



MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN
FEDERATION
Federal state autonomous educational institution
of higher education
«Far Eastern Federal University»
(FEFU)

SCHOOL OF BIOMEDICINE

«AGREED»

Head of education program
«General medicine»

Khotimchenko Yu.S.

(signature)

(Full name)

«09» of July 2019

«APPROVED»

Director of the Department of Clinical
Medicine

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«09» of July 2019



WORKING PROGRAM OF ACADEMIC DISCIPLINE (WPAD)

« Pathophysiology»

Educational program

Specialty 31.05.01 «General medicine»

Form of study: full time

year 3 semester 5,6
lectures 36 hours
practical classes 126 hours
laboratory works not provided
total amount of in-classroom work 162 hours
independent self-work 126 hours
including exam preparation 63 hours
control works ()
credit not provided
exam 3 year, 5,6 semester

The working program is drawn up in accordance with the requirements of the Federal state educational standard of higher education (level of training), approved by the order of the Ministry of education and science of the Russian Federation from 09.02.2016 № 95.

The working program of the discipline was discussed at the meeting of the Department of fundamental and clinical medicine. Protocol No. 8, 09 of July 2019

Author: Turmova E.P.

ANNOTATION

Discipline "Pathophysiology" is intended for students enrolled in the educational program 31.05.01. "General Medicine".

Discipline is implemented on the 3rd course in 5.6 semester, is a basic discipline.

In developing the work program of the discipline, the Federal State Educational Standard of Higher Education was used in the specialty 31.05.01 "Medicine", approved by order of the Ministry of Education and Science of the Russian Federation of February 09, 2016 No. 95, the curriculum for preparing students.

The total complexity of the discipline is 288 hours, 8 credit units, of which 36 hours of lectures, 108 hours of practical training, 144 hours of independent work (81 hours of examination).

The purpose of mastering the discipline: the formation of students' ability to effectively solve professional medical tasks based on the pathophysiological analysis of data on pathological processes, conditions, reactions and diseases using knowledge of general patterns and mechanisms of their occurrence, development and completion, as well as to formulate principles (algorithms, strategies) and methods for their detection, treatment and prevention.

Objectives of the discipline:

- study of molecular, cellular, tissue, organ, system and intersystem mechanisms of typical pathological processes;
- Studying the causes, mechanisms of development and outcomes of specific diseases developing in individual organs and systems;
- analysis of the nature of the clinical manifestations of the main pathological processes;
- familiarization with the principles of pathogenetic treatment of diseases of individual organs and systems;

- teach the ability to conduct pathophysiological analysis of data on pathological syndromes, pathological processes, forms of pathology and individual diseases.

As a result of studying this discipline, the following general professional competencies are formed among students:

Competence code and formulation	Stages of forming the competence	
the ability and willingness to analyze the results of his own activity to prevent professional errors (GPC-5)	Knows	Basic concepts of general nosology. Causes, mechanisms and basic manifestations of typical violations of organs and physiological systems of the body.
	Is able to	To use educational, scientific, scientific-popular literature, the Internet for professional activity. To solve professional problems of the doctor on the basis of pathophysiological analysis of the specific data on pathological processes, states, reactions and diseases.
	Possesses	Medical-anatomical conceptual apparatus. Principles of demonstrative medicine, based on the search for solutions using theoretical knowledge and practical skills.
the readiness to use basic physical and chemical, mathematical and other natural science concepts and methods in solving professional problems (GPC – 7)	Knows	Basic concepts of general nosology. The role of causes, conditions, reactivity of the organism in the occurrence, development and completion (outcome) of diseases.
	Is able to	To conduct pathophysiological analysis of clinical-laboratory, experimental, other data and to formulate on their basis the conclusion on the most probable reasons and mechanisms of development of pathological processes (illnesses),
	Possesses	The main methods of assessing the functional state of the human body, the skills of analyzing and interpreting the results of modern diagnostic technologies.
the capacity for the assessment of morphological and physiological states and pathological processes in the human body for solving professional tasks (GPC – 9)	Knows	Causes and mechanisms of typical pathological processes of states and reactions, their manifestations and importance for the organism in the development of various diseases. Etiology, pathogenesis, manifestations and outcomes of the most frequent forms of pathology of organs and physiological systems, principles of their etiological and pathogenetic therapy
	Is able to	To use principles and methods of revealing pathological processes (illnesses), treatment,

		prevention of them. To integrate the results of the most common diagnostic methods.
	Possesses	Skills of analyzing the regularities of functioning of separate organs and systems in norm and pathology. Skills of pathophysiological analysis of clinical syndromes, to substantiate pathogenetic methods (principles) of diagnostics, treatment, debilitation and prophylaxis of diseases.

I. STRUCTURE AND CONTENT OF THE THEORETICAL PART OF THE COURSE (36 hours)

Semester 5

Section 1 General nosology (4 hours)

Theme 1. Introduction to study of pathophysiology. (2 hours)

The notion of "nosology", parts nosology. The notions of "pathologic process", "pathologic state", "pathologic reactions", "typical pathologic processes", "remission", "recurrence", "complication". Disease, definition. Principles used in classification of diseases. Stages of disease. Etiology, definition. The nature and characteristics of pathogenic factors. Factors of diseases: environmental, genetic, social. The relation between causes and conditions in the development of diseases. The notions of "pathogenesis", "vicious circles".

Theme 2. Cell injury. (2 hours)

Causes, common mechanisms of cell damage, manifestation of cell damage. Specific and nonspecific mechanisms of cell damage. Manifestations of cell degeneration, consequences. Adaptive-protective mechanisms of protection of cells from damage. Types of cell death.

Section II. Typical pathological processes (14 hours)

Theme 3. of blood circulation (edema, hyperemia, shock). (2 hours)

Arterial hyperemia: definition, causes, types (physiologic and pathologic), mechanisms (neurogenous, neuromyoparalytic and humoral) and

consequences. Reactive hyperemia. Manifestations of arterial hyperemia and its mechanisms.

Venous hyperemia: definition, causes and consequences. Manifestations of venous hyperemia and their mechanisms.

Ischemia: definition, causes and consequences. Manifestations of ischemia and their mechanisms, factors that influence on the consequences of ischemia.

Stasis: types and causes.

Sludge syndrome: types, causes, and mechanisms.

Theme 4. Acute inflammation. Stages. Etiology, pathogenesis. Inflammatory cells, factors and mediators. (2 hours)

Definition and significance of inflammation. Causes of inflammation. Primary and secondary alteration in the focus of acute inflammation: causes, mechanisms of development, manifestation. Physico-chemical changes in the focus of inflammation. Exudation. Definitions of an exudate and transudate. Sequence and mechanisms of vascular changes in acute inflammation. Inflammatory mediators that influence on these processes. Phagocytosis: stages. Local and systemic signs of inflammation. Nature and effects of inflammatory mediators: vasoactive amines, complement, kinin, and clotting systems, arachidonic acid metabolites, platelet-derived factor, cytokines and chemokines, nitric oxide, lysosomal constituents. General features of acute and chronic inflammation.

Theme 5. Systemic inflammatory reactions of human body. Systemic inflammatory response syndrome. Disturbance of thermoregulation. Fever. Chronic inflammation (2 hours)

Definition of fever. Differences between fever and hyperthermia. Types of pyrogens. The biological significance of fever. Pathogenesis of fever. Features of thermoregulation at different stages of fever. Types of fever: - based on the extent of temperature rise; - based on the circadian temperature fluctuations.

Exertional hyperthermia: causes, mechanisms. Definition of hy-poxia and its classification.

Theme 6. Pathologic physiology of immune system. Introduction. Innate and adaptive immune systems. Hypersensitivity. Pathophysiology of allergy (2 hours).

Typical forms of disordered immunologic reactivity. The notion of the "allergy". Types of allergens. Exoge-nous and endogenous allergens. Stages of allergy.a) Immunologic stage.b) Pathochemical stage.c) Patho-physiological stage. Anaphylactic (I) type of allergy. The nature of allergen and antibody. Mediators of the anaphylactic reaction. Type II hypersensitivity. The nature of allergen and antibody. Mechanisms and clini-cal examples of type II allergies. Type III hypersensi-tivity. The nature of allergen and antibody.Mechanisms and clinical examples of type III allergies. Systemic and local immune complex disease. Type IV hypersen-sitivity. The nature of allergen and antibody.

