APPROVED BY
the Academic Board of the Institute for Medicine, Ecology and Physical Education at Ulyanovsk State University
« 16 » May 2024, Record № 9/260
Chairperson _____ V.V.Mashin
(signature) *surname, initials)*
« 16 » May 2024

COURSE SYLLABUS

Discipline	Pathophysiology, clinical pathophysiology
Faculty	Faculty of Medicine named after T.Z.Biktimirov
Department	Physiology and pathophysiology
Course	3

Field of study «General medicine» 31.05.01.
Name, code

Orientation (profile/specialty) not provided

Mode of study full-time

First introduced in the educational process at Ulyanovsk State University September 1st, 2024.

Updated at the Department session, record №_____ of_____ «_____» 20___.
Updated at the Department session, record №_____ of_____ «_____» 20___.
Updated at the Department session, record №_____ of_____ «_____» 20___.
Updated at the Department session, record №_____ of_____ «_____» 20___.

Information about developers:

Initials	Department	Job title, Academic Qualification
Kseiko D.A.	Physiology and pathophysiology	PhD in biological science, Associate professor

AGREED by	AGREED by
Head of the department of Physiology and pathophysiology implementing the discipline _____ / Gening Tatyana P. / *Signature* *Full name* « 16 » May 2024	Head of the Graduating Department of Hospital Therapy _____ / Vize-Khripunova Marina A. / *Signature* *Full name* « 16 » May 2024

1. GOALS AND OBJECTIVES OF STUDING THE DISCIPLINE

The goals of studing «Pathophysiology, Clinical Pathophysiology» as a discipline are the formation of:

• scientific knowledge about the general laws and specific mechanisms of the emergence, development and outcomes of pathological processes, individual diseases and disease states, the principles of their detection, therapy and prevention;

• the skills of effective solution of professional medical cases using the pathophysiological analysis of clinical data and the knowledge of pathological processes, conditions, reactions and diseases, the general rules and mechanisms of their onset, progress and termination; as well as the skills of formulate principles (algorythms, strategy) and methods of their diagnostics, treatment, and prevention;

• methodological, methodical, and practical basis of rational thinking and efficient professional performance.

The objectives of mastering the «Pathophysiology, Clinical Pathophysiology» as a discipline are:

• Familiarization with the basic concepts of general nosology;

• Determining the role of causative factors, conditions and reactive properties of the organism in the emergence, development and outcome of diseases;

• Elucidation of the causes and mechanisms of the development of typical pathological processes, their manifestations and outcomes;

• Elucidation of the causes, mechanisms and the most important manifestations of typical disorders of the functions of organs and systems of the organism;

• Revealing the importance of the experimental method in the study of pathological processes, its possibilities, limitations and perspectives;

• The disclosure of the importance of pathophysiology, clinical pathophysiology for the preventive direction of clinical medicine;

• Revealing the connection of pathophysiology with other medical-biological and medical disciplines.

2. PLACE OF THE SUBJECT IN THE STRUCTURE OF MASTERING THE PROGRAM:

The discipline B1.O.16 (Б1.О.16) "Pathophysiology, clinical pathophysiology" refers to the basic part of the curriculum disciplines, studied in the fifth and sixth semesters.

To study this discipline, a student must master such disciplines as: biology; biochemistry; anatomy; neuroanatomy; histology, embryology, cytology; embryonic development of body tissues; normal physiology, physiology of the visceral systems; microbiology, virology; caring for a patient with a surgical profile; dignostic practice.

Knowledge in the discipline "Pathophysiology, clinical pathophysiology" is necessary for the subsequent development of the following disciplines: obstetrics and gynecology; forensic medicine, physician assistant in a stationary institution; preparation for passing and passing the state exam.

3. THE LIST OF EXPECTED LEARNING RESULTS ON THE SUBJECT (UNIT), MATCHED TO EXPECTED RESULTS OF MASTERING THE PROGRAM

Code and name of the implemented competency	The list of planned learning outcomes in the discipline (module), correlated with indicators of achievement of competencies
general professional competence -5 (GPC-5) the ability to assess morphofunctional, physiological conditions and pathological processes in the human body for solving professional problems.	**Know:** - the basic notions of general nosology; - the role of causes, conditions, reactivity of the body in the onset, progression, and outcomes of diseases; - causes and mechanisms of typical pathological processes, states, and reactions; their manifestations and significance for the development of various diseases; -causes, mechanisms and principal manifestations of typical forms of pathology of organs and organ systems; -etiology, pathogenesis, symptoms, and outcomes of the most common forms of pathology of organs and physiological systems; principles of their etiological and pathogenesis-based therapy; - the significance of physical (in biological systems) and non-physical (formalized) modeling of diseases, pathological states, processes and reactions for the progress of medical sciences and biology; - the role of various methods of modeling: experimental (in laboratory animals, isolated organs, tissues, and cells; artificial physical systems), logic (intellectual), computer-based, mathematical etc. in the studies of pathological processes; their advantages, limitations, and perspectives; -the importance of pathophysiology for the progress of medicine and health security; the relationship of pathophysiology with other medico-biological and medical disciplines. **Be skilled in:** - solve the professional cases using pathophysiological analysis of the specific data concerning pathological processes, states, reactions, and diseases; - carry out pathophysiological analysis of clinico-laboratory, experimental and other data, and formulate a conclusion about the most likely causes and mechanisms of development of the pathological processes (diseases), principles and methods of their diagnostics, treatment, and prevention; - employ the knowledge of pathophysiology in the studies of clinical disciplines and the following medical practice; - analyze problems of general pathology and critically evaluate the modern theoretical concepts and trends in medical science; - design and take part (observing the necessary rules) in experiments using laboratory animals, handle and analyze the obtained data, and adequately assess the results to improve the knowledge of clinical forms of pathology;

	- evaluate the results of the most common methods of diagnostics of diseases; - solve the clinical cases of various types; - analyze the ECG records and determine the main types of arrhythmia, and signs of myocardial ischemia or infarction; - evaluate the cell composition of the inflammatory exudates and the phagocytizing activity of leukocytes; - analyze neutrophils in differential blood test and make a conclusion about the observed changes; - formulate a conclusion about the presence and type of blood cell pathology in differential blood test; - analyze the parameters of coagulogram and make a conclusion about the observed changes; - determine the typical forms of disorders of the lungs respiratory function using parameters of alveolar ventilation, blood gases, and pulmonary perfusion; - distinguish types of pathological breathing and explain mechanisms of their development; - characterize typical forms of kidneys disfunction using parameters of the blood test, urinalysis and clearance-tests; - differentiate various types of jaundice; - analyze parameters of the acid-base balance and formulate a conclusion about its disorders; - distinguish various types of hypoxia; - determine typical disorders of the stomach and intestine secretion by the analysis of their contents; - evaluate the results of the common diagnostic allergy tests; - formulate principles of the pathogenesis-based therapy of the common diseases. **Master:** - system approach in analysis of medical information; - principles of evidence-based medicine that imply working out decisions based on the theoretical knowledge and practical skill; - system approach in analysis of natural laws of functioning of organs and organ systems in normal and pathological states; - adequate methods to evaluate functions of the body, to analyze and interpret results of the modern diagnostic procedures; - pathophysiological analysis of clinical syndromes, skills to substantiate pathogenesis-based methods (principles) of diagnostics, treatment, medical rehabilitation, and prevention of diseases.

