Khanty-Mansiysk Autonomous Okrug-Ugra
"Surgut State University"

Approved by
Deputy Rector for Academic Affairs

_____E.V. Konovalova

"16" June 2022, Record No.6

Adaptive and age-related physiology

Syllabus

Department **Morphology and physiology**

Curriculum s310501-ЛечДелоИн-21-1.pli.xml
Specialty 31.05.01 General Medicine

Qualification **General Practitioner**

Form of education **Full-time**

Total (in credits) 2

Total academic hours 72
including:
Classes 48
Self-study 24

Control:
Credit 4th Term

Course outline in terms

Academic year (Term)	**4 (2.2)**		Total	
Weeks	18 3/6			
Types of classes	Cur	Syl	Cur	Syl
Lectures	16	16	16	16
Practical	32	32	32	32
Total classes	48	48	48	48
Contact work	48	48	48	48
Self-study	24	24	24	24
Total	72	72	72	72

The Syllabus is compiled by:
*PhD in Biological Sciences, Professor,Litovchenko O.G.*_____

The Syllabus

Adaptive and age-related physiology

Developed in accordance with Federal State Educational Standard:

Federal State Educational Standard of higher education in the specialty 31.05.01 General medicine (Order of the Ministry of Education and Science of the Russian Federation on August 12 2020 No. 988)

Based on the Curriculum:
31.05.01 GENERAL MEDICINE
Specialization: General Medicine
Approved by the Academic Council of Surgut State University, "16" June 2022, Record No.6

The Syllabus was approved by the department
Morphology and physiology

Head of Department, Doctor of Medicine, Professor Stolyarov V.V.

1. COURSE OBJECTIVES	
1.1	to form a system of knowledge and ideas among students about the functioning of the human body as a whole, its systems, organs, tissues and cells, about the basic laws of functioning and mechanisms of regulation of vital activity, about the influence of environmental factors on the body's functions, as well as the skills necessary for a doctor to make a preliminary diagnosis and provide qualified medical care to patients at the pre-hospital stage.; to develop professional competencies in the preparation of a specialist by forming modern natural science knowledge in the field of general and private physiology on the basis of a systematic approach, ideas about the vital activity of the human body as an open self-regulating system that ensures adaptive interaction of the body with the external environment.

2. COURSE OVERVIEW	
Course code (in curriculum)	Б1.О.04.11
2.1	**Assumed background:**
2.1.1	Biology
2.1.2	Human anatomy
2.2	**Post-requisite courses and practice:**
2.2.1	Homimal physiology
2.2.2	Pathophysiology
2.2.3	Human Genetics
2.2.4	Physiological Basics of Human Adaptation in the North

3. COMPETENCES UPON COMPLETION OF THE COURSE (MODULE)
GPC-5.1: Knows the histological structure of organ tissues - knows how to differentiate them microscopically; the anatomy of the human body - the macroscopic structure and topography of organs and body parts; human physiology - the mechanisms of homeostasis regulation and the functional systems of the body in the normal condition
GPC-5.9: Demonstrates knowledge of the theoretical foundations of immunology, allergology, understanding of immune defence mechanisms, types of immunological reactions and their role in the pathogenesis of human diseases

By the end of the course students must:

3.1	**Know:**
3.1.1	basic concepts used in age physiology
3.1.2	basic concepts of the neurobiology and neurophysiology fields
3.1.3	possibilities of application of end-to-end technologies in biomedical research
3.1.4	mechanisms of functioning of physiological systems
3.1.5	regularities of functioning and mechanisms of regulation of the activity of cells, tissues, organs, systems of a healthy organism, considered from the standpoint of general physiology, private physiology and integrative human activity
3.1.6	the essence of research methods for various functions of a healthy body, which are widely used in practical medicine
3.1.7	ways of working with electronic databases of physiological indicators
3.1.8	the possibilities of using Internet things in the management of patients of different ages
3.1.9	methodology of the study of the adult and child population health in order to preserve, strengthen and restore it
3.1.10	methodology to determine the impact of environmental factors on the health of the population or its individual groups
3.1.11	forms and methods of organization of hygienic education and upbringing of the population; the main problems and directions of modern public health and international policy in this area
3.2	**be able to:**
3.2.1	correctly interpret and apply the basic concepts of hominal physiology when studying biomedical and medical literature and when working with medical specialists together
3.2.2	explain the principle of the most important methods of studying the functions of a healthy body
3.2.3	independently perform laboratory work, conduct experiments on experimental animals, protect the protocol of the study, solve test tasks and situational tasks, prepare scientific reports, etc.
3.2.4	explain the informational value of various indicators (constants) and the mechanisms of regulation of the activity of cells, tissues, organs, systems and the whole organism
3.2.5	evaluate and explain the basic laws of the formation and regulation of physiological functions of the body when achieving an adaptive result
3.2.6	evaluate and explain the general principles of state, activity and significance of the leading functional systems of the body
3.2.7	to evaluate and explain the patterns of formation and regulation of the main forms of behaviour of the organism, depending on the conditions of its existence

3.2.8	evaluate and explain the age-related features of the physiological systems of the body
3.2.9	use hardware and software complexes to assess the functional state and age characteristics of the body
3.2.10	use information about the health of adults and children in the activities of medical organizations
3.2.11	analyse information about the health status of the population; compile a list of measures aimed to improve the quality and effectiveness of preventive assistance to the population in the formation of a healthy lifestyle
3.2.12	interpret the results of laboratory and radiological research methods
3.2.13	use medical equipment, computer technology in their professional activities; use methods of primary and secondary prevention (based on evidence-based medicine), preventing the development of diseases
3.3	**have skills of:**
3.3.1	examination and assessment of the functional state of the human body
3.3.2	monitoring vital physiological indicators in patients of different ages
3.3.3	studying the health of adults and children in order to preserve, strengthen and restore it
3.3.4	determining the influence of environmental factors on the health of the population or its individual group methods of organization of hygienic education and upbringing of the population
3.3.5	organization of hygienic education and upbringing of the population; methods of formation and implementation of preventive programs

4. STRUCTURE AND CONTENTS OF THE COURSE (MODULE)

Class Code	Topics /Class type	Term / Academic year	Academic hours	Competences	Literature	Inter active	Notes
	Unit 1. Ontogenesis						
1.1	Patterns of ontogenesis /Lecture/	4	2	GPC-5.1; GPC-5.9	Л1.2 Л1.8Л2.4Л3.1	0	oral quiz
1.2	Patterns of ontogenesis /Practice/	4	2	GPC-5.1; GPC-5.9	Л1.2 Л1.5Л2.18Л3. 1	0	oral quiz
1.3	The patterns of ontogenesis. Maturation of human body systems /Practice/	4	2	GPC-5.1; GPC-5.9	Л1.2 Л1.7Л2.18Л3. 1	0	test
1.4	Neural network technologies as end-to-end technologies in the study of age-related features of the organism at various stages of ontogenesis. /Self-study/	4	2	GPC-5.1; GPC-5.9	Л1.5Л2.18Л3. 1	0	test
	Unit 2. Age-related and adaptive features of the nervous system						
2.1	Age-related and adaptive features of the nervous system at different stages of ontogenesis. Age-related features of the central nervous system /Lecture/	5	2	GPC-5.1; GPC-5.9	Л1.2Л2.4 Л2.19Л3.1	0	oral quiz
2.2	Investigation of tendon reflexes. Study of motor functions of the cerebellum /Practice/	5	2	GPC-5.1; GPC-5.9	Л1.2 Л1.5Л2.2 Л2.4Л3.1	0	oral quiz

2.3	Features of regulatory processes. Systemogenesis. /Practice/	5	4	GPC-5.1; GPC-5.9	Л1.5Л2.13 Л2.18Л3.1	0	test
2.4	Private nervous system. The possibilities of neurobiology and neurophysiology in the study of the properties of the human nervous system using information and end-to-end technologies at various stages of ontogenesis /Practice/	5	8	GPC-5.1; GPC-5.9	Л1.5Л2.13 Л2.16Л3.1	0	test
2.5	Age-related aspects of the physiology of higher nervous activity. Age-related features of the peripheral nervous system /Lecture/				Л1.1Л2.4 Л2.16Л3.1		oral quiz
2.6	Physiology of higher nervous activity. Properties of nervous processes. Information processing speed /Practice/				Л1.1 Л1.5 Л1.8Л2.9 Л2.12Л3.1		test
	Unit 3. Age-related and adaptive features of the musculoskeletal system						
3.1	Morphofunctional features of the musculoskeletal system at different stages of ontogenesis /Lecture/	4	2	GPC-5.1; GPC-5.9	Л1.1Л2.1 Л2.17Л3.1	0	oral quiz
3.2	Age-related features of movement and musculoskeletal system / Practice/	4	2	GPC-5.1; GPC-5.9	Л1.5Л2.1 Л2.11Л3.1	0	Case studies
3.3	Neural network technologies as end-to-end technologies in the study of age-related features of the organism at ontogenesis various stages /Self-study/	4	4	GPC-5.1; GPC-5.9	Л1.1Л2.6 Л2.13Л3.1	0	test
3.4	Features of the musculoskeletal system at different stages of ontogenesis. Influence of the level of motor activity on the functional state of the musculoskeletal system /Self-study/	4	2	GPC-5.1; GPC-5.9	Л1.2Л2.3Л3.1	0	test
	Unit 4. Age-related and adaptive features of the						
4.1	Morphofunctional features of the cardiovascular system at different stages of ontogenesis /Lecture/	4	2	GPC-5.1; GPC-5.9	Л1.6Л2.5Л3.2	0	oral quiz