Theme 7. Immune deficiency - etiology, pathogenesis, types and clinical manifestations. Pathologic physiology of autoimmunity (2 hours)

Principles of classification of immunodeficiency states. Primary immunodeficiencies: classification and clinical manifestations. Forms of primary immunodeficiency (causes, mechanisms, clinical manifestations): a) B sys-tem-dependent; T system-dependent; combined. Secondary (acquired) immunodeficiency states. AIDS

Theme 8. Pathologic physiology of tissue growth (etiology and pathogenesis of neoplasia). (2 hours)

Definition of neoplasms. Principles of classification of neoplasms. Forms of neoplastic cell abnormality. Characteristic features of benign and malignant tu-mors. Genetic hypothesis of cancer; classes of genes that in-cur mutations during neoplastic transformation of a cell. The concept of oncogenes. Mechanisms of transformation of protooncogene to oncogene. Role of antioncogenes in carcinogenesis. Role of genes that regulate DNA repair in

carcinogenesis. Chemical carcinogenesis: types of carcinogens; initiation and promotion. Radiation carcinogenesis. Viral carcinogenesis. The concept of tumor progression. Antineoplastic mechanisms. Principles of prevention and treatment of neoplastic diseases.

Theme 9. Nutritional diseases. Obesity. Starvation. Protein-energy malnutrition. Disorders of vitamins. (2 hours)

Hypoglycemia: causes and mechanisms. Hypoglycemic coma. Hyperglycemia: causes and mechanisms. The main classes of lipoproteins and their functions. Atherogenic and antiatherogenic lipoproteins. Mechanisms of hyperlipidemia. Obesity: definition, diagnostic approaches, pathological significance. Types and pathogenesis of obesity. Hypohydration: causes, types, mechanisms of development, manifestations, consequences, and principles of treatment. Overhydration: causes, types, mechanisms of development, manifestations, consequences, and principles of treatment.

6 semester (18 hours)

Section 3 Typical pathological conditions of systems and organs (18 hours)

Theme 10. Pathophysiology of the blood system (I) Pathology of red blood cells. Anemia. (etiology, pathogenesis). (2 hours)

Definition of anemia and its classification. Anemias of blood loss: types, causes, hematological signs. Hemolytic anemias: types, common causes, manifestations, hematological signs. Hereditary spherocytosis: pathogenesis, manifestations, hematological signs. Sickle cell disease: pathogenesis, manifestations, hematological signs. Thalassemia syndromes: types, pathogenesis, manifestations, hematological signs. B12 (Megaloblastic) anemia: causes, pathogenesis, manifestations, hematological signs. Iron deficiency anemia: causes, pathogenesis, manifestations, hematological signs. Aplastic anemia: causes and pathogenesis, hematological signs. Erythrocytosis: causes and mechanisms

Theme 11. Pathophysiology of white blood cells (leukocytosis, leukopenia, leukemoid reactions . Bleeding disorders. (2 hours)

Leukopenia: definition and causes. General mechanisms of leukopenia. Patterns of shift to the right. Leukocytosis: causes and mechanisms. Types of leukocytosis; patterns of shift to the left. Leukemoid reactions: typical features, causes, mechanisms of development, physiologic significance. Bleeding disorders, platelet related bleeding vascular disorders coagulation disorders disseminated Intravascular coagulation .

Theme 12. Pathophysiology of heart failure (etiology, pathogenesis). (2 hours)

Definition, general causes and classification of heart failure. Myocardial and nonmyocardial cardiac insufficiency. Adaptive reactions during acute and chronic heart failure: Frank-Starling mechanism, myocardial hypertrophy, redistribution of cardiac output, salt and water retention, activation of the sympathetic system. Pathogenesis of the myocardium decompensation during hypertrophy. Hemodynamic abnormalities in heart failure. Clinical features of heart failure: the syndromes of cardiac edema and cachexia.

Theme 13. Pathophysiology of external respiration system (etiology, pathogenesis). (2 hours)

Alveolar hyper- and hypoventilation: causes, mechanisms of development, consequences, and typical changes in breathing volumes. Disorders of the neuro-genic control of breathing. Pathological forms of breathing. Types and consequences of perfusion disorders: pulmonary arterial hyper- and hypotension. Types and mechanisms of ventilation-perfusion mismatch. Abnormal diffusive capacity of the alveolar-capillary barrier.

Theme 14. Pathophysiology of the gastrointestinal tract (etiology, pathogenesis). (2 hours)

Typical forms of functional pathology of the digestive tract: general etiology. Disorders of appetite, taste, and initial treatment of food in the oral

cavity. Disorders of swallowing: dysphagia, achalasia, diffuse esophageal spasm. Disorders of digestion in the stomach: disturbance of secretory and motor function. Disorders of digestion in the intestine: disturbance of secretion, motor function, and absorption. The syndrome of malabsorption: etiopathogenesis, manifestations and consequences. Typical disorders of cavity digestion: causes, manifestations. Typical disorders of parietal digestion: causes, manifestations. Pathogenesis of peptic ulcer of the stomach and duodenum

Theme 15. Liver pathophysiology (etiology, pathogenesis). (2 hours)

General causes of liver dysfunction. The syndrome of hepatic insufficiency. Causes, types and pathogenesis of hepatic coma. The syndrome of hepatic insufficiency. Typical disorders of carbohydrate, aminoacid, protein, and lipid metabolism in hepatic insufficiency; failure of detoxification function. Hemolytic jaundice: causes, mechanisms, clinical and laboratory manifestations. Obstructive jaundice: types, causes, mechanisms, clinical and laboratory manifestations, consequences. Hepatocellular jaundice: causes, mechanisms, stages, clinical and laboratory manifestations.

Theme 16. Pathophysiology of kidneys (etiology, pathogenesis) (2 hours)

General causes and mechanisms of kidneys dysfunction. Disorders of filtration, tubular reabsorption and excretion. Syndromes of acute renal insufficiency: typical features, causes and manifestations. Syndromes of chronic renal insufficiency: typical features, causes and manifestations. Uremic coma. Nephrotic and nephritic syndromes: typical features, causes and manifestations. Pyelonephritis: characteristic features, causes and pathogenesis. Nephrolithiasis: causes, mechanisms of development, consequences.

Theme 17. Pathophysiology of the endocrine system (etiology, pathogenesis) (2 hours)

General etiology and pathogenesis of endocrine disorders. Typical forms of functional pathology of adeno-pituitary. Hypopituitarism: types, causes,

mechanisms of development and manifestations. Hyperpituitarism: types, causes, mechanisms of development and manifestations. Acromegaly and gigantism. Typical forms of disorders of neurohypophysis. Diabetes insipidus. Typical forms of adrenals' dysfunction. Hypercortisolism: types, pathogenesis and manifestations. Cushing's disease and syndrome, hyperaldosteronism. Hypocortisolism: types, pathogenesis and manifestations. Acute adrenal failure and Addison's disease, hypoadosteronism, syndromes of adrenal androgen excess. Disorders of adrenal's medulla. Manifestations and consequences of pheochromocytoma.

Theme 18. General etiology and pathogenesis of nervous system diseases. typical pathological processes in the nervous system. (2 hours)

General etiology, pathogenesis, and typical forms of pathology of the nervous system. Disorders of locomotion: manifestations of the upper (central) and lower (peripheral) motor neuron damage. Disorders of the extrapyramidal system: muscle dystonia and dyskinesia. Hypokinetic and hyperkinetic movement disorders: types, etiology and pathogenesis. Disorders of sensation: general etiology and classification. Positive and negative abnormal sensory phenomena. Hypo- and hyperesthesia, dysesthesia: types and mechanisms of disorders. Levels of sensation disorders. Localization of sensory abnormalities. Types and mechanisms of ataxia. Pain. Denervation syndrome.

**II. THE STRUCTURE AND CONTENT OF THE PRACTICAL PART
OF THE COURSE (126 hours)**

Semester 5 (72 hours)

Topic 1. Pathophysiology. Introduction. Etiology and pathogenesis. Experiment as scientific method. (4 час.)

The notion of "nosology", parts nosology. The notions of "pathologic process", "pathologic state", "pathologic reactions", "typical pathologic processes", "remission", "recurrence", "complication". Disease, definition.

Principles used in classification of diseases. Stages of disease. Etiology, definition. The nature and characteristics of pathogenic factors. Factors of diseases: environmental, genetic, social. The relation between causes and conditions in the development of diseases. The notions of "pathogenesis", "vicious circles".

