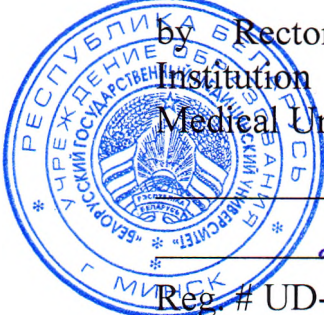


MINISTRY OF HEALTH OF THE REPUBLIC OF BELARUS
Educational Institution
BELARUSIAN STATE MEDICAL UNIVERSITY

**Контрольный
экземпляр**

APPROVED
by Rector of the Educational
Institution «Belarusian State
Medical University»
 S.P. Rubnikovich
20.11.2024
Reg. # UD- 091-102/2425/edu.

PATHOLOGIC PHYSIOLOGY

**Curriculum of the educational institution
in the academic discipline for the specialty**

7-07-0911-03 «Dentistry»

Curriculum is based on the educational program «Pathological Physiology», approved 20.11.2024, registration # УД-091-102/2425/уч.; on the educational plan in the specialty 7-07-0911-03 «Dentistry», approved 15.05.2024, registration # № 7-07-0911-03/2425/mf.

COMPILERS:

F.I.Vismont, Head of the Pathological Physiology Department of the Educational Institution «Belarusian State Medical University», D.Sc., Professor, Corresponding Member of National Academy of Sciences of the Republic of Belarus;

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RECOMMENDED FOR APPROVAL:

by the Pathological Physiology Department of the Educational Institution «Belarusian State Medical University»
(protocol # 2 of 09.09.2024);

by the Scientific and Methodological Council of the Educational Institution «Belarusian State Medical University»
(protocol # 3 of 20.11.2024)

EXPLANATORY NOTE

«Pathologic Physiology» is an academic discipline of the Medical and Biological Module # 2, which contains systematized scientific knowledge about the life activity of a sick organism, the nature and mechanisms of resistance to diseases, the general patterns of the occurrence, development and outcome of diseases.

The purpose of the discipline «Pathologic Physiology» is the formation of basic professional competence for the detection and prevention of disease states and diseases.

The objectives of the discipline «Pathological Physiology» are to form students' scientific knowledge about:

- the basic concepts of general nosology, the role of the causes and conditions of the external and internal environment, as well as the reactive properties of the human body in the onset, development and outcome of the disease;

- causes and mechanisms of typical pathological processes and reactions, their significance for the human body and manifestations in various diseases;

- causes, mechanisms and most important manifestations of typical disorders of organs and functional systems of the human body;

- skills and abilities necessary for interpreting the data of instrumental and laboratory studies and formulating, based on them, a conclusion about the causes and mechanisms of the development of pathology.

The knowledge, skills and abilities gained in the study of the discipline «Pathologic Physiology» are necessary for the successful study of the modules: «General Clinical Therapy Module # 1», «General Clinical Therapy Module # 2», «General Clinical Surgical Module».

A student who has mastered the content of the educational material of the academic discipline should have the following basic professional competence: use knowledge about the etiology and pathogenesis of general pathological processes, typical forms of the human body organs and systems pathology while conducting pathophysiological assessment of the laboratory investigation data

As a result of studying the discipline «Pathologic Physiology», the student should

know:

- basic concepts of general nosology;

- causes, main mechanisms of development and outcomes of typical pathological processes;

- the main patterns and mechanisms of the development of the disease and recovery;

- compensation mechanisms and principles of correction of structural and functional disorders in typical forms of pathology of organs and systems of the human body;

- the role of experimental research in the study of pathological processes, their possibilities and limitations, requirements for the experiment and the experimenter;

- the rules of medical ethics and deontology.

be able to:

identify and evaluate pathological and compensatory-adaptive reactions, functional reserves of the human body in various forms of pathology;

to carry out pathogenic analysis of hemograms of patients;

give an opinion on the hemogram about the presence of typical forms of pathology of the blood system, assess the severity of the changes that have occurred;

identify and evaluate typical disorders of the acid-base state, their mechanisms and degree of compensation;

identify the main types of cardiac arrhythmias, liver and kidney function according to clinical and additional research methods;

master:

skills of pathophysiological analysis of clinical symptoms and syndromes;

skills in conducting pathophysiological analysis of laboratory research data;

methods for conducting a pathophysiological analysis of clinical, laboratory and experimental data and formulating, based on them, conclusions about the possible causes and mechanisms for the development of pathology;

methods of substantiation and use of etiological and pathogenic principles of prevention and treatment of diseases.

Total number of hours for the study of the discipline is 210 academic hours, of which 102 classroom hours and 108 hours of student independent work. Classroom hours according to the types of studies: lectures – 21 hours (including 6 hours of supervised student independent work (SSIW)), practical classes – 81 hours.

Intermediate assessment is carried out according to the syllabus of the specialty in the form of a credit (4th semester) and an exam (5th semester).

Form of higher education – full-time.

ALLOCATION OF ACADEMIC TIME ACCORDING TO SEMESTERS OF STUDY

Code, name of the specialty	semester	Number of academic hours						Form of intermediate assessment
		total	in-class	including			out-of-class self-studies	
				lectures	supervised student independent work	practical classes		
7-07-0911-03 «Dentistry»	4	120	57	6	3	48	63	credit
	5	90	45	9	3	33	45	examination
Total hours		210	102	15	6	81	108	

THEMATIC PLAN

Name of section	Number of classroom hours	
	lectures	practical
1. General nosology	3	18
1.1. Introduction. General questions of the doctrine of the disease. General etiology and pathogenesis	1,5	6
1.2. Pathogenic influence of environmental factors on the human body	–	6
1.3. The role of the reactivity, constitution and age in pathology	1,5	3
1.4. The role of heredity in pathology	–	3
2. Typical pathological processes	6	30
2.1. Disorders of peripheral circulation and microcirculation	–	6
2.2. Pathophysiology of cell	1,5	3
2.3. Inflammation	1,5	3
2.4. Pathophysiology of thermoregulation. Fever and hyperthermia	1,5	3
2.5. Hypoxia	–	3
2.6. Typical metabolic disorders	–	6
2.7. Tumor growth	1,5	6
3. Pathophysiology of organs and systems	12	33
3.1. Pathophysiology of the blood system	–	9
3.2. Pathophysiology of the cardio-vascular system	3	9
3.3. Pathophysiology of external respiration	1,5	3
3.4. Pathophysiology of the digestive system	3	1,5
3.5. Pathophysiology of the liver	1,5	1,5
3.6. Pathophysiology of the kidneys	–	3
3.7. Pathophysiology of the endocrine system	1,5	3
3.8. Pathophysiology of the nervous system	1,5	3
Total hours	21	81

CONTENT OF THE EDUCATIONAL DISCIPLINE

1. General nosology

1.1. Introduction. General questions of the doctrine of the disease. General etiology and pathogenesis

Pathological physiology as fundamental science and educational discipline. Subject and tasks of Pathophysiology: its place in the system of medical education, as the theoretical basis of modern clinical medicine. Value of pathophysiological researches for development of preventive health care, improvement and development of new methods and means of diagnosis and diseases treatment.

