

Ministry of Science and Higher Education of the Russian Federation
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ULYANOVSK STATE UNIVERSITY
Faculty of Medicine
Department of General and Clinical Morphology

**METHODOLOGICAL RECOMMENDATIONS
FOR OF STUDENTS
ON DISCIPLINE «NEUROANATOMY »
(practical (laboratory) lessons)**

Specialty - 31.05.01 «General medicine»
Form of study: intramural

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Study guide on a subject matter “Neuroanatomy”.-Ulyanovsk, UIGU, 2023.

The study guide is prepared according to requirements of the working program and contains methodical indications for the main sections of a subject matter “Neuroanatomy” according to the existing curriculum. The study guide is intended for the students of medical faculty studying on specialties 31.05.01 “General medicine”

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INTRODUCTION

Short characteristic of a subject matter “Neuroanatomy”.

1. GOALS AND TASKS OF MASTERING THE DISCIPLINE:

Goals of mastering the discipline - is the acquisition by students of knowledge about the form and structure of the human body, its constituent organs and systems.

The process of mastering the discipline "Neuroanatomy" is aimed at the formation of general cultural and general professional competencies (**GPC-5**).

Tasks of mastering the discipline:

- to form students' knowledge about the shape of the human body, organs and systems;
- the study of anatomy as a fundamental biomedical discipline on the development and structure of organs and systems, the study of the development, structure of sex, age and individual variability of organs and systems as a whole and their individual parts.

2. THE LIST OF PLANNED LEARNING OUTCOMES ON DISCIPLINE (MODULE), CORRELATED WITH THE PLANNED RESULTS OF MASTERING THE BASIC PROFESSIONAL EDUCATIONAL PROGRAM

Code and name of the implemented competence	List of planned learning outcomes for discipline (module), correlated with indicators of achievement of the competencies
GPC-5 Able to assess morphofunctional, physiological conditions and pathological processes in the human body to solve professional problems	IA-1_{GPC5} The student must know: <ul style="list-style-type: none">• structure, topography and development of cells, tissues, organs and systems of the body in interaction with their function in the norm and pathology, features of the organismic and population levels of organization of life;• anatomical and physiological, age-sexual and individual features of the structure and development of a healthy and sick organism;• the structure of the human body in relation to the function and topography of systems and organs, the functional systems of the human body, their regulation and self-regulation when exposed to the external environment in the norm and pathology.

	<p>IA-2_{GPC5} The student must be able to:</p> <ul style="list-style-type: none"> • use educational, scientific, popular science literature, the Internet for professional activities; • palpate the main bony landmarks on a person, outline the topographic contours of organs and the main vascular and nerve trunks; • explain the nature of deviations in the course of development that can lead to the formation of variants of anomalies and defects.
	<p>IA-3_{GPC5} The student must possess:</p> <ul style="list-style-type: none"> • the methods for assessing the anatomical, physiological and pathological conditions of the patient; • the methods of physical examination of the patient.

PRACTICAL (LABORATORY) LESSON №1

Theme: Functional anatomy of the brain, the topography of the roots of the cranial nerves

Purpose of a lesson: to gain knowledge about the form, development, functions and structure of the brain. To be able to determine the boundaries of the brain. To study the topography of cranial nerves roots on the base of brain.

Standard equipment: natural preparations of the brain. Tables.

Student should know:

1. The stages of brain development in embryogenesis.
2. General anatomy of brain regions: borders, main structures and functions of the telencephalon.
3. General anatomy of brain regions: borders, main structures and functions of the midbrain.
4. General anatomy of brain regions: border, main structures and functions of the hindbrain.
5. General anatomy of brain regions: borders, main structures and functions of the diencephalon.
6. General anatomy of brain regions: borders, main structures and functions of the myelencephalon.
7. The base of the brain: topography of 12 pairs roots of the cranial nerves.
8. The base of the brain: the structure of hypothalamus.
9. Surfaces, edges and slits of the brain.
10. The brain stem: structure, function.

Student should be able to:

1. Properly call (in Latin) anatomical structures, which are provided in list of practical skills in the workbook.
2. Determine the borders and basic structures of the telencephalon.
3. Determine the borders and basic structures of the diencephalon.
4. Determine the borders and basic structures of the midbrain.
5. Determine the borders and basic structure of the hindbrain.

6. Determine the borders and basic structures of the myelencephalon.
7. Determine the topography of cranial nerves roots on the base of brain.
8. On roentgens to be able to show all the basic anatomical structure of the brain.