4. SUBJECT VOLUME

4.1. Subject volume in credits (total): 7 (252h)

4.2. On types of academic workload (in hours)

Type of academic workload	Number of hours (form of training: full time)		
	Total in the plan	Throughout the terms	
		term № 5	term № 6
1	2	3	4
Student-Teacher activity	158/158**	90/90**	68/68**
Auditory classes:	158	90	68
Lectures	53/53**	36/36**	17/17**
practical classes and seminars	105/105**	54/54**	51/51**
lab work (practical activity in the lab)			
Self-study work	58	36	22
Concurrent checking (number and type: a test, a colloquium, a report, cases)	Interviewing students, checking the protocols of practical work; Colloquiums-6 lessons tests, cases	Interviewing students, checking the protocols of practical work; Colloquiums-3 lessons tests, cases	Interviewing students, checking the protocols of practical work; Colloquiums-3 lessons tests, cases
Types of midterm assessment (an exam, a test)		a credit	an exam (36h)/36**
Total number of hours on the subject	252	126	126

* - number of hours spent interactively

«** If it is necessary to use partially / exclusively distance educational technologies in the educational process, in the table, through a slash, the number of hours of work of teaching staff with students for conducting classes in a distance format using e-learning is indicated»

4.3. The content of a subject (unit.) Distribution of hours on themes and types of academic workload:

Form of training: full-time

Name of sections and topics	Total	Types of classes				Self-study work	Current checking of knowledge
		Classes			Interactive classes		
		lectures	practical classes and seminars	lab work			
1	2	3	4	5	6	7	8
Section 1. The subject and tasks of pathological physiology. General nosology							
1. **S**ubject and tasks of pathological physiology. General nosology.	6	2	3			1	Questions on the practical class, colloquium, credit, exam. Interview.
2. General etiology. General pathogenesis.	3	2				1	Questions on the practical class, colloquium, credit, exam. Interview.
3. Pathogenic effects of environmental factors.	6		4		2	2	Questions on the practical class, colloquium, credit, exam. Interview.
Section 2. Reactivity and resistance of the organism, their role in pathology							
4. Reactivity and resistance of the organism, their role in pathology	8	2	4			2	Questions on the practical class, colloquium, credit, exam. Interview.
5. The role of heredity in pathology	4	2				2	Questions on the exam. Interview.
Section 3. Typical pathological processes							
6. Cell injury.	6		4			2	Questions on the practical class, colloquium, credit, exam. Interview.
7. Disorders of microcirculation.	6	2	3		2	1	Questions on the practical

							class, colloquium, credit, exam. Interview.
8. Disturbances of the peripheral blood flow	7	2	3		2	2	Questions on the practical class, colloquium, credit, exam. Interview.
9. Pathophysiology of acid-base imbalance. Pathogenesis of the major syndromes of acidosis and alkalosis.	9	2	4		2	3	Questions on the practical class, colloquium, credit, exam. Interview.
10. Disorders of water-mineral balance. Pathogenesis of the major syndromes of pathology of water-mineral metabolisms	8	2	4		1	2	Questions on the practical class, colloquium, credit, exam. Interview.
11. Disorders of protein and lipid metabolisms.	5	2				3	Questions on the practical class, colloquium, credit, exam. Interview.
12. Disorders of carbohydrate metabolism.	6		4			2	Questions on the practical class, colloquium, credit, exam. Interview.
13. Pathophysiology of starvation. Disturbances in vitamins metabolism.	3					3	Questions on the practical class, colloquium, credit, exam. Interview.
14. Inflammation.	13	4	6			3	Questions on the practical class, colloquium, credit, exam. Interview.

15. Acute phase response. Fever. Hyperthermia.	8	2	4			2	Questions on the practical class, colloquium, credit, exam. Interview.
16. Pathophysiology of hypoxia.	7	2	4			1	Questions on the practical class, colloquium, credit, exam. Interview.
17. Pathophysiology of the Immune System. Allergy. Autoimmune Disorders	11	2	7			2	Questions on the practical class, colloquium, credit, exam. Interview.
18. Immunodeficiency states.	4	2				2	Questions on the practical class, colloquium, credit, exam. Interview.
19. The pathophysiology of tumor process.	5		3			2	Questions on the practical class, colloquium, credit, exam. Interview.
Section 4. Systemic pathophysiology (Pathophysiology of organs and systems)							
20. Pathophysiology of the heart. Pathogenesis of the main clinical syndromes of heart disease.	7	2	4			1	Questions on the practical class, colloquium, credit, exam. Interview.
21. Cardiac arrhythmia	5		4		2	1	Questions on the practical class, colloquium, credit, exam. Interview.
22. Disorders of circulation due to alterations of the vascular tone.	7	2	3			2	Questions on the practical class, colloquium, credit, exam. Interview.
23. Pathophysiology of external breath-							Questions on the practical

ing. Pathogenesis of the main clinical syndromes of respiration system disease.	8	2	4			2	class, colloquium, credit, exam. Interview.
24. Pathophysiology of gastrointestinal tract. Pathogenesis of the main clinical syndromes of gastrointestinal disease.	8	2	4			2	Questions on the practical class, colloquium, credit, exam. Interview.
25. Pathophysiology of liver. Pathogenesis of the main clinical syndromes of the liver diseases.	7	2	4		2	1	Questions on the practical class, colloquium, credit, exam. Interview.
26. Pathophysiology of kidneys. Pathogenesis of the main clinical syndromes of the renal diseases	7	2	4			1	Questions on the practical class, colloquium, credit, exam. Interview.
27. Pathophysiology of red blood cells system. Pathogenesis of the main clinical syndromes due to the pathology of erythrocytes.	6	2	3		1	1	Questions on the practical class, colloquium, credit, exam. Interview.
28. Pathophysiology of white blood cells system. Pathogenesis of the main clinical syndromes due to the pathology of leukocytes.	7	2	4		1	1	Questions on the practical class, colloquium, credit, exam. Interview.
29. Leukemia	4		3		1	1	Questions on the practical class, colloquium, credit, exam. Interview.
30. Impairments of hemostasis	7	2	4		1	1	Questions on the practical class, colloqui-

							um, credit, exam. Interview.
31. Pathophysiology of the emergency states	3	2				1	Questions on the practical class, colloquium, credit, exam. Interview.
32. Stress, the concept of the general adaptation syndrome, and their role in pathology.	3	2				1	Questions on the practical class, colloquium, credit, exam. Interview.
33. Pathophysiology of the endocrine system.	6	1	4		1	1	Questions on the practical class, colloquium, credit, exam. Interview.
34. Pathophysiology of the nervous system and higher nervous functions	6		3			3	Questions on the practical class, colloquium, credit, exam. Interview.
Total	216	53	105		18	58	

Interactive classes

№	The name of the discipline section	Forms of the interactive classes	Duration (hours)
1.	Pathogenic effects of environmental factors.	1. Modeling of pathological processes. 2. Training in developing skills in performing experimental work. 3. The discussion in the group the results obtained during the experiment.	2
2.	Disorders of microcirculation.	1. Modeling of pathological processes. 2. Training in developing skills in performing experimental work. 3. The discussion in the group the results obtained during the experiment.	2
3.	Disturbances of the peripheral blood flow	1. Modeling of pathological processes. 2. Training in developing skills in performing experimental work. 3. The discussion in the group the results obtained during the experiment.	2

