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ULYANOVSK STATE UNIVERSITY
Faculty of Medicine
Department of Human Anatomy

METHODOLOGICAL RECOMMENDATIONS FOR SELF- STUDY WORK OF STUDENTS ON DISCIPLINE « NEUROANATOMY »

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

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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 professional competence 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. PLACE OF DISCIPLINE IN THE STRUCTURE OF THE BASIC PROFESSIONAL EDUCATIONAL PROGRAM: the discipline Б1.О.48

Discipline "Neuroanatomy" refers to the basic part of the BPEP HE specialty 31.05.01 – «General medicine». Discipline "Neuroanatomy" for English-speaking students is taught and studied in English.

Natural science, mathematical and biomedical disciplines. Students must master the basics of terminology, correctly apply medical terms in both Latin and Russian, as well as master the knowledge and skills in the anatomy and topography of organs and tissues of the human nervous system.

Mastering the discipline is based on the knowledge, skills and abilities formed by previous disciplines: "Biology", "Anatomy", " Embryonic development of body tissues ", "Histology, embryology, cytology", "Biochemistry".

Studying the discipline "Neuroanatomy" allows students to obtain the necessary knowledge and skills in the development of subsequent disciplines: "Normal physiology", "Microbiology, Virology", "Physiology of visceral systems", "Pathological anatomy", "Pathophysiology, clinical pathophysiology", "Obstetrics and gynecology", "Forensic medicine".

THE LIST OF PLANNED LEARNING OUTCOMES ON DISCIPLINE, CORRELATED WITH THE PLANNED RESULTS OF MASTERING THE BASIC PROFESSIONAL EDUCATIONAL PROGRAM

The study of the subject " Neuroanatomy " within the completion of the educational program is directed towards the formation of general professional competence in students:

Code and name of the implmented 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 $_{GPC}$5** **The student must know:** • 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.
	IA-2 $_{GPC}$5 **The student must be able to:** • 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.
	IA-3 $_{GPC}$5 **The student must possess:** • the methods for assessing the anatomical, physiological and pathological conditions of the patient; • the methods of physical examination of the patient.

TOPICS OF SELF- STUDY WORK

Section 1. CENTRAL NERVOUS SYSTEM.

TOPIC 1

Theme: <u>Functional anatomy of the brain, the topography of the roots of the cranial nerves</u>

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.

Form of control: questions of credit
Student should know:

1. The stages of brain development in embryogenesis.
2. Age features of the brain.
3. Age features of the meninges of the brain.
4. Formation and ways of cerebrospinal fluid outflow.
5. Age features of vessels of the brain.

TOPIC 2

Theme: <u>The telencephalon.</u>

Purpose of a lesson: to gain knowledge about the form, development, functions and structure of the telencephalon. To study the structure and function of the reticular formation.

Form of control: questions of credit

Student should know:
1. The development of the telencephalon in phylogeny.
2. Cytoarchitectonics of the large brain's pallium.
3. Functional anatomy and topography of cortical analyzers.
4. The structures and functions of medial and lateral reticular formation
5. Function of the reticular formation.
6. Major subsystems of the reticular formation.

TOPIC 3

Theme: <u>The basal nuclei (nuclei basales)</u>

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.

Form of control: questions of credit

Student should know:
1. The functions of basal nuclei. The concept of striopallidar system.
2. Structure and function of the amygdala.
3. The concept of neostriatum and paleostriatum.
4. The internal capsule: structure, structure of pathways.
5. Structure and function of the anterior commissure.
6. The structure and function of the corpus callosum.
7. The structure and function of the fornix.

TOPIC 4

Theme: <u>The diencephalon. The midbrain.</u>

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

Form of control: questions of credit

Student should know:
1. The functions of the diencephalon and midbrain.

2. The development of diencephalon and midbrain in the phylogeny.
3. The structure and function of the thalamus.
4. Features of the structure and functions of epithalamus.
5. Structure and functions of metathalamus.
6. Features of the structure and function of the hypothalamus.
7. The concept of the hypothalamic-pituitary system.
8. The nucleus and the pathways of the midbrain.
9. The structures of the extrapyramidal system, included in the midbrain.