4.2	Study of the properties of the cardiovascular system. Features of adaptation of the cardiovascular system to the effects of various factors /Practice/	4	2	GPC-5.1; GPC-5.9	Л1.6Л2.14Л3. 1	0	oral survey
4.3	Cardiovascular system at different stages of ontogenesis /Self-study/	4	2	GPC-5.1; GPC-5.9	Л1.6Л2.5 Л2.10Л3.4	0	essay
	Unit 5. Blood. Age and adaptive features						
5.1	Age and adaptive features of blood /Lecture/	4	1	GPC-5.1; GPC-5.9	Л1.6Л2.15Л3. 4	0	oral quiz
5.2	Age features of white and red blood /Practice/	4	2	GPC-5.1; GPC-5.9	Л1.6 Л1.7Л2.10Л3. 4	0	Case studies
	Age-related features of the immune system /Self-study/	4	2	GPC-5.1; GPC-5.9	Л1.6Л2.8Л3.4	0	oral quiz
	Unit 6. Age and adaptive features of the respiratory system						
6.1	Age-related features of the respiratory system /Lecture/	4	2	GPC-5.1; GPC-5.9	Л1.6Л2.4Л3.4	0	oral quiz
6.2	Methods for determining the main indicators of respiration /Practice/	4	4	GPC-5.1; GPC-5.9	Л1.6Л2.8Л3.1	0	test
6.3	Age-related features of the respiratory system /Self-study/	4	2	GPC-5.1; GPC-5.9	Л1.1Л2.3Л3.2	0	Case studies
	Unit 7. Age-related and adaptive features of the digestive system and metabolism						
7.1	Age-related and adaptive features of the digestive system and metabolism /Lecture/	4	1	GPC-5.1; GPC-5.9	Л1.6Л2.4Л3.2	0	oral quiz
7.2	Age-related features of the digestive system /Practice/	4	2	GPC-5.1; GPC-5.9	Л1.6Л2.7Л3.4	0	test
7.3	Age-related features of metabolism. Preparation of food ration for different ages /Practice/	4	2	GPC-5.1; GPC-5.9	Л1.6Л2.7Л3.1	0	test
7.4	Metabolism and nutrition at different stages of ontogenesis /Self-study/	4	2	GPC-5.1; GPC-5.9	Л1.6Л2.10Л3. 4	0	Case studies
	Unit 8. Age-related and adaptive features of the excretory and reproductive systems						
8.1	Age and adaptive features of the excretory and reproductive systems	4	2	GPC-5.1; GPC-5.9	Л1.2 Л1.3Л2.10Л3. 3	0	oral quiz
8.2	The sexual formula /Practice/	4	2	GPC-5.1; GPC-5.9	Л2.10Л3.1	0	test

8.3	The use of end-to-end and information technologies for the study of age-related and adaptive properties of the respiratory system /Self-study/	4	2	GPC-5.1; GPC-5.9	Л1.6Л2.10Л3. 4	0	test
	Unit 9. Age-related and adaptive features of the endocrine system						
9.1	Age-related and adaptive features of the endocrine system /Lecture/	4	2	GPC-5.1; GPC-5.9	Л1.4Л2.4Л3.1 Л3.4	0	oral quiz
9.2	Features of the endocrine system at different stages of ontogenesis /Practice/	4	2	GPC-5.1; GPC-5.9	Л1.4 Л1.7Л2.10Л3. 4	0	test Case studies
9.3	Features of endocrine regulation during puberty, peri- and postmenopause /Self-study/	4	2	GPC-5.1; GPC-5.9	Л1.4Л2.8Л3.4	0	Case studies
	Unit 10. Final lesson						
10.1	Credit /Practice/	4	2	GPC-5.1; GPC-5.9	Л1.5 Л1.6Л2.2 Л2.4	0	Oral quiz Test

5. ASSESSMENT TOOLS

5.1. Tests and tasks

Supplement 1

5.2. Topics for written papers

Supplement 1

5.3. Assessment tools

Supplement 1

5.4. Assessment tools

Formative assessment: oral quiz, tests, essay, case studies
Credit: oral quiz, test

6. COURSE (MODULE) RESOURCES

6.1. Recommended Literature

6.1.1. Core

	Authors	Title	Publish., year	Quantity
Л1.1	Tyurikova G. N.	Anatomy and age physiology: Textbook	Moscow: INFRA-M Scientific Publishing Center LLC, 2016, http://znanium.com/go.php?id=538396	1
Л1.2	Tyurikova G. N., Tyurikova Yu. B.	Anatomy and age physiology: Textbook	Moscow: INFRA-M Scientific Publishing Center LLC, 2018, http://znanium.com /go.php?id=924698	1
Л1.3	Tyurikova G. N., Tyurikova Yu. B.	Anatomy and age physiology: Textbook	Moscow: INFRA-M Scientific Publishing Center LLC, 2016, http://znanium.com/go.php?id=538396	1

Л1.4	Sudakov K.V., Andrianov V.V., Vagin Yu.E., Kiselev I.I.	Human Physiology: Atlas of Dynamic Circuits	Moscow: GEOTAR-Media, 2015, http://www.studentlibrary.ru/book/ISBN9785970432341.html	1
Л1.5	Lyakso E. E., Nozdrachev A.D., Sokolova L. V.	Age physiology and psychophysiology: Textbook	Moscow: Yurayt Publishing House, 2019, https://www.biblio-online.ru/book/vozrastnaya-fiziologiya-i-psihofiziologiya-	1
Л1.6	Tyurikova G.N., Tyurikova Yu.B.	Anatomy and age physiology: Textbook	Moscow: LLC "Scientific and Publishing Center, 2018, http://new.znanium.com/go.php?id=924698	1
Л1.7	Lyakso E. E., Nozdrachev A.D., Sokolova L. V.	Age physiology and psychophysiology: Textbook	Moscow: Ю?zdatelstvo Yurayt, 2019, https://www.biblio-online.ru/bcode/433196	1
Л1.8	Shchelchkova N.N.	Human anatomy and physiology: Educational and methodological literature	Moscow: INFRA-M Scientific Publishing Center LLC, 2019, http://znanium.com/catalog/document?id=350729	1

6.1.2. Supplementary

	Authors	Title	Publish., year	Quantity
Л2.1	Solodkov A. S., Sologub E. B.	Human physiology : general, sports, age: Textbook for higher educational institutions of physical culture M.: Terra-Sport, 2001	M.: Terra-Sport, 2001	10
Л2.2	Brin V. B.	Human physiology in diagrams and tables	Moscow: Lan, 2017, https://e.lanbook.com/book/90163	1
Л2.3	Tulyakova. O. V.	State of health, physical and mental development of children depending on various factors: Monograph	Saratov: University education, 2014, http://www.iprbookshop.ru/21903	1
Л2.4	R Aizman. I., Lysova N. F.	Age physiology and psychophysiology: Textbook	Moscow: INFRA-M Scientific Publishing Center LLC, 2014, http://znanium.com / they leave.in PHP?ID=376897	1
Л2.5	Gribanova O. V., Novikova E. I., Shcherbakova T. G.	Anatomy and physiology of the cardiovascular system: Textbook	Volgograd: Volgograd State Socio-Pedagogical University, 2016, http://www.iprbookshop.ru/57763.html	1