4.	Pathophysiology of acid-base imbalance. Pathogenesis of the major syndromes of acidosis and alkalosis.	Case-method: solving specific situational problems.	2
5.	Disorders of water-mineral balance. Pathogenesis of the major syndromes of pathology of water-mineral metabolisms	1. Modeling of pathological processes. 2. Training in developing skills in performing experimental work. 3. The discussion in the group the results obtained during the experiment.	1
6.	Cardiac arrhythmia.	Case-method: solving specific situational problems. (расшифровка ЭКГ больных).	2
7.	Pathophysiology of liver. Pathogenesis of the main clinical syndromes of the liver diseases.	1. Modeling of pathological processes. 2. Training in developing skills in performing experimental work. 3. The discussion in the group the results obtained during the experiment. 4. Case-method: solving specific situational problems.	2
8.	Pathophysiology of red blood cells system. Pathogenesis of the main clinical syndromes due to the pathology of erythrocytes.	1. Modeling of pathological processes. 2. Training in developing skills in performing experimental work. 3. The discussion in the group the results obtained during the experiment. 4. Case-method: solving specific situational problems.	1
9.	Pathophysiology of white blood cells system. Pathogenesis of the main clinical syndromes due to the pathology of leukocytes.	1. Modeling of pathological processes. 2. Training in developing skills in performing experimental work. 3. The discussion in the group the results obtained during the experiment. 4. Case-method: solving specific situational problems.	1
10.	Leukemia	1. Modeling of pathological processes. 2. Training in developing skills in performing experimental work. 3. The discussion in the group the results obtained during the experiment. 4. Case-method: solving specific situational problems.	1
11.	Impairments of hemostasis	1. Modeling of pathological processes. 2. Training in developing skills in perform-	1

		ing experimental work. 3. The discussion in the group the results obtained during the experiment. 4. Case-method: solving specific situational problems.	
12.	Pathophysiology of the endocrine system.	Case-method: solving specific situational problems.	1
TOTAL			18

5. COURSE CONTENT

Section 1. The subject and task of pathological physiology. General nosology.

Topic 1. Subject and tasks of pathological physiology. General nosology.

Pathophysiology as a theoretical and methodological basis of modern practical medicine. The role of scientists of our country and foreign scholars in the development of pathophysiology (M.M.Sechenov, I. P. Paulov, V.V.Pashutin, A.B.Foht, A.A.Bogomolets, A.M.Chernukh, Yu.Kongeym, C. Bernard, H.Selye). The structure of the training course pathophysiology.

Methods of pathophysiology. Importance of experiment in the development of pathophysiology and clinical medicine. Modeling as the principal and specific method of pathophysiology. The basic conditions of performing a biological experiment. Moral-ethical aspects of experimenting on animals. Acquisition of practical skills of work with experimental animals (fixation, narcotization, injection).

Concepts of normalcy, health, predisease, pathological process, pathological reaction, pathological state, typical pathological processes, remission, recurrence, complication. The notions of the disease, disease criteria, stages of the disease. Social criteria of disease. Principles of disease classification. Analysis of contemporary conception of general nosology.

Topic 2. General etiology. General pathogenesis.

Principle of determinism in pathology. The significance of reasons and conditions in beginnings of the disease. The notion of environmental and internal causes and factors of risk of disease. The notion of polyetiologic disease. Principles of etiotropic prevention and treatment of disease. The essence of monocausealism, conditionalism and constitutionalism, genetic determinism and others. Injury as the initial link of the pathogenesis. Unity of structural and functional alterations in the pathogenesis of the disease. The cause-and-effect relationship in the pathogenesis of the disease. Localization and generalization of the injury; local and general reactions to injury, their relationship. Leading links of the pathogenesis, the vicious circle in the pathogenesis of the disease. The outcomes of the disease. Pathogenic principles of therapy of the diseases.

Terminal conditions. Pathophysiological bases for resuscitation the organism.

Topic 3. Pathogenic effects of environmental.

The significance of reasons and conditions in beginnings of the disease. Injury as the initial link of the pathogenesis. Pathological effect of high and low temperatures, electric current, the rays of the solar spectrum, ionizing radiation on the body. Pathological effect of changed air pressure, acoustic waves and space flight factors on the body.

Alcoholism, drugs and chemical addiction: characteristics of the notions, etiology, pathogenesis, manifestations and consequences.

Section 2. Reactivity and resistance of the organism, their role in pathology

Topic 4. Reactivity and resistance of the organism, their role in pathology.

Characteristics of the notions: sensitivity, irritation, reaction, reactivity, resistance of the body. Definition of the notions «reactivity» and «resistance», their relationship. Types of reactivity: species, group, individual; physiological and pathological; specific and nonspecific (examples). Forms of reactivity: normergy, hypoergy, hyperergy, dysergy (examples). Resistance of the organism: active and passive; primary and secondary; specific and nonspecific.

The definition of the concept «constitution of the organism». Classification of constitutional types. Effect of the constitution on the emergence and development of diseases.

Basic parameters and classification of biological rhythms. The role of biological rhythms in the formation of the organism reactivity.

Phylo-and ontogenesis of reactivity and resistance. The aging of the organism. Theories of aging. Peculiarities of development of pathological processes in elderly and senile age. Features reactivity in childhood and their role in pathology.

Topic 5. The role of heredity in pathology.

Health and disease as the expression of the genetic control of the organism's homeostasis. Difference and similarity of hereditary, congenital and acquired forms of pathology. Phenocopies: the definition, causes of development, examples. Mechanisms of stability and variability of the genotype. Mutagen factors, their kinds. Mutations: point, chromosome, genome; spontaneous and induced. Typical variants of pathogenesis of hereditary pathology. Classification of hereditary pathology. Mono- and polygenic hereditary diseases. The concept of penetrance and expressivity of genes. Diseases with hereditary predisposition. Chromosomal diseases: polyploidy and aneuploidy, their manifestations and features of pathogenesis. Methods of studying hereditary forms of pathology; principles of their prophylaxis and possible treatment.

Importance of critical periods in the pathology of the embryo and fetus. Pathology of intrauterine development. The concept of antenatal pathology. Gametopathies, blastopathies, embriopathies, phetopathies. Relationship of fetal pathology with harmful effects on the maternal organism. A pathogenetic role of hypoxia, hormonal and metabolic impairments, infection, industrial and household intoxications; harmfulness of alcoholism and smoking. Immune tolerance in pregnancy.

Section 3. Typical pathological processes

Topic 6. Cell injury.

Causes of cell injury: exogenous and endogenous. Injury of cellular membranes and enzymes. Abnormality of the cellular energy balance, intracellular mechanisms of regulation of cell's functions. Mechanisms of hypoxic and reperfusion cell injury. The role of Na+, K+, Ca2+, and water disbalance in cell injury. Injury of the genome. Apoptosis, its role in physiological and pathological processes. Specific and nonspecific manifestations of cell injury. Mechanisms of protection and adaptation of the cell to injurious effects.

Dystrophy and dysplasia of the cells, paranecrosis, necrosis, autolysis.

Topic 7. Disorders of microcirculation.

The structure of microcirculatory bed. Mechanisms of neuro-humoral regulation of microcirculation. Typical forms of disorders of lymph microcirculation. Methods of studying of microcirculation.

The reasons and mechanisms impairments of microcirculation. Changes of blood viscosity, hemoconcentration, violations of the suspension-stability of the blood and erythrocyte deformability.

«Sludge» -phenomenon. Disorders of blood flow structuring in the microvessels. Typical forms of disorders of blood microcirculation (intravascular, transmural, extravascular), etiology, pathogenesis, clinical manifestations and consequences. Developmental mechanisms, manifestations and consequences «capillarotrophic insufficiency». Microcirculatory disorders in patients with cardiovascular disease, acute and chronic renal failure, extreme conditions, diabetes and other endocrinopathy.