Topic 2. Cell injury. Adaptation in pathophysiology (4 hours)

Causes, common mechanisms of cell damage, manifestation of cell damage. Specific and nonspecific mechanisms of cell damage. Manifestations of cell degeneration, consequences. Adaptive-protective mechanisms of protection of cells from damage. Types of cell death.

Topic 3. Reactivity and Resistance. (4 hours).

Reactivity of the body and its role in the development of disease. Forms and types of reactivity.

Topic 4. Pathophysiology of fluid and electrolyte metabolism. Acid-base balance (4 hours)

Hypohydration: causes, types, mechanisms of development, manifestations, consequences, and principles of treatment. Overhydration: causes, types, mechanisms of development, manifestations, consequences, and principles of treatment. Edema: definition, types, the main factors of development, principles of treatment. Edema during cardiac failure: etiology, pathogenesis, and manifestations. Renal edema: etiology, pathogenesis, manifestations, and consequences.

Topic 5. Pathophysiology of hypoxia (4 hours)

Definition of hypoxia and its classification. Exogenous hypoxia: causes, types and typical changes. Respiratory hypoxia: causes, types and typical changes in the given type of hypoxia. Anemic hypoxia: causes, types and typical changes. Circulatory hypoxia: causes, types and typical changes. Histotoxic and substrate types of hypoxia: causes, types and typical changes.

Adaptive re-actions in acute hypoxia. Mechanisms of long-term adaptation to hypoxia.

Topic 6. Pathophysiology of peripheral blood flow. (4 hours)

Arterial hyperemia: definition, causes, types (physiologic and pathologic), mechanisms (neurogenous, neuromyoparalytic and humoral) and consequences. Reactive hyperemia. Manifestations of arterial hyperemia and its mechanisms.

Venous hyperemia: definition, causes and consequences. Manifestations of venous hyperemia and their mechanisms.

Topic 7. Pathophysiology of peripheral blood flow #2. (4 hours)

Ischemia: definition, causes and consequences. Manifestations of ischemia and their mechanisms, factors that influence on the consequences of ischemia.

Stasis: types and causes.

Sludge syndrome: types, causes, and mechanisms.

Topic 8. Inflammation #1. Definition. Stages. Inflammatory cells, factors and mediators. (4 hours)

Definition and significance of inflammation. Causes of inflammation. Primary and secondary alteration. Physico-chemical changes in the focus of inflammation. Exudation. Definitions of an exudate and transudate. Sequence and mechanisms of vascular changes in acute inflammation. Inflammatory mediators that influence on these processes. Phagocytosis: stages. Local and systemic signs of inflammation. Nature and effects of inflammatory mediators

Topic 9. Inflammation #2. Chronic inflammation. System reaction of human body. Fever. Sepsis and SIRS. (4 hours)

Definition of fever. Differences between fever and hyperthermia. Types of pyrogens. The biological significance of fever. Pathogenesis of fever. Features of thermoregulation at different stages of fever. Types of fever: - based on the extent of temperature rise; - based on the circadian temperature fluctuations. Exertional hyperthermia: causes, mechanisms.

Topic 10. Pathophysiology of immune system #1. Introduction. Innate and adaptive immune systems. The role of immune response. Types of immune responses. (4 hours)

Typical forms of disordered immunologic reactivity.

Topic 11. Pathophysiology of immune system #2. Hypersensitivity. Classification, etiopathogenetic aspects and mechanism. Pathologic physiology of allergy (4 hours)

Allergy definition concept. Classification of Etholgiemia and pathogenesis. 4 types of allergic reactions according to the classification of Gell, Coombs. reasons, mechanisms of development by stages. Manifestations, consequences. The concept of autoallergic reactions. The concept of desensitization and hysenbilization. The basic principles of prevention and therapy of allergic reactions of different types.

Topic 12. Pathophysiology of immune system #3. Immune deficiency. Types. Etiopathogenetic features and clinical manifestations. (4 hours)

Primary immunodeficiencies. Hereditary and congenital. Secondary (acquired) Immunodefocytos and immunodepressive states. Acquired immunodeficiency syndrome (AIDS).

Topic 13. Pathophysiology of autoimmunity. Etiology, pathogenesis. The role of immunological surveillance (4 hours)

The immune conflict of mother and fetus is its main forms and consequences. Physiological and pathological tolerance, their role in the healthy body. The concept of autoaggressive processes.

Topic 14. Pathophysiology of infection diseases (4 hours)

Conference-like lesson. Open discussion, test control. Case task solving.

Topic 15. Pathophysiology of tissue growth. (4 hours)

Definition of neoplasms. Principles of classification of neoplasms. Forms of neoplastic cell abnormality. Characteristic features of benign and malignant tumors. Cancerogenesis.

Topic 16. Pathophysiology of metabolism processes #1. Metabolism of proteins and carbohydrates. (4 hours)

Features of Kwashiorkor and Marasmus. Malnutrition. Case task.

Topic 17. Pathophysiology of metabolism processes #2. Metabolism of nucleic acids, fats and vitamins (4 hours)

Malnutrition and obesity. Vitamins deficiency and hypervitaminosis states.

Topic 18. Pathophysiology of aging (4 hours)

Age-related diseases. Senescence pathogenesis.

Semester 6 (54 hours)

Topic 19. Pathophysiology of the blood system # 1. Pathophysiology of red blood cells. Anemia. Etiology, pathogenesis, clinical features. (4 hours)

Definition of the concept of "anemia". Methods of studying anemia. Pathological forms of red blood cells. The principles of anemia classifications. Meaning to the general practitioner.

Topic 20. Pathophysiology of the blood system # 2 Pathophysiology of white blood cells. Leukocytosis. Leukopenia. Leukemia. (etiology, pathogenesis). (4 hours.)

Definition of "leukocytosis", etiology, pathogenesis. The notions of "absolute", "relative" leukocytosis. Types of absolute leukocyte. Meaning for a practical doctor. Leukopenia, etiology, pathogenesis. The concepts of "gemoblistzy", "leukoses". Etiology, pathogenesis of leukemia, methods of study. Classification of leukoses. Blood painting in leukemia. Leukemic reactions.

Topic 21. Pathophysiology of the hemostatic system. Platelets disorders. (4 hours)

Definition and functions of hemostasis system. Types of hemostasis. Causes, mechanisms and consequences of the violation of vascular-platelet (primary) hemostasis. Causes, mechanisms and consequences of the violation of the coagulation (secondary) hemostasis. Causes and consequences of the

dysfunction of the anti-clotting system: anticoagulants (primary and secondary) and plasminogen system.

Topic 22. Pathophysiology of heart failure (etiology, pathogenesis). (4 hours)

The concept of heart failure. Types of heart failure by phases, cardiac divisions, etiology, flow. Etiology and pathogenesis of acute and chronic heart failure. Hemodynamic indices in heart failure.

Topic 23. Pathophysiology of blood pressure disorders. (4 hours)

The term "arterial hypertension". Primary and secondary arterial hypertension. hypertensive disease, concept, conception of origin and development of hypertensive disease. Arterial hypotension, concept, primary and secondary arterial hypotension. Hypotonic disease, etiology, pathogenesis.

Topic 24. Pathophysiology of external respiratory system. (4 hours)

The concept of "external respiration" types of hypoxic in case of external respiration disorders (endogenous respiratory hypoxia). Etiology, pathogenesis. Gas composition of blood in hypoxic with impaired external respiration. The notions of "respiratory insufficiency". Types of etiology and pathogenesis. Criteria of certain types of respiratory insufficiency.

Topic 25. Pathophysiology of gastrointestinal tract. (4 hours)

Typical digestive disorders in the oral cavity. Typical violations of the secretory and motor functions of the stomach. Etiology and pathogenesis of digestive disorders. Gastric ulcer and 12-pergut bowel disease. Etiology, pathogenesis, modern conception. Digestive disorders in the intestines. Etiology, pathogenesis. Malabsorption, causes, mechanisms of development. Glutenic disease.

Topic 26. Pathophysiology of liver. Hepatic failure. (4 hours)

Liver failure, definition of the concept. Classification by pathogenesis. Manifestations and consequences of liver failure. Hepatic coma. Jaundice,

definition of the concept. Classification by pathogenesis. Etiology, pathogenesis of certain species of jaundice. Differential diagnosis of them.