Brief information on the history of Pathophysiology; main stages of its development. Value of works V.V.Pashutin, A.B.Foht, I.I.Mechnikov, A.A.Bogomolets, N.N.Anichkov, S.S.Halatov, P.N.Veselkina, G.N.Saharov, A.D.Speranskii, L.O.Orbeli, V.V.Parin, I.R.Petrov, N.N.Sirotinin, A.M.Chernukh, P.D.Gorizontov, G.N.Kryzhanovsky, A.D.Ado, R.Virhov, Yu.Kongeym, K.Bernar, U.Kennon, F.Bernet, H.Selye and other most prominent researchers of in the pathophysiology development.

Methods of pathological physiology. The value of an experiment in the development of experimental and clinical medicine pathophysiology. General principles of biomedical experiments and their results interpreting. Modern methods used in pathophysiological experiment. Modeling: its types, capabilities and limitations. Animal model of various forms of pathological processes and protective-adaptive reactions in man; value of comparative evolutionary method. Moral and ethical aspects of experiments on animal. Role of the newest advances in molecular biology, genetics, biophysics, biochemistry, electronics, mathematics, cybernetics, ecology and other sciences in the development of modern pathophysiology. Experimental therapy as an important method for the study of diseases and the development of new treatment methods.

Basic concepts of general nosology. Norm, health, transition of the body state between health and disease. The concept of the pathological response, the pathological process, pathological condition, disease. Typical pathological processes. Illness as a dialectical unity of damage and protective-adaptive (sanogenic) reactions of organism; systemic principle in pathology; the integrity of the organism. Stage of the disease, its outcomes. Complete or incomplete recovery. Remission, relapse, complications. Value of biological and social factors in human pathology.

Terminal condition. Dying as a staging process. Preagonal state, the agony, clinical death, biological death. Pathophysiological basis of resuscitation. Principles of recovery, temporary substitution of impaired functions of the circulatory and respiratory systems, correction of metabolic changes. Postresuscitation disorder. Social and ethical aspects of resuscitation.

The value of biological and social factors in human pathology. Social criteria of the disease. The principles of disease classification.

The role of causes and conditions, morphofunctional characteristics of the macroorganism, their dialectical relationship in disease occurrence. The concept of the disease external and internal reasons. The concept of polietiological diseases.

The definition of pathogenesis. Damage as a primary link in the pathogenesis. Injury levels: submolecular, molecular, subcellular, cellular, organ, tissue, organism. Manifestation of injury at different levels of the body. The unity of structural and functional changes in pathogenesis of diseases. The role and place of the etiological factor in the pathogenesis. The cause-and-effect relations in the pathogenesis; primary and secondary damage. Localization and generalization of damage; local and general reactions to damage, their relationship. Leading links of pathogenesis and «vicious circles», trace reaction.

Protective and compensatory response. The similarities and the differences between the concepts of adaptation and compensation. Emergency and long-term of adaptation and compensation reactions, their mechanisms, role in the disease development. The role of the genetic apparatus in the formation of long-term reactions of adaptation and compensation. Pathophysiological «price» adaptation and compensation. Mechanisms for recovery. The phenomenon of decompensation. Pathogenic principles of disease treatment.

Stress. The concept of stress as a non-specific reaction of the body to the impact of various extreme stimuli. Stages and mechanisms of stress development; the role of neuro-hormonal factors. The main manifestations of stress. The protective-adaptive and pathogenic significance of stress; stress and general adaptation syndrome. The concept of «diseases of adaptation».

1.2. Pathogenic influence of environmental factors on the human body

Characterization of the physical factors pathogenic effects: mechanical damages, hypo - and hyperkinesia, hypo - and hyperthermia, burn disease. The weather factors, the consequence of their impact (mountain disease, the bends).

The electric current and the peculiarities of its damaging effect on the body.

The damaging effect on the organism of ionizing radiation. The forms and stages of radiation sickness. Long-term effects of ionizing radiations.

Pathogenic action of chemical factors; exo - and endogenous intoxication.

Biological factors. Viruses, bacteria, and parasites as causes of infectious diseases.

Psychogenic pathogenic factors; the concept of iatrogenic diseases. The importance of social factors in preservation of health and the occurring of human diseases. Environmental aspects of General pathology.

Causal principle of diseases prevention and treatment.

Critical analysis of some General nosology concepts of (monocausalism, conditionalism, constitutionalism and others).

1.3. The role of the reactivity, constitution and age in pathology

The reactivity of the organism, its types, indexes and evolutionary aspects. Reactivity and resistance. Factors determining reactivity. The role of genotype, age, sex, congenital and acquired properties, individual peculiarities of the organism. The role of reactivity in the infectious process development. Specific and nonspecific protective factors.

The influence of environmental factors on the organism reactivity: the role of social and environmental factors. Pathological reactivity, its types and forms of manifestation. The directional change of individual and group reactivity as the major

means of diseases prevention and treatment. Factors that reduce nonspecific resistance. Ways and means of its improvement.

Immunogenic reactivity and basic forms of its violations. Immunodeficiency: primary (hereditary) and secondary (acquired) in infectious diseases, radiation injuries, protein starvation, intoxication, alcoholism, cancer, aging and other; iatrogenic immunodeficiency states.

Allergy, its general characteristics and connection with immune phenomena. Exogenous and endogenous allergens, their classification. Types of allergy; drug allergy. Types of allergic reactions. Causes and mechanisms of development. Manifestations of immediate and delayed types of allergy. Anaphylactic shock. Hay fever, bronchial asthma, urticaria and Quincke's edema. The concept of pseudoallergy. Serum sickness.

Transplant rejection reaction. Graft-versus-host disease.

The concept of autoimmune diseases, their significance in human pathology, classification. Mechanisms of immune tolerance impairment and immune autoaggression.

The doctrine of the constitution. Classification of constitutional types, significance in pathology.

1.4. The role of heredity in pathology

Hereditary and congenital diseases. Phenocopies. Etiology of hereditary diseases. Mutagenesis mutation; their varieties. Mutagenic factors; the value of ionizing radiation, viruses and environmental pollution in causing mutations; the possibility of drug mutations. The role of the conditions and the reactivity of the organism in the appearance of hereditary diseases.

Mechanisms of hereditary pathology: loss of normal hereditary information; excess of hereditary information; its replacement by a pathological; violations of regulation of the genetic apparatus activity; untimely realization of genetic information. Violation of DNA repair processes. The role of violations of the repair system and «immune surveillance» in the appearance of hereditary pathology.

Mono - and polygenic hereditary diseases. Penetrance and expressiveness. Chromosomal diseases. Hereditary predisposition to disease. The value of heredity in the multifactorial diseases development.