Л2.6	Belchenko L. A., Lavrinenko V. A.	Human physiology. The organism as a whole: Educational and Methodical complex	Novosibirsk: Siberian University Publishing House, 2017, http://www.iprbookshop.ru/65293.html	1
Л2.7	Sergeev. I. Yu., Dubynin. V.A., Kamensky A. A.	Physiology of man and animals in 3 vols. Vol. 1 nervous system: Anatomy, Physiology, Neuropharmacology: Textbook and workshop	Moscow: Yurayt Publishing House, 2019, https://www.biblio - online.ru/book/fizio human-and-animal-logic-in-3-t-t-1 - nervous-system - anatomy - physiology -	1
Л2.8	Say Yu. V., Kuznetsova N. M.	Human anatomy and physiology. Dictionary of terms and concepts: textbook	St. Petersburg: Lan, 2019, https://e.lanbook.com/book/113398	1
Л2.9	Karakhanyan K. G., Karpova E. V.	Human anatomy and physiology. Collection of situational tasks: textbook	St. Petersburg: Lan, 2020, https://e.lanbook.com/book/130175	1
Л2.10	Degtyarev V.P.	Normal physiology. Typical test tasks: textbook	Moscow: GEOTAR-Media, 2014, http://www.studentlibrary.ru/book/ISBN9785970429327.html	1
Л2.11	Sudakov K.V., V. Andrianov.V., Vagin Yu.E.,	Human Physiology: Atlas of dynamic circuits: educational visual aid	Moscow: GEOTAR - Media, 2015, http://www.studentlibrary.ru/book/ISBN9785970432341.sectTML	1
Л2.12	Sudakov K.V., V. Andrianov.V., Vagin Yu.E., Dzhebrailova T.D., Kiselev, Umryukhin P.E.	Normal Physiology: textbook	Moscow: GEOTAR - Media, 2015, http://www.studentlibrary.ru/book/ISBN9785970435281.sectTML	1
Л2.13	Degtyar V.P.	Normal Physiology: textbook	Moscow: GEOTAR - Media, 2016, http://www.studentlibrary.ru/book/KP - 2016-01.html	2
Л2.14	Degtyarev V.P., Sorokina N.D.	Normal physiology: textbook	Moscow: GEOTAR - Media, 2016, http://www.studentlibrary.ru/book/ISBN9785970435472.sectTML	2
Л2.15	Telya L.Z., Aghajanyan N.A.	Normal Physiology: textbook	Moscow: Litterra, 2015, http://www.studentlibrary.ru/book/ISBN9785423501679.sectTML	1

Л2.16	Titova T.A., About Yeletskaya.V.	Speech and mental development of young children: Bachelor's degree	Moscow: building "FORUM", 2019, http://new.znanium . com/go.php ? ID=1002631	1
Л2.17	Kapilevich L. V.	Human physiology. Sport: Textbook	Moscow: building Yurayt, 2019, https://www.biblio - online.ru/bcode/429 445	1
Л2.18	Tulyakova, O. V.	State of health, physical and mental development of children depending on various factors: monograph	Saratov: University education, 2014, http://www.iprbook shop.ru/21903.html	1
Л2.19	R Aizman.I., Abaskalova N.P.	Human physiology: Textbook	Moscow: INFRA-M Scientific Publishing Center LLC, 2018, http://znanium.com / catalog/document? id=370059	1

6.1.3. Methodological developments

	Authors	Title	Publish., year	Quantity
Л3.1	Sai Yu. V.	Workbook on the academic discipline "Human anatomy and physiology"	Moscow: Lan, 2017, https://e.lanbook.co m/book/93715	1
Л3.2	Solodkov A.S., Sologub E.B.	Human physiology. General. Sports. Age group. - 7th edition	Moscow: Sport, 2017, http://www.studmed lib.ru/book/ISBN97 85906839862.html	2
Л3.3	Morozkina A.V.	Human and animal physiology with the basics of higher nervous activity: methodological recommendations and tasks for laboratory classes and control works	Surgut: Publishing Center of SurSU, 2020, https://elib.surgu.ru / local/umr/631	1
Л3.4	Yurina M. A., Lopatskaya Zh. N.	Normal physiology: guidelines for performing laboratory work	Surgut: Publishing Center of SurGU, 2020, https://elib.surgu.ru / local/umr/673	1

6.3.1 Software

6.3.1.1	http:// www .garant.ru
6.3.1.2	http://www.consultant.ru

6.3.2 Information Referral systems

6.3.2.1	«Consilium medicum» - http://www.consilium-medicum.com/media/consilium
6.3.2.2	http://www.rmj.ru
6.3.2.3	http://www.iqlib.ru
6.3.2.4	www.biblioclub.ru
6.3.2.5	http://medlecture.ru/

7. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE (MODULE)

7.1	Classrooms for conducting lecture-type classes, seminar-type classes (practical classes), group and individual consultations, formative and summative assessment are equipped with: standard educational furniture, technical training tools that serve to present educational information
7.2	The lecture hall is equipped with a multimedia projector, a screen, a laptop, a stationary chalk board, standard educational furniture: tables, chairs
7.3	The classroom for practical classes is equipped with a personal projector, a laptop, computers, videos, tables, electro-cardiographs, a spirometer and a "Micro LAB" are included.
7.4	Tools and consumables in an amount that allows students to master the skills and abilities provided for by professional activities.

8. METHODOLOGICAL INSTRUCTIONS FOR STUDENTS ON LEARNING THE DISCIPLINE (MODULE)

ASSESSMENT TOOLS

ADAPTIVE AND AGE-RELATED PHYSIOLOGY

Graduate qualification	specialist
Direction of training	31.05.01 General Medicine
Orientation (profile)	General Medicine
The form of study	Full-time
Department-Developer	Morphology and physiology
Graduate Department	Internal diseases

Stage I: Formative assessment.

Section No. 1. Ontogenesis

Topic 1. Patterns of ontogenesis.

Points for oral quiz.

1. Integral characteristics of the physiological characteristics of the organism at different stages of ontogenesis.

2. The concept of the growth and development of the child's body

3. Age periodization.

4. Approaches to substantiating the division of the life cycle of individual development into separate age periods.

5. Ontogenesis.

6. Patterns of ontogenetic development.

7. Basic theories of ontogenesis.

8. The influence of endo- and exogenous factors, and age-related anatomical and physiological features.

9. The role of heredity factors in the process of ontogenesis. The concept of the gene pool.

10. The role of environmental factors in the process of ontogenesis.

11. Uneven or heterochronous development.

12. The main stages of intrauterine development.

13. Physiological characteristics of infants.

14. The main stages of childhood.

15. Height and body proportions at different age stages of development.

16. Sensitive periods for various physical qualities.

17. Criteria of biological age.

18. Determination of mediants, retardants, accelerants.

19. Acceleration is epochal and individual.

20. The reasons for the epoch-making acceleration.

21. Heterochrony and harmony of development.

22. Critical periods in postnatal development.

23. Principles of systemogenesis and advanced development of organs and functional systems in children and adolescents.

24. The human body as a biological system.

25. The body as a whole.

Task for formative assessment:

1 The period of second childhood in boys' lasts

A) from 4 to 7 years

B) from 13 to 14 years

C) from 8 to 12 years

D) from 15 to 16 years

2 Dental age is used to determine

A) somatoscopic indicators

B) calendar age

C) somatometric indicators

D) biological age

3. When a functionally immature child enters school, there is

A) high mental activity

B) a long period of adaptation to

educational activities

C) low fatigue

D) high fatigue

4. The science that studies the functions of the body and its organs is called

A) histology

B) physiology

C) anatomy

D) morphology

5. Individual development of the organism is called

A) phylogeny

B) anthropogenesis

C) systemogenesis

D) ontogenesis

6. The non-simultaneous maturation of various organs and systems is called

A) reliability

B) homeostasis

C) heterochronicity

D) harmony

7. The child's readiness to study at school is determined

A) according to the level of mental and physical development, coordination abilities

B) only by the level of physical development

C) only by the level of mental development

D) only by coordination abilities

8. Acceleration is understood as

A) accelerated rates of development of the organism in comparison with previous generations

B) comprehensive development

C) average level of development

D) slow rates of development of the organism in comparison with previous generations

9. Children with functional disabilities belong to the health group

A) the fourth

B) the third

C) the second

D) the fifth

Section No.2. Age-related and adaptive features of the nervous system

Topic 1. Age-related and adaptive features of the nervous system at different stages of ontogenesis. Age-related features of the central nervous system.

Points for oral quiz.

1. Age-related changes in the structure of the neuron and nerve fiber.

2. Myelination of nerve fibers.

3. The growth and shape of the brain.

4. Ontogenesis of the large hemispheres.

5. The development of conductive pathways.

6. Structural transformations of the cerebral cortex.

Practical skills for formative assessment

- Study of tendon reflexes. Investigation of motor functions of the cerebellum.

- Features of manipulatory processes. Systemogenesis.

List of essay topics

1. Structure, functions of the cytoplasmic membrane, types of membrane transport proteins, gate mechanisms of ion-selective channels. The concept of excitable tissues, their physiological properties, features of development in ontogenesis.

2. Sodium-potassium pump, its role at rest and during excitation, features of development in ontogenesis.

3. Action potential, its phases, ionic mechanisms. Changes in the permeability of the cell membrane during excitation. Age features.

4. The change in excitability during the generation of the action potential. Characteristics of refractoriness and exaltation. Age features.

5. Mechanisms of excitation in pulpy and non-pulpy nerve fibers, features of development in ontogenesis.

6. Trophic function of motor nerve fibers, features of development in ontogenesis.

7. Types of signal transmission between excitable cells. The concept of synapse, classification of synapses. Functional properties of electrical and chemical synapses. The mechanism of formation of VPSP, TPSP. Age features.

8. Characteristics of the myoneural synapse. Mechanism of transmission of excitation from nerve to muscle, features of development in ontogenesis.