PRACTICAL (LABORATORY) LESSON №2

Theme: The telencephalon.

Purpose of a lesson: to gain knowledge about the form, development, functions and structure of the telencephalon. To be able to determine the boundaries, furrows and convolutions of each share of the final cord. To study the structure and function of the olfactory brain.

Standard equipment: natural products of the brain hemispheres. Tables. Model of hemispheres.

Student should know:

1. The development of the telencephalon in phylogeny.
2. Borders, furrows and convolutions of the frontal lobe.
3. Borders and gyri of the parietal lobe.
4. Borders, gyrus and sulcuses of the temporal lobe.
5. Borders, gyrus and sulcuses of the occipital lobe.
6. Borders, gyrus and sulcus of the insular lobe.
7. Cytoarchitectonics of the large brain's pallium.
8. Functional anatomy and topography of cortical analyzers.
9. The structures and functions of the olfactory brain.
10. The concept of the limbic system of the brain.
11. The most important anomalies in the structure of telencephalon.
12. External benchmarks of the studied anatomical structures.

Student should be able to:

1. Properly call (in Latin) anatomical structures, which are provided in list of practical skills in the workbook.
2. Determine the boundaries and gyri of the frontal lobe of the cerebral hemispheres.
3. Determine the boundaries and gyri of the parietal lobe of the cerebral hemispheres.
4. Determine the boundaries and gyri of the temporal lobe of the cerebral hemispheres.
5. Determine the boundaries and gyri of the occipital lobe of the cerebral hemispheres.
6. Determine the sulcuses and gyri of the olfactory brain.
7. Determine the poles surfaces and edge of the hemispheres.
8. On roentgens to be able to show all the basic anatomical structure of the hemispheres.

PRACTICAL (LABORATORY) LESSON №3

Theme: The basal nuclei (nuclei basales)

Purpose of a lesson: to gain knowledge about the functions and structure of basal nuclei. To study the structure and conductive path of the internal capsule. Gain knowledge about the

structure and function of commissural fibers: the corpus callosum, the arch, the anterior commissura.

Standard equipment: natural products of the brain hemispheres. Tables. Model of basal nuclei.

Student should know:

1. The functions of basal nuclei. The concept of striopallidar system.
2. Structure and function of the caudate nucleus.
3. Structure and function of lenticular nucleus.
4. Structure and function of the amygdala.
5. The concept of neostriatum and paleostriatum.
6. The internal capsule: structure, structure of pathways.
7. The topography of the outermost and outer capsules.
8. Structure and function of the arch.
9. Structure and function of the anterior commissura.
10. The structure and function of the corpus callosum.

Student should be able to:

1. Properly call (in Latin) anatomical structures, which are provided in list of practical skills in the workbook.
2. Determine the anatomical structures of the caudate nucleus.
3. Determine the anatomical structures of the lenticular nucleus.
4. Determine the anatomical structures of the inner, outer and outermost capsules.
5. Determine the anatomical structure of the corpus callosum.
6. Determine the anatomical structure of the arch.
7. Determine the anatomical structures of the lateral ventricle wall.
8. On roentgens to be able to show all the major anatomical structures of the basal ganglia and lateral ventricles

PRACTICAL (LABORATORY) LESSON №4

Theme: The diencephalon. The midbrain

Purpose of a lesson: gain knowledge about the structure and functions of the intermediate and midbrain. To be able to define their boundaries, and parts structure.

Standard equipment: natural products of the brain hemispheres. Tables.

Student should know:

1. The functions of the intermediate and midbrain.
2. The development of intermediate and midbrain in the phylogeny.
3. General anatomy of the diencephalon.
4. The structure and function of the thalamus.
5. Features of the structure and functions of epithalamus.
6. Structure and functions of metathalamus.
7. Features of the structure and function of the hypothalamus.
8. The concept of the hypothalamic-pituitary system.
9. Brain Stem: structure, composition conducting pathways.
10. Tire quadrigemina topography nuclei.
11. The structures of the extrapyramidal system, included in the midbrain.

Student should be able to:

1. Properly call (in Latin) anatomical structures, which are provided in list of practical skills in the workbook.
2. Determine the anatomical structures of the brain stems.
3. Determine the anatomical structures of the aqueductus cerebri and midbrain tectum.
4. Determine the anatomical structures of the thalamus.
5. Determine the epithalamus anatomical structure.
6. Determine the anatomical structures of the hypothalamus.
7. Determine the metathalamus anatomical structure.
8. Determine the anatomical structures of the third ventricle wall.
9. On roentgens to be able to show all the major anatomical structures of the intermediate and midbrain.