Hereditary diseases of connective tissue.

Methods of hereditary diseases studying, principles of their prevention and possible treatments.

Pathology of fetal development. The concept of antenatal pathology. Gametopathy, blastopathy, embryopathy, fetopathy. Dead fertility, its etiology. The value of the critical (sensitive) periods in the pathology of the embryo and fetus. Communication fetus pathology with harmful effects on the mother's body.

Anomalies of dental system, individual teeth, dentition, occlusion, deformation of the jaws.

2. Typical pathological processes

2.1. Disorders of peripheral circulation and microcirculation

General hemodynamic bases of local peripheral circulatory disorders. Basic forms of local circulatory disorders: arterial hyperemia, venous congestion, ischemia, stasis. Their types, causes and mechanisms of development, symptoms. Microcirculation in

different types of local circulatory disorders. Ratio of violations of macro- and microcirculation. Changes in the tissues of patients with arterial and venous congestion, ischemia, stasis; their significance and possible consequences. General changes in the body at the local circulatory disorders. Postischemic reperfusion syndrome. Compensatory processes (shunting blood flow, collateral circulation).

Typical microcirculatory disorders. Changes in blood flow and its rheological properties, the walls of microvessels and perivascular tissue; their relationship. Causes and mechanisms of microcirculatory disorders. Hemoconcentration, violation of suspension stability, aggregation and agglutination of red blood cells, «sludge»-phenomenon. Platelet aggregation. Capillary (veritable) stasis.

Disturbances of tone, mechanical integrity, structure, physical and mechanical properties and microvascular permeability. Accumulation in the perivascular space of physiologically active substances, ions, liquid. Capillary-trophic failure.

Thrombosis and embolism as common causes of local blood flow disorders. Causes and conditions of thrombosis. Stages and mechanisms of thrombus formation; types of thrombi. Causes and mechanisms of emboli formation; types of embolism. The significance, outcomes and consequences of thrombosis and embolism, principles of prevention and treatment.

Typical violations of lymphodynamics. Mechanical, dynamic and functional resorptive failure of lymphatic vessels.

2.2. Pathophysiology of cell

Cell injury. Definition and characterization of concept. Exogenous and endogenous causes of cell injury. The concept of cells self-harm. The role of immune processes in the cells self-harm, as well as their long inactivity, aging, disorders of the nervous system trophic function.

Common mechanisms of cell injury and manifestation. Direct and indirect effects on the cell-damaging agent. Character arising violations; their specificity. Violations of energy production, transport mechanisms and utilization of energy in the cell. Violations of the permeability and transport functions of cell membranes and cell organelles. Changes in the activity of intracellular enzymes; output of organelles and enzymes from the damaged cells. An imbalance in ion and fluid cell.

Role of free radicals in pathological processes development. Damaging effects of active oxygen species and peroxidation products (free radical) of lipids. Changes in the balance of the cell pro- and antioxidant systems, as one of the typical mechanisms of free radical's pathogenic action. Violations of the structure and functions of individual cell organelles, cell function regulation mechanisms. Changes in receptor properties of cells. Violations of the genetic apparatus and mechanisms of the genetic program realization.

Violation of damaged cells functions and interaction. Reversible and irreversible injury. Manifestation of cell injury, cell dystrophy and dysplasia. Necrosis and autolysis as outcomes of injury.

Cellular mechanisms of compensation at damage. Microsomal detoxification system, buffer systems, cellular antioxidants, anti-mutagenic system. Adaptive changes in the functional activity of the cell and its genetic apparatus. Cellular and subcellular regeneration. Ways to improve the resistance of cells to the action of pathogenic factors and stimulate recovery processes in damaged cells.

General reactions of the body to injury: acute phase response, shock, collapse, coma. Shock, definition of the concept. Types of shock. Pathogenesis of shock states; characteristics of its main components: disorders of regulation, macro- and microcirculation, metabolism; mechanism and pathogenic assessment of blood flow shunting; centralization of blood circulation. Similarities and differences between individual types of shock. Stages of shock, functional and structural disorders at different stages of shock. The importance of the functional state and reactive properties of the human body for the outcome of shock. Irreversible changes in shock. Pathophysiological foundations of shock prevention and treatment.

Collapse, definition of the concept, characteristics, types, causes and mechanisms of development, main links of pathogenesis, manifestations, consequences. Principles of collapse treatment. Fainting, etiology and pathogenesis.

Coma, definition of the concept, characteristics, types. Etiology and pathogenesis of comatose states, dysfunctions of the human body, principles of treatment.

2.3. Inflammation

Definition. Local and general signs of inflammation. The etiology of inflammation. Acute inflammation. The main components of the inflammatory process: alteration, changes in blood circulation with exudation and emigration of leukocytes, proliferation.

Primary and secondary alteration at an inflammation. Changes in metabolism, permeability of cell membranes and cell organelles in inflammation site, mechanisms of their development and significance. Mediators of inflammation; their origin classification principles and their role in the inflammatory process, in the development of secondary alteration. The concept of pro-and anti-inflammatory mediators. Interrelation of various mediators.

Reactions of microvascular vessels. Changes in blood flow, their stages and mechanisms. Changes in blood rheology in inflammation site, protein composition and physic-chemical properties of the plasma proteins. Changes in microvascular permeability.

Exudation. Enhancing filtration, diffusion and microvesicles formation as a basis of exudation process. Mechanisms and significance of exudation in inflammation site. Types of exudates.

Marginal position and emigration of leukocytes in inflammation site, their mechanisms.

Phagocytosis; its types, stages, mechanisms and biological significance. Violation of phagocytosis; its causes and significance at an inflammation. Hereditary diseases of phagocytic system. Proliferation, its main manifestations and mechanisms of development.

Reactivity role in the development of inflammation. Communication of local and general phenomena in inflammation. Meaning of endogenous pro-and anti-inflammatory factors, nervous, endocrine and immune systems in the inflammatory process. Inflammation and allergy. Types of inflammation.

Chronic inflammation, patterns of development. Pathogenic features of acute and chronic inflammation.

Outcomes of inflammation. Value of an inflammation to the body. Basic theory of the inflammation pathogenesis. The principles of anti-inflammatory therapy.

Inflammatory diseases of the maxillofacial region.

Infectious process as a form of interaction between micro- and macroorganism. Mechanisms of anti-infective resistance of the human body. Ways of introduction of infectious agents into the human body and their spread. Stages of the infectious process; outcomes and complications. Sepsis, etiology and pathogenesis. Coronavirus infection.

Ways of preventing infectious diseases. Principles of therapeutic intervention in the infectious process: impact on pathogens, correction of the immune response; stimulation of non-specific resistance mechanisms.