9. Features of the nervous system (brain, spinal cord, peripheral nervous system) in childhood.

10. Features of the nervous system (brain, spinal cord, peripheral nervous system) in old age.

11. Ways of working with electronic databases of physiological indicators;

12. The possibilities of using Internet things in the management of patients of different ages

Task for formative assessment: (Sample Sample Test)

1. The weight of the child's brain at the time of birth reaches:

a) 1400g;

b) 1375g;

c) 390g;

d) 1275g;

d) 600g.

2. The weight of the spinal cord in an adult is

a) 21-22g;

b) 5g;

c) 36-38g;

g) 140-150g;

e) 200g.

3. The three-bubble stage of brain development is observed

a) at 3 weeks of embryonic development;

b) at the 2nd week of embryonic development;

c) at the 5th week of embryonic development;

d) at 3 months of embryonic development;

e) at the 5th month of embryonic development.

4. The autonomic nervous system innervates

a) skeletal muscles;

b) internal organs, glands, blood vessels;

c) skeletal muscles and blood vessels;

d) internal organs and glands;

e) blood vessels and internal organs.

5. The peripheral nervous system is represented by

a) 12 pairs of cranial nerves;

b) 31 pairs of mixed spinal nerves;

c) 12 pairs of cranial and 31 pairs of mixed spinal nerves;

d) the autonomic nervous system;

e) the somatic nervous system.

Topic 2. Age-related aspects of the physiology of higher nervous activity. Formation of conditioned reflex activity

Points for oral quiz.

1. Development of higher nervous activity in ontogenesis. Age-related features of the higher nervous activity of a person.

2. The orientation reflex, its importance in teaching and upbringing.

3. The ratio of the first and second signaling systems in ontogenesis.

4. Functions, centers, conditions of speech development.

5. Development of functional asymmetry of the brain in children.

6. The significance of determining the types of GNI of children and adolescents.

7. Behavior, its structure.

8. Classification of behaviors.

9. Unconditional reflexes and instincts. Classification of unconditional and conditional reflexes. Higher nervous activity (HNI) and its role in the formation of behavior.

10. Conditioned reflexes.

11. Inhibition of conditioned reflex activity.

12. Dynamic stereotype as the basis of habits and skills. 5

13. Typological features of higher nervous activity.

14. Taking into account the types of GNI when implementing an individual approach to children.

15. Physiological foundations of memory, its types.

16. The formation of communicative behavior and its components at each stage of ontogenesis. Violations of communicative behavior.

17. Speech, neurophysiological and morphological foundations. The development of a child's speech in ontogenesis.

18. Lateralization of functions.

19. Neuroscience.

20. Artificial intelligence in the study of the functions of higher nervous activity in humans in various periods of ontogenesis

Practical skills for formative assessment

- Determination of mental performance.

- Determination of temperamentological characteristics.

- With the use of a hardware and software complex to evaluate the choronophysiological indicators

Task for formative assessment: (Sample Sample Test)

1. The first conditioned reflex in a child is a sucking reflex to:

a) the position when feeding;

b) the type of mother's breast;

c) feeding time;

d) overflow of the bladder;

e) hunger.

2. The first conditioned reflex to an external stimulus is a conditioned reflex to:

a) the appearance of a soapy hand;

b) feeding time;

c) the surrounding environment;

d) type of maternal breast;

e) feeding position.

3. Conditioned reflexes fade very quickly in age:

a) 2-3 years;

b) primary school age;

c) high school age;

d) preschool age;

e) the period of puberty.

4. The great strength of the conditioned reflexes formed is observed at the age of: a) 2-3 years;

b) 5 years;

c) 14-16 years old;

d) 1 year;

e) newborns.

5. Define the "dynamic stereotype".

Section No.3. Age-related and adaptive features of the musculoskeletal system

Topic 1. Morpho-functional features of the musculoskeletal system at different stages of ontogenesis /Practice/

Points for oral quiz.

1. The cerebellum, its functions. Symptoms of partial and complete removal of the cerebellum. The role of the cerebellum in the regulation of muscle tone and movements, physiological features in ontogenesis.

2. Physiological features of skeletal muscle properties, physiological features in ontogenesis.

3. Structural features of the membrane and sarcomeres of skeletal muscle fibers. The mechanism of muscle contraction, physiological features in ontogenesis.

4. The concept of a motor unit, physiological features of fast and slow motor units, physiological features in ontogenesis.

5. Energy of muscle contraction. Ways of ATP resynthesis. The power and capacity of the body's energy systems, physiological features in ontogenesis.

6. Characteristics of types and modes of muscle contraction: single and tetanic contraction. The mechanism of tetanic contraction. Physiological features in ontogenesis.

7. Conditions of occurrence of optimum and pessimum of frequency and intensity of irritation (N.E. Vvedensky). Work and muscle strength. Dynamometry and ergography. The theory of fatigue. Hypertrophy and muscle atrophy. Age features.

8. Physiological features and properties of smooth muscles, their significance in the myogenic regulation of motor function of internal organs, physiological features in ontogenesis

9. Features of contraction and transmission of excitation in smooth muscles, physiological features in ontogenesis.

Practical skills for formative assessment

1. Physical development.

2. Types of constitution. Definition of body type.

Task for formative assessment: (Case studies)

Task: During the development of milk teeth (during histogenesis), first of all, dentin appears.

Task:

1) What cells are involved in its formation?

2) What embryonic germ do they form from?

Topic 2. Age-related features of movement and musculoskeletal system

Practical skills for formative assessment

- Dynamometry. Strength endurance.

Points for oral quiz.

1. The role of movements in the physical and mental development of children and adolescents.

2. The value of motor activity at different stages of ontogenesis.

3. Development of the muscular system.

4. Development of the bone system.

5. Physiology of labor processes and physical exercises.

6. Age-related features of the organization and regulation of voluntary movements in children and adolescents.

7. Fetal motor activity.

8. Motor activity of a newborn and an infant.

9. Development of basic movements (walking, running, jumping, throwing), development of motor qualities.

10. Age-related features of speed and accuracy of motor acts, endurance.

11. Features of the body's reaction to physical activity in different periods of ontogenesis.

12. Structure, growth, development of the skeleton.

13. Types and functional features of muscle tissue at different stages of ontogenesis.

Task for formative assessment: (Sample Sample Test)

1) Baby's bones:

a) have high strength

b) are not subject to curvature

c) have low strength

d) easily bend under prolonged heavy loads and incorrect body position

2) Injuries in children are less common than in adults, accompanied by fractures, since the bone tissue of the child is dominated by:

a) calcium salts

b) iron salts

c) water

d) organic substances

3) When choosing furniture for a child, take into account:

a) the length and proportions of the body

b) posture

c) age

d) muscle mass

4) The size of the necessary furniture for the child is determined by:

a) body weight

b) growth

c) head circumference

d) the vital capacity of the lungs

5) In order to avoid deformation of the chest, the distance between the trunk and the edge of the table when writing and drawing should be at least:

a) 1-2 cm

b) 10 cm

c) 20 cm

d) 3-4 cm

6) The formation of the arch of the foot ends

a) during adolescence

b) when the child begins to walk

c) at the time of birth

d) by the age of 2-3 years

7) From the point of view of hygiene, shoes should

a) not have a heel

b) have a high heel

c) have low thermal conductivity

d) have a high thermal conductivity

8) With age, the amount of bone tissue decreases

a) water and mineral substances

b) water

c) mineral and organic substances

d) water and organic substances

9) For the correct working posture at the table, it is necessary

a) development of neck flexor muscles

b) the presence of the arch of the foot

c) the formation of the skill of the correct working posture

d) development of torso flexor muscles

10) If the vertical distance between the tabletop and the chair seat is higher than normal, then the posture is formed

a) lordotic

b) rectifier

c) scoliotic

d) kyphotic

11) With incorrect posture

a) the vital capacity of the lungs increases

b) fatigue decreases

c) the work of the heart becomes more difficult

d) the work of the lungs improves

12) The causes of posture disorders do not include

a) the skill of correct landing

b) inconsistency of school furniture with the height and proportions of the child's body

c) carrying weights in one hand

d) weakening of the ligamentous-muscular system

13) The development of rickets in a child occurs when

a) malnutrition (lack of vitamin D and insufficient exposure to fresh air)

b) lack of physical activity

c) incorrect working position

d) excessive physical exertion at the table when writing, reading, drawing, etc.

14) The arch of the foot is formed due to the support on the heel bone and

a) the posterior ends of the bones are metatarsal

b) the front ends of the metatarsal bones

c) the phalanges of the fingers

d) other bones of the tarsus

15) From the point of view of the prevention of flat feet, the child's shoes should

a) not have a heel

b) have a high heel

c) have an elastic sole

d) have a non-elastic sole

16) Fixation of physiological bends of the spine occurs to

a) the moment of birth

b) 1 year

c) 30 years

d) 12-15 years old

Section No.4. Age-related and adaptive features of the cardiovascular system

Topic 1. Morphofunctional features of the cardiovascular system

Practical skills for formative assessment

1. Determination of the main indicators of hemodynamics.

2. Indicators of heart rate variability.

3. Determination of adaptive potential.

4. Regulation of the cardiovascular system.

5. Age-related features of ECG.

6. To evaluate the functional state of the cardiovascular system using a hardware and software package.

7.Possibilities of using mobile applications in assessing the functional parameters of the cardiovascular system at different stages of ontogenesis

Points for oral quiz.

