

**Entrance exam program
in training of highly qualified personnel
(Ph.D. programme)
5.12. “COGNITIVE SCIENCES”**

Entrance exam program for the postgraduate Ph.D. programme in training of highly qualified personnel
5.12. “COGNITIVE SCIENCES” includes the following sections:

HUMAN PHYSIOLOGY. Internal Environment of Organism. Concept of Homeostasis. The Blood System, Its Components. The Volume of Blood, Its Composition, the Concept of Hematocrit. Blood functions. The Erythrocyte System. Hemoglobin, Its Structure, Compounds and Functions. Types of Excitable Tissues, Their Properties. The Structure of the Membrane of Cells of Excitable Tissues. The Concept of Ion Channels and Pumps, Their Types and Principles of Operation. Mechanisms of Formation of Ionic Asymmetry and Resting Membrane Potential. Methods of Recording the Membrane Potential. Muscles, Their Types and Functions. Modern Ideas about the Structure of the Muscle. Muscle Proteins, Their Functions. The Structure of the Myocyte Membrane, the Concept of T-Systems and Sarcoplasmic Network, Their Functions. Modern Ideas about the Mechanisms of Muscle Contraction and Relaxation. The Physiological Significance of the Central Nervous System. Neuron as a Structural and Functional Unit of the Central Nervous System. A Functional Element of the Brain. Private Physiology of the Central Nervous System. Physiology of the Vegetative (Autonomic) Nervous System. Physiology of the Endocrine System. Neurohumoral Regulation. Physiology of Metabolism, Thermoregulation and Excretion. The General Concept of Metabolism in the Body. Metabolism between the Body and the External Environment as the Main Condition of Life and Preservation of Homeostasis. Plastic and Energy Role of Nutrients. Physiology of Sensory Systems (Analyzers). The Concept of Sensory Organs, Analyzers, Sensory Systems. Physiology of the Higher Nervous Activity. Biological Bases of Behavior. Congenital Forms of Behavior (Unconditioned Reflexes and Instincts), Their Significance for the Adaptive Activity of the Organism. The Study of Congenital Forms of Behavior.

NERVOUS DISEASES. Anatomical and Physiological Features of the Nervous System. Histological Structure of the Nervous System; the Concept of the Blood-Brain Barrier; Fundamentals of Synaptology; Spinal Cord and Its Membranes; Reflex Arc; Medulla Oblongata, Pons, Midbrain and Cerebellum; Interbrain and Subcortical Nuclei; Cortex and White Matter of the Cerebral Hemispheres; Cerebrospinal Fluid System of the Brain and Its Membranes; Pathways of the Brain and Spinal Cord; Spinal Nerves and Nerve Plexuses, Autonomic Nervous System. Age-Related Aspects of Neurological Diseases. Mechanisms of Natural Aging Processes; Morphological, Biochemical, Immunological and Neurophysiological Age-Related Changes of the Nervous System; Clinical Manifestations of Diseases of the Nervous System in Different Age Periods; Nosological Forms Characteristic of Certain Age Groups; Modern Methods of Clinical, Laboratory, Instrumental, Neurophysiological Diagnostics of Diseases and (or) States of the Nervous System in Different Age Periods; Effective Medications That Improve Cognitive Functions in Geriatric Patients; Clinical Diagnostics Based on Somatic, Neurological and Additional Research Methods; Laboratory Studies of Patients of Different Age Groups in accordance with Current Medical Care Procedures, Clinical Recommendations (Treatment Protocols) on the Provision of Medical Care, Taking into account the Standards of Medical Care; Principles of Treatment of Patients, taking into account the Diagnosis, Age and Clinical Picture in accordance with the Current Procedures for the Provision of Medical Care, Clinical Recommendations (Treatment Protocols) on the Provision of Medical Care, taking into Account the Standards of Medical Care.

Recommended literature:

1. Normal physiology: Textbook for students of higher educational institutions, studying on ‘Biology’, ‘Physiology’ and related fields and professions / Agadzhanian N., Smirnov V. – 2012, MIA. – 571 p.
2. Normal physiology: Textbook / Degtyarev V., Sorokina N.. – M.: GEOTARMEDIA, 2016. – 480 p.: il.
3. Normal physiology: Textbook [Electronic resource] / Nozdrachev A., Maslyukov P. - M.:

- GEOTAR-Media, 2019. Access: <http://www.studentlibrary.ru/book/ISBN9785970445938.html>
4. Gusev E. Neurology [Electronic resource] / Gusev E., Konovalov A., Skvortsova V. - M.: GEOTAR-Media, 2018. - 880 p. ("National Guidelines" Series) - IS BN 978-5- 9704-4143-5 - Access: <http://www.rosmedlib.ru/book/ISBN9785970441435.html>
5. Gusev E. Neurology [Electronic resource] / Gusev E., Konovalov A., Skvortsova V. - M. : GEOTAR-Media, 2019. - 432 p. ("National Guidelines" Series)- ISBN 978-5-9704-4983-7. - Access: <https://www.rosmedlib.ru/book/ISBN9785970449837.html>