2.4. Pathophysiology of thermoregulation. Fever and hyperthermia

Definition and general characteristics of fever. Etiology of fever. Infectious and non-infectious fever. Pyrogenic substances: primary and secondary, exogenous and endogenous, their chemical nature and the sources of formation at infection process, aseptic tissue damage and immune reactions. Mechanisms of realization of pyrogens actions. Mediators of fever. Stages of fever. Thermoregulation at different stages of fever. Meaning of thermosensitive zones of the hypothalamus and peripheral receptors in restructuring of thermoregulation at a fever. Types of febrile reactions. Dependence of fever development on the properties of the pyrogenic factor and organism reactivity. Temperature curves, their diagnostic value.

Participation of the nervous, endocrine and immune systems in the development of fever. Changes in metabolism and physiological functions at a fever. Meaning of febrile response to the organism. Features of febrile response in the neonatal period and in elderly patients. Principles of analgesic therapy. Concept of pyrotherapy.

Difference between fever and exogenous overheating and other types of hyperthermia.

Changes in the salivary glands function and oral cavity in fever.

2.5. Hypoxia

Definition of hypoxia. The role of hypoxia in the pathogenesis of various diseases and pathological processes. Stability of individual organs and tissues to oxygen starvation. Principles of hypoxia classification. Types of hypoxia. Etiology and pathogenesis of hypoxia major types: hypoxic, hyperoxic, respiratory, circulatory, hemic, tissue, mixed origin. Hypoxia during uncoupling of oxidation and phosphorylation, overload hypoxia. Hypoxia as consequence of oxidation substrates deficit. Mixed forms of hypoxia. Laboratory parameters of gas composition of arterial and venous blood at certain types of hypoxia.

Urgent and long-term reactions of adjustment and compensation during hypoxia; their mechanisms.

Violation of metabolism, structure and function of cells and physiological functions at acute and chronic hypoxia. Reversibility of hypoxic conditions. Influence of hyper- and hypocapnia on the development of hypoxia. Pathophysiological bases of hypoxic conditions prevention and treatment. Experimental models of various types of hypoxia. Mechanisms of adaptation and compensation. Protective effects of adaptation to hypoxia. Local hypoxia in the pathogenesis of inflammatory and dystrophic lesions of the maxillofacial area tissue.

Hyperoxia: definition and its role in pathology. The therapeutic effect of hyperoxia: hyperbaric oxygen therapy and its application in dentistry.

2.6. Typical metabolic disorders

Disturbances of acid-base status. Classification of the main types of violations of the acid-base status of internal environment of the body. Gas (respiratory) acidosis and alkalosis. Non-gas forms of acidosis and alkalosis: metabolic, excretory (renal and gastro), exogenous. Mixed forms. Compensatory reactions in acute and chronic disorders of acid-base balance.

The role of oral acid-base balance disorders in the development of pathology. Pathogenic analysis of oral acid-base balance indicators with the formulation of a conclusion on the causes, mechanisms of development, and degree of compensation for typical forms of disorders. Correction of oral acid-base balance indicators.

Disorders of water metabolism. Hyper-, iso- and hypoosmolar dehydration. Hyper-, iso- and hypoosmolar hypohydration. Edema. Pathogenic factors of edema; value of hydrodynamic, osmotic and oncotic pressure gradients in the blood and tissues, state of vascular tissue membranes. The role of neuro-hormonal mechanisms in the development of edema. Types of edema. Pathogenesis of cardiac, renal, inflammatory, allergic, hungry edema. Local and general edema violations, the principles of their therapy, experimental models.

Violations of electrolyte metabolism. Violation of the content and ratio of sodium, potassium, calcium, magnesium ions and microelements in body fluids between cellular and extracellular sectors. The underlying causes and mechanisms of electrolyte imbalance. The relationship between water, ion and acid-base balance. Disorders of metabolism and physiological functions in the most frequent forms of electrolyte imbalance.

Carbohydrate metabolism disturbances. Violations of carbohydrate foods suction, the processes of synthesis, deposition and glycogen disintegration, transport of carbohydrate into cells and digestion of carbohydrates. Hypoglycemia, types and mechanisms of origin. Hyperglycemia. Diabetes mellitus and its types. The etiology and pathogenesis of various diabetes types. The mechanisms of insulin resistance. Disorders of carbohydrate and other kinds of metabolism at diabetes; disorders of physiological functions, complications; their mechanisms. Diabetic coma. Carbohydrate metabolism disturbances in hereditary enzymopathies. Violations of protein metabolism.

Violations of protein metabolism. Positive and negative nitrogen balance. Final stages, urea synthesis. Hyperasotemia. Violations of the blood plasma protein composition: hyper-, hypo- and dysproteinemia.

Disorders of purine and pyrimidine bases metabolism. The role of exogenous and endogenous factors in the development of gout.

Lipid metabolism disorders. Primary and secondary dyslipidemia. General obesity; its types and mechanisms. Violation of phospholipids metabolism. Hyperketonemia. Violation of cholesterol metabolism; hypercholesterolemia. Atherosclerosis and its pathogenic mechanisms and negative effects.

Starvation. Exogenous and endogenous causes of starvation. Absolute, complete, incomplete, partial starvation; protein starvation. Protein-energy (protein-energy) deficiency, its types: alimentary marasmus, Kwashiorkor-disease, alimentary dystrophy.

Periods of complete starvation; changes in metabolism and physiological functions in different periods of complete starvation. Concept of medical starvation.

Typical metabolic disorders as risk factors for main noninfectious diseases (cardiovascular disease, cancer, diabetes).

2.7. Tumor growth

Definitions of «tumor growth» and «tumor». Spread of tumors in nature, phylogenesis and ontogenesis.

Etiology of tumors; physical and chemical blastomogenic factors, biological carcinogens.

Chemical carcinogenic factors, their classification, procarcinogens and the final (true) carcinogens. Cocarcinogens and sincarcinogens. Stages of chemical carcinogenesis.

Physical carcinogenic factors. Ionizing radiation as a blastomogenic factor. Stages of physical carcinogenesis.

Carcinogens of biological nature. Types of oncogenic viruses. Stages of viral carcinogenesis.

The importance of hereditary factors, gender, age, chronic diseases in the appearance of tumors in humans.

Biological features of tumor growth relative autonomy and unregulated tumor growth, simplification of structural chemical organization (atypism, its types), the tumors and embryonic tissues similarities and differences. Metastasis (the definition, stage, mechanisms). Recurrence of tumors.

Malignant and benign tumors, peculiarities of their growth. Metabolic, functional and antigenic properties of malignant cells. Features and mechanisms of the invasive and destructive growth. Tumor progression.

Theory of the tumors pathogenesis. Modern ideas about the molecular and genetic mechanisms of carcinogenesis. The concept about the cellular proto-oncogenes and anti-oncogenes and their role in oncogenesis. Mechanisms of proto-oncogene transformation in active oncogene. Nature of oncoproteins and possible mechanisms of action. The role of mutation, epigenetic, virus-genetic mechanisms in carcinogenesis. Precancerous conditions.

