

**Entrance exam program
for the postgraduate Ph.D. programme
in FUNDAMENTAL MEDICINE
(Subject code: 30.06.01)**

Human Anatomy

Anatomy Study Methods. Anatomy as Related to Other Disciplines. Embryogenesis Stages, Main Morphological Changes in Early Embryogenesis Stages. Features of the Formation of the Germ Layer and Axial Complex of Organs and Subsequent Importance in Embryo - and Organogenesis. Human Body Axes and Planes Used in all Module Sections. Study of Bones – Osteology. General Information about the Skeletal Anatomy, Classification of Bones. Bone as an Organ, Periosteum, Bone Marrow Cavity, Bone Marrow. Bone Structure; Diaphysis, Metaphysis, Epiphysis, Apophysis, Osteon, Compact and Spongy Substance. Chemical Composition of Bones and their Physical Properties. Anatomical Nomenclature. Human Body Plane and Axis. Study of Bone Joints – Syndesmology. Bone Joints in Phylogenesis. Classification of Bone Joints. Functional Anatomy of Syndesmoses, Synchondrosis, Synostosis, Half-Joints. Classification of Joints. Main and Auxiliary Elements of Joints. Fundamental Laws of Joint Biomechanics. Study of Muscles – Myology. General Characteristics of Muscle Tissue. Concept of Skeletal-Muscle Phylo - and Ontogenesis. Classification of Muscles, General Characteristics of Individual Functional Muscle Groups: Agonists, Antagonists, Synergists. Structure of the Muscle as an Organ. Muscle Anatomical and Physiological Diameter. Neuromotor Unit. Role and Fascia Development Patterns in the Muscular System According to N. Pirogov. Study of Internal Organs – Splanchnology. Main Sources of Formation in the Embryogenesis of the Digestive, Respiratory and Genitourinary Systems. General Principles of the Structure of Hollow and Parenchymal Organs. Internal Organ Topography Concept. Human Digestive System. Concept of Phylo- and Ontogenesis of the Digestive System. Tissue Development of the Gastrointestinal Tract. Respiratory System. Phylo- and Ontogenesis of the Respiratory System. Respiratory System, General Characteristics of the Gaseous Exchange Process Organ System of the Genitourinary Apparatus. Endocrine Glands. Classification of Endocrine Glands, Anatomy and Topography. Lymphatic System. Role of Russian Scientists in the Study of the Lymphatic System – Iosifov G., Zhdanov D. Organs of the Hematopoietic and Immune Systems. Bone Marrow, Topography, Structure, Age-Related Changes. Nervous System – Neurology. Central Nervous System. Peripheral Nervous System. Spinal Nerves. Cranial Nerves. Vegetative (Autonomic) Nervous System. Autonomic Nervous System: Development Patterns and Function. Division of the Autonomic Nervous System into Sympathetic and Parasympathetic Parts. Study of the Senses – Estesiologia. Anatomical and Functional Characteristics of the Senses, Analyzers.

Recommended literature:

1. Human Anatomy (v. 1, 2). – Ed. M. Sapina. – M.: Medicine, 2010. – 1104 p.
2. Gaivoronsky, I. Anatomy and Human Physiology: Textbook / I. Gaivoronsky. – M., 2013.

