anterior horns, called the nuclei of the horns and determine their individual function.

3.8. To define a common functional feature of anterior, lateral and posterior cords of the spinal cord, call the ways that pass through it.

3.9. To demonstrate the cross sections of the brain stem, the distribution of the fibers of white matter and nuclei of gray matter in accordance with their functional characteristics.

3.10. To determine the value of the function and relationships of individual structures of the basal nuclei in the provision of reflex-automatic movements (extrapyramidal system) in the regulation of mood and behavior in the management of the vegetative and emotional reactions.

3.11. To define and show on preparations associative, comissural and projection of nerve fibers of white matter of the brain.

3.12. Explain the concepts: "cytoarchitektonic field", "column", "cell and act of cerebral cortex of the brain."

3.13. To determine the components of the analyzers; to demonstrate on preparations of cerebral hemispheres the centres of the first and second signaling systems.

Nerve fibers are divided into:	- Associative nerve fibers (neurofibrae associationes); - Comissural (adhesive) nerve fibers (neurofibrae comissurales); - Projection nerve fibers (neurofibrae projectiones);

<u>ASSOCIATIVE</u> nerve fibers (neurofibrae associationes) - connect different areas of the cerebral cortex within the same hemisphere and nuclei of different segments of the spinal cord within one half; Distinguish between: - long associative fibers ultimate brain (neurofibrae associationes telencephali); - short associative fibers ultimate brain (neurofibrae associationes breves);	**Long associative fibers ultimate brain (associaciones neurofibrae telencephali):** The superior longitudinal bundle (fasciculus longitidinalis superior) cortex frontal lobe ↔ cortex of the parietal lobe Inferior longitudinal bundle (fasciculus longitidinalis superior) cortex of the temporal lobe ↔ cortex of the occipital lobe The upper occipital-frontal bundle (fasciculus occipitofrontalis) cortex of the occipital lobe ↔ cortex frontal lobe Lower occipital-frontal (subcallosi) bundle (fasciculus occipitofrontalis (subcallosi) inferior) cortex of the occipital lobe ↔ cortex frontal lobe Uncinate bundle (fasciculus uncinatus) cortex of the frontal pole ↔ cortex of the anterior temporal lobe Belt (cingulum) Horizontal and vertical occipital fascicles (fasciculus occipitals verticalis (horizontalis)); **Short associative fibers ultimate brain (associaciones neurofibrae breves) –** connect adjacent convolutions; are called arcuate fibers of the brain (fibrae arcuatae cerebri).

<u>COMISSURAL</u> (adhesive) nerve fibers, neurofibrae comissurales:	**The corpus callosum (corpus callosum).** Components fibrae corporis callosi: - radiatio corporis callosi (radiance); - forceps frontalis minor, frontal (minor) forceps; - forceps occipitalis major, occipital (large) forceps; - tapetum (cover). **The anterior commissure (comissura anterior).** **Comissura fornicis (comissura fornicis).** **The posterior comissira (comissira posterior).** **Comissira habenularum (comissira habenularum).** **Comissural (adhesive) nerve fibers of the spinal cord:** 1. The anterior white comissura (comissura alba anterior) 2. The posterior white comissura (comissira alba posterior)
<u>PROJECTIVE</u> nerve fibers (neurofibrae projectiones)	**There are two groups of projection pathways:** - ascending (afferent, sensory, centripetal); - descending (efferent, motor, centrifugal).

4. Tasks for self-control during preparation to practical classes.

4.1. A list of the main terms, parameters, characteristics that need to learn by the student during the preparation for the lesson.

What is the morphological basis of the reflex? Describe a simple reflex arc.

What are the functions of receptor (sensitivity), false (interneurone) and motor (motor neuron) neurons reflex arc? Where are they located? Show on preparation the constituent parts of the posterior horn of gray

matter of the spinal cord, identify the nuclei that they respond.
What morphological and functional types of neurons isolated in the anterior horns of the gray matter of the spinal cord?
Show on preparation the spinal cord wedge-shaped bundle. Why is it missing in lower segments and what is its function?
Name the efferent and afferent paths of the lateral cord.
What are the pyramidal paths of the spinal cord? What cords does it have?
What are extra pyramidal paths of the spinal cord? What cords does it have?
What are the paths of tactile and pain sensitivity of the spinal cord? What cords does it have?