Antineoplastic body resistance, immune and non-immune factors of resistance. Depression antineoplastic resistance value in the occurrence and development of tumors. The tumor and the body interaction. Role and reaction of the nervous and endocrine systems. Systemic manifestations of neoplastic disease. Cancer cachexia.

Pathophysiological bases for prevention and therapy of tumors.

3. Pathophysiology of organs and systems

3.1. Pathophysiology of the blood system

Periods and types of hematopoiesis and their disorders.

Pathology of the erythron. Pathological forms of erythrocytes and hemoglobin. Anemias and erythrocytosis, definition of notions, principles of classification by: the etiology and pathogenesis, hematosi type, the color index, regenerative ability of bone marrow, the size and shape of red blood cells. Iron deficiency anemia. Anemia with a deficiency of vitamin B₁₂ and folic acid (megaloblastic anemia), erythropoietin deficiency and other erythropoiesis factors. Achrestic anemias.

Anemias due to suppression of erythropoiesis by toxic effects, ionizing radiation and during autoimmune processes. Hypo- and aplastic anemias. Anemia at leukemia and other tumors of the bone marrow.

Anemia due to the enhanced hemolysis. Hereditary hemolytic anemias (erythrocytopathies, erythroenzymopathies, hemoglobinopathies). Acquired hemolytic anemias. Role of autoimmune processes in the pathogenesis of anemias.

Acute and chronic hemorrhagic anemias.

Polycythemias: primary (erythremias) and secondary (absolute and relative erythrocytosis).

Violations and compensatory-adaptive processes in the body with anemia and polycythemia.

Pathology of leukone. Disruption of the structure and function of the individual types of leukocytes and their role in pathological processes. Leukocytosis, leukopenia, agranulocytosis, their types, causes and mechanisms of development. Changes in leukocyte formula. Panmyelophthisis.

Concept of hemoblastoses. Leukemias. Definition, general characteristics, principles of classification. Tumor nature of leukemias, the role of abnormal expression of oncogenes. The etiology of leukemias, the role of viruses, chemical carcinogens, ionizing radiation. Features of leukemic cells, their morphological, cytochemical, cytogenetic and immunological characteristics. Hematopoiesis features and peripheral blood cell composition during different types of leukemias. Principal disturbances in the body with leukemia, their mechanisms. Principles of diagnosis and therapy of leukemias.

Leukemoid reactions. Types of leukemoid reactions, their etiology, pathogenesis, hematopoiesis and morphological changes of the peripheral blood, the difference from leukemia and value for the organism.

Violations of the hemostatic system. Thrombocytosis, thrombocytopenia, thrombocytopathy. Hemorrhagic and thrombotic syndromes. Hereditary and acquired forms of violation of vascular-platelet hemostasis and coagulation hemostasis.

Changes of total blood volume: hypo- and hypervolemia, their types, causes mechanisms and value for the organism. Acute hemorrhage as the most common cause of hypovolemia. Emergency and long-term protective and adaptive reactions of the organism at blood loss: the restoration of the blood volume, plasma proteins and formed elements. Disorders of physiological functions at blood loss and during posthemorrhagic states; reversible and irreversible changes. Principles of hemorrhage therapy.

The oral cavity changes in the pathology of the blood.

Currying of pathogenic analysis of hemograms of patients with various forms of blood system pathology, formulating a conclusion.

3.2. Pathophysiology of the cardio-vascular system

General etiology and pathogenesis of the circulatory system functions disorders. Risk factors in the occurrence of cardiovascular disease: managed and unmanaged. Value of psycho-emotional factors. The notion of circulatory failure, it forms the basic hemodynamic parameters and manifestations.

Heart failure, its kinds. Overload form of heart failure. Overloading by blood volume and blood pressure in the cavity of the heart, the etiology and pathogenesis. The

concept of the systolic and diastolic failure. Myocardial form of heart failure, its causes and mechanisms.

Short-term and long-term intracardiac compensation mechanisms of heart failure. Myocardial hypertrophy, peculiarity of the hypertrophied heart, the mechanisms of its decompensation.

General and hemodynamic manifestations of heart failure. Principles of treatment and prevention of heart failure.

Coronary insufficiency, absolute and relative. Pathogenesis of ischemic coronary insufficiency syndrome. Clinical forms of coronary insufficiency. Coronary heart disease, its forms, causes and mechanisms of development. Angina pectoris. Myocardial infarction, metabolic disorders, electrogenic and contractile properties of the myocardium in the ischemic area and beyond. Complications and outcomes of angina pectoris and myocardial infarction. Restoring blood flow to the ischemic area. Pathogenesis and clinical manifestations of myocardial reperfusion injury. Noncoronary form of heart damage.

Myocardial damage during systemic diseases (diabetes mellitus, beriberi, obesity, endocrine disorders, collagenoses).

Cardiac arrhythmias. Types, causes, mechanisms, signs on the electrocardiogram. Disorders of systemic and coronary circulation during cardiac arrhythmias.

Recognition of typical forms of cardiac arrhythmia based on electrocardiography data.

Arterial hypertension. Primary (essential) arterial hypertension, its etiology, pathogenesis theories, stabilizing factors of high blood pressure. Secondary («symptomatic») arterial hypertension, types, causes and mechanisms of development. Hemodynamics at different types of arterial hypertension. Complications and consequences of arterial hypertension. Target organ damage during arterial hypertension. The relationship between arterial hypertension and atherosclerosis.

Arterial hypotension: types, causes and mechanisms of development. Hypotonic disease. Collapse. Disorders of macro- and microcirculation in shock, fainting and collapse. Pathogenic assessment of shunting and centralization of blood circulation in shock.

Pathophysiology of cerebral circulation: general etiology and pathogenesis, compensation mechanisms, main forms of disorders.

The role of atherosclerosis in the pathology of the cardiovascular system.

Signs of the cardiovascular system chronic failure identified in the oral cavity.

3.3. Pathophysiology of the external respiration

Etiology and pathogenesis of external respiration disorders. Concept of respiratory failure, its stages and manifestations. Shortness of breath, its types, mechanisms of development.

Alveolar hypoventilation. Obstructive and restrictive types of ventilation disorders, their causes and mechanisms. Upper airway obstruction. Acute mechanical asphyxia, causes and mechanisms of development. Obstruction of the lower respiratory tract: pathogenesis of bronchial and emphysematous types of obstruction. Dysregulation of breathing. Reflex respiratory disorders, lesions of the respiratory center. Pathological

forms of breathing. Respiratory arrhythmia, periodic breathing, terminal breathing, apnea.

Disorders of pulmonary blood flow, their causes and consequences. General pulmonary perfusion failure. Pulmonary hypertension, pre- and post-capillary form. Local irregularity of ventilation-perfusion relationships.

Violations of blood-air diffusion. Their causes and consequences. Mixed forms of external respiration violations. Etiology and pathogenesis of acute respiratory failure at respiratory distress syndrome of adults and newborns.

