

**Entrance exam program
in training of highly qualified personnel
(Ph.D. programme)**

3.1 “CLINICAL MEDICINE”

Entrance exam program for the postgraduate Ph.D. programme in training of highly qualified personnel 3.1 “CLINICAL MEDICINE” includes the following sections:

HUMAN ANATOMY.

General information about the motor system. Passive and active parts of the motor system. Doctrine of bones. Functions of the skeleton. Classification of bones. Development of bones. Influence of environmental factors on the development and growth of the skeleton. The doctrine of the connection of bones. Types of joints of bones. Classification of joints. Formation of joints in onto- and phylogenesis. Functional dependence between form, relation of articular surfaces and character of movement. Axes and planes in the human body. General information about the skull (craniology). Skull, peculiarities of its structure. Evolution of the cerebral and facial skull. Ontogenesis of the skull. Age and sex peculiarities. Teaching about muscles. Muscle as an organ. Auxiliary apparatus of muscles. General anatomy according to the list of striated muscles. Muscle work /elements of biomechanics/. Laws of muscle distribution. Classification of muscles. General overview and functional anatomy of the nervous system. Philo- and ontogenesis of the nervous system. Neurons. The spinal cord, its segmental structure. Formation of spinal nerves. Functional anatomy of the vegetative nervous system. Division of the autonomic nervous system into sympathetic and parasympathetic. The conditionality of this division. General plan of the structure of the circulatory system. Large and small circuits of the blood circulation, regional circulation.

BIOCHEMISTRY.

Definition of biological chemistry as a science. Contribution of native scientists to the development of various areas of biochemistry. The main sections of biological chemistry (general biochemistry, medical biochemistry, genome biochemistry, immunochemistry, etc.). Properties of living matter (complexity of chemical composition, high level of organization, structural and functional activity of macromolecules, use of environmental energy to maintain structural integrity and functional activity, self-reproduction of living organisms). Protein characteristics ensuring their functioning as the main carriers of life (various structures, high

specificity of the species, variety of physical and chemical transformations, ability for intramolecular interactions, the formation of supramolecular structures). Characteristics of enzymes as biological catalysts: (activity, specificity). The active centers of enzymes (catalytic, substrate). Functional groups of enzyme active centers. Isoenzymes. Influence of substrate concentration on activity and rate of enzymatic reactions. Features of biological oxidation (multistep, participation of enzymes, release of energy through hydrogen oxidation). Dehydrogenation as the main process of biological oxidation. Concept of tissue respiration. Respiratory chain. The concept of "toxicity". Endogenous and alien toxic substances. Metabolism of foreign substances: microsomal oxidation reactions and conjugation reactions with glutathione, glucuronic acid, sulfuric acid. Multiple drug resistance proteins. Metallothionein and deactivation of heavy metal ions. Heat shock proteins.

PATHOLOGICAL ANATOMY.

Reversible and irreversible damage. Necrosis. Causes, mechanisms of development, morphological characteristics. Clinical and morphological forms of necrosis, patho- and morphogenesis, clinical and morphological characteristics, diagnostic methods, outcomes. Metabolic disorders in cells and tissues (dystrophies). Definition, mechanisms of development, classification of dystrophies. Intra- and extracellular accumulations. Hereditary and acquired disorders of protein, lipid, carbohydrate metabolism: causes, patho- and morphogenesis, clinical and morphological characteristics, diagnostic methods, outcomes. Disorders of blood and lymph circulation. Blood flow disorders. Arterial and venous perfusion: causes, types, patho- and morphogenesis, clinical and morphological characteristics, outcomes. Inflammation. Definition, general characteristics, clinical signs and symptoms of inflammation (local and systemic). Diseases of the central and peripheral nervous system. The main manifestations of lesions of the brain tissue. Pathology associated with environmental factors and nutrition.

HUMAN PHYSIOLOGY.

Components of the internal environment of the body. The concept of homeostasis. The blood system, its components. The volume of blood, its composition, the concept of hematocrit. Functions of blood. The erythrocyte system. Hemoglobin, its structure, compounds and functions. Types of excitable tissues, their properties. Structure of cell membranes of excitable tissues. The concept of ion channels and pumps, their types and principles of

functioning. Mechanisms of formation of ionic asymmetry and resting membrane potential. Methods of recording membrane potential. Muscles, their types and functions. Modern concepts of muscle structure. Muscle proteins and their functions. Myocyte membrane structure, the concept of T-systems and sarcoplasmic network, their functions. Modern concepts of the mechanisms of muscle contraction and relaxation. Physiological significance of CNS. Neuron as a structural and functional unit of CNS. Functional element of the brain. Private physiology of CNS. Physiology of autonomic (autonomous) nervous system. Physiology of the endocrine system. Neurohumoral regulation. Physiology of metabolism, thermoregulation and excretion. General concept of metabolism in the body. Metabolism between organism and environment as the basic condition of life and homeostasis preservation. Plastic and energetic role of nutrients. Physiology of sensory systems (analyzers). The concept of sense organs, analyzers, sensory systems. Physiology of higher nervous activity. Biological foundations of behavior. Inborn forms of behavior (unconditioned reflexes and instincts), their importance for the adaptive activity of the organism. Study of innate forms of behavior.