PRACTICAL (LABORATORY) LESSON №5**Theme: The metencephalon (metencephalon)**

Purpose of a lesson: to gain knowledge about the external and internal structure of the pons and cerebellum. To be able to define their boundaries, and parts structure. To be able to define the boundaries and structure of the isthmus of rhombencephalon.

Standard equipment: natural products of the brain hemispheres. Tables.

Student should know:

1. Structure of the isthmus of rhombencephalon.
2. General anatomy of cerebellum.
3. Hemisphere, vermis, their parts, lobes and segments.
4. The functions of cerebellum.
5. The stages of development of the cerebellum in the phylogeny.
6. The structure of gray and white matters of the cerebellum.
7. Structure, parts and general anatomy of the pons.
8. The boundaries of the bridge.
9. The nuclei, which are located within the pons.
10. The conductive path of the pons.

Student should be able to:

1. Properly call (in Latin) anatomical structures, which are provided in list of practical skills in the workbook.
2. Determine the anatomical structure of the pons.
3. Determine the anatomical structures of cerebellum's hemispheres.
4. Determine the anatomical structure of the cerebellar vermis.
5. To find cerebellum's nuclei on the cuts.
6. Determine the anatomical structures of the isthmus rhombencephalon.
7. On roentgens to be able to show all the basic anatomical structure of the hindbrain.

PRACTICAL (LABORATORY) LESSON №6

Theme: The medulla oblongata. The fourth ventricle

Purpose of a lesson: to gain knowledge about the external and internal structure of the medulla oblongata. To be able to determine the boundaries, surfaces and structure of the medulla oblongata.

Standard equipment: natural products of the brain hemispheres. Tables.

Student should know:

1. The general anatomy of the myelencephalon (medulla oblongata) , its parts.
2. The boundaries of the myelencephalon.
3. Development of the myelencephalon, its functional significance.
4. Anatomical formation in the ventral surface of myelencephalon.
5. Anatomical formation on the dorsal surface of the myelencephalon.
6. Core and functional centers of the myelencephalon.
7. The conductive paths of the myelencephalon.

Student should be able to:

1. Properly call (in Latin) anatomical structures, which are provided in list of practical skills in the workbook.
2. Determine the anatomical structure of ventral surface of the medulla oblongata.
3. Determine the anatomical structures of the dorsal surface of the myelencephalon.
4. Determine the anatomical structures of cerebellar vermis.
5. Determine the topography of the nuclei of cranial nerves, projecting at the level of myelencephalon.
6. On roentgens to be able to show all the basic anatomical structures of the myelencephalon.

PRACTICAL (LABORATORY) LESSON №7

Theme: The system of the brain ventricles. Intermeningeal spaces of the brain and the spinal cord

Purpose of a lesson: to gain knowledge about the functions and structure of brain ventricles. Explore the boundaries and walls of the lateral ventricles. Explore walls of III ventricle. Explore the boundaries and walls of the IV ventricle.

Standard equipment: natural products of the brain (lateral ventricles, III ventricle. IV ventricle.) Tables.

Student should know:

1. Name the parts of the lateral ventricle. Where is each of these parts situated?
2. Name the walls of the fourth ventricle. Where is each of these parts situated?
3. The structure of the lateral ventricle and its connection with the third ventricle.
4. The structure of the third ventricle, its side posts and fourth ventricles.
5. The walls of the third ventricle.
6. The fourth ventricle, its shape, walls and connections.

7. Liquor circulation.

Student should be able to:

1. Properly call (in Latin) anatomical structures, which are provided in list of practical skills in the workbook.
2. Determine (Describe) the anatomical structures of the lateral ventricles walls.
3. Determine (Describe) the anatomical structures of the third ventricle walls.
4. Determine (Describe) the anatomical structures of the fourth ventricle walls.
5. On roentgens to be able to show all the major anatomical structures of the lateral ventricles, third ventricle, fourth ventricle fourth ventricle.

PRACTICAL (LABORATORY) LESSON № 8

Theme: The rhomboid fossa

Purpose of a lesson: to study the structure of the rhomboid fossa. To study topography of the nuclei of cranial nerves on the rhomboid fossa.

Standard equipment: natural products of the brain hemispheres. Tables.