Compensatory-adaptive processes in the system of external respiration in case of its individual unit's damage. Alveolar hyperventilation: its causes, mechanisms and consequences. Changes in ventilation rate, blood gas and acid-base status at respiratory failure and hyperventilation.

Manifestation of pathology of the external respiratory system in the oral cavity and with anomalies of the maxillofacial region.

3.4. Pathophysiology of the digestive system

General etiology and pathogenesis of the digestive system disorders. The role of food and nutrition. Significance of neurogenic and humoral factors. Pathogenic effects of smoking and alcohol. Functional relationships of the digestive system different parts in pathological conditions. Digestive disorders during metabolic disorders.

Appetite disorders: hyporexia, anorexia, pararexia, bulimia, polyphagia, polydipsia, disorders of taste sensations. Violations of salivation, hypo- and hypersalivation. Violations of mastication, swallowing and esophageal function.

Violations of the reservoir, the secretory and motor functions of the stomach. Types of pathological secretion. Hypo- and hyperkinetic stomach conditions. Violations of gastric contents evacuation: belching, heartburn, nausea, and vomiting. Relationship of secretory and motor disorders. Disorders of the small intestine and colon. Violations of secretory function. Meaning damage enterocytes, pancreatic achylia, acholia; role of gastrointestinal hormones. Violations of the cavernous and parietal digestion; malabsorption. Intestinal dysmotility. Diarrhea, constipation, intestinal obstruction. Violations of the intestinal barrier function; Coli-septicemia and dysbacterioses. Enteritis, colitis. Peptic ulcer and symptomatic ulcers of the stomach and duodenum.

Violations of the pancreas secretory function; acute and chronic pancreatitis.

Pathophysiology of certain diseases of the oral cavity and dentoalveolar apparatus. Dental caries (etiology and pathogenesis). Periodontal disease. Role of neurogenic dystrophy and autoimmune reactions in the pathogenesis of periodontal disease. Modern understanding of the development mechanisms. Role of dentoalveolar apparatus (chewing) violations in disorders of the gastrointestinal tract. The role of salivary gland pathology in disorders of the gastrointestinal tract.

3.5. Pathophysiology of the liver

General etiology and pathogenesis of the liver diseases. Violations of the portal circulation, the arterial blood supply of the liver. Parenchymal liver damage: inflammatory (acute and chronic hepatitis), dystrophic, cholangiostatic. Cirrhosis of the liver. Violations of biliary excretion. The role of autoimmune mechanisms in the liver pathology.

Hepatic failure: cholestatic, hepatocellular, vascular, mixed. Manifestations of liver failure. Disorders of carbohydrate, protein, lipid, water-electronic exchange, the hormonal regulation of the composition and physico-chemical properties of the blood during hepatic failure. Abnormalities of the barrier and disintoxication liver function. Acute hepatic failure, hepatic coma.

The main syndromes in liver pathology. Jaundice, their types: suprahepatic, liver, obstructive; their causes, mechanisms, manifestations.

Hematological, endocrinological and hepatosplenic syndromes. Portal hypertension syndrome, pathogenic assessment of its symptoms.

The role of hepatotropic poisons in pathogenesis of dystrophic, oncological and alcoholic liver diseases. Ways to prevent liver diseases. Signs of liver disease identified in the oral cavity.

3.6. Pathophysiology of the kidneys

Common elements in the etiology and pathogenesis of different renal function impairments. Impairments of renal hemodynamics, urine flow, renal parenchymal; disorders of urine formation neuro-humoral regulation; renal enzymopathy. Violation mechanisms of glomerular filtration, proximal and distal tubular reabsorption, tubular secretion and excretion; mixed violations.

Manifestations of renal function disorders. Changes in diuresis and urine composition, polyuria, oliguria, anuria, hypo- and hypersthenuria, izostenuriya pathological urine components of renal and extrarenal origin. Changes in the composition and physico-chemical properties of blood. Manifestations of hereditary tubulopathy.

Concept of glomerulopathy. Diffuse glomerulonephritis; etiology, pathogenesis. Nephrotic syndrome. Acute and chronic renal failure. Etiology, pathogenesis, stages.

Symptoms of chronic renal failure identified in the oral cavity.

Carrying of pathogenic analysis of clinical and laboratory data, formulating a conclusion based on them about the possible causes and mechanisms of development of pathology of organs and systems of the human body.

3.7. Pathophysiology of the endocrine system

General etiology and pathogenesis of endocrine disorders. Violations of the central mechanisms of the endocrine glands regulation. Excess, deficiency and imbalance of releasing and inhibiting factors of the midbrain (liberines and statines); violation of feedback and self-regulation mechanisms in the neuroendocrine system, trans-, para-adenohypophysis mechanisms of regulatory disorders. Psychogenic endocrinopathies.

Primary disorders of hormone synthesis in peripheral endocrine glands as a consequence of pathological processes in the glandular tissue, depletion on the basis of long-term hyperfunction, deficiency of the necessary components for the synthesis of hormones; genetically determined defects in hormone biosynthesis. Iatrogenic endocrinopathies.

Peripheral (extraglandular) mechanisms of disorders violations of hormone effect realization: binding disorders and the «liberation» of hormones by blood proteins, blockade, excessive destruction and other metabolic disorders in tissues, absence or change in properties of hormone receptors in target cells.

The main types of endocrine disorders. Hypo-, hyper- and dysfunctional; mono- and pluriglandular; partial and total endocrinopathies; early and late; primary, secondary and tertiary; absolute, relative and relative-absolute forms.

General characteristics of detection methods and principles of endocrine disorder treatment. Endocrine disorder role in etiology and pathogenesis of non-endocrine diseases.

Typical forms of disorders of individual endocrine gland functions. Pathology of the hypothalamic-pituitary system. Hyperfunction and hypofunction of the anterior pituitary gland. Hyper- and hypofunction of the posterior pituitary gland. Total failure of the pituitary gland.

Pathophysiology of the adrenal glands. Typical forms of disease (hypo- and hyperfunctional state), their manifestations.

Pathophysiology of the thyroid gland. Hypo- and hyperthyroidism, thyrotoxicosis.

Pathophysiology of parathyroid glands: hypoparathyroidism, hyperparathyroidism.

Pathophysiology of the gonads. Hypo- and hypergonadism in women and men.

Endocrine function of the pancreas.

Dyshormonal disorders of maternal organism, and their importance in the development of fetal endocrinopathy.

3.8. Pathophysiology of the nervous system

General etiology of nervous system disorders, exogenous and endogenous etiological factors, the importance of social conditions, primary and secondary disorders. The role of social factors in the occurrence of nervous system disorders, the importance of household intoxications; the possibility of medicinal origin of these disorders. Inflammatory, vascular, post-traumatic and oncological diseases of the nervous system.