Topic 27. Pathophysiology of kidneys. (4 hours)

Nephrotic and nephritic syndromes. Etiology, pathogenesis. Etiology, pathogenesis of immune nephropathium. Renal and extrarenal symptoms and syndromes in nephropathies. The term "nitrogen", "uremia", "Kidney failure". Types of renal failure. Pathogenesis, outcomes.

Topic 28. Pathophysiology of endocrine system #1. Diabetes. Metabolic syndrome (4 hours)

The role of the endocrine system in disease. Causes and basic structures of damage in the pathogenesis of endocrine disorders. The role of feedback violations in the development of endocrine diseases. Etiology, pathogenesis of individual syndromes in diseases of the endocrine system. Classification of various forms of diabetes mellitus. Pathogenetic factors contributing to the development of diabetes mellitus I and II type. Diagnostic signs showing the violation of carbohydrate-lipid metabolism and their evaluation in the condition of this endocrinopathy. State of cardiovascular system, neurological status and kidney function in complicated forms of diabetes mellitus. Ketoacidosis. Diabetic coma. The concept of insulin resistance.

Topic 29. Pathophysiology of endocrine system #2. Primary endocrinopathy, clinical pathophysiology of endocrine system disorders. (4 hours)

The role of the endocrine system in disease. The main structures of damage in the pathogenesis of endocrine disorders. The role of feedback violations in the development of endocrine diseases. Hypo- and hyperfunctional violations of the cortex of adrenal glands, pituitary gland and thyroid. Pathogenetic therapy of known diseases.

Topic 30. Pathophysiology of nervous system disorders. (4 hours)

General etiology and peculiarities of damage to the nervous system (the role of the blood-brain barrier, trace reactions, second signaling system, etc.). The main typical pathological processes in the nervous system: the generator of pathologically amplified excitation, the deficiency of braking, denervatory syndrome, syndrome of nervous dystrophy, pathological system, spinal shock, etc.

Topic 31. Pathophysiology of pain. (2 hours)

Pain syndrome. The concept of nociceptive and antinociceptive systems.

Topic 32. Pathophysiology of emergency states. (2 hours)

Shock: characteristics, types, etiology, pathogenesis, manifestations, principles of treatment. Coma: characteristics, types, etiology, general pathogenesis, manifestations, principles of treatment.

Topic 33. Final lesson. (2 hours)

Case-task solving, test control. Presentations and discussions.

III. EDUCATIONAL-METHODICAL SUPPORT OF STUDENTS' INDEPENDENT WORK

Educational-methodical support of students' independent work in the discipline pathophysiology presented in Supplement 1 and includes:

- schedule for performing individual work in the discipline, including the approximate time to allocate on each task;
- description of the tasks for individual work of students and methodical recommendations for their completion;
- requirements for submission and registration of results of individual work.

IV. CONTROL OF THE COURSE GOALS ACHIEVEMENTS

№	Controlled sections/topics of the discipline	Codes and stages of forming the competences		Means for evaluation	
				Current control	Half-way attestation
1	Section 1 General nosology Section 2. Typical pathological processes Section 3 Typical pathological conditions of systems and organs	the ability and willingness to analyze the results of his own activity to prevent professional errors (GPC-5)	Knows	PT-1 Test	Offset test questions 1-24 Exam questions 1-24
			Is able to	Case study	Case study
			Possesses	Disquission	Case study
2	Section 1 General nosology Section 2. Typical pathological processes Section 3 Typical pathological conditions of systems and organs	the readiness to use basic physical and chemical, mathematical and other natural science concepts and methods in solving professional problems (GPC – 7)	Knows	PT-1 Test	Offset test questions 25-44 Exam questions 25-44
			Is able to	Case study	Case study
			Possesses	Disquission	Case study
3	Section 1 General nosology	CPC-5 the capacity for	Knows	PT-1 Test	Offset test questions

	Section 2. Typical pathological processes	the assessment of morphological and physiological states and pathological processes in the human body for solving professional tasks (GPC – 9)			45-75 Exam questions 45-75
	Section 3		Is able to	Case study	Case study
	Typical pathological conditions of systems and organs		Possesses	Disquision	Case study

The model tests, methodical materials prescribing procedures for evaluation of knowledge, skills and/or practical experience, as well as criteria and indicators necessary to assess knowledge, abilities, skills and the defined stages of forming competencies in the process of acquiring educational program, are presented in Appendix 2.

V. LIST OF EDUCATIONAL LITERATURE AND INFORMATIONAL-METHODICAL REQUIREMENTS FOR THE DISCIPLINE

Primary

1. Pathophysiology of COPD, Eun Kyung Kim 2017
https://link.springer.com/chapter/10.1007/978-3-662-47178-4_5
2. Immune Neuropathies, Darine Kassar, Stanley Iyadurai 2016
https://link.springer.com/chapter/10.1007/978-3-319-29514-5_15
3. Hypertrophy and Dilatation, Markers of Dysfunction, Ecaterina Bontaș, Florentina Radu-Ioniță, Liviu Stan 2016
https://link.springer.com/chapter/10.1007/978-3-319-73764-5_8

Additional

1. The Skin, the Eyes, and the Ears in Rheumatic Diseases, Haralampos M. Moutsopoulos, Evangelia Zampeli,

Panayiotis G. Vlachoyiannopoulos

2016

https://link.springer.com/chapter/10.1007/978-3-319-71604-6_10

2. Neutrophil Cytosolic Factor 1 Contributes to the Development of Sepsis, Dei-fang Chen, Xiu-zhen Cui, Wen-ming Cao, Wen Meng 2016 <https://link.springer.com/article/10.1007/s10753-018-0935-z>

The list of resources of the information-telecommunication network

“Internet”

1. Central Scientific Medical Library: <http://www.scsml.rssi.ru>
2. Medical Internet Resources: <http://www.it2med.ru/mir.html>
3. Publishing House "Medicine": <http://www.medlit.ru>
4. Scientific Electronic Library: <http://elibrary.ru/>
5. Scientific Electronic Library: <https://www.ncbi.nlm.nih.gov/>

LIST OF INFORMATION TECHNOLOGIES AND SOFTWARE

The location of the computer equipment on which the software is installed, the number of jobs	List of licensed software
<p>Multimedia auditorium Vladivostok Russian island, Ayaks 10, building 25.1, RM. M723 Area of 80.3 m² (Room for independent work)</p>	<p>Windows Seven enterprice SP3x64 Operating System Microsoft Office Professional Plus 2010 office suite that includes software for working with various types of documents (texts, spreadsheets, databases, etc.); 7Zip 9.20 - free file archiver with a high degree of data compression; ABBYY FineReader 11 - a program for optical character recognition; Adobe Acrobat XI Pro 11.0.00 - software package for creating and viewing electronic publications in PDF; WinDjView 2.0.2 - a program for recognizing and viewing files with the same format DJV and DjVu.</p>

In order to provide special conditions for the education of persons with disabilities all buildings are equipped with ramps, elevators, lifts, specialized places equipped with toilet rooms, information and navigation support signs.

VI. METHODOLOGICAL RECOMMENDATIONS ON THE COMPLETING THE DISCIPLINE

The main goal is the formation of students' scientific outlook, preventive thinking based on pathology knowledge, competencies in systemic fundamental knowledge, skills and abilities in matters of hygiene and human ecology, necessary for the subsequent practical activities of the doctor.

Performing by students of extracurricular individual work in extracurricular time, both under the guidance of a teacher and without his direct participation is important in order to achieve this goal.

Students are encouraged to systematically study the teaching material using textbooks, texts and methodical writings in accordance with the study plan, and to perform all task in a timely manner, which is especially important when using grade-rating system for assessing students' knowledge.

The goal of students' individual work is to master fundamental knowledge, professional skills and experiences of their specialty, experience of creative scientific research. Individual work of students promotes the development of autonomy, responsibility and organization, creative approach to solving the problems of the educational and professional level, deepen and broaden knowledge, formation of interest to cognitive activity, mastering the techniques of learning, the development of cognitive abilities.

Individual work of students for the discipline is mandatory for each student, its volume is determined by the federal educational standard and curriculum. It is necessary at the very beginning of the course to carefully plan the time allocated for individual work with the sources and literature on the subject.

Individual work includes:

- a) reading textbooks, lectures, methodical recommendations, scientific articles
- b) reading and analyzing literature passages of journalistic nature;
- c) reading and analysis of literary passages of scientific nature;
- g) working with resources posted on the Internet.