Typical impairments of lymphodynamics (mechanical, dynamic, resorptional insufficiency of lymphatic vessels) and their role in pathology.

Topic 8. Disturbances of the peripheral bloodflow

Typical forms of impairments of peripheral blood circulation, their types, etiology, pathogenesis, disorders of microcirculation, clinical manifestations and consequences.

Arterial hyperemia, its types and significance. Neurogenic and humoral mechanisms of local vasodilation; neuromyoparalytical mechanism of arterial hyperemia. Disorders of microcirculation in arterial hyperemia.

Ischemia. Reasons for increase of resistance to blood flow in the arteries: vascular compression, vasospasm, thrombosis, embolism. Microcirculatory disorders in ischemia. Clinical symptoms and consequences of ischemia. Mechanisms of ischemic injury of myocardium, kidney, brain.

Venous hyperemia, its causes. Microcirculation at the site of venous congestion. Symptoms and significance of venous hyperemia. Clinical manifestations of venous hyperemia in diseases of heart, liver and others. Stasis: its types (ischemic, congestion-associated, primary).

The reasons and mechanisms of embolus formation. Types of embolism. The significance, outcomes and consequences of embolism for the organism. The patterns of emboli travel. Prophylaxis of embolism.

Topic 9. Pathophysiology of acid-base imbalance. Pathogenesis of the major syndromes of acidosis and alkalosis.

The concept of the acid-base balance of the organism. Basic laboratory estimation criteria of acid-base balance impairments. Mechanisms of control of acid-base balance. The role of buffer systems, kidneys, lungs, liver, and gastro-intestinal tract in the regulation of acid-base balance.

Clinical aspects of state and regulation of the acid-base homeostasis.

Typical forms of disorders of acid-base balance. Syndrome non-respiratory acidosis and alkalosis, etiology, pathogenesis, mechanisms of compensation. Clinical complications resulting from non-respiratory acidosis and alkalosis. Pathogenetic therapy of non-respiratory acidosis and alkalosis.

Respiratory acid-base imbalance. Basic causes, the mechanisms of development and compensation of respiratory acidosis and alkalosis. Clinical complications resulting from respiratory acidosis and alkalosis. Pathogenetic correction of acute respiratory acidosis and alkalosis. Mixed disorders of acid-base state of blood (respiratory alkalosis + metabolic acidosis, etc.).

Interrelation of acid-base balance and water-electrolyte balance. The relationship between disorders of acid-base state, the system of hemostasis, and water-electrolyte metabolism in therapeutic and surgical patients. Effect of hypoxia on metabolic indices of acid-base balance (ABB) and water-electrolyte balance. Changes in indicators of acid-base state for respiratory (gas), acidosis, metabolic acidosis, respiratory alkalosis and metabolic alkalosis.

Pathogenetic bases correction of ABB violations.

Topic 10. Disorders of water-electrolytes balance. Pathogenesis of the major syndromes of pathology of water- electrolytes metabolism.

The content and distribution of water in the organism. The laws of electroneutrality and isoosmolarity. Neurohormonal regulation of water-electrolyte metabolism and the mechanisms of its violation. Violation of the distribution and exchange of ions between the cell and the extracellular sectors.

The disturbances of water-salt metabolism, principles of classification and main types.

Hypohydration syndrome: types, causes, pathogenesis, clinical and pathophysiological manifestations, consequences, pathogenetic principles of correction.

Hyperhydration syndrome: types, causes, pathogenetic features, symptoms, consequences, principles of correction.

Edema. Factors of edema development. The pathogenesis of cardiac, renal, inflammatory, toxic, allergic, starvation types of edema. Local and systemic disturbances in edema.

Disorders of quantity and ratio of Na+, K+, Ca2+, Mg2+ and microelements in biological fluids and cells of the body.

Syndromes: hyper- and hyponatremia, hyper- and hypokalemia, hyper- and hypocalcemia, hyper- and hypomagnesemia. Their causes, mechanisms of development. Disorders of metabolism and physiological functions for most frequent forms of ion exchange violations.

Violations of the functions of organs and systems in disorders of water-electrolytes metabolism.

Topic 11. Disorders of protein and lipid metabolisms.

Positive and negative nitrogen balance. Violations of protein digestion of food; metabolism of amino acids and amino acid composition of the blood. Disorders of the final stages of protein metabolism, the synthesis of urea. Hyperasotemia. Violations of the protein composition of blood plasma: hyper-, hypo- and dysproteinemia. Protein-energy malnutrition.

Violations of nucleic acid metabolism: replication and repair of DNA, RNA synthesis. Conformational changes in DNA and RNA. Violations of the exchange purine and pyrimidine bases. Gout, the role of exogenous and endogenous factors, pathogenesis.

Disorders of lipid metabolism. Pathology of digestion, transport and metabolism of fats. Hyperlipidemia types, a value for the organism. Obesity, types, causes, mechanisms of development, consequences.

Topic 12. Disorders of carbohydrate metabolism.

Impaired digestion and resorption of carbohydrates in the gastrointestinal tract. Impaired of the synthesis process, the deposit and the splitting of glycogen. Hypoglycemic state, their types, mechanisms of development, disorders of physiological functions; hypoglycemic coma. Violation of carbohydrate metabolism in hereditary enzymopathies.

Hyperglycemic conditions, their types, mechanisms of development. Pathogenetic significance of hyperglycemia. Diabetes mellitus, its types, etiology, pathogenesis. Complications of diabetes mellitus. Diabetic coma, pathogenesis.

Energy metabolism, definition, factors determining the energy balance. The causes and mechanisms of energy metabolism disorders, symptoms, principles of correction.

Topic 13. Pathophysiology of starvation. Disturbances in vitamines metabolism.

Starvation, types. Periods of starvation, changes in metabolism and physiological functions in different periods of starvation. The concept of therapeutic starvation.

Violations of vitamin metabolism. Hypo-, hyper-, dys- and avitaminosis, causes, mechanism of development, clinical manifestations and consequences. Exogenous (primary) and endogenous (secondary) hypovitaminosis due to lack of food, malabsorption, violations of transport, deposition, recovery and vitamin metabolism.

Topic 14. Inflammation.

The definition of the notion «inflammation». Inflammation as a typical pathological process. Local and systemic manifestations of inflammation. Etiology of inflammation. The main components of the pathogenesis of the inflammatory process.

Classification of inflammatory reactions. Cellular response in inflammation. The role of inflammation in the development of tissue damage.

Alteration. Primary and secondary alteration in inflammation. The significance of inflammation mediators in the development of secondary alteration. Changes function, metabolism, status of membrane and cell organelles. Mediators of inflammation; their types, principles of classification, their origin and significance in the dynamics of development and completion of the inflammation.

Metabolic changes in the focus of inflammation. Physical and chemical changes in the focus of inflammation, mechanisms of their development and significance.

Impairment stages of peripheral blood circulation in the focus of inflammation and mechanisms of their development. The reasons and mechanisms of increasing the permeability and tone of a vascular wall in the focus of inflammation.

Exudation, mechanisms of development. Types of exudates. Stages, and mechanisms of leukocytes emigration in inflammation. Phagocytosis, its types, stages, and mechanisms of development

Proliferation, its development mechanisms, stimulators and inhibitors of proliferation.

Pathogenetic features of acute and chronic inflammation. Interrelation damage and adaptive responses in the inflammatory process.