Show the pyramids of the medulla oblongata, what are the fibres in it?
What paths form the media lemniscus?
What is formed the lateral lemniscus by?
What is formed the posterior longitudinal bundle by?
What is formed the trapezoidal body of the pons by?
What is included in trigle lemniscus?
Name the pathways to the composition of the upper, middle, and inferior cerebellar legs.
Where are the bodies of neurons of the ascending pathways of cortical areas located?
Where are the decussations of ascending conducting tracts of cortical direction located?
What paths are in the white matter of the midbrain cover?
Which path starts from the red nucleus?
What fibers make up the front leg, the knee, the back leg of internal capsule?
Give the definition of cortical end of the analyzer.
Determine motor and sensory centers of the first signaling system and demonstrate the convolutions, which it is located in.
Determine the centers of the second signal system and demonstrate the convolutions, which it is located in.
What are the motor nucleus of cranial nerves. Show on preparation projection of these nuclei on the rhomboid fossa.

4.2. Questions for control of final level preparation.
What are somatosensory paths of unconscious sensitivity?
What are the cerebellar proprioceptive pathways?
What are somatosensory ways conscious sensitivity?
What structures belong to ekstralemniscus ways of conscious sensitivity?
What functions of long afferent pathways are?

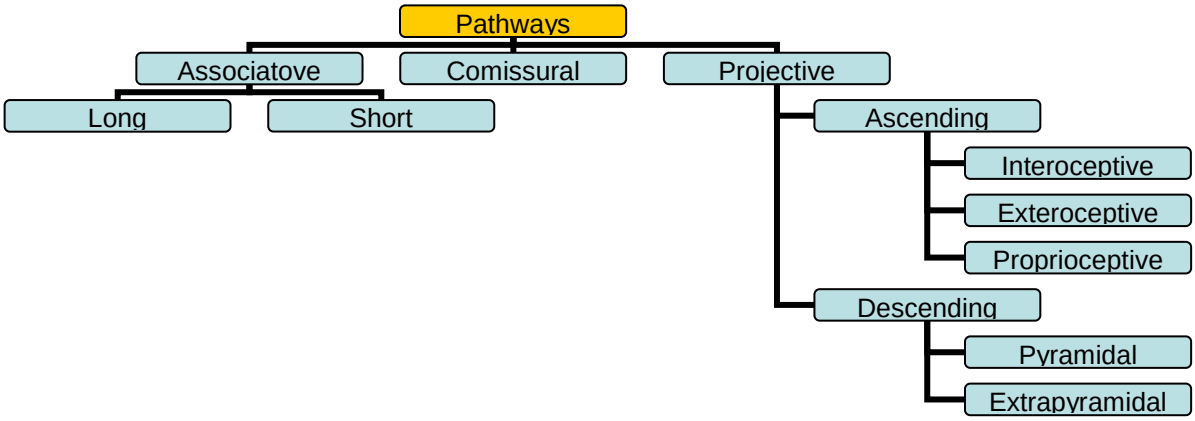
What formed a thin bundle (fasciculus gracilis) and a wedge-shaped bundle (fasciculus cuneatus)? What cord of the spinal cord it pass in?
What formed tractus bulbothalamicus by?
What paths form the lemniscus medialis?
In what nuclei of the thalamus lie the bodies of III neurons tractus gangliobulbothalamocorticalis?
What part of the capsula interna are fibers tractus thalamocorticalis pass?
To give a name to cortical centre tractus gangliobulbothalamocorticalis?
Describe by every neuron the proprioceptive path of cortical areas. Draw a diagram.
Which way is responsible for the feeling deep touch and pressure (species sensitivity). Describe, according to the general scheme its course by every neuron.
Describe the exteroceptive path of pain and temperature sensitivity by every neuron.
In which of the nuclei lie the bodies of II neurons lateralis tractus spinothalamicus?
What cord of the spinal cord is spinothalamicus tractus lateralis, tractus spinothalamicus anterior pass in?
In which nuclei of the thalamus lie the bodies of III neurons lateralis tractus spinothalamicus?
What part of the capsula interna are the axons of III neurons path of pain and temperature?
Name the cortical center of tractus spinothalamicus lateralis?
Describe the proprioception paths of cortical areas by every neuron.
What ways conduct impulses purposeful volitional movements? Show on a preparation, where the neurons, the axons, that form these paths.
Identify and demonstrate on preparations structure (core, path) of the midbrain, which belong to the extrapyramidal system. What kind of movement disorders appear in destruction of the black substance of the pathological process? Which hamergn structures thus affected? Identify and demonstrate on preparations structure (core, path) of the brain stem, which belong to the extrapyramidal system.