The purpose of this types of work is to instill an interest in reading and to teach students to overcome difficulties in reading, extract the necessary information from the text to teach them to use Russian and International sources for self-education and improve their professional skills.

VII. CLASSROOM, EQUIPMENT AND MATERIAL REQUIREMENTS FOR THE DISCIPLINE

The educational process in the discipline is conducted in lecture, computer classes of the building of the School of Biomedicine of the FEFU campus, equipped with computers and multimedia systems, connected to the general corporate network of FEFU and the Internet.

For carrying out practical work, as well as for organizing independent work, students have access to the following laboratory equipment and specialized classrooms that meet applicable sanitary and fire regulations, as well as safety requirements for educational and research and production work:

Name of equipped premises and rooms for independent work	List of basic equipment
Computer class of the School of Biomedicine, M723, 15 comp.	Motorized screen 236 * 147 cm Trim Screen Line; DLP Projector, 3000 ANSI Lm, WXGA 1280x800, 2000: 1 EW330U Mitsubishi; The subsystem of specialized fixing equipment CORSA-2007 Tuarex; Video switching subsystem: DVI DXP 44 DVI Pro Extron matrix switcher; DVI extension cable for twisted pair DVI 201 Tx / Rx Extron; Audio switching and sound reinforcement subsystem; ceiling speaker system SI 3CT LP Extron; DMP 44 Extron digital audio processor; extension for the control controller IPL T CR48; Wireless LANs for students are provided with a system based on 802.11a / b / g / n 2x2 MIMO access points (2SS). Monoblock HP RgoOpe 400 All-in-One 19.5 (1600x900), Core i3-4150T, 4GB DDR3-1600 (1x4GB), 1TB HDD 7200 SATA, DVD +/- RW, GigEth, Wi-Fi, BT, usb kbd / mse, Win7Pro (64-bit) + Win8.1Pro (64-bit), 1-1-1 Wty
Reading rooms of the FEFU Scientific Library with open access to the Foundation (Building A - Level 10)	Monoblock HP RgoOpe 400 All-in-One 19.5 (1600x900), Core i3-4150T, 4GB DDR3-1600 (1x4GB), 1TB HDD 7200 SATA, DVD +/- RW, GigEth, Wi-Fi, BT, usb kbd / mse, Win7Pro (64-bit) + Win8.1Pro (64-bit), 1-1-1 Wty Internet access speed 500 Mbit / s. Jobs for people with disabilities are equipped with braille displays and printers; equipped with: portable devices for reading flat-printed texts, scanning and reading machines with a video maker with the ability to adjust color spectra; magnifying electronic loops and ultrasonic markers
Accreditation and Simulation Center of the School of Biomedicine	Scales medical with a bar Centimeter tape (150x13 mm) Light meter-UV radiometer thermohygrometer Dynamometer Dynamometer carpal Height meter medical with a stool (for adult)



THE MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN FEDERATION
Federal State autonomous education institution of higher education
«Far Eastern Federal University»
(FEFU)

SCHOOL OF BIOMEDICINE

TRAINING AND METHODOLOGICAL SUPPORT

INDEPENDENT WORK OF STUDENTS

in discipline **“Pathophysiology”**
Educational program
Specialty 31.05.01. General Medicine
Full-time training

Vladivostok

2016

**The schedule execution of independent work on discipline
« Pathophysiology»
(63 hours)**

№	Date / deadlines	Type of independent work	Estimated time to complete rules	Form of control
Semester 5				
	During semester	Work with literature and lecture notes, preparation for practical exercises. Writing an essay. Writing a literary review on the topic of the abstract. Preparation of presentations on the topic of the abstract	54 h.	Work on a practical lesson with phantoms, verbal answer, computer testing. Abstract text file Presentation on the abstract Solving situational problems
		Preparing to exam	54 h	
Semester 6				
	During semester	Work with literature and lecture notes, preparation for practical exercises. Writing an essay. Writing a literary review on the topic of the abstract. Preparation of presentations on the topic of the abstract	9 h.	Work on a practical lesson with phantoms, verbal answer, computer testing. Abstract text file Presentation on the abstract Solving situational problems
		Preparing to exam	27 h.	

Methodical recommendations for the preparation of presentations

For the preparation of the presentation it is recommended to use: PowerPoint, MS Word, Acrobat Reader, LaTeX-bev package. The simplest program for creating presentations is Microsoft PowerPoint. To prepare a presentation, it is necessary to process the information collected while writing the essay.

The sequence of preparation of the presentation:

1. Clearly state the purpose of the presentation.
2. Determine what the presentation format will be: live presentation (then how long it will be) or e-mail (what will be the context of the presentation).

3. Select the entire content of the presentation and build a logical chain of presentation.

4. Identify key points in the content of the text and highlight them.

5. Determine the types of visualization (pictures) to display them on slides in accordance with the logic, purpose and specificity of the material.

6. Choose the design and format the slides (the number of pictures and text, their location, color and size).

7. Check the visual perception of the presentation.

The types of visualization include illustrations, images, charts, tables. The illustration is a representation of a real-life visual. The images - as opposed to illustrations - are a metaphor. Their purpose is to cause an emotion and create an attitude towards it, to influence the audience. With the help of well-designed and presented images, information can remain permanently in a person's memory. Chart - visualization of quantitative and qualitative relationships. They are used for convincing data demonstration, for spatial thinking in addition to the logical one. Table - specific, visual and accurate data display. Its main purpose is to structure information, which sometimes facilitates the perception of data by the audience.

Practical tips on preparing a presentation

- printed text + slides + handouts are prepared separately;
- slides - a visual presentation of information that should contain a minimum of text, a maximum of images that carry a meaning, to look visually and simply;
 - textual content of the presentation - oral speech or reading, which should include arguments, facts, evidence and emotions;
 - recommended number of slides 17-22;
 - mandatory information for the presentation: the subject, surname and initials of the speaker; message plan; brief conclusions from all that has been said; list of sources used;

– handout - should provide the same depth and coverage as the live performance: people trust more what they can carry with them than disappear images, words and slides are forgotten, and handouts remain a constant tangible reminder; handouts are important to distribute at the end of the presentation; Handouts should be different from slides, should be more informative.

Approximate topics of presentations

1. The concept of circulatory failure; it forms the main hemodynamic parameters and displays.
2. Coronary heart disease, its forms. Etiology. Risk factors.
3. Myocardial infarction. Metabolic disorders, electrogenic and contractile properties of the myocardium in the ischemic area and beyond.
4. The pathogenesis of the main manifestations of heart attack (pain, re-zorbivno necrotizing, arrhythmic syndrome, heart failure).
5. The hemodynamic performance, the clinical manifestations and mechanisms of development of heart failure. The pathogenesis of dyspnea, cyanosis, edema.
6. Arterial hypertension in the pathology of the endocrine system: types, causes and mechanisms of development.
7. Arterial hypertension in renal disease: types, causes and mechanisms of development.
8. Essential arterial hypertension, modern views on etiopathogenesis. The main manifestations.



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FUND ASSESSMENT TOOLS

TRAINING COMPLEX OF DISCIPLINE

Pathophysiology
Educational program
Specialty 31.05.01. General Medicine
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2016

Passport of the Fund Assessment Tools

The passport is filled in accordance with the Regulations on the Funds of assessment tools of educational programs of higher education - undergraduate, specialist's and master's programs of Far Eastern Federal University, approved by order of the rector of 12.05.2015 №12-13-850.

Competence code and formulation	Stages of forming the competence	
the ability and willingness to analyze the results of his own activity to prevent professional errors (GPC-5)	Knows	Basic concepts of general nosology. Causes, mechanisms and basic manifestations of typical violations of organs and physiological systems of the body.
	Is able to	To use educational, scientific, scientific-popular literature, the Internet for professional activity. To solve professional problems of the doctor on the basis of pathophysiological analysis of the specific data on pathological processes, states, reactions and diseases.
	Possesses	Medical-anatomical conceptual apparatus. Principles of demonstrative medicine, based on the search for solutions using theoretical knowledge and practical skills.
the readiness to use basic physical and chemical, mathematical and other natural science concepts and methods in solving professional problems (GPC – 7)	Knows	Basic concepts of general nosology. The role of causes, conditions, reactivity of the organism in the occurrence, development and completion (outcome) of diseases.
	Is able to	To conduct pathophysiological analysis of clinical-laboratory, experimental, other data and to formulate on their basis the conclusion on the most probable reasons and mechanisms of development of pathological processes (illnesses),
	Possesses	The main methods of assessing the functional state of the human body, the skills of analyzing and interpreting the results of modern diagnostic technologies.
the capacity for the assessment of morphological and physiological states and pathological processes in the human body for solving professional tasks (GPC – 9)	Knows	Causes and mechanisms of typical pathological processes of states and reactions, their manifestations and importance for the organism in the development of various diseases. Etiology, pathogenesis, manifestations and outcomes of the most frequent forms of pathology of organs and physiological systems, principles of their etiological and pathogenetic therapy
	Is able to	To use principles and methods of revealing pathological processes (illnesses), treatment, prevention of them.