Outcomes of inflammation. Barrier role of inflammation, mechanisms of its maintenance. Principles of anti-inflammatory therapy.

Clinical features of acute and chronic inflammation.

The pathophysiology of wound process. Peculiarities of wound healing process during hypoxia, anemia, metabolic diseases.

Topic 15. Acute phase response. Fever. Hyperthermia.

The concept of "acute phase response" (APR). The main mediators of the APR, their origin and biological effects. Manifestations of APR, their pathogenesis. The role of the APR in protecting the body during acute infection and antitumor resistance formation.

The definition of the notion «fever». Etiology and pathogenesis of fevers. Action mechanisms of pyrogens. Mediators of fever. Infectious and noninfectious fever.

Fever stages. Thermoregulation during various stages of fever. Principles of antipyretic therapy. Pyrotherapy. Definitions of the notion, general characteristic.

The concept of "hyperthermia", its types and mechanisms of development.

Basic distinction of fever from hyperthermia (overheating).

Topic 16. Pathophysiology of hypoxia.

The definition of the notion «hypoxia». The role of hypoxia in the pathogenesis of various diseases and pathological processes. Principles of classification of hypoxic states. Types of hypoxia.

The etiology and pathogenesis of the main types of hypoxias: exogenous, respiratory, circulatory, anemic, tissue (histotoxic). Hypoxia of the overutilization type. Hypoxia due to deficiency of substrates of oxidation. Changes of the arterial and venous blood gas parameters in various types of hypoxia.

Mechanisms of urgent and long-term adaptation to hypoxia.

Disorders of metabolism, structure and functions of cells in acute and chronic hypoxia. Pathophysiological bases of prevention and treatment of hypoxic conditions. Hyperoxia, its role in pathology. Hyper- and normobaric oxygenation and their use in medicine.

Topic 17. Pathophysiology of the Immune System. Allergy. Autoimmune Disorders

The structure, function and role of immune surveillance system (ISS) Typical forms of pathology of ISS. Allergy: definition of the notion, general characteristics of allergies. Relationships

immunity and allergy, allergy and inflammation. Exogenous and endogenous allergens, their types. Types of allergic reactions, their classification. The etiology and pathogenesis of allergic diseases. Etiology, stages, mediators, characteristics of pathogenesis of the I, II, III, and IV types of allergy after Gell and Coombs. Clinical forms. Methods of diagnosis, prevention and treatment of allergic diseases.

Pseudoallergy, definition, etiology, pathogenesis.

Autoimmune diseases, etiology, pathogenesis, clinical forms. Role external and internal factors in the pathogenesis of autoimmune diseases.

Topic 18. Immunodeficiency states.

Primary immunodeficiencies. The predominant failure of cellular immunity (T-systems). Immunodeficiencies with impaired antibody production (disordes of the B-systems). Immunodeficiencies with impaired of A-cells of the immune system. Combined immunodeficiencies (defect of T-, B- and A-systems).

Secondary (acquired) Immunodeficiency and imunodepressive state in infections, radiation injuries, cancer, endocrinopathy (diabetes), and others.

Acquired immunodeficiency syndrome (AIDS). Etiology and ways infection, pathogenesis, clinical forms, the principles of prevention and treatment.

Topic 19. The pathophysiology of tumor process.

Characteristics of the notions of «tumor growth», «tumor», «tumor progression». Tumor atypia, its varieties. Etiology of tumors. Blastomogenic action of ionizing reactions, UV rays, thermal and mechanical factors. Chemical carcinogens, their classification. The notion of syn-carcinogensis and co-carcinogensis. Oncogenic viruses, their types. The role of viral oncogens in the carcinogenic effect of oncoviruses. Meaning of hereditary factors, sex, age, chronic disease occurrence and development of tumors in humans. Pathogenesis of tumor growth. The stages of initiation and promotion in the process of carcinogenesis. Precancerous diseases. Malignant and benign tumors, their characteristics. Antineoplastic resistance of the organism.

The interaction of the tumor and the body. The etiology and pathogenesis of cachexia syndrome, immunodeficiency syndrome, intoxication syndrome and other in oncological diseases.

Section 4. Systemic pathophysiology (Pathophysiology of organs and systems)

Topic 20. Pathophysiology of the heart. Pathogenesis of the main clinical syndromes of heart disease.

Etiology and pathogenesis of disorders of circulation in hypo- and hypervolemia (simple, olygocytemic, polycytemic forms). Adaptive reactions in blood losses: emergency hemodynamic reactions, recovery of the blood volume, plasma proteins, formal particles. Disorders of physiological functions in blood loss. Principles of therapy of blood loss.

General etiology and pathogenesis of the blood circulation system disturbances. Insufficiency of blood circulation: forms, characteristic hemodynamic parameters and manifestations.

Heart failure syndrome; its forms. Myocardial heart failure: etiology and pathogenesis. Coronary insufficiency: absolute and relative, reversible and irreversible.

Cardiac insufficiency due to overload. Volume and pressure overload of the heart chambers; its causes. Compensation mechanisms of cardiac insufficiency, their types, manifestations and pathogenetic characteristic. Comparative characteristic of heterometric and homeometric mechanisms of intracardiac compensation in cardiac overstrain. Tonogenic and myogenic dilatation of heart.

Physiological and pathological hypertrophy of the myocardium: remodeling syndrome of the myocardium; mechanisms of decompensation in hypertrophy and remodeling. Clinical manifestations and hemodynamic parameters of the heart failure; principles of its therapy and prophylaxis.

Ischemic heart disease: forms, causes, mechanisms of development. Myocardial infarction.

The concept of the reperfusion cardiac syndrome in reversible coronary insufficiency.

Syndrome secondary aldosteronism in the pathogenesis of heart failure.

Non-coronarogenic type of the myocardium injury, etiology and pathogenesis.

Cardiac tamponade, causes, mechanism of development, ways of compensating, clinical manifestations.

Topic 21. Cardiac arrhythmia

The definition of the notion «cardiac arrhythmias». Cardiac arrhythmia: types, causes, mechanisms of development, characteristic ECG changes.

Impairments of cardiac excitability and automatism: sinus arrhythmia, paroxysmal tachycardia, extrasystole, auricular fibrillation, auricular flutter, ventricular fibrillation, ventricular flutter (definition of the notion, causes, types, characteristic, ECG-manifestations, hemodynamic impairments).

Cardiac conduction impairments: blockade of the heart (definition of the notion, causes, types, characteristic, ECG-manifestations, hemodynamic impairments).

Topic 22. Disorders of circulation due to alterations of the vascular tone.

Arterial hypertension. Primary (essential) arterial hypertension: etiology, pathogenesis, forms and stages. Secondary (symptomatic) arterial hypertension: types, causes, mechanisms of development. Health complications and consequences of arterial hypertension Atherosclerosis: risk factors, pathogenesis, outcomes. The role of atherosclerosis in cardiovascular pathology.

Hypertensive syndrome, types, etiology, pathogenesis, stages. Substantiation of pathogenetic therapy of the hypertension states.

Hypotensive syndrome, types, causes, mechanisms of development. Acute and chronic arterial hypotension. Essential hypotension. Collapse; its types. Manifestations and outcomes of the hypotensive states.

Metabolic syndrome, risk factors for its development, pathogenesis, clinical manifestations, consequences.

Syndrome of pulmonary embolism.

Pathogenetic connection of arterial hypertension and atherosclerosis. The role of atherosclerosis in the pathology of the cardiovascular system, in the development of ischemic syndrome.