The list of standardized practical skills:

<u>THE CONTENT OF TRAINING MATERIAL.</u>

Pathways:

- the combination of functional and gystotopographic homogeneous, united in chains neurons;
- the part of a complex reflex arc;
- morphological relationships between the centers of the CNS;



<u>PROJECTIVE</u> nerve fibers (neurofibrae projectiones)
There are two groups of projective pathways:
- ascending (afferent, sensory, centripetal);
- descending (efferent, motor, centrifugal).

Ascending (afferent) paths are divided into:
1. Somatosensory paths of conscious sensitivity;
2. Somatosensory paths of unconscious sensitivity.

Ascending (afferent) paths (classification by types of receptors):

*** Exteroceptive path (distant, contact)**

A. Exteroceptive paths (from distantly receptor organs of sight, hearing, smell)

B. Exteroceptive paths (from receptors in skin (contact):

Tractus gangliospinothalamocorticalis

Tractus ganglionucleothalamocorticalis

*** Proprioceptive paths**

- Proprioceptive paths cortical directions:

Tractus gangliobulbothalamocorticalis (the Gaulle's path, the Burdah's path)

Proprioceptive path from the receptor apparatus of the head movement

- Proprioceptive path cerebellar directions:
- Tractus spinocerebellaris anterior (Hovers)
- Tractus spinocerebellaris posterior (Flexig)
- Proprioceptive path from the receptor apparatus of the head movement

*** Interoceptive paths** (from baro-, mechano-, and chemoreceptors of the viscera and blood vessels)

Ascending (afferent) paths (classification relative to the lemniscus medialis):

*** Lemniscus paths**

- Exteroceptive paths (from receptors in skin (contact)):

Tractus gangliospinothalamocorticalis
Tractus ganglionucleothalamocorticali
- Proprioceptive paths cortical directions:
Tractus gangliobulbothalamocorticalis (the Gaulle's path, the Burdah's path)
Proprioceptive path from the receptor apparatus of the head movement
*** Extralemniscus paths (**tractus spinoreticularis) – the part of limbic system, it goes to the sea horse (hippocampus). This is multi-sensory multimodal structure of the brain.

Descending (efferent, motor, centrifugal).
Pyramidal:
Tractus corticospinalis lateralis
Tractus corticospinalis anterior
Tractus corticonuclearis
Extrapyramidal:
Tractus rubrospinalis
Tractus tectospinalis
Tractus vestibulospinalis
Tractus olivospinalis
Tractus reticulospinalis
Fasciculus longitudinalis medialis
Tractus thalamostriopalidorubrospinalis
The pathes of the cerebral cortex to the cerebellum:
Tractus corticopontocerebellaris
The efferent vegetative path:
Fibrae frontotemporoparietohypothalamici → fasciculus longitudinalis dorsalis (Schutz)
↓ ↓
the vegetative nucleus of cranial nerves nucleus intermediolateralis (C8-L2; S2-S4).

TEST TASKS "KROK-1"

1. The founder of the Russian neurology A. Y. Kogelnik described syndrome is the combination of hyperkinetic and epileptic seizures caused by encephalitis cldavis. In this pathology process involves the motor area of the cerebral cortex with stimulation of the pyramidal cells of Betz. What descending pathway is the cause of convulsions?
A. Tractus corticospinalis.
B. Tractus rubrospinalis.
C. Tractus tectospinalis
D. Tractus thalamospinalis.
E. Tractus vestibulospinalis.

2. The child, 12 years old, progressive weakness and muscle atrophy – atrophy Werdna-Hoffmann. Scientists have evidence that in this disease destroyed the Betz cells and atrophy of the pyramidal tracts. What gyrus of the brain starts the pyramid way?
A. Gyrus precentralis.
B. Gyrus postcentralis.
C. Uncus.
D. Gyrus supramarginalis.
E. Gyrus angularis.

3. As a result of the stroke, the patient has no volitional movement of the head and neck muscles. Examination of the brain using MRI showed that the hematoma compresses the knee of the internal capsule. What conducting pathway is damaged during hemorrhage?
A. Tractus corticospinalis.
B. Tractus frontopontineus.
C. Tractus corticonuclearis.
D. Tractus thalamocorticalis.
E. Fibrae temporopontineae.