		To integrate the results of the most common diagnostic methods.
	Possesses	Skills of analyzing the regularities of functioning of separate organs and systems in norm and pathology. Skills of pathophysiological analysis of clinical syndromes, to substantiate pathogenetic methods (principles) of diagnostics, treatment, debilitation and prophylaxis of diseases.

CONTROL OF THE COURSE GOALS ACHIEVEMENTS

№	Controlled sections/topics of the discipline	Codes and stages of forming the competences		Means for evaluation	
				Current control	Half-way attestation
1	Section 1 General nosology Section 2. Typical pathological processes Section 3 Typical pathological conditions of systems and organs	the ability and willingness to analyze the results of his own activity to prevent professional errors (GPC-5)	Knows	PT-1 Test	Offset test questions 1-24 Exam questions 1-24
			Is able to	Case study	Case study
			Possesses	Disquision	Case study
2	Section 1 General nosology Section 2. Typical pathological processes Section 3 Typical pathological conditions of systems and organs	the readiness to use basic physical and chemical, mathematical and other natural science concepts and methods in solving professional problems (GPC – 7)	Knows	PT-1 Test	Offset test questions 25-44 Exam questions 25-44
			Is able to	Case study	Case study
			Possesses	Disquision	Case study
3	Section 1 General nosology Section 2. Typical pathological processes Section 3 Typical pathological	the capacity for the assessment of morphological and physiological states and pathological processes in the human body for solving professional tasks	Knows	PT-1 Test	Offset test questions 45-75 Exam questions 45-75
			Is able to	Case study	Case study
			Possesses	Disquision	Case study

	conditions of systems and organs	(GPC – 9)			
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The scale of assessment the level of formation of competences

Code and the wording of competence	Stages of competence		Criteria	Indicators	Points
the ability and willingness to analyze the results of his own activity to prevent professional errors (GPC-5)	Knows	Basic concepts of general nosology. Causes, mechanisms and basic manifestations of typical violations of organs and physiological systems of the body.	Knowledge of basic concepts of general nosology, as well as mechanisms and main manifestations of typical organ disorders	Knows the main causes, mechanisms and main manifestations of typical violations of organs and physiological systems of the body	65-71
	Is able to	To use educational, scientific, scientific-popular literature, the Internet for professional activity. To solve professional problems of the doctor on the basis of pathophysiological analysis of the specific data on pathological processes, states, reactions and diseases. Apply the acquired knowledge in the study of clinical disciplines in the subsequent treatment and prevention activities. Analyze the problems of general pathology	Ability to solve professional problems of the doctor on the basis of pathophysiological analysis of specific data on pathological processes, conditions, reactions and diseases; Solve situational problems of different types	Can analyze problems of general pathology and critically evaluate modern theoretical concepts and directions in medicine	71-84

		and critically evaluate modern theoretical concepts and directions in medicine. Solve situational problems of different types.			
	Possesses	Medical-anatomical conceptual apparatus. Principles of demonstrative medicine, based on the search for solutions using theoretical knowledge and practical skills.	Possession of methods of research of material taking into account evidence-based medicine	Ones possesses the methodology of research of material in various nosological forms of diseases	85-100
the readiness to use basic physical and chemical, mathematical and other natural science concepts and methods in solving professional problems (GPC – 7)	Knows	Basic concepts of general nosology. The role of causes, conditions, reactivity of the organism in the occurrence, development and completion (outcome) of diseases.	Knowledge of the role of causes, conditions, reactivity of the organism in the occurrence, development and completion (outcome) of diseases	Knows the basic concepts of general nosology	65-71
	Is able to	To conduct pathophysiological analysis of clinical-laboratory, experimental, other data and to formulate on their basis the conclusion on the most probable reasons and mechanisms of development of pathological processes (illnesses),	Ability to independently conduct pathophysiological analysis of clinical-laboratory, expert-Tali and other data.	is able on the basis of pathophysiological analysis of clinical and laboratory data to formulate a conclusion on the causes and mechanisms of the development of the pathological process	71-84
	Possesses	Basic concepts of general nosology.	Knowledge of the role of causes,	Knows the basic concepts of	85-100

		The role of causes, conditions, reactivity of the organism in the occurrence, development and completion (outcome) of diseases.	conditions, reactivity of the organism in the occurrence, development and completion (outcome) of diseases	general nosology	
the capacity for the assessment of morphological and physiological states and pathological processes in the human body for solving professional tasks (GPC – 9)	Knows	Causes and mechanisms of typical pathological processes of states and reactions, their manifestations and importance for the organism in the development of various diseases. Etiology, pathogenesis, manifestations and outcomes of the most frequent forms of pathology of organs and physiological systems, principles of their etiological and pathogenetic therapy	Knowledge of the causes and mechanisms of typical pathological processes of states and reactions, their manifestations and importance for the organism in the development of various diseases.	Ones know the etiology, pathogenesis, manifestations and outcomes of the most frequent forms of pathology of organs and physiological systems, principles of their etiological and pathogenetic-therapeutic therapy.	65-71
	Is able to	To use principles and methods of revealing pathological processes (illnesses), treatment, prevention of them. To integrate the results of the most common diagnostic methods.	Ability to use principles and methods of detection of pathological processes (diseases), treatment, prevention of their	Is able to integrate the results of the most disseminated diagnostic methods	71-84
	Possesses	Skills of analyzing the regularities of functioning of separate organs and systems in norm and pathology. Skills of	Knowledge of the skills of analyzing the regularity of functioning of individual organs and systems in norm and	Ownership Skills of pathophysiological analysis of clinical syndromes, substantiation of	85-100

		pathophysiological analysis of clinical syndromes, to substantiate pathogenetic methods (principles) of diagnostics, treatment, debilitation and prophylaxis of diseases.	pathology	pathogenetic methods (principles) of diagnostics, treatment, rehabilitation of profile-tics of diseases	
CPC-7 the readiness to use basic physical and chemical , mathematical , mathematical and other natural science concepts and methods in solving professional problems	Knows	Basic concepts of general nosology. The role of causes, conditions, reactivity of the organism in the occurrence, development and completion (outcome) of diseases.	Knowledge of the role of causes, conditions, reactivity of the organism in the occurrence, development and completion (outcome) of diseases	Knows the basic concepts of general nosology	65-71
	Is able to	To conduct pathophysiological analysis of clinical-laboratory, experimental, other data and to formulate on their basis the conclusion on the most probable reasons and mechanisms of development of pathological processes (illnesses),	Ability to independently conduct pathophysiological analysis of clinical-laboratory, expert-Tali and other data.	is able on the basis of pathophysiological analysis of clinical and laboratory data to formulate a conclusion on the causes and mechanisms of the development of the pathological process	71-84
	Possesses	The main methods of assessing the functional state of the human body, the skills of analyzing and interpreting the results of modern diagnostic technologies.	Possession of the basic methods of evaluation of the functional state of the human body	Knowledge of the skills of analysis and modern of the results of diagnostic technologies	85-100

Evaluation tools for intermediate certification

Questions for the exam (5,6 semester)

1. The notion of "nosology", parts nosology.
2. The notions of "pathologic process", "pathologic state", "pathologic reactions", "typical pathologic processes", "remission", "recurrence", "complication".
3. Disease, definition. Principles used in classification of diseases. Stages of disease.
4. Etiology, definition. The nature and characteristics of pathogenic factors. Factors of diseases: environmental, genetic, social. The relation between causes and conditions in the development of diseases.
6. The notions of "pathogenesis", "vicious circles".
7. Reactivity of the body and its role in the development of disease. Forms and types of reactivity.
8. Arterial hyperemia: definition, causes, types (physiologic and pathologic), mechanisms (neurogenous, neuromyoparalytic and humoral) and consequences. Reactive hyperemia. Manifestations of arterial hyperemia and its mechanisms.
9. Venous hyperemia: definition, causes and consequences. Manifestations of venous hyperemia and their mechanisms.
10. Ischemia: definition, causes and consequences. Manifestations of ischemia and their mechanisms, factors that influence on the consequences of ischemia.
11. Stasis: types and causes.
12. Sludge syndrome: types, causes, and mechanisms.
13. Definition and significance of inflammation. Causes of inflammation.
14. Primary and secondary alteration in the focus of acute inflammation: causes, mechanisms of development, manifestation. Physico-chemical changes in the focus of inflammation.
15. Exudation. Definitions of an exudate and transudate. Sequence and mechanisms of vascular changes in acute inflammation.