Neurogenic movement disorders. Hypo- and hyperkinetic states. Central and peripheral paralysis and paresis. Ataxia, parkinsonism, convulsive syndrome. The concept of myasthenia and epilepsy.

Neurogenic sensitivity disorders. Types of sensory disorders. Pain, its mechanisms and biological significance.

Neurogenic vegetative disorders, types and main manifestations. The concept of vegetative dystonia. Neurogenic trophic disorders: neurogenic atrophy and dystrophy.

Disorders of higher nervous activity. Neuroses: definition of the concept and general characteristics. Biological and social aspects of neuroses. Main manifestations of neuroses.

CURRICULAR CHART OF ACADEMIC DISCIPLINE «PATHOLOGICAL PHYSIOLOGY»

Section, topic #	Section (topic) name	Number of class hours		Supervised student independent work	Literatures	Practical skill	Form of control	
		lectures	practical				of practical skill	of current / intermediate assessment
	4 semester							
	Lectures	6	-	3				
1.1	Introduction. General issues of the doctrine of disease. General etiology and pathogenesis	1,5	-	-	1-6			
1.3	The role of reactivity, constitution and age in pathology. The role of heredity in pathology	-	-	1,5	1-6			Electronic tests
2.2	Pathophysiology of cell	1,5	-	-	1-6			
2.3	Inflammation	1,5	-	-	1-6			
2.4	Pathophysiology of thermoregulation Fever and hyperthermia	1,5	-	-	1-6			
2.7	Tumor growth	-	-	1,5	1-6			Electronic tests
	Practical classes	-	48	-				
1.1.	Introduction. General questions of the doctrine of disease	-	3	-	1-6			Survey, tests, essays
1.1.	General questions of the doctrine of disease. General etiology and pathogenesis	-	3	-	1-6			Survey, test, computer testing
1.2.	Pathogenic influence of environmental factors on the human body. Damaging effect of electric current on the body	-	3	-	1-6			Survey, tests, reports on practical work
1.2.	Pathogenic influence of environmental factors on the human body. Damaging effect of ionizing radiation on the body	-	3	-	1-6			Survey, tests, reports on practical work

1.3.	The role of reactivity, constitution and age in pathology	-	3	-	1-6			Survey, tests, reports on practical work
1.4.	The role of heredity in pathology	-	3	-	1-6			Survey, tests, reports on practical work
2.1.	Peripheral circulatory disorders. Arterial and venous hyperemia. Ischemia. Stasis. Thrombosis, embolism, stasis	-	3	-	1-6			Interviews, tests, reports on practical work
2.1.	Microcirculation disorders Microcirculation disorders	-	3	-	1-6			Survey, tests, reports on practical work
2.2.	Pathophysiology cells	-	3	-	1-6			Survey, tests
2.3.	Inflammation	-	3	-	1-6			Survey, tests, reports on practical work
2.4.	Pathophysiology of thermoregulation. Fever and hyperthermia	-	3	-	1-6	Recognition of fever types by temperature curve	Solving situational problems*	Survey, written reports on practical work, computer testing
2.5.	Hypoxia	-	3	-	1-6			Survey, tests
2.6.	Typical metabolic disorders. Acid-base balance disorders	-	3	-	1-6	Pathogenic analysis of acid-base balance indicators with formulation of a conclusion on the causes, mechanisms of development, and degree of compensation of typical forms of disorders	Solving situational problems*	Survey, tests
2.6.	Typical metabolic disorders. Pathological physiology of water metabolism. Edema and dropsy	-	3	-	1-6		Solving situational problems*	Survey, tests Colloquium*

2.7.	Tumor growth. Biological features of tumor growth. Methods of experimental reproduction of tumors. Etiology of tumors. Mechanisms of carcinogenesis	-	3	-	1-6			Survey, tests
2.7.	Tumor growth. Relationships between tumor and organism. Principles of tumor treatment and prevention	-	3	-	1-6			Test, reports on practical work with their oral defense. Credit
5 semester								
	Lectures	9	-	3				
3.3.	Pathological physiology of the external respiration	1,5	-	-	1-6			
3.2.	Pathophysiology of the circulatory system. Heart failure	1,5	-	1,5	1-6			Electronic tests
3.4.	Pathological physiology of the digestion system	1,5	-	1,5	1-6			Electronic tests
3.5.	Pathological physiology of liver	1,5	-	-	1-6			
3.7.	Pathological physiology of the endocrine system	1,5	-	-	1-6			
3.8.	Pathological physiology of the nervous system	1,5	-	-	1-6			
	Practical classes	-	33	-				
3.1.	Pathophysiology of blood system. Periods and types of hematopoiesis and their disorders. Pathology of erythron. Pathological forms of erythrocytes and hemoglobin. Anemia. Erythrocytosis.	-	3	-	1-6	Pathogenic analysis of hemograms of patients with various forms of blood system pathology, formulation of the conclusion	Solving situational problems	Interviews, tests, reports on practical work
3.1.	Pathophysiology of blood system. Leukocyte pathology. Pathological forms of leukocytes. Leukocytosis, leukopenia. Hemoblastoses. Leukemoid reactions	-	3	-	1-6	Pathogenic analysis of hemograms of patients with various forms of blood system pathology, formulation of the conclusion	Solving situational problems	Interviews, tests, reports on practical work

3.1.	Pathophysiology of blood system. Hemostasis disorders. Final lesson on the topic «Pathophysiology of the blood system»	-	3	-	1-6	Pathogenic analysis of hemograms of patients with various forms of blood system pathology, formulation of the conclusion	Solving situational problems*	Survey, tests, report on practical work, abstracts. Colloquium*
3.2.	Pathophysiology of the cardiovascular system. Heart failure, its types. Overload and myocardial forms of heart failure	-	3	-	1-6	Recognition of typical forms of heart rhythm disturbances according to electrocardiography data	Solving situational problems	Interviews, tests, reports on practical work
3.2.	Pathophysiology of the cardiovascular system. Heart rhythm disturbances (arrhythmias), types, causes, mechanisms	-	3	-	1-6	Recognition of typical forms of heart rhythm disturbances according to electrocardiography data	Solving situational problems*	Interviews, tests, reports on practical work
3.2.	Pathophysiology of the cardiovascular system. Violations of the regulation of vascular tone. Arterial hypertension and hypotension. Final lesson on the topic «Pathophysiology of the cardiovascular system»	-	3	-	1-6	Pathogenic analysis of clinical and laboratory data, formulation of a conclusion on their basis on the possible causes and mechanisms of development of pathology of organs and systems of the human body	Solving situational problems	Survey, tests, report on practical work, abstracts. Colloquium*
3.3.	Pathological physiology of the external respiration	-	3	-	1-6	Pathogenic analysis of clinical and laboratory data, formulation of a conclusion on their basis on the possible causes and mechanisms of development of pathology of organs and systems of the human body	Solving situational problems	Interviews, tests, reports on practical work