1. What are the age-related features of the anatomy and physiology of the heart?

2. Formulate the energy rule of the Rubner surface. What is its physiological significance?

3. List the main age-related features of the arteries of the veins.

4. What are the causes of increased arterial blood pressure in the elderly?

5. What are the features of fetal circulation?

Topic 2. Circulatory system in different periods of ontogenesis

Points for oral quiz.

1. Characteristics of the phases of the cardiac cycle. Changes in blood pressure in the cavities of the heart in different phases of the cardiac cycle, physiological features in ontogenesis.

2. The main indicators of heart activity. Their dependence on the functional state of the organism, physiological features in ontogenesis.

3. Automatics of the heart: nature, the conducting system of the heart, its features.

4. Characteristics of the action potential of working cardiomyocytes. Age features.

5. Physiological properties of the heart muscle and its features in ontogenesis.

6. Characteristics of contractility of the heart muscle.

7. Mechanisms of homeometric and heterometric self-regulation of heart activity.

8. Characteristics of the effects of sympathetic and parasympathetic nerves and their mediators on the activity of the heart, physiological features in ontogenesis.

9. Reflex regulation of heart activity, physiological features in ontogenesis.

10. Humoral regulation of heart activity, physiological features in ontogenesis.

11. Excitability of the heart muscle, physiological features in ontogenesis.

12. The ratio of excitation, contraction and excitability during the cardiocycle. Extrasystoles, mechanisms of its formation.

13. Functional organization of the vascular bed. Types and features of blood vessels, physiological features in ontogenesis.

14. Mechanisms of blood flow through the vessels. Factors affecting the movement of blood through the vessels. Features of the movement of blood through the veins, physiological features in ontogenesis.

15. The main indicators of hemodynamics, physiological features in ontogenesis.

16. Blood pressure: its determining factors, the main indicators.

17. The concept of vascular tone, physiological features in ontogenesis.

18. Myogenic mechanisms of vascular tone regulation (intravascular pressure, metabolites, etc.).

19. Nervous regulation of vascular tone, physiological features in ontogenesis.

20. Vascular reflexogenic zones and their role in the regulation of vascular tone, physiological features in ontogenesis.

21. Vasomotor center. Levels of central regulation of vascular tone (spinal, bulbar, hypothalamic, cortical), physiological features in ontogenesis.

22. Humoral mechanisms of vascular tone regulation, physiological features in ontogenesis.

Task for formative assessment: (Sample Sample Test)

1. Embryonic adaptations of the cardiovascular system that disappear after the birth of a child:

a) epicardium, myocardium, endocardium;

b) Botall duct, oval hole;

c) pericardial bag;

d) bradycardia, tachycardia;

e) coronary vessels.

2. The heart weight of a newborn baby is:

a) 300g;

b) 220g;

c) 23.6g;

d) 10mg;

e) 32.6g.

3. The systolic volume of blood in a newborn is:

a) 2.5 ml;

b) 10.2 ml;

c) 50 ml;

d) 60-70 ml;

e) 1ml.

4. The minute volume of blood in an adult is:

a) 1.2liters;

b) 0.33 liters;

c) 2.5 liters;

d) 1.8 liters;

e) 5.25 liters.

5. Duration of the cardiac cycle in an adult

a) 0.46 s;

b) 0.63 s;

c) 0.8 s;

d) 0.4-0.5 s;

e) 1c.

Topic Main features of the cardiovascular system in children and adolescents

List of essay topics

1. The general scheme of fetal blood circulation.

2. Age-related features of the electrocardiogram.

3. Juvenile hypertension.

4. Age-related features of the reaction of the cardiovascular system to physical and psycho-emotional stress.

5. Factors adversely affecting the heart and blood vessels of children and adolescents.

6. Methods of working with electronic databases of physiological indicators.

7. The possibilities of using Internet things in the management of patients of different ages

Section No. 5. Age and adaptive features of blood

Topic 1. Age features of white and red blood.

List of essay topics

1. The concept of blood, blood system, blood function. The amount of circulating blood, its composition. The main constants of blood, their magnitude and functional significance. Physiological features in ontogenesis.

2. The concept of osmotic blood pressure, oncotic blood pressure, their values. Functional systems that ensure the maintenance of constant osmotic pressure and blood pH. Physiological features in ontogenesis.

3. Understanding of the protective function of blood and its manifestations (immune reactions, blood clotting). Physiological features in ontogenesis.

4. Plasma proteins, their composition, functions, role in the formation of immunity, in maintaining the physico-chemical constants of blood, in blood clotting.

5. Leukocytes, their morphofunctional characteristics. Leukocyte reactions, types of physiological leukocytosis, their mechanisms. The concept of the leukoformula, its shifts.

6. The concept of leukopoiesis, its nervous and humoral regulation. Physiological features in ontogenesis.

7. Shaped elements of blood. Erythrocytes are their morphofunctional characteristic. Erythrocyte reactions, mechanisms of physiological erythrocytosis. Physiological features in ontogenesis.

8. The concept of hemolysis, its types. Osmotic resistance of erythrocytes, the boundaries of the minimum and maximum osmotic resistance of erythrocytes.

9. Erythrocyte sedimentation rate, its mechanisms, clinical significance of ESR. Physiological features in ontogenesis.

10. Hemoglobin, its functions. Types, compounds of hemoglobin, their functional significance.

11. The concept of erythropoiesis, its nervous and humoral regulation. The process of blood clotting, its significance. The main factors involved in the coagulation process, their functional characteristics. Physiological features in ontogenesis.

12. The concept of vascular-platelet, coagulation hemostasis. Phases of vascular-platelet hemostasis, their characteristics. Physiological features in ontogenesis.

13. Coagulation hemostasis. Stages of coagulation hemostasis, their characteristics. Physiological features in ontogenesis.

14. A functional system that ensures the maintenance of the liquid state of the blood. Coagulation, anticoagulation and fibrinolytic systems, their functional interaction. Physiological features in ontogenesis.

Case study for formative assessment:

After puberty, the content of red blood cells in the blood of men becomes greater than that of women.

Task: What is the biological feasibility of sex differences in the content of erythrocytes and hemoglobin? What is their mechanism?

Task for formative assessment: (Sample Sample Test)

1. Peripheral organs of the immune system include:

a) red bone marrow;

b) lymph nodes;

c) tonsils;

d) thymus gland;

e) appendix;

f) the spleen.

2. Has a pronounced selective effect on infectious agents:

a) nonspecific cellular immunity;

b) nonspecific humoral immunity;

c) specific cellular immunity;

d) specific humoral immunity.

3. Humoral immunity is provided by:

a) T-amplifiers;

b) T-killers;

c) T-helpers;

d) T-suppressors;

e) T-memory;

f) B-lymphocytes;

g) plasma cells;

h) immunoglobulins;

i) antigens.

4. With the development of cellular immunity, B-lymphocytes are activated:

a) T-amplifiers;

b) T-killers;

c) T-helpers;

d) T-suppressors;

e) T-memory;

f) B-lymphocytes;

g) plasma cells;

h) immunoglobulins;

i) antigens.

5. Which immunoglobulins have the ability to dissolve genetically foreign to the body:

a) antitoxins;

b) agglutinins;

c) lysines;

d) precipitins;

e) antigens;

e) interleukins.

Section No. 6. Age-related and adaptive features of the respiratory system

Topic 1. Age-related features of the respiratory system. Methods for determining the main indicators of respiration.

Points for oral quiz.

1. The respiratory system, its main components, the importance of breathing for the body, the main stages of breathing. Physiological features in ontogenesis.

2. Biomechanics of inhalation and exhalation. Intrapleural pressure, its value. Physiological features in ontogenesis.

3. Composition and partial pressure of gases in the inhaled and exhaled air.

4. Indicators of external respiration (lung volumes, capacity, ventilation). Physiological features in ontogenesis.

5. Transfer of gases by blood. The dissociation curve of oxyhemoglobin. Features of carbon dioxide transport. Physiological features in ontogenesis.

6. Gas exchange between alveolar air and blood. Gas exchange between blood and tissues. Physiological features in ontogenesis.

7. The breathing center. Modern ideas about its structure and function. Automation of the respiratory center. Age features.

8. Spinal level of respiratory regulation. The role of respiratory muscle proprioreceptors in the regulation of respiration. Age features.

9. The role of the medulla oblongata and the varolian bridge in maintaining the periodicity and optimal level of pulmonary ventilation. Age features.

10. The role of the hypothalamus, limbic system and cerebral cortex in the regulation of respiration in various adaptive reactions of the body. Age features.

11. Humoral regulation of respiration: experiments, registering the role of oxygen and carbon dioxide. Physiological features in ontogenesis.