Pathological Anatomy

Damage, Cell and Tissue Death. Damage Morphology. Apoptosis. Intracellular Accumulation. Lipid Accumulation (Lipidosis). Protein Accumulation (Dysproteinosis). Glycogen Storage. Metabolic Disorders of Pigments (Chromoproteins). Pathological Calcifications (Calcinosis). Hyaline Changes. Fluid-Medium Imbalance and Blood and Lymph Circulation Disorders. Water and Electrolyte Imbalance. Circulatory Disturbance. Shock. Hemostasis. Hemorrhage. Thrombosis. Embolism. Ischemia. Infarction. Inflammation, Healing and Recovery. Acute Inflammation. Chronic Inflammation. Granulomatous Inflammation (Acute and Chronic). Inflammation Mediators. Inflammation Cellular and Molecular Processes. Morphological Manifestations of Acute and Chronic Inflammation. Common Manifestations of Inflammation. Repair, Regeneration, Wound Healing. Pathological Aspects of Inflammation and Regeneration. Pathology of the Immune System. Hypersensitivity Reactions. Autoimmunization and Autoimmune Diseases. Immunodeficiency Syndromes. Cell Growth and Differentiation Pathology. Adaptation Process. Cell Growth and Cell Differentiation. Role of Extracellular Matrix and Cellular Matrix Interactions. Adaptation Process. Tumors. Most Important Clinical and Morphological Manifestations of Tumor Growth. Tumor Growth Risk Factors. Molecular Basis of Carcinogenesis. Biology of Tumor Growth. Carcinogenic agents and their Interaction with Cells. Antitumor Immunity. Genetic Disease. Diseases that Develop under the Laws of Mendel. Diseases with Polyfactorial (Multifactorial) Inheritance. Cytogenic Diseases (Chromosomal Disorders). Diseases with Non-Classical Inheritance Caused by One Genome. Pathology Caused by Environmental Factors and Nutrition. Importance of the Environment and Human Pathology. Air Pollution. Chronic Drug Effects. Physinosis. Nutrition-related Diseases. Study of Diagnosis: Most Important Sections. Medical Statement of Death. Main Provisions of the Study of Diagnosis. Signs of Death and Postmortem Changes. Diseases of Blood Vessels and Heart. Atherosclerosis and Arteriosclerosis. Hypertension and Arteriolosclerosis. Main Types of Iatrogenic Pathology Arising in the Treatment of Vascular Diseases. Coronary Heart Disease (Coronary Disease). Diseases of the Valves and Openings of the Heart and Main Arteries. Myocardial Diseases of Established Etiology (Specific Diseases). Diseases of the Pericardium. Pathology of Blood Cells and Bone Marrow. Anemias. Hematopoietic Tissue Tumors (Leukemia). Myeloproliferative Disease. Myelodysplastic Syndrome. Plasma-Cell Tumors. Platelet Diseases. Coagulopathy. Diseases of the Lymphatic System. Infectious / Nonparasitic Diseases. Bacteremia and Sepsis. Infections Affecting Mainly the Respiratory Organs. Infections Affecting Mainly the Gastrointestinal Tract. Purulent Infections caused by Gram-Positive Bacteria. Infections caused by Anaerobic Pathogens. Sexually-Transmitted Infections or Predominantly Sexually-Transmitted Infections. Infections of Children and Adolescents. Opportunistic Infections and AIDS. Anthrozoönotic and Vector-Borne Infections. Tropical Infections. Diseases of the Respiratory System. Diseases of the Digestive System. Cystic Kidney Disease. Glomerular Kidney Disease. Acute Glomerulonephritis. Nephrotic Syndrome. Chronic Glomerulonephritis. Damage to the Renal Glomeruli Associated with Systemic Diseases. Other Systemic Diseases Causing Kidney Damage. Kidney Disease Associated with Lesions of the Tubular Interstitial Tissue. Pyelonephritis and Urinary Tract Infections. Tubulo-interstitial Nephritis Caused by Drugs and Toxins. Acute and Chronic (Gouty) Uterine Nephropathy. Nephrolithiasis. Pathogenesis and Morphogenesis. Benign and Malignant (Malignant Phase of Hypertension) Nephrosclerosis. Renal Artery Stenosis. Urinary Tract Obstruction (Obstructive Uropathy). Hydronephrosis. Urolithiasis (Kidney Stones). Kidney Tumors, Classification.