Topic 23. Pathophysiology of external breathing. Pathogenesis of the main clinical syndromes of respiration system disease.

Characteristics of the notion of respiratory insufficiency; its types. Extrapulmonary and pulmonary etiological factors. Breathlessness, characteristic of the concept, types, mechanism of

development. Changes in the gas composition of blood and acid-base state in respiratory failure in the stage of compensation and decompensation.

Disorders of alveolar ventilation. Etiology and pathogenesis of lungs ventilation disorders of the obstructive type. Broncho-obstructive syndrome: pathogenesis of symptoms, mechanisms of compensation, substantiation of pathogenetic therapy. Etiology and pathogenesis of lungs ventilation disorders of the restrictive and complex types. Restrictive syndrome: pathogenesis of symptoms, mechanisms of compensation, substantiation of pathogenetic therapy. Regulation impairments of respiration. Pathological forms of breathing: tachypnea, bradypnea, hyperpnea, Kussmaul's respiration, etc. Etiology and pathogenesis of pathological forms of respiration.

Disorders of the diffusion of gases through the respiratory membrane. Causes, manifestations, and methods of evaluation of abnormal diffusion through alveolar-capillary membranes.

Disorders of the pulmonary perfusion of blood; their causes and consequences. Pulmonary hypertension, pathogenesis, mechanisms of compensation, substantiation of pathogenetic therapy.

Ventilation-perfusion mismatch. Etiology, pathogenesis, and forms of pathological breathing. Adults respiratory distress-syndrome; its difference from the respiratory distress syndrome of newborns.

Sudden apnea syndrome.

Topic 24. Pathophysiology of gastrointestinal tract. Pathogenesis of the main clinical syndromes of gastrointestinal disease.

General etiology and pathogenesis of digestive system disorders. The importance of neurogenic factors, infectious processes, the impact of smoking and alcohol abuse in digestive disorders. Functional connections of various parts of the digestive system in pathological conditions.

Disorders of appetite: hyporexia, anorexia, parorexia, bulimia, polyphagia, polydipsia. Disorders of taste. Disorders of salivation: hypo- and hypersalivation. Disorders of mastication and swallowing. Disturbances of the esophagus function.

Disorders of the reservoir, secretory, and motor function of the stomach. Quantitative and qualitative disorders of the gastric secretion. Types of pathological gastric secretion. Hypo- and hyperkinesia of the stomach. Violation of evacuation of gastric contents: nausea, belching, vomiting, heartburn. Causes of their development. Interrelation of secretory and motor functional impairments of the stomach. The role of *H. Pylori* in pathogenesis of the gastritis and ulcer. Theories of ulcer. Modern concepts of etiology and pathogenesis of the peptic ulcer disease. Dumping syndrome.

Functional disorders of the small and large intestine. Abnormal secretory function of the intestine. The significance of injury to enterocytes, pancreatic achylia, acholia, gastrointestinal hormones in disorders of intestinal function. Abnormalities of the intralumenal and terminal digestion; abnormal absorption. Disorders of motility of the intestine. Diarrhea, constipation, intestinal obstruction. The characteristics of the malabsorption syndrome: etiology, pathogenesis, clinical manifestations, consequences for the organism. Etiology and pathogenesis of the gluten-sensitive enteropathy (celiac sprue). Intestinal autointoxication, etiology, pathogenesis, manifestations, the main protective and detoxifying systems of the body (liver, immune system).

Enteritis and colitis: etiology, pathogenesis, clinical manifestations.

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

Malabsorption syndrome: etiology, pathogenesis, clinical manifestations, consequences for the organism.

Irritable bowel syndrome: etiology, pathogenesis, clinical manifestations, consequences.

Topic 25. Pathophysiology of liver. Pathogenesis of the main clinical syndromes of the liver diseases.

Hepatic insufficiency: characteristics of the notion; types. Pathogenetic variants of hepatic insufficiency: cholestatic, hepatic-cellular, vascular, mixed. Disorders of carbohydrate, protein, lipid, water-electrolyte metabolism in hepatic insufficiency. Violation of the barrier and detoxification function of the liver.

The characteristics of the notion of jaundice. Types, causes, differential diagnostics of the prehepatic (hemolytic), intrahepatic (hepatic) and posthepatic (mechanical, obstructive) jaundice.

Gallstone disease (cholelithiasis), etiology, mechanism of gallstones formation.

Etiology and pathogenesis, clinical manifestations of syndromes in liver diseases: cytolytic syndrome, hepatic-cell syndrome, dyspeptic syndrome, asteno-vegetative syndrome, immuno-inflammatory syndrome, hepatolienal syndrome, portal hypertension, the syndrome of cholestasis (primary and secondary), acholia, cholemia, jaundice, hepatic encephalopathy syndrome.

Hepatic encephalopathy, types, stages, mechanism of development, causes hepatic encephalopathy. Hepatic coma: types, its etiology and pathogenesis.

Topic 26. Pathophysiology of kidneys. Pathogenesis of the main clinical syndromes of the renal diseases

Disorders of glomerular filtration, tubular reabsorbtion, secretion and incretion as the basis for development of renal insufficiency. The value of clearance for assessing the filtration and excretory, reabsorption function of the kidneys. Etiology and pathogenesis of symptoms of renal insufficiency. Characteristic changes in diuresis (poly-, oligo-, anuria) and violations of the diluent and concentration ability of kidneys (hypo-, hyper- and isosthenuria; their causes and diagnostic value.

Syndromes associated with glomerular and tubular dysfunctions.

Typical changes in urine in renal diseases. Urinary syndrome (proteinuria, hematuria, leukocyteuria, cylidruria; their types, causes and diagnostic significance). Other pathological components of urine of the renal and extrarenal origin.

Nephritic and nephrotic syndromes; their causes, pathogenesis, manifestations.

Acute and chronic pyelonephritis; their etiology, pathogenesis, clinical manifestations, principles of treatment.

Glomerulonephritis: types, manifestations, principles of treatment.

Acute renal failure (ARF): forms, etiology, pathogenesis, stages, principles of treatment. The importance hemodialysis in the treatment of ARF; principles of hemodialysis.

Chronic renal failure CRF): etiology, stages, features of pathogenesis. Uremia; principles of its treatment.

Nephrolithiasis: etiology, pathogenesis, clinical manifestations, consequences.

Etiology, pathogenesis, clinical manifestations of hypertonic syndrome, dysuric syndrome, nephrotic syndrome, dyselectrolytemia (hyper-, hypo-: kaliemia, magnesemia, natremia, calcemia). Disorders of metabolism and physiological functions in the most common forms of ion ex-

change disorders.

Topic 27. Pathophysiology of red blood cells system. Pathogenesis of the main clinical syndromes due to the pathology of erythrocytes.

Erythrocytosis. Characteristics of absolute and relative, hereditary and acquired types of erythrocytosis, their etiology, pathogenesis, clinical manifestations, consequences.

Anemia. Types of anemia according to etiology, pathogenesis, pattern of hematopoiesis , mean corpuscular hemoglobin, bone marrow regeneration ability, size and shape of erythrocytes. Etiology, pathogenesis, clinical and hematological manifestations, principles of diagnostics and treatment of anemia: diserythropoietic (B12- and folic acid-deficient, sideroblastic, hypo- and aplastic, etc.), hemolytic, and posthemorrhagic types. Changes in osmotic resistance of erythrocytes.

Etiology and pathogenesis of anemic and hemolytic syndromes.