Student should know:

1. Rhomboid fossa, its boundaries, relief and basic structure.
2. What cranial nerves are projected on the rhomboid fossa?
3. Projection of somatic nuclei 6, 11 and 12 pairs of cranial nerves.
4. Projection of somatic, vegetative and sensitive nuclei 5 pairs of cranial nerves.
5. Projection of somatic, autonomic and sensory nuclei 7 pairs of cranial nerves.
6. Projection of somatic, autonomic and sensory nuclei 9 pairs of cranial nerves.
7. Projection of somatic, autonomic and sensory nuclei 10 pairs of cranial nerves.
8. The projection of sensitive nuclei 8 pairs of cranial nerves.

Student should be able to:

1. Properly call (in Latin) anatomical structures, which are provided in list of practical skills in the workbook.
2. Determine the anatomical boundaries and structure of the rhomboid fossa.
3. Determine the projection of the motor nuclei the cranial nerves on the rhomboid fossa.
4. Determine the projection of sensory nuclei of the cranial nerves on the rhomboid fossa.
5. Determine the projection of autonomic nuclei of the cranial nerves on the rhomboid fossa.

PRACTICAL (LABORATORY) LESSON № 9

Theme: Upward tracts of the brain and spinal cord

Purpose of a lesson: to study the anatomical structure of the brain

Standard equipment: Tables. Atlas.

Student should know:

1. Associative conductive tracts and their functions
2. Commissural conductive tracts and their functions
3. What conductive tracts are called projection?
4. Classification of projection conductive tracts.

Student should be able to:

1. Properly call (in Latin) anatomical structures, which are provided in list of practical skills in the workbook.
2. Draw a scheme of the lateral spino — thalamical tract and explain its functions.
3. Draw a scheme of the anterior spino — thalamical tract and explain its functions.
4. Draw a scheme of the proprioceptive tract of cortical direction and explain its functions.
5. Draw a scheme of the posterior spino — cerebellar tract and explain their functions.
6. Draw a scheme of the anterior spino — cerebellar tract and explain their functions.

PRACTICAL (LABORATORY) LESSON № 10

Theme: Downward tracts of the brain and spinal cord

Purpose of a lesson: to study the anatomical structure of the brain

Standard equipment: Tables. Atlas.

Student should know:

1. Classification of efferent tracts (pathways) .
2. Classification of pyramidal tracts (pathways)
3. Classification of associative tracts (pathways)

Student should be able to:

1. Properly call (in Latin) anatomical structures, which are provided in list of practical skills in the workbook.
2. Draw a scheme of the lateral corticospinal tract and explain its functions.
3. Draw a scheme of the anterior corticospinal tract and explain its functions.
4. Draw a scheme of the corticonuclear tract and explain its functions.

PRACTICAL (LABORATORY) LESSON № 11

Theme: Downward tracts of the brain and spinal cord

Purpose of a lesson: to study the anatomical structure of the brain

Standard equipment: Tables. Atlas.

Student should know:

1. Classification of efferent tracts (pathways) .
2. Classification of extrapyramidal tracts (pathways)
3. Classification of associative tracts (pathways)

Student should be able to:

1. Properly call (in Latin) anatomical structures, which are provided in list of practical skills in the workbook.
2. Draw a scheme of the tectospinal tract and explain their functions.
3. Draw a scheme of the rubrospinal tract and explain their functions.

PRACTICAL (LABORATORY) LESSON №12

Theme: I-IV pairs of the cranial nerves

Purpose of a lesson: to study the anatomy of 1-4 cranial nerves, innervation area

Standard equipment: anatomical and relief tables, brain with the cranial nerves (anatomical preparation)

The student should know:

1. The functional significance of 1-4 craniocerebral nerves.
2. The nuclei 1-4 craniocerebral nerves.
3. Through what anatomical formation the olfactory nerve enters the skull?
4. Through what anatomical formation the optic nerve enters the skull?
5. Parts of the optic nerve.
6. The nuclei of the oculomotor nerve .
7. Innervation areas of the 3 pairs of cranial nerves.
8. Through which anatomical formation passes the oculomotor nerve?
9. Through which anatomical formation passes the trochlear nerve?
10. Innervation areas of the 4 pairs of cranial nerves.

The student should be able to:

1. Demonstrate the olfactory nerve.
2. Find the parts of optic nerve.
3. Demonstrate the nuclei of the oculomotor nerve.
4. Recount the branches of oculomotor nerve.
5. Demonstrate the trochlear nerve.