12. The mechanism of the newborn's first breath.

13. Mobile and web applications for monitoring respiratory system indicators in patients of various ages.

Practical skills for formative assessment

- Spirometry

Task for formative assessment: (Sample Test)

1. The vital capacity of the lungs in children aged 4 years is:

a) 1.2 liters;

b) 1.6l;

c) 1.4l;

d) 3.5l.

2. The weight of a newborn's lung is:

a) 68g;

b) 500g;

c) 100g;

d) 86g;

d) 300g.

3. Type of breathing in children 3-7 years old:

a) diaphragmatic;

b) asthmatic;

c) thoracic;

d) mixed.

4. The respiratory rate in newborns is ..... breathing movements per minute.

a) 40-60;

b) 18-20;

c) 16;

d) 30;

e) 50.

5. The final part of the respiratory tract is:

a) bronchiole;

b) alveolus;

c) pleura;

d) the cage.

6. The vital capacity of the lungs in adults is:

a) 1.2 liters;

b) 1.6l;

c) 1.4l;

d) 3.5l.

7. The weight of the lung lobe in an adult is:

a) 68g;

b) 500g;

c) 100g;

d) 86g;

d) 300g.

8. Type of breathing in newborns:

a) diaphragmatic;

b) asthmatic;

c) thoracic;

d) mixed.

Case study for formative assessment:

By the method of spirometry, 2 practically healthy boys aged 12 years, of the same height and weight were examined. In Roma, the value of the vital capacity of the lungs (VEL) was 1530 ml, and in Boris, the extensibility of the lungs is more by 200 ml. After carrying out a functional Sample Test of Saffron jelly in both boys increased to 1900 ml, . Task: 1) Describe the observed phenomena, what causes them. 2) Determine who has the functional reserves of the respiratory system more adaptive. Why?

Section No. 7. Age-related and adaptive features of the digestive system and metabolism

Topic 1. Age-related features of the digestive system /Practice/

Points for oral quiz

1. The digestive system, its role in the body. Functions of the digestive tract. Types of digestion depending on the characteristics and localization of hydrolysis. Physiological features in ontogenesis.

2. General principles of self-regulation of digestion. Food center, modern ideas about its localization and function. Physiological features in ontogenesis.

3. The role of reflex, humoral, local mechanisms in the regulation of secretory function of the digestive tract. Hormones of the gastroinSample Testinal tract, their classification, mechanisms of action. Physiological features in ontogenesis.

4. The role of reflex, humoral, local mechanisms in the regulation of the motor function of the digestive tract. Physiological features in ontogenesis.

5. Absorption of substances in various parts of the digestive tract. The concept of transport tone. Mechanisms of regulation of absorption of water and salts in the inSample Testine. Physiological features in ontogenesis.

6. Functional power system, analysis of its central and peripheral components. Food motivation. The physiological basis of hunger and satiety. Physiological features in ontogenesis.

8. Digestion in the oral cavity. Changing food in the oral cavity - mechanical and chemical processing.

9. Salivation, methods of study. The composition and physiological role of saliva. Regulation of salivation.

10. The act of chewing, its self-regulation. Research methods. Swallowing, its phases.

11. Morphofunctional features of the esophagus.

12. Digestion in the stomach. Composition, properties of gastric juice, role in digestion. Features of gastric secretion during digestion of proteins, fats, carbohydrates.

13. Phases of gastric secretion. Regulation of gastric secretion (nervous and humoral).

15. Types of stomach contractions, their neuro-humoral regulation, methods of study. Age features.

16. The process of evacuation of stomach contents into the duodenum, its regulation. Age features.

17. Digestion in the duodenum. Physiological features in ontogenesis.

18. External secretory activity of the pancreas, its regulation. Composition and properties of pancreatic juice. Physiological features in ontogenesis.

20. The role of the liver in digestion. The composition and properties of bile. Bile formation, regulation mechanisms. Physiological features in ontogenesis.

23. Secretory function of the inSample Testine. The composition and properties of inSample Testinal juice, the role in digestion. Cavity and membrane hydrolysis of nutrients in the small inSample Testine. Physiological features in ontogenesis.

25. Motor activity of the small inSample Testine. Types of contractions, role in digestion, mechanisms of regulation. InSample Testinal reflexes. Physiological features in ontogenesis.

26. Motor activity of the colon. Types of contractions, role in digestion. Mechanisms of regulation. The importance of the microbiota of the large inSample Testine for the body. Physiological features in ontogenesis.

Task for formative assessment: (Sample Sample Test)

1.Establish a correspondence between the digestive process and the part of the digestive tract in which it occurs:

Departments:

a) stomach

b) small inSample Testine

c) colon

Digestive processes:

1. processing of food mass with bile

2. suction of the main part of the water

3. the beginning of the breakdown of proteins and some types of fats

4. intensive absorption of nutrients by villi

5. splitting of fiber

6. completion of the breakdown of proteins, carbohydrates, fats

2. Set the sequence of the location of the digestive organs:

a) Colon

b) Small inSample Testine

c) The oral cavity

d) Esophagus

e) Pharynx

f) Rectum

g) Stomach

h) Anal opening

3. Set the sequence of small inSample Testine divisions:

a) Iliac

b) Jejunum

c) Duodenum

4. Set the sequence of sections of the large inSample Testine:

a) Rectum

b) Transverse colon

c) Sigmoid colon

d) Ascending colon

e) Caecum

f) Descending colon

5. Establish the sequence of occurrence of gastric secretion carried out reflexively:

a) Irritation of the oral cavity receptors by food, as well as the appearance and smell of food

b) Along the fibers of the vagus nerve, excitation is transmitted to the glands of the stomach

c) Excitation is transmitted to sensitive neurons in the composition of sensitive fibers d) Excitation is transmitted to motor neurons

e) The impulses reach the centers of the juice-separating reflexes located in the medulla oblongata and hypothalamus

f) The separation of gastric juice is caused

6. Establish a correspondence between the cells located in the gastric mucosa and the substances they produce

Cells

1.Main cells

2.Lining cells

3.Additional cells

4. Endocrine cells

Substances

a) Mucin

b) Components of hydrochloric acid

c) Gastrin

d) Various enzymes (pepsinogen, lipase)

7. Hydrochloric acid of gastric juice:

a) activates gastric juice enzymes that break down proteins

b) cleaves proteins to end products

c) promotes the formation of enterokinase and secretin

d) converts progastrin to gastrin

e) regulates the pyloric sphincter

Topic 2. Age-related features of metabolism

Practical skills for formative assessment

- Metabolism.

Task for formative assessment: (Sample Sample Test)

1. An adult is required per day... grams of protein per kilogram of body weight, and a child under 1 year old... grams.

a) 1.5 g;

b) 6-7 g;

c) 2-2.5 g;

d) 1.25 g;

e) 4-5 g.

2. Energy value of 1g of fat:

a) 39.06 kJ;

b) 0.239 cal;

c) 4.19 J;

d) 17.2 kJ;

e) 30 kJ.

3. The ratio of animal and vegetable proteins in adult food should be:

a) 75% and 25%;

b) 50% and 50%;

c) 30% and 70%;

d) 25% and 75%.

4. The inSample Testine retains ... carbohydrates to provide energy to its cells:

a) 7%;

b) 5%;

c) 9%;

d) 12%.

5. The daily need for water in a one-year-old child ...., in 11-14 years ...., and in an adult ....

a) 950-1000 ml;

b) 2.5 liters;

c) 1350 ml;

d) 1.5 l;

e) 800 ml.

Case study for formative assessment:

Three friends, Ivan, Andrey and Nastya, gathered for a kayaking trip to the river for 4 days. On the first day in the morning they will arrive at the river and will no longer have breakfast, on the last day they will have dinner in the city, having left the route. Friends plan to spend 8 hours a day on the water with a stop for a small snack of canned fish. Before cooking dinner, each of the men will spend about 30 minutes chopping wood. Task: 1. Calculate the energy consumption of young people. Do not forget that, even resting, an adult spends about 1500 kcal per day, the entire load is added in excess of this value. Show your calculations. 2. Write down which dishes for each meal you would choose for friends.

Topic 3. Physiological basis of nutrition at different stages of ontogenesis.

Practical skills for formative assessment

- Preparation of a daily food ration. Assessment of a typical daily diet.

Section No. 8. Age-related and adaptive features of the excretory and reproductive systems

Topic 1. Age-related and adaptive features of the excretory and reproductive system

Points for oral quiz

1. Draw a diagram of the nephron. Specify the age characteristics.

2. What processes of urination occur: a) in the renal glomerulus; b) proximal tubules; c) Henle loop; d) distal tubules and collecting tubes. Specify the age characteristics.

3. Describe, taking into account the physiological features of ontogenesis, the indicators regulated by the kidneys. Age features.

4. Describe, taking into account the physiological features of ontogenesis, the mechanisms of regulation of the excretory system.