Acute blood loss as the most common cause of hypovolemia. Adaptive reactions in significant blood losses: emergency hemodynamic reactions, recovery of the blood volume, plasma proteins, formal particles. Principles of therapy blood loss.

Topic 28. Pathophysiology of white blood cells system. Pathogenesis of the main clinical syndromes due to the pathology of leukocytes.

Leukocytosis, leucopenia, their types, the causes and developmental mechanisms. Leukocyte formula changes, absolute and relative changes of some types of leukocytes, pathogenetic and prognostic characteristic. Disorders of the structure and function of various types of leukocytes; the role of these disorders in pathological processes. Leukemoid reactions, types, etiology, pathogenesis, changes in the morphological composition of peripheral blood, differentiation from leukemia, significance for the organism.

Etiology, pathogenesis, clinical manifestations of leukopenic syndrome.

Topic 29. Leukemia

Leukemia: characteristics of the notion, principles of classification, etiology. Atypia of leukemic cells; their morphological, cytochemical, cytogenetic and immunological characteristics; differentiation from leukemoid reactions.

Features of hematopoiesis and cellular composition of peripheral blood in different types of leukemia.

Etiology, pathogenesis, clinical manifestations of the main syndromes developing in the organism in leukemia (myelodysplastic syndromes, anemic syndrome, hemorrhagic syndrome, immunodeficiency syndrome, hyperplastic syndrome, etc.).

Topic 30. Impairments of hemostasis

The hemostasis system, the definition of the notion, functional purpose. Classification of the hemostasis system impairments. The role of factors of coagulation, anticoagulation, and fibrinolytic systems in maintenance of the optimum aggregation state of blood and in disorders of the hemostatic system.

The vascular-platelet (primary) hemostasis. Antithrombotic properties of the vascular wall and the causes of their violations. The role of platelets in primary and secondary hemostasis. Co-

agulation (secondary) hemostasis. The role of factors of the anticoagulant system, primary and secondary anticoagulants, fibrinolysis in primary and secondary hemostasis.

Hypercoagulation-thrombotic states, thrombosis: etiology, pathogenesis, outcomes. The role of thrombogenicity of vessels, adhesion and aggregation of platelets in the development of thrombophilia. Characteristics of thrombi formation in arterial and venous vessels. Principles of the pathogenetic therapy of thrombosis.

Hypocoagulation-hemorrhagic states: types, etiology, pathogenesis, clinical manifestations. Disorders of the primary hemostasis: role of thrombocytopenia and thrombocytopathy. Disorders of secondary hemostasis: deficit of procoagulants (prothrombine, fibrinogen, antihemophylic globulins), predominance of anticoagulation system.

Thrombohemorrhagic syndrome (DIC-syndrome (disseminated intravascular coagulation)) or a syndrome of intravascular microcoagulation of blood. Etiologic and pathogenetic factors of development, clinical manifestations, laboratory diagnostics, principles of treatment.

Hemophilia, etiology, pathogenesis, clinical manifestations, laboratory diagnostics, principles of treatment.

Topic 31. Pathophysiology of the emergency states

Emergency and terminal states: characteristics of the notions, types, etiology and the key points of pathogenesis; manifestations and consequences.

Collapse: types, causes, mechanisms of development, manifestations, outcomes, and principles of therapy.

Shock: characteristics of the notion, types. The general pathogenesis of the shock states; similarity and differences of the various types of shock. Stages of shock. The main functional and structural changes at various stages of shock. Irreversible disorders in shock. Pathophysiological basis of prophylaxis and therapy of shock. The concept of the crush syndrome; its causes and the main links of pathogenesis.

Coma: types, etiology, pathogenesis, stages. Disorders of the functions of the body in comatose states. Principles of therapy of coma. The syndrome of polyorganic insufficiency.

Topic 32. Stress, the concept of the general adaptation syndrome, and their role in pathology.

The concept of stress as a nonspecific reaction of the organism to the effect of various extreme stimuli. Stages and mechanisms of stress development; the role of neuro-hormonal factors. The main manifestations of stress. The concept of "adaptation diseases", the mechanism of their development.

The role of stress and the general adaptation syndrome in the development of ischemic heart disease, stomach ulcer and duodenal ulcer, hypertensive disease, etc.

Stress-limiting systems of the body.

Topic 33. Pathophysiology of the endocrine system.

General etiology and pathogenesis of endocrine pathology. The role of violations of central trans- and parahypophysar regulation in the development of endocrinopathies. The role of feedback in endocrine pathology.

Pathological processes in the endocrine glands: infectious, tumor processes, genetically caused defects in the biosynthesis of hormones. Peripheral (extraglandular) mechanisms of disruption of the effects of hormones: disruption of hormone binding by proteins, disturbance of hormone metabolism, the role of autoimmune mechanisms in the development of endocrinopathies.

Pathology of the pituitary gland. Etiology and pathogenesis of dysfunction of adenohypophysis. Gigantism, acromegaly, pituitary dwarfism. Total (Simmonds disease) hypofunction of adenohypophysis, causes, mechanism of development. Pathology of the adrenal glands, Itsenco-Cushing's disease and syndrome, Conn's syndrome. Acute and chronic adrenal insufficiency. Adrenogenital syndrome. Endemic and toxic goiter (Basedow's disease/Graves disease), cretinism, myxedema. Iodine deficiency disorders, hypothyroidism in children, principles of diagnosis and treatment. Hyper- and hypofunction of parathyroid glands. Disorders of function of the sex glands.

Topic 34. Pathophysiology of the nervous system and higher nervous functions

General etiology and mechanisms of damage of the nervous system. The reactions of the nervous system to injury. Disorders of function of the nervous system caused by hereditary deterioration of metabolism; hypoxic and ischemic brain injury. Alteration of the brain function in hypoglycemia and acid-base disbalance. Disorders of function of the nervous system caused by hepatic insufficiency, renal failure.

Pathological processes in the nervous system, trace reactions. Generators of pathologically enhanced excitation; pathological determinant; their general characteristics and pathogenetic significance.

Neurogenic impairments of sensitivity, their types, mechanisms and clinical manifestations. Neurogenic disturbances of the locomotor function. Hypokinetic conditions: paresis and paralysis, their mechanisms and characteristic. Hyperkinesis, the definition of the notion, types of hyperkinesis. Convulsive conditions, types of spasms and their pathogenesis.

Pathophysiology of pain. Nociceptors and mediators of the nociceptive afferent nervous fibers. The pain syndromes: complex regional pain syndrome (causalgia), phantom pain. The thalamic pain syndrome. Principles of pain treatment. Pain as an integrative reaction of the body to injury. Nociceptive stimuli and mechanisms of their perception. Receptor, conduction pathways and central parts of the nociceptor system. Chemical factors of pain; the role of kinins and neuropeptides. Biological significance of pain as a signal of danger or injury. The notions of "physiological" and "pathological" pain. Mechanisms of pain syndromes of the peripheral and central origin. The endogenous mechanisms of pain control. Pain as a result of injury to the antinociceptive system. Pathophysiological basis of medical anesthesia.

Typical pathological processes in the nervous system. The denervation syndrome. Deafferentation. The spinal shock. Neurodystrophy.

Pathophysiology of the higher nervous functions. Neurosis: characteristics of the notion, types, causes, mechanisms of development, its role in the initiation and progression of other diseases.

6. TOPICS OF PRACTICAL CLASSES AND SEMINARS

Section 1. The subject and tasks of pathological physiology. General nosology.

Topic. Subject and tasks of pathological physiology. General nosology.