3.4.- 3.5.	Pathological physiology of digestion. Pathological physiology of liver	-	3	-	1-6	Pathogenic analysis of clinical and laboratory data, formulation of a conclusion on their basis on the possible causes and mechanisms of development of pathology of organs and systems of the human body	Solving situational problems	Interviews, tests, reports on practical work
3.6.	Pathological physiology of the kidneys	-	3	-	1-6	Pathogenic analysis of clinical and laboratory data, formulation of a conclusion on their basis on the possible causes and mechanisms of development of pathology of organs and systems of the human body	Solving situational problems*	Interviews, tests, reports on practical work
3.7.	Pathological physiology of the endocrine system	-	3	-	1-6	Pathogenic analysis of clinical and laboratory data, formulation of a conclusion on their basis on the possible causes and mechanisms of development of pathology of organs and systems of the human body	Solving situational problems	Interviews, tests, reports on practical work

3.8.	Pathological physiology of the nervous system	-	3	-	1-6	Pathogenic analysis of clinical and laboratory data, formulation of a conclusion on their basis on the possible causes and mechanisms of development of pathology of organs and systems of the human body	Solving situational problems*	Interviews, tests, reports on practical work
Total hours		15	81	6		Exam		

* is a mandatory form of current certification (the form of control for which each student will receive a mark is marked)

INFORMATION AND INSTRUCTIONAL UNIT

Literature

Basic:

1. Pathophysiology : textbook for students of higher medical educational institutions of the III-IV accreditation levels / N. V. Krishtal [et al.] ; ed. by. N. V. Krishtal, V. A. Mikhnev. – Kyiv : AUS Medicine Publishing, 2017. – 656 p.

Additional:

2. General and clinical pathophysiology : textbook for students of higher educational institutions, of IV th level of accreditation / A. V. Kubyshkin [et al.] ; ed. by. A. V. Kubyshkin, A. I. Gozhenko. – 2nd ed. – Vinnytsya : Nova Knyha Publishers, 2016. – 656 p.

3. Pathophysiology : textbook for students / P. F. Litvitsky, S. V. Pirozhkov, E. B. Tezikov). – Moscow : Geotar-Media, 2016. – 432 p.

4. Kumar, V. Robbins and Cotran Pathologic Basis of Disease. V. II / V. Kumar, A. K. Abbas, J. C. Aster. – South Asia ed. – India : Elsevier, 2015. – 1391 p.

5. Simeonova, N. K. Pathophysiology: textbook for students of higher medical educational institutions of the III-IV accreditation levels / N. K. Simeonova ; ed. by. V. A. Mikhnev. – 2nd ed. – Kyiv : AUS Medicine Publishing, 2015. – 544 p.

Electronic courseware for the academic discipline «Pathological Physiology »

6. <https://etest.bsmu.by/course/view.php?id=266>.

METHODOLOGICAL RECOMMENDATIONS FOR THE ORGANIZATION AND PERFORMANCE OF STUDENT INDEPENDENT WORK IN THE ACADEMIC DISCIPLINE

The time allocated for independent work can be used by students for:

- preparing for lectures, practical classes;
- preparing for colloquiums, tests and exams in the academic discipline;
- studying the topics (issues) designed for independent work;
- performing research and creative tasks;
- problem solving.

METHODOLOGICAL RECOMMENDATIONS FOR THE ORGANIZATION AND PERFORMANCE OF SUPERVISED STUDENT INDEPENDENT WORK IN THE ACADEMIC DISCIPLINE

APPROXIMATE LIST OF TASKS FOR SUPERVISED STUDENT INDEPENDENT WORK:

- studying topics and problems that have not been discussed at the lectures;
- preparation and presentation of abstracts;
- presentation of reports;
- preparation of didactic materials.

FORMS OF CONTROL OF SUPERVISED STUDENT INDEPENDENT WORK:

- electronic tests.

LIST OF AVAILABLE DIAGNOSTIC TOOLS

The following forms are used for competence assessment:

survey;
interview;
tests;
reports on practical work;
essay;
computer testing;
colloquium.

LIST OF AVAILABLE TEACHING METHODS

Traditional method;
active (interactive) methods:
 Problem-Based Learning (PBL);
 Case-Based Learning (CBL).

LIST OF PRACTICAL SKILLS

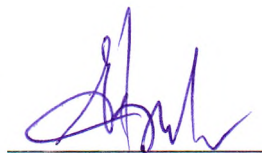
Name of practical skills	Form of practical skills control
1. Pathogenic analysis of hemograms of patients with various forms of blood system pathology, formulation of a conclusion	Solving situational problems
2. Recognition of fever types by the temperature curve	Solving situational problems
3. Pathogenic analysis of acid-base balance indicators with the formulation of a conclusion on the causes, mechanisms of development, and degree of compensation of typical forms of disorders	Solving situational problems
4. Pathogenic analysis of clinical and laboratory data, formulation of a conclusion on their basis on the possible causes and mechanisms of development of pathology of organs and systems of the human body	Solving situational problems
5. Recognition of typical forms of heart rhythm disturbances according to electrocardiography data	Solving situational problems

**PROTOCOL OF THE CURRICULUM APPROVAL
BY OTHER DEPARTMENTS**

Title of the discipline requiring approval	Department	Amendments to the curriculum in the academic discipline	Decision of the department, which designed the curriculum (date, protocol #)
1. Radiology and Radiation Therapy	Radiation Diagnostics and Radiation Therapy	Agreed. No comments or suggestions	protocol # 2 of 09.09.2024
2. Disaster Medicine	Military Health Maintenance Organization and Emergency Medicine	Agreed. No comments or suggestions	protocol # 2 of 09.09.2024
3. Internal Medicine	Propaedeutics of Internal Diseases	Agreed. No comments or suggestions	protocol # 2 of 09.09.2024
4. Pediatrics	Propaedeutics of Childhood Diseases	Agreed. No comments or suggestions	protocol # 2 of 09.09.2024
5. Psychiatry and Narcology	Psychiatry and Medical Psychology	Agreed. No comments or suggestions	protocol # 2 of 09.09.2024
6. Infectious Diseases	Infectious Diseases	Agreed. No comments or suggestions	protocol # 2 of 09.09.2024
7. Neurology and Neurosurgery	Nervous and Neurosurgical Diseases	Agreed. No comments or suggestions	protocol # 2 of 09.09.2024
8. Obstetrics and Gynecology	Obstetrics and gynecology	Agreed. No comments or suggestions	protocol # 2 of 09.09.2024

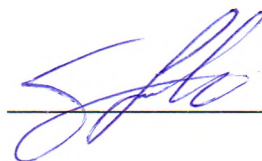
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Curriculum content, composition and the accompanying documents comply with the
established requirements.

Head of the Office of Educational
Activities of the educational institution
«Belarusian State Medical University»

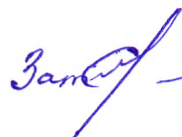
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