5. Features of sexual development taking into account the physiological features of ontogenesis.

Topic 2. Age-related features of the excretory system

Task for formative assessment: (Sample Test)

1. On average, water is released from the adult body through the urinary system for 1 day, in liters:

a) 0.5-1.0

b) 1,0-1,2

c) 1,5-2,0

d) 2,5-3,5

2. The kidneys in the human body are located in:

a) the chest cavity

b) the abdominal cavity is closer to the anterior wall

c) the pelvic cavity

d) partially in the thoracic and partially abdominal cavities

3. The vessel carrying blood from the kidney is:

a) artery

b) arteriole

c) vienna

d) venule

4. What is the function of the Malpighian glomerulus in the human body?

a) blood filtration

b) urine filtration

c) salt absorption

d) water suction

5. During a routine examination of a 9-year-old child with chronic glomerulonephritis, a general urine analysis revealed: no protein, 2-3 leukocytes in the field of vision, 10-15 erythrocytes in the field of vision, relative urine density 1.007-1.028, glomerular filtration (according to endogenous creatinine clearance) 100 ml/min / 1.73m. Deviation from the norm should be considered:

a) the number of white blood cells in the urine sediment

b) the number of red blood cells in the urine sediment

c) the relative density of urine

d) glomerular filtration volume

6. In a five-day-old child, each urination leaves reddish-brick-colored spots on diapers. The collected urine turned out to be cloudy, a reddish-brown precipitate appeared in it during storage, there was no protein in the urine analysis, leukocytes 2-3 in the field of vision, erythrocytes 0-1 in the field of vision. This child has:

a) acute pyelonephritis

b) uric acid kidney infarction

c) acute glomerulonephritis

d) nephrolithiasis

7. In a healthy child of 7 years, the daily diuresis is:

a) 400 ml

b) 600 ml

c) 800 ml

d) 1200 ml

8. Substances contained in urine:

a) glucose

b) protein

c) urea

d) sugar

9) How much primary urine is formed in the body per day?

a) 180L

b) 110L

c) 20L

d) 10L

10. Bedwetting:

a) cystitis

b) enuresis

c) jade

d) bronchitis

Section No. 9. Age-related and adaptive features of the endocrine system

Topic 1. Age-related features of the endocrine system /Practice/

Points for oral quiz

1. Characteristics of endocrine glands and hormones. Features in ontogenesis.

2. Hormones of the hypothalamus, pituitary gland. Features in ontogenesis.

3. Draw a diagram reflecting regulatory interactions: a) hypothalamus-pituitary gland; b) pituitary-peripheral endocrine glands

4. Thyroid gland. Physiological features in ontogenesis.

5. Parathyroid glands. Physiological features in ontogenesis.

6. Pancreas. Physiological features in ontogenesis.

7. The adrenal glands. Physiological features in ontogenesis.

8. Sex glands. Physiological features in ontogenesis.

Topic 2. Features of endocrine regulation during puberty, peri- and postmenopause

Task for formative assessment: (Sample Test)

1. The pancreas produces hormones:

a) somatotropin;

b) glucagon;

c) thyroxine;

d) insulin;

e) oxytocin;

f) vasopressin

2. Select three options. Humoral effects on physiological processes in the human body

a) carried out with the help of chemically active substances

b) are associated with the activity of the glands of external secretion

c) spread slower than the nerve

d) occur with the help of nerve impulses

e) controlled by the medulla oblongata

f) are carried out through the circulatory system

3.Establish compliance

Iron:

Substances produced:

1. The adrenal glands

2. Parathyroid

3. Pituitary gland

a) Insulin

b) Tropic hormones

c) Adrenaline

d) Growth hormone

e) Androgens

f) Growth Hormone

g) Calcitonin

h) Thyroxine

Case study for formative assessment:

A child of 11 years old has a slowdown in growth, changes in the structure of the skin, hair, muscle apparatus, a sharp decrease in the speed of metabolic processes, mental disorders. Specific hormonal treatment in this case does not give a positive result. Task: 1) Which endocrine gland has impaired functional activity? 2) Suggest prevention options.

Stage II: Summative assessment

Points for oral quiz

1. The human body as a biological system.

2. Integral characteristics of the physiological characteristics of the organism at different stages of ontogenesis.

3. Phenotype and genotype.

4. Environmental factors affecting the body in the process of its vital activity, growth and development.

5. The main indicators of child development

6. The body as a whole

7. The concept of the growth and development of the child's body

8. The perinatal period.

9. Postnatal period.

10. Age periodization.

11. Patterns of ontogenetic development.

12. Basic theories of ontogenesis.

13. The influence of endo- and exogenous factors, and age-related anatomical and physiological features.

14. The role of heredity factors in the process of ontogenesis. The concept of the gene pool.

15. The role of environmental factors in the process of ontogenesis.

16. Uneven or heterochronous development.

17. Approaches to substantiating the division of the life cycle of individual development into separate age periods.

18. The main stages of intrauterine development.

19. Physiological characteristics of infants.

20. The main stages of childhood.

21. Height and body proportions at different age stages of development.

22. Sensitive periods for various physical qualities.

23. The influence of heredity and the environment on the development of the organism.

24. Criteria of biological age.

25. Determination of mediants, retardants, accelerants.

26. Acceleration is epochal and individual.

27. Reasons for epochal acceleration.

28. Heterochrony and harmony of development.

29. Critical periods in postnatal development

30. Principles of systemogenesis and advanced development of organs and functional systems in children and adolescents.

31. Characteristics of age periods of development.

32. Correlation of growth and development processes.

33. Definition of concepts: continuity, heterochrony, systemogenesis, biological reliability.

34. Neurohumoral regulation of body functions.

35. Homeostasis and its determining factors.

36. Calendar and biological age, their ratio, criteria for determining biological age at different stages of ontogenesis.

37. Morphological criteria of biological age at different stages of ontogenesis.

38. The role of environment and heredity.

39. Age-related changes in the structure of the neuron and nerve fiber.

40. Myelination of nerve fibers

41. Brain growth and shape

42. Ontogenesis of the large hemispheres.

43. Development of conducting pathways.

44. Structural transformations of the cerebral cortex

45. The significance and structural and functional organization and development of the nervous system.

46. Anatomical and physiological features and development of the central nervous system.

47. The effect of hormones on the development of the central nervous system.

48. The effect of hypoxia on brain development.

49. Maturation of the electrical activity of the brain.

50. Features of the maturation of the autonomic nervous system.

51. Evaluation of indicators and determination of the level of physical and neuropsychic development of a healthy child in various periods of childhood.

52. Features of the child's development during the first year of life.

53. Features of physical education and hardening of children in preschool institutions. Assessment of the child's readiness to study at school.

54. Acceleration processes.

55. Features of the puberty period.

56. Gerontology.

57. Biorhythms.

58. Concepts of geriatrics and gerontology.

59. Aging of the body.

60. Theories of aging.

61. Longevity

62. Old age

63. Biological age

64. Constitution.

65. Physique.

66. The main exchange.

67. Energy costs in various types of activities.

68. Daily food ration.

69. Circadian rhythms.

70. Mental performance.

71. Physical performance.

72. General patterns of growth and development of children and adolescents

73. The concept of ontogenesis.

74. The problem of age periodization and its criteria.

75. Heterochrony and harmony.

76. Stages in the development of the body of children and adolescents.

77. Critical periods in postnatal development of children and adolescents.

78. The main age-related features of the musculoskeletal system.

79. Age-related features of the cardiovascular system.

80. Age-related features of the respiratory system.

81. Age-related features of the endocrine system.

82. Development of secondary sexual characteristics.

83. Characteristics of secondary sexual characteristics in girls at various stages of ontogenesis.

84. Characteristics of secondary sexual characteristics in girls at various stages of ontogenesis.

85. Physiological characteristics of a teenager.

86. Changing the proportions of the body in ontogenesis.

87. Characteristics of the youth age period.

88. Maturity - as a period of ontogenesis, characteristic.

89. Factors affecting the functional state of the body in old age.

90. Uneven growth and development rate.

91. Biological reliability

92. Continuity and unevenness of growth and development.

93. The state of the cardiovascular system in the prenatal period.

94. The state of the respiratory system in the prenatal period.

95. Thymus gland (thymus) in ontogenesis.

96. Hypothalamic-pituitary system. Age features.

97. The state of the thyroid gland in ontogenesis.

98. Stages of puberty.

99. Dental age.

100. Changes in respiratory volumes and capacities in ontogenesis.

101. End-to-end technologies in the study of physiological patterns.

102. The possibilities of mobile applications for monitoring functional indicators in different periods of ontogenesis.

103. Ways of working with electronic databases of physiological indicators.

Task for credit: (Sample Test)

1 The period of second childhood in boys lasts

A) from 4 to 7 years

B) from 13 to 14 years

C) from 8 to 12 years

D) from 15 to 16 years

2 Dental age is used to determine

A) somatoscopic indicators

B) calendar age

C) somatometric indicators

D) biological age

3 When a functionally immature child enters school, there is

A) high mental activity

B) a long period of adaptation to

educational activities

C) low fatigue

D) high fatigue

4 The science that studies the functions of the body and its organs is called

A) histology

B) physiology

C) anatomy

D) morphology

5 Individual development of the organism is called

A) phylogeny

B) anthropogenesis

C) systemogenesis

D) ontogenesis

6 The non-simultaneous maturation of various organs and systems is called

A) reliability

B) homeostasis

C) heterochronicity

D) harmony

7 The child's readiness to study at school is determined by

A) according to the level of mental and physical development, coordination abilities