Diseases of the Male Reproductive System. Diseases of the Prostate. Diseases of the Testicles and Epididymis. Breast Disease. Breast Diseases in Men. Gynecomastia. Diseases of the Female Genital Organs. Diseases of the Vulva and Vagina. Disease of the Uterus. Diseases of the Fallopian Tubes. Diseases of the Ovaries. Pathology of Pregnancy and the Postpartum Period. Pre- and Postnatal Disorders, Diseases of Infancy and Childhood. Birth Trauma and Birth Defects. Congenital Malformations. Intrauterine Infections. Hemolytic Disease of the Newborn. Sudden Death Syndrome. Tumors in Children. Endocrine Disease. Disease of the Pituitary Gland. Diseases of the Thyroid Gland. Diseases of the Parathyroid Gland. Diseases of the Adrenal Glands. Disease of the Thymus. Diseases of the Pineal Gland. Multiple Endocrine Neoplasia (MEN). Diseases of the Musculoskeletal System. Diseases Associated with Bone Matrix Abnormalities. Diseases Caused by Osteoclast Dysfunction. Osteonecrosis. Osteomyelitis. Malignant Melanoma. Benign Epithelial Tumors. Acute Dermatoses. Chronic Inflammatory Dermatoses. Psoriasis, Lupus Erythematosus, Lichen Planus. Diseases of the Central Nervous System, Peripheral Nerves. Traumatic Brain Injury. Cerebrovascular Disease. Infarction (Ischemic Stroke) of the Brain. Selective Necrosis of Neurons (Ischemic Encephalopathy). Spontaneous Intracranial Hemorrhage. Infectious Diseases of the Central Nervous System. Non-Purulent Infections of the Central Nervous System. Tuberculous Meningitis. Neurosyphilis. Fungal Infection. Viral Infectious Diseases of the Central Nervous System. Slow Viral Neuroinfections and Prion Diseases (Kuru, Creutzfeldt-Jakob Disease, Animal Prion Diseases). Demyelinating Diseases. Metabolic Diseases of the Central Nervous System. Diseases of the Central Nervous System Associated with Various Types of Deficiency, Intoxication and Radiation Therapy. Changes in Aging, Degenerative Processes and Dementia. Systemic Diseases of the Central Nervous System. Tumors of the Central Nervous System. Diseases of Peripheral Nerves and Paraganglia.

Recommended literature:

1. Pathological Anatomy [Electronic resource]: Nat. Guidelines / [M. Paltsev et al.]; Ed. M. Paltsev [et al.]. – Moscow: GEOTAR-Media, 2013. – 1259 p.: il.
2. Strukov, A. Pathological Anatomy [Text]: [Textbook for higher vocational education] / A. Strukov, G. Serov; ed. V. Paukov – 6th ed., updated and revised - Moscow: GEOTAR-Media, 2015.
3. Pathological Anatomy [Text]: Atlas: [textbook for higher vocational education] / [O. Zayratyants, S. Boykova, L. Zotova et al.]; ed. O. Zayratyants. - Moscow: GEOTAR-Media, 2012.
4. Ordin, G. G. History of General Pathology [Text]: People and Facts / G. Poryadin, G. Balyakin, J. M. Salmas. - Moscow: Litterra, 2013. - 200 p.

Pathological Physiology

Subject and Tasks of Pathological Physiology. Place of Pathological Physiology in Modern Medical Science. Definition of "Health" and "Disease". Definition of "Pathogenesis". Definition of "Sanogenesis". Disease, Periods Disease. Reactivity. Cell Pathophysiology. Regional Typical Pathological Processes. Disorders of Local Blood Circulation. Arterial Hyperemia. Inflammation. Typical Metabolic Disorders. Pathology of Body Heat Metabolism. Violations of Water-Salt Metabolism. Edema. Body Acid-Base State Disorders. Protein Metabolism Disorders. Fat

Metabolism Disorders. Hyper - and Hypolipidemia. Carbohydrate Metabolism Disorders. Diabetes. Pathophysiology of Vitamin Deficiency and Mineral Metabolism Disorders. Hypoxia. Immunopathology. Pathophysiology of Immunity. Allergy. Pathophysiology of Tissue Growth. Tumors. Pathophysiology of Terminal States. Pathophysiology of Pain. Stress (Adaptation Syndrome). Shock, Collapse, Coma. Dying and Revitalization of the Body. Pathophysiology of Biorhythms. Pathophysiology of Hereditary Diseases. Disease of Civilization. Private Pathological Physiology. Blood and Haematopoiesis. Anemias. Hemoglobinosis Pathophysiology. Leukocytosis and Leukopenia. Leukemia and Leukemoid Reactions. Hemorrhagic Diathesis. Cardiovascular System. Pathophysiology of the Heart. Arrhythmias, Definition and Classification. Pathophysiology of Myocardial Necrosis. Cardiomyopathies. Myocarditis, Endocarditis and Pericardial Diseases. Heart Disease. Heart Failure. Pathophysiology of the Vascular Tone. Pathophysiology of Atherosclerosis. Pathophysiology of the Respiratory System. Digestive System. Pathophysiology of Pancreatic Dysfunction. Pathophysiology of the Liver. Excretory System. Modern Ideas about the Process of Urination and its Regulation. Acute Diffuse Glomerulonephritis. Pyelonephritis. Renal Stone Disease, Exogenous and Endogenous Etiological Factors. Renal Failure, Changes in Blood and Urine Composition. Endocrine System. Pathophysiology of the Nervous System. Pathophysiology of Drug Addiction. Infectious Process. Definition of an Infectious Process. Factors of Immune Protection in the Development of an Infectious Process. Role of Environmental, Social and Epidemiological Factors in the Development of Infection. Periods of Infectious Disease and their Pathophysiological Analysis.