16. Inflammatory mediators that influence on these processes.
17. Phagocytosis: stages.
18. Local and systemic signs of inflammation.
19. Nature and effects of inflammatory mediators: vasoactive amines, complement, kinin, and clotting systems, arachidonic acid metabolites, platelet-derived factor, cytokines and chemokines, nitric oxide, lysosomal constituents
20. General features of acute and chronic inflammation.
21. Typical forms of disordered immunologic reactivity. Principles of classification of immunodeficiency states.
22. Primary immunodeficiencies: classification and clinical manifestations. Forms of primary immunodeficiency (causes, mechanisms, clinical manifestations): a) B system-dependent: b) T system-dependent: c) combined.
23. Secondary (acquired) immunodeficiency states. AIDS
24. The notion of the "allergy". Types of allergens. Exogenous and endogenous allergens.
25. Stages of allergy: a) Immunologic stage: b) Pathochemical stage: c) Pathophysiological stage
26. Anaphylactic (I) type of allergy. The nature of allergen and antibody. Mediators of the anaphylactic reaction.
27. Type II hypersensitivity. The nature of allergen and antibody. Mechanisms and clinical examples of type II allergies.
28. Type III hypersensitivity. The nature of allergen and antibody. Mechanisms and clinical examples of type III allergies. Systemic and local immune complex disease.
29. Type IV hypersensitivity. The nature of allergen and antibody.
30. Definition of fever. Differences between fever and hyperthermia. Types of pyrogens. The biological significance of fever
31. Pathogenesis of fever. Features of thermoregulation at different stages of fever.

32. Types of fever:- based on the extent of temperature rise;- based on the circadian temperature fluctuations.
33. Exertional hyperthermia: causes, mechanisms
34. Definition of hypoxia and its classification
35. Exogenous hypoxia: causes, types and typical changes
36. Respiratory hypoxia: causes, types and typical changes in the given type of hypoxia
37. Anemic hypoxia: causes, types and typical changes
38. Circulatory hypoxia: causes, types and typical changes
39. Histotoxic and substrate types of hypoxia: causes, types and typical changes
40. Adaptive reactions in acute hypoxia.
41. Mechanisms of long-term adaptation to hypoxia.
42. Hypoglycemia: causes and mechanisms. Hypoglycemic coma.
43. Hyperglycemia: causes and mechanisms.
44. Diabetes mellitus: characteristic features, classification, pathogenesis of type I and type II forms.
45. Metabolic disorders (carbohydrate, protein, lipid) in diabetes mellitus.
46. Complications of diabetes mellitus (chronic and acute). Ketoacidotic coma.
47. The main classes of lipoproteins and their functions. Atherogenic and antiatherogenic lipoproteins. Mechanisms of hyperlipidemia.
48. Obesity: definition, diagnostic approaches, pathological significance. Types and pathogenesis of obesity.
49. Atherosclerosis: description and pathological features. Risk factors of atherosclerosis. Stages of atherogenesis:- initiation;- formation and evolution of atheroma;- complications.
50. Hypohydration: causes, types, mechanisms of development, manifestations, consequences, and principles of treatment.
51. Overhydration: causes, types, mechanisms of development, manifestations, consequences, and principles of treatment.

52. Edema: definition, types, the main factors of development, principles of treatment.
53. Edema during cardiac failure: etiology, pathogenesis, and manifestations.
54. Renal edema: etiology, pathogenesis, manifestations, and consequences.
55. Shock: characteristics, types, etiology, pathogenesis, manifestations, principles of treatment.
56. Coma: characteristics, types, etiology, general pathogenesis, manifestations, principles of treatment.
57. Definition of anemia and its classification.
58. Anemias of blood loss: types, causes, hematological signs.
59. Hemolytic anemias: types, common causes, manifestations, hematological signs. Hereditary spherocytosis: pathogenesis, manifestations, hematological signs. Sickle cell disease: pathogenesis, manifestations, hematological signs. Thalassemia syndromes: types, pathogenesis, manifestations, hematological signs.
60. B₁₂ (Megaloblastic) anemia: causes, pathogenesis, manifestations, hematological signs.
61. Iron deficiency anemia: causes, pathogenesis, manifestations, hematological signs.
62. Aplastic anemia: causes and pathogenesis, hematological signs.
63. Erythrocytosis: causes and mechanisms
64. Leukopenia: definition and causes. General mechanisms of leukopenia. Patterns of shift to the right.
65. Leukocytosis: causes and mechanisms. Types of leukocytosis; patterns of shift to the left.
66. Leukemoid reactions: typical features, causes, mechanisms of development, physiologic significance.
67. The system of hemostasis: components and their function. Typical forms of pathology of the hemostatic system.

68. Thrombotic syndrome: its main causes, mechanisms of development, manifestations and consequences.
69. Hemorrhagic syndrome: causes, mechanisms of development, manifestations and consequences.
70. Causes and mechanisms of thrombocytopenia and thrombocytopathia.
71. Abnormalities in clotting factors. Hemophylia.
72. The syndrome of disseminated intravascular coagulation: stages, mechanisms of development, manifestations and consequences.
73. Definition of coronary insufficiency. The main causes of coronary insufficiency. Adaptive mechanisms developing during acute and chronic coronary insufficiency.
74. The syndromes of coronary insufficiency: angina pectoris, myocardial infarction, chronic ischemic heart disease, sudden coronary death.
75. Definition, general causes and classification of heart failure. Myocardial and nonmyocardial cardiac insufficiency.
76. Adaptive reactions during acute and chronic heart failure: Frank-Starling mechanism, myocardial hypertrophy, redistribution of cardiac output, salt and water retention, activation of the sympathetic system.
77. Pathogenesis of the myocardium decompensation during hypertrophy.
78. Hemodynamic abnormalities in heart failure. Clinical features of heart failure: the syndromes of cardiac edema and cachexia.
79. Definition and principles of classification of arterial hypertension.
80. Renal arterial hypertension: pathogenesis of renovascular, renovascular, renal parenchymal hypertension.
81. Pathogenesis of endocrinogenic arterial hypertension.
82. Essential hypertension: etiology and pathogenesis.
83. Alveolar hyper- and hypoventilation: causes, mechanisms of development, consequences, and typical changes in breathing volumes.

84. Disorders of the neurogenic control of breathing. Pathological forms of breathing.
85. Types and consequences of perfusion disorders: pulmonary arterial hyper- and hypotension.
86. Types and mechanisms of ventilation-perfusion mismatch.
87. Abnormal diffusive capacity of the alveolar-capillary barrier.
88. Typical forms of functional pathology of the digestive tract: general etiology.
89. Disorders of appetite, taste, and initial treatment of food in the oral cavity.
90. Disorders of swallowing: dysphagia, achalasia, diffuse esophageal spasm.
91. Disorders of digestion in the stomach: disturbance of secretory and motor function.
92. Disorders of digestion in the intestine: disturbance of secretion, motor function, and absorption.
93. The syndrome of malabsorption: etiopathogenesis, manifestations and consequences.
94. Typical disorders of cavity digestion: causes, manifestations.
95. Typical disorders of parietal digestion: causes, manifestations.
96. Pathogenesis of peptic ulcer of the stomach and duodenum.
97. General causes of liver dysfunction. The syndrome of hepatic insufficiency
Causes, types and pathogenesis of hepatic coma.
98. The syndrome of hepatic insufficiency. Typical disorders of carbohydrate, aminoacid, protein, and lipid metabolism in hepatic insufficiency; failure of detoxification function.
99. Hemolytic jaundice: causes, mechanisms, clinical and laboratory manifestations.
100. Obstructive jaundice: types, causes, mechanisms, clinical and laboratory manifestations, consequences.