4. In a man there is a paralysis of the right half of the body. What gyrus of the brain is the pathological process?
A. Gyrus postcentralis.
B. Gyrus precentralis sinister.
C. Gyrus precentralis dexter.
D. Gyrus supramarginalis.
E. Gyrus frontalis superior.

5. The patient lost imagination on the parts of your own body, the movement lost clarity, become inconsistent. It is a violation of coordination of movements associated with loss of proprioceptive sensitivity. What conducting tract is affected?
A.Tractus gangliospinothalamocorticalis.
B. Tractus corticospinalis.
C. Tractus ganglionucleothalamocorticalis.
D. Tractus spinovestibularis.
E. Tractus gangliobulbothalamocorticalis.

6. Patient, 63 years old, went to a neurologist with the complaint that for a long time unable to perform carpentry that require precision, because the right hand does a lot

of unfocused movement. What conducting tract is broken?
A. Tractus corticospinalis.
B. Tractus rubrospinalis.
C. Tractus pontoreticulospinalis.
D. Tractus vestibulospinalis.
E. Tractus tectospinalis.

6. As a result of an accident the victim's spine was injured. The examination revealed right-sided paralysis of the lower limbs. What conducting pathway is damaged?
A. Tractus corticospinalis.
B. Tractus tectospinalis.
C. Tractus corticonuclearis.
D. Tractus spinothalamicus anterior.
E. Tractus rubrospinalis.

7. The patient due to traumatic brain injury decreased skin sensitivity. Where the end of the axons of the third neurons of conducting tracts of tactile sensitivity?
A. Gyrus postcentralis.
B. The occipital region.
C. Gyrus cinguli.
D. The frontal area of the cortex.
E. Gyrus precentralis.

8. The patient has the sensory ataxia - a disorder of motor coordination associated with loss of proprioceptive sensitivity. Where are the bodies of the second neuron of the conscious proprioceptive sensitivity?
A. Substantia gelatinosa.
B. Nucleus interstitialis.
C. Nucleus gracilis et nucleus cuneatus.
D. Ganglion spinale.
E. Nuclei proprii.

9. The neurologist was asked by patient L., 52 years old, with complaints of loss the skin sensitivity on the right half of the face in the area of the lower eyelid, dorsum of nose and upper lip. Violation of which the conductive path associated with these symptoms?
A. Tractus gangliospinothalamocorticalis.
B. Tractus corticospinalis.
C. Tractus ganglionucleothalamocorticalis.
D. Tractus spinovestibularis.
E. Tractus gangliobulbothalamocorticalis.

10. After injury the patient admitted to decrease a pain and temperature sensitivity the skin of the upper limb. Where are the bodies of the first neurons the paths of pain and temperature sensitivity?
A. The anterior horns of the spinal cord.
B. The posterior horns of the spinal cord.
C. The lateral horns of the spinal cord.
D. Ganglion sensorium nervi spinalis.
E. Thalamus.

11. In a patient there is a sensory ataxia - a disorder of motor coordination associated

with loss of proprioceptive sensitivity. Which path is the conductor of the conscious proprioceptive sensitivity from the upper half of the body?
A.Tractus gangliospinothalamocorticalis.
B. Fasciculus cuneatus.
C. Tractus ganglionucleothalamocorticalis.
D. Tractus spinovestibularis.
E. Fasciculus gracilis.

12. As a result of infarction in the pool of deep branches the middle cerebral arteries the patient developed spastic hemiplegia (paralysis of one half of the body), Central paresis facial muscles and tongue on the side opposite the lesion, which is associated with damage to the cortico-spinal path. Where is the decussation of the fibres of this path?
A. Decussatio tegmentalis posterior.
B. Decussatio lemniscorum.
C. Velum medullare superius
D. Decussatio pyramidum.
E. Decussatio tegmentalis anterior.

13. As a result of development of a brain tumor in the left parietal lobe of the brain, there was a loss of general sensitivity in the opposite half of the body. Which path is the conductor of general sensitivity?
A. Tractus spinovestibularis
B. Tractus spinocerebellaris posterior.
C. Tractus ganglionucleothalamocorticalis.
D. Tractus gangliospinothalamocorticalis.
E. Tractus spinoreticularis.