TOPIC 5

Theme: <u>The metencephalon.</u>

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.

Form of control: questions of credit

Student should know:
1. General anatomy of cerebellum.
2. Hemisphere, vermis, their parts,its shape, surfaces, lobes and segments.
3. The functions of cerebellum.
4. The stages of development of the cerebellum in the phylogeny.
5. The structure of gray and white matters of the cerebellum.
6. Structure, parts and general anatomy of the pons.
7. The boundaries of the bridge.
8. The nuclei, which are located within the pons.
9. Bridge, its surfaces, cores and paths.

TOPIC 6

Theme: <u>The medulla oblongata.The fourth ventricle</u>

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. To be able to determine the boundaries, walls of the fourth ventricle.

Form of control: questions of credit

Student should know:
1. The general anatomy of the medulla oblongata.
2. The boundaries of the medulla oblongata.
3. Development of the the medulla oblongata., its functional significance.
4. Anatomical formation in the ventral and dorsal surface of the medulla oblongata.
5. The conductive pathways of the medulla oblongata.
6. The fourth ventricle, its vascular base, messages.

TOPIC 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 the 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.

Form of control: questions of credit

Student should know:
1. Name the parts of the lateral ventricle. Choroid plexus of the lateral ventricle of the brain.
2. Name the the walls of the fourth ventricle. Where is each of these parts situated? Connections with subarachnoidal space of spinal cord.
3. The structure of the lateral ventricle and its connection with the third ventricle.
4. The structure and the walls of the third ventricle.
5. The walls of the third ventricle.
6. Ways outflow of cerebrospinal fluid.

TOPIC 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.
Form of control: questions of credit

Student should know:
1. Rhomboid fossa, its boundaries, relief and basic structure. Topography of white and gray matter in the frontal, horizontal and sagittal sections of the brain substance.
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.

TOPIC 9

Theme: Upward tracts of the brain and spinal cord (1)

Purpose of a lesson: to study the anatomical structure of the brain and spinal cord

Form of control: questions of credit

Student should know:
1. Anatomical and functional classification of the pathways of the nervous system.
2. Associative and commissural pathways.
3. Commissural conductive tracts and their functions
3. What conductive tracts are called projection?
4. Classification and function of upward conductive tracts.

TOPIC 10

Theme: Downward tracts of the brain and spinal cord (2)

Purpose of a lesson: to study the anatomycal structure of the brain and spinal cord

Form of control: questions of credit

Student should know:
1. Classification of downward tracts .
2. Classification and function of pyramidal tracts.

TOPIC 11

Theme: Downward tracts of the brain and spinal cord (3)

Purpose of a lesson: to study the anatomycal structure of the brain and spinal cord

Form of control: questions of credit

Student should know:
1. Classification of downward tracts .
2. Classification and function of extrapyramidal tracts.

Section 2. PERIPHERAL NERVOUS SYSTEM

TOPIC 12

Theme: I- IV pairs of the cranial nerves.

Purpose of a lesson: to study the anatomy of 1-4 craniocerebral nerves, areas of innervation

Form of control: questions of credit

The student should know:
1. The functional significance and features of development of 1-4 craniocerebral nerves.
2. The nuclei 1-4 craniocerebral nerves.
3. Through what anatomical formation the olfactory and the optic nerves enter the skull?
4. Parts of the optic nerve.
5. Innervation areas of the 3 pair of cranial nerves.
6. Through which anatomical formation pass the oculomotor and he trochlear nerves?
7. Innervation areas of the 4 pair of cranial nerves.

TOPIC 13

Theme:V- VII pairs of the cranial nerves.

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

Form of control: questions of credit

The student should know:
1. The anatomy, branches, areas of innervation of V- VII pars of the cranial nerves.
2. Autonomic ganglions, their relations with trigeminal nerve.
3. Pterygopalatine ganglion, otic ganglion, sublingual ganglion, submandibular ganglion, their biding with branches of trigeminal nerve

LESSON (TOPIC) 14

Theme: <u>VIII- XII pairs of the cranial nerves.</u>

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

Form of control: questions of credit

The student should know:
1. The features of development, nucleus of VIII- XII pairs of the cranial nerves.
2. The topography of the canals and openings of the skull of VIII- XII pairs of the cranial nerves.
3. The branches and areas of innervation of VIII- XII pairs of the cranial nerves.