PRACTICAL (LABORATORY) LESSON №13

Theme: V- VII pairs of the cranial nerves

Purpose of a lesson: to study the anatomy of 5-8 cranial nerves, innervation area

Standard equipment: anatomical and relief tables, brains with the cranial nerves (anatomical preparation)

The student should know:

1. The anatomy of the trigeminal nerve.
2. The branches and innervation areas of the optic nerve.
3. The branches and innervation areas of the maxillary nerve.
4. The branches and innervation areas of the mandibular nerve.
5. Anatomy of the abducent nerve.
6. The branches and innervation areas of the facial nerve.
7. Motor branches of the facial nerve and their innervation areas.
8. Anatomy of the vestibulocochlear nerve.
9. The nuclei of vestibulocochlear nerve.
10. Through which anatomical formation passes the 5-8 craniocerebral nerves.

The student should be able to:

1. Demonstrate the trigeminal nerve.
2. Find the branches of the trigeminal nerve.
3. Demonstrate the nuclei of abducent nerve.
4. Recount the branches of the oculomotor nerve.
5. Demonstrate the trochlear nerve.

PRACTICAL (LABORATORY) LESSON №14

Theme: VIII- XII the cranial nerves

Purpose of a lesson: to study the anatomy of 9-12 cranial nerves, innervation area

Standard equipment: anatomical and relief tables, brains with the cranial nerves (anatomical preparation)

The student should know:

1. Anatomy of the glossopharyngeal nerve.
2. Branches and innervation areas of the IX nerve.
3. The nuclei of the glossopharyngeal nerve. Where they are located?
4. The nuclei of the vagus nerve. Where they are located?
5. Anatomy of the X pair of craniocerebral nerves.
6. Head part branches of the vagus nerve and their innervation areas.
7. Cervical part branches of the vagus nerve and their innervation areas.
8. The branches of thoracic and abdominal parts of vagus nerve.
9. Formation of the accessory nerve. The branches and their innervation areas.
10. The topography of the hypoglossal nerve

The student should be able to:

1. Demonstrate the glossopharyngeal nerve
2. Find branches of the vagus nerve.
3. Demonstrate the nuclei of vagus nerve.
4. Recount the branches of vagus nerve.
5. Demonstrate the accessory and hypoglossal nerves.

PRACTICAL (LABORATORY) LESSON №15

Theme: Functional anatomy of organ of vision

Purpose of a lesson: to study the structure, topography and functional features of the organ of vision.

Standard equipment: natural product of the organ of vision. Tables. Model of the organ of vision..

Student should know:

1. Anatomical structure and development of the visual analyzer.

2. The structure of the fibrous covering of the eyeball.
3. The structure of the vascular covering of the eyeball.
4. Anatomical formation and function of the accommodative apparatus of the eye.
5. The anatomical structure and function of dioptric apparatus of the eye.
6. The structure of the sensitive membrane of the eyeball.
7. Education and aqueous humor outflow.
8. Structure and functions of the structures of the auxiliary apparatus of the eye.
9. The anatomical structure of the eyeball nuclei.

Student should be able to:

1. Properly call (in Latin) anatomical structures, which are provided in list of practical skills in the workbook.
2. Determine the anatomical structures of the fibrous covering of the eyeball.
3. Determine the anatomical structures uvea.
4. Determine the anatomical structure the sensitive membrane of the eyeball.
5. Determine the anatomical structures of the eyeball nuclei.
6. Determine the anatomical structures of the auxiliary apparatus of the eye.

PRACTICAL (LABORATORY) LESSON №16

Theme: Functional anatomy of organ of hearing and balance

Purpose of a lesson: to study the anatomy of organ of hearing and balance

Standard equipment: anatomical and relief tables of the organ of organ of hearing and balance (anatomical preparation)

The student should know:

1. Where is the center of the cortical auditory analyzer?
2. The anatomical structures of the ear.
3. Anatomy of the external auditory canal.
4. The structure and parts of the tympanic membrane.
5. The walls of tympanic cavity of the middle ear.
6. The auditory ossicles, their structure and function.
7. Structure and function of the auditory tube.
8. Parts of the bony labyrinth.
9. Formation of the membranous labyrinth.
10. The structure of the spiral organ.