PATHOLOGICAL PHYSIOLOGY.

Modern definition of the concept "disease". The essence of concepts "pathological process" and "pathological state" and their interrelation with pathological process and disease. Types of symptoms and their characteristics. The content of the concepts of "syndrome" and "symptom complex". Periods of the typical course of the disease and their characterization. General etiology and pathogenesis Definition of the concept of "etiology" and justification of its main provisions. The importance of cause and condition in the emergence of disease. Modern understanding of the role of "external" and "internal" causes in the occurrence of disease. The role of reactivity and resistance of the organism in pathology Definition of the concepts of "reactivity" and "resistance". Classification of reactivity. Types of group and individual reactivity and resistance. Pathophysiology of peripheral circulation and microcirculation Main forms of peripheral circulation disorders. The causes and mechanisms of various types of arterial hyperemia. Pathophysiology of hemostasis Current understanding of the factors involved in the regulation of blood aggregate state. Pathophysiology of pain Pain: definition of concept, etiology, biological significance. Structurally functional organization of nociceptive and antinociceptive systems.

PUBLIC HEALTH AND HEALTH CARE ORGANIZATION.

Public health and health care as a scientific discipline about the regularities of public health, the impact of social conditions, environmental factors and lifestyle on health, ways to protect and improve it. The ratio of social and biological in medicine. The main theoretical concepts of medicine and health care. Public health and factors determining it. Public health - the main content of the subject. The concept of health and disease, concepts, new philosophy of health, WHO definition. Criteria of health. Factors that determine health. Definition of health and disease. Evolution of concepts. Health-disease process and possibilities of intervention, notion of natural course of disease. WHO definition of health. Health as an inalienable right of the individual. Health indicators Comprehensive approach to health assessment. Purpose and objectives of health assessment. Indicators of individual health. Self-assessment of individual health (tests, questionnaires). Risk factors of disease. Modern problems of health promotion and disease prevention Promoting public health and disease prevention is a priority direction of national health care, reflected in legislative documents. Biostatistics Definition of biostatistics. Theoretical foundations. Main sections. Distribution of a variable. Types of distributions. Characteristics of distributions. Medical demography Demography and its medical and social aspects. Definition of medical demography, major sections. Primary health care Primary health care (PHC) is the first stage of the continuum of public health. Quality of medical care Quality of medical care: definition and main characteristics (effectiveness, efficiency, legitimacy, adequacy, satisfaction, etc.).

Reference List:

1. Severin, E. S. Biochemistry [Electronic resource]: textbook / Severin E. S. - Moscow : GEOTAR-Media, 2015 URL:<http://www.studentlibrary.ru/book/ISBN9785970433126.html>
2. Severin, S. E. Biological chemistry with exercises and tasks [Electronic resource] : textbook / Severin S.E. - Moscow : GEOTAR-Media, 2014. - URL:<http://www.studentlibrary.ru/book/ISBN9785970430279.html>.
3. normal physiology : textbook for students of higher education institutions studying in Biology, Physiology and related areas and specialties / Agadzhanyan N.A., V.M. Smirnov. - 2012, MIA. - 571 p.
4. Normal Physiology: Textbook / V.P. Degtyarev, N.D. Sorokina. - Moscow: GEOTARMedia, 2016. - 480 p.
5. Normal physiology : textbook [Electronic resource] / Nozdrachev A.D., Maslyukov P.M. - M. : GEOTAR-Media, 2019. Access mode: <http://www.studentlibrary.ru/book/ISBN9785970445938.html>

6. Tsarik G.N., Health care and public health: a textbook [Electronic resource] / edited by G.N. Tsarik - M. : GEOTAR-Media, 2018. - 912 p. - ISBN 978-5-9704-4327-9 - Mode of access: <http://www.rosmedlib.ru/book/ISBN9785970443279.html>
7. Starodubov V.I., Public health and health care [Electronic resource]: National guide / edited by V.I. Starodubov, O.P. Schepin et al. - Moscow: GEOTAR Media, 2013. - 624 p. (National guidelines series) - ISBN 978-5-9704-2678-4 - Mode of access: <http://www.rosmedlib.ru/book/ISBN9785970426784.html>
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10. Sapin, M.R. Atlas of human anatomy: in 3 vols. Textbook for students of medical universities / M.R. Sapin. - M.: Medicine, 2020.- 296 p. Vulture of the UMO
11. Pathological Anatomy. T. 1. General pathology [Electronic resource] : textbook / ed. by V.S. Paukov. - 2nd ed. in 2 vol. - Moscow: GEOTAR-Media, 2016. URL: <http://www.studentlibrary.ru/book/ISBN9785970437445.html>
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13. Pathophysiology : textbook : in 2 vols. V. Novitsky, E. D. Goldberg, O. I. Urazova. - M. : GEOTAR-Media, 2009. 2010.
14. Pathophysiology : a course of lectures [Electronic resource] / edited by G.V. Poryadin - M. : GEOTAR-Media, 2018. Access mode: <http://www.studentlibrary.ru/book/ISBN9785970447659.html>