101. Hepatocellular jaundice: causes, mechanisms, stages, clinical and laboratory manifestations.
102. General causes and mechanisms of kidneys dysfunction. Disorders of filtration, tubular reabsorption and excretion.
103. Syndromes of acute renal insufficiency: typical features, causes and manifestations
104. Syndromes of chronic renal insufficiency: typical features, causes and manifestations. Uremic coma.
105. Nephrotic and nephritic syndromes: typical features, causes and manifestations.
106. Pyelonephritis: characteristic features, causes and pathogenesis.
107. Nephrolithiasis: causes, mechanisms of development, consequences.
108. General etiology and pathogenesis of endocrine disorders. Typical forms of functional pathology of adenopituitary. Hypopituitarism: types, causes, mechanisms of development and manifestations
108. Hyperpituitarism: types, causes, mechanisms of development and manifestations. Acromegaly and gigantism. Typical forms of disorders of neurohypophysis. Diabetes insipidus
109. Typical forms of adrenals' dysfunction. Hypercortisolism: types, pathogenesis and manifestations. Cushing's disease and syndrome, hyperaldosteronism.
110. Hypocortisolism: types, pathogenesis and manifestations. Acute adrenal failure and Addison's disease, hypoaldosteronism, syndromes of adrenal androgen excess.
111. Disorders of adrenal's medulla. Manifestations and consequences of pheochromocytoma.
112. Hypothyroidism: types, causes, mechanisms of development and clinical manifestations. Common hypothyroid states: myxedema, cretinism, endemic goiter.

113. Hyperthyroidism: types, causes, mechanisms of development and clinical manifestations. Pathogenesis and manifestations of Grave's disease, Hashimoto's thyroiditis.

114. General etiology, pathogenesis, and typical forms of pathology of the nervous system.

115. Disorders of locomotion: manifestations of the upper (central) and lower (peripheral) motor neuron damage.

116. Hypokinetic and hyperkinetic movement disorders: types, etiology and pathogenesis.

117. Disorders of sensation: general etiology and classification. Hypo- and hypersthesia, dysesthesia: types and mechanisms of disorders

**Scoring criteria on the student competition on the subject
«pathological anatomy»**

Points (rating)	Evaluation offset/exam (standard)	Requirements to the formed competences
86-100	<i>«credited»/ «excellent»</i>	The rating of «excellent» to the students, if it is deeply and firmly mastered the program material, comprehensively, consistently, accurately and logically sound it sets, can be closely linked theory with practice, freely to cope with questions and other types of application knowledge is not difficult to answer at modification jobs has versatile skills and techniques perform practical tasks.
76-85	<i>«credited»/ «good»</i>	The rating of «good» to the students, if he knows for sure the material correctly and essentially sets out its not allowing significant inaccuracies in answering the

		question correctly applies the theoretical principles in solving practical issues and challenges, has the necessary skills and techniques for their implementation.
51-75	« <i>credited</i> »/ « <i>satisfactory</i> »	The rating of «satisfactory» to the students, if he has knowledge of only the base material, but did not learn his parts, admits inaccuracies, insufficient correct wording violations of logical consistency in the presentation of program material, has difficulty in carrying out practical work.
Less 50	« <i>fail</i> »/ « <i>unsatisfactory</i> »	The rating of «unsatisfactory» to the students, who did not know a large part of the program material, allows substantial errors, uncertainly, with great difficulty performing practical work.

Typical estimates of funds for the current certification

Test papers (examples)

- 1) Specific reactivity is a property
 - a) +of the body to respond to antigenic stimulus
 - b) of an organism of this species to respond to environmental influence
 - c) of the group of individuals of this species to respond to environmental influence
 - d) of the body respond by certain way on the impact of physical factors
 - e) of specific organism to respond to environmental influences
- 2) Classification of constitutional types by I.P. Pavlov correspond to:
 - a) Choleric;
 - b) Phlegmatic;
 - c) melancholic;
 - d) +strong, balanced, movable
 - e) asthenik.

3) Resistance of the body – is

a) property of the body to respond on the impact of the environment by change of vital activity;

b) response of the organism to a stimulus;

c) reduced the body's response to a stimulus;

d) +body's resistance to pathogenic factors;

e) body's sensitivity to the action of environmental factors.

4) The correct is the statement:

a) +the high reactivity of the organism is not always accompanied by a high resistance;

b) reactivity and resistance occur independently

c) low reactivity of the organism is always accompanied by a high resistance;

d) low reactivity always promotes resistance to infection.

5) Select the characteristics of an asthenic type of human constitution

a) obtuse epigastric angle;

b) +high level of basal metabolism;

c) low level of basal metabolism;

d) tendency to obesity;

e) tendency to increase of blood pressure.

6) The impact of the pathogenic factor of the same force does not cause the same changes vital activity in different people, is an example of:

a) species reactivity;

b) group reactivity;

c) sexual reactivity;

d) age-reactivity;

e) +individual reactivity.

7) Asthenic constitution predisposes to the development of:

a) Hypertension;

- b) coronary heart disease;
 - c) cholelithiasis;
 - d) +gastric ulcer and duodenal ulcer;
 - e) diabetes mellitus.
- 8) The uniqueness of each individual is determined by:
- a) species reactivity;
 - b) group reactivity;
 - c) +the individual reactivity;
 - d) gender;
 - e) constitutional peculiarities.
- 9) What relates to manifestations of passive resistance of the organism?
- a) neutralization and excretion of toxins;
 - b) response of acute phase of the damage;
 - c) +barrier function of the skin and mucous membranes;
 - d) immunity after infectious diseases;
 - e) +content of HCl in gastric juice.
- 10) Which statements are true?
- a) +the reactivity depends from the constitution of the body;
 - b) +the reactivity depends from the state of nervous and endocrine systems;
 - c) the reactivity is not depends from the environmental factors;
 - d) resistance and reactance of an organism do not depend from the state of metabolism;
 - e) +reaction of the organism depends from the age and sex.

Evaluation tools for the current attestation

Control tests are designed for the students studying the course "Pathological anatomy".

The tests are necessary for the control of knowledge during the current interim attestation, and for the evaluation of knowledge and thus to get credit for course.

While working with tests the student are asked to select one answer from the three - four proposed. At the same time the tests are not identical in their complexity.

Offered tests contain several variants of correct answers. The student must select all the correct answers.

The tests are designed both for individual and collective solving them. They can be used in the process both classroom lessons and independent work. The tests, required for the control of knowledge, are chosen in the process of the intermediate certification by each teacher individually.

The results of the test tasks are evaluated by a teacher on a five-mark grading scale or system of "**credit**" - "**not credit**".

Evaluation of "**excellent**" is got by student at the correct answer to more than 90% of the proposed tests.

Evaluation of "**good**" getting - at the correct answer by more than 70% of tests.

Evaluation of "**satisfactory**" - at the correct answer to 50% of the offered tests.

Examples of Case studies

A 46-year-old patient B. has visited his physician with complaints of right upper quadrant tenderness, nausea, vomiting, frequent diarrhea, weakness, fatigability. The patient's history includes an episode of jaundice at the age of seven. On examination: the skin and conjunctiva appear jaundiced; blood pressure 110/75 mm Hg, heart rate 86 per min; the liver is enlarged and nontender on palpation; the spleen is significantly enlarged; the stool is normally coloured; the urine is dark. Blood test data: Hb 92 g/L, erythrocyte count

$3.5 \times 10^{12}/L$, reticulocytes 11%; leukocyte count $3.7 \times 10^9/L$, white blood cell count differential is unremarkable; ESR 9 mm/h.

Microscopy of the blood smear demonstrates anisocytosis, poikilocytosis, and spherocytosis of erythrocytes. Osmotic fragility testing shows increased hemolysis. Blood biochemistry data: total protein 50 g/L (N:70-80 g/L), total bilirubin 5.8 mg/dl (N<1.3 mg/dl), conjugated bilirubin 0.15 mg/dl (N<0.30 mg/dl), urobilinogen is detected in increased amounts; serum AST activity 52 U/L (N<47 U/L); glucose level 105 mg/dl. Urine test data: 24-h urine volume 1450 ml, specific gravity 1028, protein and glucose are not detectable; positive reaction for Hb.

Questions:

1. What forms of pathology does the patient suffer from?
2. Are there any signs of hepatic insufficiency in this patient?
3. What is your conclusion about the state of the bile pigment metabolism in this patient? What is the pathological basis of changes in the bile pigment metabolism in this case?
4. What changes in the bile pigment metabolism can be expected in acholia and cholemia?