Section 3. ESTHESIOLOGY

TOPIC 15

Theme: <u>Functional anatomy of organ of vision</u>

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

Form of control: questions of credit

Student should know:
1. Filo and ontogenesis of the organ of vision.
2. Age features of the organ of vision.
3. Anomalies of the development of the eye cloud.

TOPIC 16

Theme: <u>Functional anatomy of organ of hearing and balance</u>

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

Form of control: questions of credit

The student should know:
1. Filo and ontogenesis of the organ of hearing and balance
2. Age features of the organ of hearing and balance
3. Anomalies of the development of hearing and balance

TOPIC 17

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

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

Form of control: questions of credit

The student should know:

1.Filo and ontogenesis of organs of smell and taste.
2. Anomalies of the development of organs of smell and taste.

TOPIC 18

Theme: Functional anatomy of skin (cutis).

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

Form of control: questions of credit

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.

EDUCATIONAL-METHODICAL AND INFORMATION SUPPORT OF DISCIPLINE

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. 2 / M. R. Sapin, L. L. Kolesnikov, D. B. Nikitjuk; ed. by M. R. Sapin**.** - 2nd ed. - Moscow : New Wave, 2020. - 480 с. : ил. - ISBN 978-5-7864-0211-8 (кн. 2) (в пер.). - ISBN 978-5-7864-0209-5 : 2150.00.
2. Uddin, Lucina Q. Insula : Neuroanatomy, Functions and Clinical Disorders/ Uddin, Lucina Q..- New York : Nova Science Publishers, Inc. 2014.- Series: Neuroscience Research Progress- ISBN 978163.1171758.- http://search.ebscohost.com/login.aspx?direct=true&db=e600xww&AN=714784&site=ehost-live

Additional literature:

1. Seiden, David, Lachman, Ernest, Corbett, Siobhan A. Lachman's Case Studies in Anatomy/Seiden, David, Lachman, Ernest, Corbett, Siobhan A..- Ed.: 5th ed. rev. by David Seiden and Siobhan A. Corbett. New York : Oxford University Press. 2013.-ISBN: 9780199846085.- http://search.ebscohost.com/login.aspx?direct=true&db=e600xww&AN=644737&site=ehost-live
2. Borden, Neil M, Forseen, Scott E. Imaging Anatomy of the Human Brain : A Comprehensive Atlas Including Adjacent Structures/Borden, Neil M, Forseen, Scott E..- New York : Demos

Medical. 2016.-ISBN: 9781936287741.-
http://search.ebscohost.com/login.aspx?direct=true&db=e600xww&AN=1081584&site=ehost-live
3. Forseen, Scott E., Borden, Neil M. Imaging Anatomy of the Human Spine : A Comprehensive Atlas Including Adjacent Structures/Forseen, Scott E., Borden, Neil M..- New York : Demos Medical. 2016.- ISBN: 9781936287826..-
http://search.ebscohost.com/login.aspx?direct=true&db=e600xww&AN=1109463&site=ehost-live

b) Software:

Information infrastructure of the department includes web-page on the official website of the University, its own computer lab for testing students at 8 workplaces, personal computers, the current generation (equipped with every job faculty, staff and graduate students), multimedia lecture complex (2 stationary and portable), all computers, without exception, are in the local network of university and have access to the Internet, printers, copiers, computer hardware. 100% of lectures in the field of medical faculty provided multimedia presentations, including animations and video clips. The training process uses more than 30 electronic textbooks and open Internet resources, including the use of on-line mode during practical classes and lectures, a DVD-videos on certain sections of the subjects taught, the department organized base of electronic textbooks and atlases with your network access to the local network of educational building of the medical Faculty.

c) Database, information and reference, search systems:

1. Digital Library System:

1.1. IPRbooks : электронно-библиотечная система : сайт / группа компаний Ай Пи Ар Медиа. - Саратов, [2021]. – URL: http://www.iprbookshop.ru. – Режим доступа: для зарегистрир. пользователей. - Текст : электронный.