The student should be able to:

1. Demonstrate the structure of the outer ear
2. Find the auditory ossicles
3. Demonstrate the nuclei vestibulocochlear nerve
4. Demonstrate the walls of the tympanic cavity
5. Demonstrate the tympanic and vestibular ladders

PRACTICAL (LABORATORY) LESSON №17

Theme: The organ of smell. The organ of taste.

Purpose of a lesson: to study the anatomy of the organ of smell, the organ of taste

Standard equipment: relief tables of the organ of smell, the organ of taste

The student should know:

1. What are the three types of cells in the olfactory epithelium?
2. What are olfactory bulbs?
3. What happens in the olfactory glomeruli?
4. What you describe the structure of a taste bud?
5. What is the sensory role of taste hairs?

The student should be able to:

1. Describe the structure of organ of smell
2. Describe the structure of organ of taste
3. Describe the nerves of the organ of taste
4. Describe the nerves of the organ of smell
5. Describe the lymphatic vessels of the skin

PRACTICAL (LABORATORY) LESSON №18

Theme: The skin (cutis)

Purpose of a lesson: to study the anatomy of the skin

Standard equipment: anatomical and relief tables, model of the skin

The student should know:

1. Nerves and blood vessels of the skin.
2. Ectoderm and neuroderm.
3. Derivatives of the skin.
4. Structure and functions of the mammary gland.
5. What are the main functions of skin.
6. What are the two types of skin glands?

The student should be able to:

1. Describe the structure of hair
2. Describe the structure of nails
3. Describe the nerves of the skin
4. Describe the structure, vessels and nerve of the mammary gland
5. Describe the lymphatic vessels of the skin

Recommended reading

a) The list of recommended literature

Main literature:

1. Sapin, M. R. Textbook of human anatomy = Анатомия человека : for medical students : учебное пособие для студентов медицинских вузов (на англ. яз.) : in 2 vol. Vol. 1 / M. R. Sapin, L. L. Kolesnikov, D. B. Nikitjuk ; ed. by M. R. Sapin. - 2nd ed. - Moscow : New Wave, 2020. - 416 с
2. Sapin, M. R. Textbook of human anatomy = Анатомия человека : for medical students : учебное пособие для студентов медицинских вузов (на англ. яз.) : in 2 vol. Vol. 2 / M. R. Sapin, L. L. Kolesnikov, D. B. Nikitjuk ; ed. by M. R. Sapin. - 2nd ed. - Moscow : New Wave, 2020. - 480 с

Additional literature:

1. Human Eye and Ear Anatomy in Diagrams and Charts : Instructional recommendations on human anatomy / Zerkalova Yu. F. , M. V. Vorotnikova, R. M. Khairullin [et al.]; Ulyanovsk State University, Insitute of Medicine, Ecology and Physical culture. - Ulyanovsk : ULSU, 2019. - Текст на англ. яз.; Загл. с экрана. - Электрон. текстовые дан. (1 файл : 692 КБ). - Текст : электронный.
<http://lib.ulsu.ru/MegaPro/Download/MObject/1458>
2. Veins and venous anastomoses of the trunk, and it's clinical value : for students of the Faculty of Medicine in the following specialties: 31.05.01 - General Medicine : In English / O. B. Astakhov, A. O. Plugatyreva ; Ulyanovsk State University, Insitute of Medicine, Ecology and Physical culture. - Ulyanovsk : ULSU, 2018. - 39 p. : ill. - Текст на англ. яз.
3. Neuroanatomy : methodological recommendations for students (Specialty 31.05.01 «General medicine») / Zerkalova Yu. F. , M. V. Vorotnikova, Ю. Ф. Зеркалова; Ulyanovsk State University, Insitute of Medicine, Ecology and Physical culture. - Ulyanovsk : ULSU, 2019. - Текст на англ. яз.; Загл. с экрана. - Электрон. текстовые дан. (1 файл : 380 КБ). - Текст : электронный.
<http://lib.ulsu.ru/MegaPro/Download/MObject/2888>
4. The neuroanatomy : practical skills workbook (III semester) / Zerkalova Yu. F. , M. V. Vorotnikova, Ю. Ф. Зеркалова; Ulyanovsk State University, Insitute of Medicine, Ecology and Physical culture. - Ulyanovsk : ULSU, 2019. - Текст на англ. яз.; Загл. с экрана. - Электрон. текстовые дан. (1 файл : 491 КБ). - Режим доступа: ЭБС УлГУ. - Текст : электронный.
<http://lib.ulsu.ru/MegaPro/Download/MObject/2889>