B) only by the level of physical development

C) only by the level of mental development

D) only by coordination abilities

8 Acceleration is understood as

A) accelerated rates of development of the organism in comparison with previous generations

B) comprehensive development

C) average level of development

D) slow rates of development of the organism in comparison with previous generations

9 Children with functional disorders belong to the health group

A) the fourth

B) the first

C) the second

D) the fifth

10 Energy rule of "skeletal muscles" formulated

A) I. A. Arshavsky

B) A. A. Markosyan

C) P. K. Anokhin

D) I. P. Pavlov

11 Nervous regulation is carried out by

A) mechanical stimuli

B) hormones

C) enzymes

D) electrical impulses

12 The formation of the arch of the foot ends

A) in adolescence

B) when the child starts walking

C) by the time of birth

D) by 3 - 5 years

13 First of all, in the process of ontogenesis, the analyzer department matures

A) teenage

B) conductor

C) cortical

D) receptor

14 Color vision is provided by

A) hair cells

B) sticks and cones

C) cones

D) sticks

15 Receptors that perceive sound are located in

A) the eardrum

B) the outer ear

C) the cochlea of the inner ear

D) middle ear

16 The upper limit of hearing in children reaches

A) 18 thousand Hz

B) 16 thousand Hz

C) 22 thousand Hz

D) 12 thousand Hz

17 The structural unit of the nervous system is

A) axon

B) dendrite

C) neuron

D) neuroglia

18 The greaSample Test hearing acuity is characteristic of children

A) 5 - 6 years

B) 14 - 19 years old

C) 7 - 8 years

D) 12 - 13 years old

19 The central nervous system includes

A) the brain and spinal cord

B) nerve nodes

C) nerves and their plexuses

D) plexuses around organs

20 Deformation of the longitudinal and transverse arches of the foot is

A) scoliosis

B) kyphosis

C) flat feet

D) lordosis

21 Which glands grow before the age of 30

A) epiphysis

B) pituitary gland

C) the adrenal glands

D) thyroid gland

22 What substances predominate in children's bone tissue

A) organic

B) mineral

C) trace elements

D) water

23 Up to what age does the growth of muscles in length continue

A) 20 years

B) 30 - 35 years old

C) 15 years

D) 23 - 25

24 Heat dissipation and relative skin surface is higher

A) in children

B) the elderly

C) in adolescents

D) in adulthood

25 Take part in the respiratory function of the blood

A) leukocytes

B) red blood cells

C) platelets

D) lymphocytes

26 The child's speech develops especially intensively at the age of

A) from 1 to 3 years

B) from 1.5 to 2 years

C) from 4 to 5 years

D) from 6 to 7 years

27 Baby teeth in children begin to erupt

A) at 6 months

B) at the 8th month

C) at the 9th month

D) at 4 months

28 It is necessary to train the processes of inhibition in a child with nervous processes

A) strong unbalanced

B) strong balanced inert

C) weak

D) strong balanced mobile

29 In the lungs occurs

A) gas exchange

B) air purification

C) humidification of the air

D) warming the air

30 Memory prevails among schoolchildren

A) verbal-logical, arbitrary

B) verbal-logical, involuntary

C) visual-figurative, involuntary

D) visually-figurative, arbitrary

METHODOLOGICAL GUIDELINES FOR LEARNING OUTCOMES ASSESSMENT

Stage: Formative assessment

Formative assessment is a regular checking of student academic progress during the academic term. It is performed in various oral and written forms (quizzes, essays, checking of home assignments, compilation of cases, self-study, colloquiums, and Sample Testing). During formative assessment, the teacher monitors the level of student's academic progress according to the curriculum identifying lack of knowledge, or misunderstanding.

The tasks of formative assessment are aligned with the Curriculum and Syllabus.

The current certification is a regular check of the assimilation of educational material throughout the semester. It can be carried out orally or in writing. The current certification is carried out in the form of surveys, solving Case study, performing laboratory work, Sample Testing. During the current monitoring of academic performance, the teacher establishes the real level of students' assimilation of the curriculum at a given time in the form of identifying areas of ignorance, incompetence, misunderstanding.

The forms of current control are defined by the curriculum and described in the work program. For all tasks of the current control, an assessment is made in accordance with the criteria and the evaluation scale.

1. Guidelines for test assessment.

Assessment criteria:

The results are assessed in a four-grading scale: "excellent", "good", "satisfactory", "unsatisfactory".

Type of the task	Assessed competences	Assessment criteria	Grade
Test	GPC - 5.1 GPC - 5.9	80 – 100%	Excellent
		66 – 80%	Good
		46 – 65%	Satisfactory
		Less Than 46%	Unsatisfactory

Assessment criteria:

The results are assessed in a four-grading scale: “excellent”, “good”, “satisfactory”, “unsatisfactory”.

Type of the task	Assessed competences	Assessment criteria	Grade
Oral survey	GPC-5.1; GPC-5.9	The student demonstrates a comprehensive, systematic and in-depth knowledge of the academic material; has learned the required and additional resources. The student demonstrates a consistent and thorough understanding of the required knowledge, concepts, skills of the material learned, and their significance for future profession. The student demonstrates a comprehensive knowledge of the academic material; has learned the required and additional resources. The student demonstrates a consistent understanding of the required knowledge, concepts, skills of the material learned, but makes minor errors.	Excellent Good
		The student demonstrates basic knowledge necessary for further study; has learned basic recommended literature. The student operates with inaccurate formulating, has difficulties in the independent answers, makes significant mistakes but is able to correct them under the guidance of a teacher.	Satisfactory
		The student does not know the obligatory minimum or demonstrates gaps in knowledge of the academic material, makes major mistakes or gives completely wrong answers.	Unsatisfactory
		The student demonstrates a comprehensive, systematic and in-depth knowledge of the academic material; has learned the required and additional resources. The student demonstrates a consistent and thorough understanding of the required knowledge, concepts, skills of the material learned, and their significance for future profession.	Excellent

Case study	GPC-5.1; GPC-5.9	The student correctly and solves the case-study task, demonstrating deep knowledge. There are no errors in logical reasoning and solution, the problem is solved in a rational way. The right answer is obtained, ways are clearly described.	Excellent
		The student correctly solves the case-study task, demonstrating deep knowledge. There are minor errors in logical reasoning and solution, the problem is solved in a rational way. The right answer is obtained, ways are clearly described.	Good
		The student correctly solves the case-study task, demonstrating basic knowledge. There are significant errors in logical reasoning and solution. The student demonstrates difficulties, but still is able to solve a case-study task.	Satisfactory
		The student incorrectly solves the case-study task, makes significant mistakes. The student is not able to solve a case-study.	Unsatisfactory
Practical work	GPC-5.1; GPC-5.9	The student demonstrates a comprehensive, systematic and in-depth knowledge of the academic material; has learned the required and additional resources. The student demonstrates a consistent and thorough understanding of the required knowledge, concepts, skills of the material learned, and their significance for future profession. The student demonstrates a comprehensive knowledge of the academic material; has learned the required and additional resources. The student demonstrates a consistent understanding of the required knowledge, concepts, skills of the material learned, but makes minor errors.	Excellent
			Good
		The student demonstrates basic knowledge necessary for further study; has learned basic recommended literature. The student operates with inaccurate formulating, has difficulties in the independent answers, makes significant mistakes but is able to correct them under the guidance of a teacher.	Satisfactory

		The student does not know the obligatory minimum or demonstrates gaps in knowledge of the academic material, makes major mistakes or gives completely wrong answers.	Unsatisfactory

2. Stage: Midterm assessment (credit)

Methodological guidelines for summative assessment (credit)

Credit is held in the oral form and includes several stages:

- oral answer (the card includes two questions);

- test.

The credit is carried out in the form of a final Sample Test control in the SurSU Moodle system: http://dl.surgu.ru/mod/quiz/view.php?id=20062

For admission and successful completion of the intermediate certification (credit), the student must meet the following requirements:

1) regularly attend classroom classes in the discipline; skipping classes is not allowed without a valid reason;

2) in case of missing a class, the student must work out the missed classes during the working hours;

3) the student must submit the practical papers for examination on time and make sure that they are counted by the next lesson.

Midterm assessment (credit) is assessed in a two-grading scale

1. «passed»;
2. «failed»

Type of the task	Assessed competences	Assessment criteria	Grade
Oral quiz	GPC -5.1 GPC – 5.9	The student answers all the questions correctly, clearly, logically and completely. The student closely applies theory and practice and correctly solves the problems of	Passed

		higher complexity with the professional content.	
	GPC -5.1 GPC – 5.9	The student is not able to give logical answer, gives no answer to additional questions and does not understand the topic. He/she makes significant and serious mistakes in answers.	Failed