14. In a patient with a tumor of the left parietal lobe of the brain there is a violation of temperature and pain sensitivity on the right half of the body. Where are the bodies of the second neurons of conducting tracts of pain and temperature sensitivity located?
A. Substantia gelatinosa.
B. Nucleus interstitialis.
C. Nucleus gracilis та nucleus cuneatus.
D. Nucleus thoracicus.
E. Ganglion sensorium nervi spinales.

15. After a spinal injury there is an absent proprioceptive sensitivity of the lower half body and lower limbs in a patient. Damage of what conductive path may be causing by this?
A. Tractus gangliospinothalamocorticalis.
B. Fasciculus cuneatus.
C. Tractus ganglionucleothalamocorticalis.
D. Tractus spinovestibularis.
E. Fasciculus gracilis.

16. The patient, suffering from syringomyelia (a chronic disease characterized by the formation of cavities in the spinal cord and medulla oblongata), there is loss of pain and temperature sensitivity of the skin of the upper extremities and trunk. The affected body II neurons of the conductive path, the total sensitivity. In what part of the spinal cord is localized the pathological process?
A. The anterior horns of the cervical enlargement.
B. The posterior horns of the cervical enlargement.

C. The lateral cords.
D.The anterior horns of the lumbosacral enlargement.
E. The posterior horns of the lumbosacral enlargement.

17. The patient has a hemiplegia – central paralysis of left side of body, paresis of muscles of tongue, face (the so-called contracture Wernicke-Mann), hemianestesia, hemianopsia (blindness in the opposite hearth fields of view). Doctors have concluded that the triad hemi characteristic lesions the fibers of the internal capsule. What type of fibers the ultimate brain applies the internal capsule?
A. Projective.
B. Long associative.
C. Adhesive.
D. Short associative.
E. Arc.

18. In a patient after colds appeared a violation of pain and temperature sensitivity the mucous membrane of the anterior 2/3 of the tongue. Which path damaged?
A. Tractus gangliospinothalamocorticalis.
B. Tractus corticospinalis.
C. Tractus ganglionucleothalamocorticalis.
D. Tractus spinovestibularis.
E. Tractus gangliobulbothalamocorticalis.

19. Due to insult (bleeding in brain) of the patient no volitional movement of the the head and neck muscles. Examination of the brain using NMR showed that the haematoma is in the knee of internal capsule. What pathway is damaged in the patient?
A. Tractus corticonuclearis.
B. Tractus corticospinalis.
C. Tractus corticothalamicus.
D. Tractus frontopontinus.
E. Tractus thalamocorticalis.

20. After the accident the man, 53 years old, was revealed with lack of muscle-joint sensitivity of the body. Installed damage thin and wedge-shaped nuclei of the medulla oblongata, in which the bodies of the second neurons of the conductive path, which is responsible for conscious proprioception and tactile sensitivity. Which conducting path axons from the nucleus gracilis et cuneatus nucleus would reach the thalamus?
A. Lemniscus lateralis.
B. Lemniscus medialis.
C. Lemniscus trigeminalis.
D. Tractus talamocorticalis.
E. Tractus spinothalamicus lateralis.

21. The patient revealed local damage to the pars basilaris pontis with dysfunction of longitudinal and transverse fibers. What fibers form the fibrae transversae,
the main part of the pons?
A. Fibrae corticospinales.
B. Fibrae corticonucleares.
C. Fibrae pontocerebellares.
D. Fibrae corticoreticulares.
E. Fibrae corticopontinae.

22. The heart attack a.cerebri posterior damaged the posterior part of the hypothalamic area, the body of Lewis, toothed-rednucleus-thalamic path. Which formations there is tractus cerebellorubronuclearis?
A. In the lower cerebellar legs.
B. In the middle cerebellar legs.
C. In the upper cerebellar legs.
D. In the legs of the piece.
E. In the legs of the brain.

23. The physician has established the patient's diagnosis: olivopontocerebellar degeneration, which is characterized by severe degeneration of the white matter of the cerebellum, middle cerebellar pedicles and lead-cerebellar pathways. In any structures of the CNS is tractus olivocerebellaris?
A. In the upper cerebellar leg.
B. In the lower cerebellar leg.
C. In the middle cerebellar legs.
D. In the legs of the brain.
E. In the back leg of internal capsule.

24. The patient has the “dry syndrome” (Shegren’s syndrome) – a failure of the external secretion glands. Disturbed lacrimation, salivation, atrophy of sweat and sebaceous glands. Suggest lesions of the hypothalamus. What path connects the hypothalamus with the autonomic nuclei of cranial nerves?
A. Fasciculus longitudinalis medialis.
B. Tractus tectospinalis.
C. Fasciculus longitudinalis superior.
D. Fasciculus longitudinalis inferiors.
E. Fasciculus longitudinalis dorsalis.