Recommended literature:

1. Litvitsky P. Pathological Physiology: Textbook. In 2 volumes. M.: GEOTAR - Media, 2014.
2. Chereshev V., Yushkov B. Pathophysiology: Textbook. M., 2014. – 836 p.

Clinical Pharmacology

Subject and Objectives of Clinical Pharmacology, Clinical Pharmacology Sections, Main Legal and Ethical Aspects of Drug Use, Organization Principles and Main Clinical and Pharmacological Services in Health Facilities. Principles of Development of Medicine Efficiency and Safety Control Programs, Methodology of Assessment of the Influence of Drugs on the Quality of Life. Concepts of Antagonists, Agonists, Partial Agonists, Main Target Molecules of Drugs. Concept of Adverse Drug Reactions. Features of Pharmacokinetics and Pharmacodynamics of Drugs in Pregnant Women and the Fetus. Features of Pharmacokinetics and Pharmacodynamics of Drugs in Children. Formulary System Concept. Adverse Drug Reactions. Drug Overdose. Drug Interactions. Features of Pharmacokinetics and Pharmacodynamics of Drugs in Pregnant Women and the Fetus. Drugs Categories Based on Degree of Risk to the Fetus by WHO: A, B, C, D, E, X. Drug Teratogenicity, Embryotoxicity and Fetotoxicity. Clinical Pharmacogenetics. Pharmacogenomics. Genetic Characteristics of the Patient Affecting Drug Pharmacokinetics: Polymorphisms of Drug Metabolism Enzymes Genes; Polymorphisms of Drug Transporters Genes. Organization of Activities of a Clinical Pharmacogenetics Laboratory in a Multidisciplinary Hospital. Clinical Pharmacoeconomics. Clinical Pharmacoepidemiology: Types of Pharmacoepidemiological Analysis (ABC-VEN Analysis, Drug Consumption Review), Defined Daily Dose (DDD). Clinical Studies of Drugs. Concept of Randomized Controlled Trials. Evidence-based Medicine: Principles, Levels (Classes) of Evidence. "End Points" of Clinical

Trials. Meta-analysis. Pharmacokinetics, Pharmacodynamics, Indications, Contraindications, Undesirable Drug Reactions, Interaction of the Following Drugs. Drugs that Lower the Vascular Tone. Antiarrhythmic Drugs. Inotropic Drugs. Diuretics. Pharmacokinetics, Pharmacodynamics, Indications, Contraindications, Undesirable Drug Reactions, Interaction of the Following Drugs.

Recommended literature

1. Kharkevich, D. Pharmacology [Electronic resource]: [textbook for medical schools] / D Kharkevich. – 11th ed., updated and revised. - Moscow: GEOTAR-Media, 2013. - 760 p.: il.
2. Clinical Pharmacology [Text]: National Guidelines / ed. by Yu. Belousov and 3 others. ; Association of Medical Quality Societies - Moscow: GEOTAR-Media, 2012. - 965 p. + CD. - (National GUIDelines.) - On Obl. : National Priority Projects – Zdorovye.
3. Medical Drugs in Russia [Electronic resource]: VIDAL Handbook, 2016. - M., 2016. - URL : <http://www.vidal.ru>.
4. Clinical Pharmacology [Text]: Textbook for Medical Students / B. G. Kukes, D. Andreev, G. Arkhipov et al.; Ed. G. Kukes. – 4th ed., updated and revised - Moscow: GEOTAR-Media, 2014. - 1052 p.: il. + CD.