1.2. ЮРАЙТ : электронно-библиотечная система : сайт / ООО Электронное издательство ЮРАЙТ. – Москва, [2021]. - URL: https://urait.ru. – Режим доступа: для зарегистрир. пользователей. - Текст : электронный.

1.3. Консультант студента : электронно-библиотечная система : сайт / ООО Политехресурс. – Москва, [2021]. – URL: https://www.studentlibrary.ru/cgi-bin/mb4x. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.4. Консультант врача : электронно-библиотечная система : сайт / ООО Высшая школа организации и управления здравоохранением-Комплексный медицинский консалтинг. – Москва, [2021]. – URL: https://www.rosmedlib.ru. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.5. Большая медицинская библиотека : электронно-библиотечная система : сайт / ООО Букап. – Томск, [2021]. – URL: https://www.books-up.ru/ru/library/ . – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.6. Лань : электронно-библиотечная система : сайт / ООО ЭБС Лань. – Санкт-Петербург, [2021]. – URL: https://e.lanbook.com. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.7. **Znanium.com :** электронно-библиотечная система : сайт / ООО Знаниум. - Москва, [2021]. - URL: http://znanium.com . – Режим доступа : для зарегистрир. пользователей. - Текст : электронный.

1.8. Clinical Collection : коллекция для медицинских университетов, клиник, медицинских библиотек // EBSCOhost : [портал]. – URL: http://web.b.ebscohost.com/ehost/search/advanced?vid=1&sid=9f57a3e1-1191-414b-8763-e97828f9f7e1%40sessionmgr102 . – Режим доступа : для авториз. пользователей. – Текст : электронный.

1.9. Русский язык как иностранный : электронно-образовательный ресурс для иностранных студентов : сайт / ООО Компания «Ай Пи Ар Медиа». – Саратов, [2021]. – URL: https://ros-edu.ru. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

2. КонсультантПлюс [Электронный ресурс]: справочная правовая система. /ООО «Консультант Плюс» - Электрон. дан. - Москва : КонсультантПлюс, [2021].

3. Базы данных периодических изданий:

3.1. База данных периодических изданий : электронные журналы / ООО ИВИС. - Москва, [2021]. – URL: https://dlib.eastview.com/browse/udb/12. – Режим доступа : для авториз. пользователей. – Текст : электронный.

3.2. eLIBRARY.RU: научная электронная библиотека : сайт / ООО Научная Электронная Библиотека. – Москва, [2021]. – URL: http://elibrary.ru. – Режим доступа : для авториз. пользователей. – Текст : электронный

3.3. «Grebennikon» : электронная библиотека / ИД Гребенников. – Москва, [2021]. – URL: https://id2.action-media.ru/Personal/Products. – Режим доступа : для авториз. пользователей. – Текст : электронный.

4. Национальная электронная библиотека : электронная библиотека : федеральная государственная информационная система : сайт / Министерство культуры РФ ; РГБ. – Москва, [2021]. – URL: https://нэб.рф. – Режим доступа : для пользователей научной библиотеки. – Текст : электронный.

5. SMART Imagebase // EBSCOhost : [портал]. – URL: https://ebsco.smartimagebase.com/?TOKEN=EBSCO-1a2ff8c55aa76d8229047223a7d6dc9c&custid=s6895741. – Режим доступа : для авториз. пользователей. – Изображение : электронные.

6. Федеральные информационно-образовательные порталы:

6.1. Единое окно доступа к образовательным ресурсам : федеральный портал / учредитель ФГАОУ ДПО ЦРГОП и ИТ. – URL: http://window.edu.ru/ . – Текст : электронный.

6.2. Российское образование : федеральный портал / учредитель ФГАОУ ДПО ЦРГОП и ИТ. – URL: http://www.edu.ru. – Текст : электронный.

7. Образовательные ресурсы УлГУ:

7.1. Электронная библиотека УлГУ : модуль АБИС Мега-ПРО / ООО «Дата Экспресс». – URL: http://lib.ulsu.ru/MegaPro/Web. – Режим доступа : для пользователей научной библиотеки. – Текст : электронный.