25. The patient, 50 years old, revealed thalamic syndrome, manifestations of which is intense pain of half of the body, a kind of hand position (“thalamic hand”) - У хворого, 50 років, виявлено таламічний синдром, проявами якого є інтенсивний біль половини тіла, своєрідне положення руки ("таламічна рука") – forearm bent and pronoun, the hand is bent, the fingers are straighten and constantly shaking. Lesion of which nuclei of the thalamus associated with ekstrapiramidna system, is the cause of the peculiar position of the upper limb?
A. Media.
B. Posterior-lateral ventral.
C. Cores cushions.
D. Posterior-medial ventral.
E. Central.

26. The heart attack a.cerebri posterior damaged the posterior part of the hypothalamic area, the body of Lewis, toothed-rednucleus-thalamic path. What is the conducting path starts from this station?
A. Fasciculus longitudinalis medialis.
B. Fasciculus longitudinalis dorsalis.
C. Fasciculus longitudinalis superior.
D. Fasciculus longitudinalis inferior.
E. Tractus tectospinalis.

27. The patient with local defeat of a brainstem (observed neurosyphilis) struck - the medial longitudinal bundle. Thus disrupting communication between the nuclei of the oculomotor nerve, which provides friendly the reflex movement of the eyeballs. What nucleus is damaged, the patient, suffering from neurosyphilis?
A. Darkshevich nucleus.
B. Kahal nucleus.
C. Zemmering nucleus.
D. Lewis nucleus.
E. Mainert nucleus.

28. The patient with local defeat of a brainstem (observed neurosyphilis) damaged pathways in the legs of the brain. What is leading the way forms decussatio tegmenti ventralis?
A. Tractus tectospinalis.
B. Tractus rubrospinalis.
C. Tractus corticospinalis anterior
D. Tractus corticospinalis lateralis.
E. Tractus corticonuclearis.

29. The patient with local defeat of a brainstem (observed neurosyphilis) damaged pathways in the legs of the brain. What is leading the way forms decussatio tegmenti dorsalis?
A. Tractus tectospinalis.
B. Tractus rubrospinalis.
C. Tractus corticospinalis anterior
D. Tractus corticospinalis lateralis.
E. Tractus corticonuclearis.

30. The patient, 54 years old, in the result of the pathological process corrupted gelatinous substance, located in the posterior horns of the spinal cord. What kind of sensitivity is not observed in the patient?
A. Temperature and pain.
B. Tactile.
C. Stereognosis.
D. Vibrating.
E. Proprioceptive.

31. The patient, in a result of prolonged diseases of the brain, has involuntary movement, disturbed muscle tone of the body. The breach of which the lead path, located in the lateral cords of the spinal cord, indicate these symptoms?
A. Tractus tectospinalis.
B. Tractus corticospinalis.
C. Tractus corticonuclearis.
D. Tractus spinothalamicus lateralis.
E. Tractus rubrospinalis.

32. The patient, after the injury of the cervical spine, has lost the ability to consciously contract the muscles of the neck. What pathway in the spinal cord is responsible for conscious innervation of skeletal muscle?
A. Tractus rubrospinalis.
B. Tractus corticospinalis anterior et lateralis.
C. Tractus olivospinalis.

D. Tractus bulbothalamicus.
E. Tractus reticulospinalis.

33. The tumor damaged the gray matter of the spinal cord. Which of the following nuclei located in the posterior horn of the spinal cord?
A. Nucleus centralis.
B. Nucleus proprius.
C. Nucleus intermediomedialis.
D. Nucleus anterolateralis.
E. Nucleus n.phrenici.

34. As a result of growth of the tumor in the region of the lateral cord of spinal cord the patient has lost the ability to respond to pain and temperature stimuli. Afferentny which way the spinal cord is responsible for conducting the pain impulse to the cortex?
A. Fasciculus gracilis.
B. Tractus spinothalamicus anterior.
C. Tractus spinothalamicus lateralis.
D. Tractus spinocerebellaris posterior.
E. Tractus tectospinalis.

35. The patient, suffering from tuberculosis, tuberculoma localized in the posterior cords of the white matter of the spinal cord. Dysfunction can be in connection with this injury?
A. The loss of pain and temperature sensitivity.
B. The loss of conscious proprioceptive sensitivity.
C. The loss of unconscious proprioceptive sensitivity.
D. The loss in auditory sensitivity.
E. The loss of visual sensitivity.

36. The patient was noted astereognosis (doesn't recognize the object on the touch). After a CT-scan revealed damage to the back cord of spinal cord. What pathway in the spinal cord is not functioning?
A. Tractus vestibulospinalis.
B. Tractus spinocerebellaris posterior.
C. Tractus spinocerebellaris anterior.
D. Tractus spinothalamicus lateralis.
E. Fasciculus cuneatus.

37. The patient revealed symptoms somatoemotional of the anterior horns of the spinal cord. Through which sulcus of spinal cord come out the axons of these neurons?
A. Sulcus anterolateralis.
B. Sulcus posterolateralis.
C. Sulcus medianus posterior.
D. Fissura mediana anterior.
E. Sulcus intermedius posterior.

38. In result of road accident the man was injured spine. The examination revealed right-sided paralysis of the lower limbs. What part of the CNS is damaged?
A. The lateral cortico-spinal path.
B. The intermediate horn of the spinal cord.

C. The posterior horn of the spinal cord.
D. The posterior cord of spinal cord.
E. The posterior thoracic nucleus of the spinal cord**.**

39. The woman, 42 years, after suffering injuries to the spinal column is no conscious proprioceptive sensitivity of the upper half of the trunk and upper extremities. Damage of what conductive path may be causing by this?
A. Fasciculus longitudinalis medialis.
B. Fasciculus cuneatus (Бурдаха).
C. Tractus spinothalamicus lateralis.
D. Tractus spinothalamicus anterior.
E. Tractus corticospinalis lateralis.

40. Male, 47 years old, taken to hospital with injury of the thoracic spine. During the surgery revealed damage to the spinal cord on both sides of the rear medial furrow. What pathways are directly adjacent to the furrow?
A. Tractus spinocerebellaris posterior.
B. Fasciculus cuneatus(Burdah).
C. Fasciculus longitudinalis posterior.
D. Tractus spinocerebellaris anterior.
E. Fasciculus gracilis (Gaulle).

41. The young man, 16 years old, at the time of the accident was damaged spine. During the inspection it was revealed that the young man is no sensitivity in the left half of the body, although the damage observed on the right. Damage of what conductive path could cause by this?
A. Fasciculus cuneatus (Burdah), fasciculus gracilis (Gaulle).
B. Tractus spinothalamicus anterior справа.
C. Tractus spinothalamicus anterior зліва.
D. Tractus rubrospinalis to the left.
E. Tractus corticonuclearis to the right.

42. At the patient the pathological process in the posterior horns of the spinal cord caused the destruction of the rear thoracic (dorsal) nucleus. Citlivosti for which it is responsible?
A. Pain.
B. Temperature.
C. Tactile.
D. Proprioceptive
E. Stereognosis.

43. After injury of the spine the patient has no conscious proprioceptive sensitivity of the lower half of the trunk and lower extremities. What pathway in the spinal cord damaged?
A. Fasciculus cuneatus.
B. Tractus spinothalamicus lateralis.
C. Tractus spinothalamicus anterior.
D. Tractus reticulospinalis.
E. Fasciculus gracilis.

44. Patient L., 69 years, hospitalized in the neurological department of hospital with complaints of pain in the lumbar region of the body. After a detailed examination of the

patient, the doctor diagnosed inflammation of the anterior roots of spinal nerves L4-L5. Processes of which neurons are formed anterior roots of spinal nerves?

A. Axons nucleus thoracicus.

B. Dendrites nuclei proprii.

C. Axons substantia gelatinosa.

D. Somatoneurons of the anterior horns of the spinal cord.

E. dendrites of pseudo-unipolar neurons whose bodies lie in ganglia sensoria n.spinalis.

45. Patient P., after exposure, admitted to the hospital with complaints of pain in the occipital region and the back region of the neck. The doctor diagnosed inflammation of the posterior roots of cervical spinal nerves. Than formed by the back roots of spinal nerves?

A. Axons of pseudo-unipolar sensitive neurons.

B. Axons of anterior horns neurons of the spinal cord.

C. Axons of the thoracic nucleus neurons.

D. Dendrites of pseudo-unipolar sensitive neurons.

E. Axons of neurons of the own nuclei posterior horns of the spinal cord.