1. The subject and tasks of pathological physiology. Its place in the system of the higher medical education. Pathological physiology as a theoretical basis of modern clinical medicine.
2. General characteristic of three basic parts of pathological physiology.
3. Methods of pathophysiology. Modeling of diseases. Sharp and chronic experiment (Claude Bernard, I. P. Paulov).
4. The requirements to the experiment and the researcher.
5. The basic conditions of performing a biological experiment.
6. Moral-ethical aspects of experimenting on animals.
7. Concepts of normalcy, health, predisease, pathological process, pathological reaction, pathological state, typical pathological processes, remission, recurrence, complication.
8. The notions of the disease, disease criteria, stages of the disease. Principles of disease classification.

Practical work:

No. 1. Work with experimental animals (acquisition of practical skills of fixation, anesthesia, injection, etc.)

Topic. Pathogenic effects of environmental.

1. The notions of etiology and pathogenesis. The significance of reasons and conditions of disease development.
2. The notion of environmental and internal causes and factors of risk of disease.
3. The essence of monocausealism, conditionalism and constitutionalism.
4. Injury as the initial link of the pathogenesis.
5. The damaging effect of physical factors. Effects of ultraviolet rays. Pathogenic effect of electric current. The reasons of lethal electrocutions and their mechanisms. «Imaginary death».
6. The effect of chemical factors on the organism.
7. The impact of mechanical factors.
8. Kinetosis, etiology, development mechanism, clinical signs.
9. The pathogenic effect of biological factors.
10. Psychogenic pathogenic factors; Iatrogenic diseases.
11. The importance of social factors in the emergence of human diseases.

Practical work:

No. 1. The development of kinetosis in mice under the action of radial acceleration.

No. 2. Change in vestibular function during a rotational test.

Registration of protocols of work performed (results, their discussion, conclusions).

Section 2. Reactivity and resistance of the organism, their role in pathology

Topic. Reactivity and resistance of the organism, their role in pathology

1. Definition of the notions «reactivity» and «resistance». Their relationship.
2. Classification of reactivity.
3. Factors determining the reactivity of the body.
4. The role of the nervous and endocrine systems in the mechanism of reactivity.
5. Forms of reactivity (normergy, hypoergy, hyperergy, dysergy).

6. Basic parameters of reactivity, their characteristic, mechanisms, master factors.
7. The relationship between reactivity and resistance.
8. The importance of reactivity in the development of pathological processes.
9. Phylo- and ontogenesis of reactivity and resistance. Peculiarities of reactivity depending on sex and age.

Practical work:

No. 1. The reactivity of the body in conditions of low oxygen in the inhaled air.
No. 2. Changes in the reactivity of an organism in conditions of high ambient temperature.
No. 3. Changing the reactivity of the body by acting on the central nervous system.
Number 4. Change in the reactivity of the body in conditions of excessive physical activity.
Registration of protocols of work performed (results, their discussion, conclusions).

Section 3. Typical pathological processes

Topic. Cell injury.

1. The definition of the notion «damage». Damage as a typical pathological process.
2. Principal causes and types of cell damage. Direct and indirect effect of a damaging agent on a cell.
3. General mechanisms of cell damage.
4. The impairment of energetic supply of processes taking place in cells, as one of master mechanisms of damage.
5. The role of damage of membranes and enzymes in the impairment of cellular vital activity, mechanisms of its development.
6. The role of genetic program impairments and its realization mechanisms in damaging a cell.
7. The role of Na+, K+, Ca2+, and water disbalance in cell injury.
8. Specific and nonspecific manifestations in cell damage.
9. Mechanisms of adaptation and compensation in response to damage.
10. Integrated mechanisms of cellular damage and death (mechanisms of hypoxic necrobiosis and apoptosis).
11. Apoptosis, its role in physiological and pathological processes.

Practical work:

No. 1. Changes in the specific motor function of the cilia of the ciliated epithelium during alteration of the frog oral mucosa.
No. 2. Studying the response of mast cells to damage.
Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Disorders of microcirculation.

1. The definition of the notions «system of microcirculation», «microcirculatory unit of the organ», their components.
2. Methods of studying of microcirculation.
3. Principal causes and forms of typical impairments of microcirculation.
4. Developmental mechanisms of intravascular impairments of microcirculation.

5. The reasons, developmental mechanisms, manifestations of transmural impairments of microcirculation.
6. The reasons, developmental mechanisms, manifestations of extravascular impairments of microcirculation.
7. The definition of the notion «sludge»; the reasons, developmental mechanisms; manifestations, consequences, the significance for the organism.
8. The definition of the notion «capillarotrophic insufficiency», developmental mechanisms and consequences.
9. Typical impairments of lymphodynamics (mechanical, dynamic, resorptional insufficiency of lymphatic vessels) and their role in microcirculation impairments.
10. Microcirculatory disorders in patients with cardiovascular disease, acute and chronic renal failure, extreme conditions, diabetes and other endocrinopathy.

Practical work:

No. 1. Change in microcirculation in the vessels of the mesentery of the small intestine of a frog during ligation of the bringing artery.
No. 2. The effect of acute blood loss on microcirculation in the vessels of the mesentery of the small intestine of a frog.
Registration of protocols of work performed (results, their discussion, conclusions***).***

Topic. Disturbances of the peripheral bloodflow.

1. Typical forms of impairments of peripheral blood circulation. General characteristic.
2. The definition of the notion of arterial and venous hyperemias, ischemia; external manifestations, the reasons and development mechanisms, outcomes.
3. Changes in tissues in the area of arterial and venous hyperemias and ischemias, their significance and possible consequences.
4. The state of microcirculation in peripheral blood circulation impairments: ischemia, arterial and venous hyperemia.
5. Compensatory reactions in the impairments of local blood circulation. Post-ischemic reperfusion. Mechanisms of triggering and developing collateral blood circulation. Types collaterals. Cerebral and cardiac steal syndromes.
6. General changes in the organism during impairments of peripheral blood circulation (arterial and venous hyperemias, ischemia) in vital organs (the heart, the brain).
7. The definition of the notion «embolism». General characteristic.
8. The reasons and mechanisms of embolus formation.
9. Types of embolism. The significance, outcomes and consequences of embolism for the organism. Prophylaxis of embolism.

Practical work:

No. 1. Disturbances of the peripheral circulation of the guinea pig's ear.
No. 2. Fat embolism of the microvasculature of the mesentery of the small intestine of the frog.
Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Pathophysiology of acid-base imbalance. Pathogenesis of the major syndromes of

acidosis and alkalosis.

1. The concept of the acid-base balance of the organism.
2. Basic laboratory estimation criteria of acid-base state impairments.
3. Mechanisms of control of acid-base balance. The role of buffer systems, kidneys, lungs, liver, and gastro-intestinal tract in the regulation of acid-base balance.
4. Classification of acid-base balance impairments.
5. Etiology and pathogenesis of respiratory acidosis and alkalosis.
6. Etiology and pathogenesis of non-respiratory acidosis and alkalosis.
7. Interrelation of acid-base state mechanisms and water-electrolyte balance.
8. Compensatory mechanisms in acid-base state impairments, laboratory criteria of their estimation.
9. Basic clinical manifestations in non-compensated acidosis and alkalosis.
10. The mechanism of development of violations of the acid-base state in acute heart failure, acute renal failure, acute liver failure and other critical conditions
11. Mixed disorders of acid-base state of blood (respiratory alkalosis + metabolic acidosis, etc.).
12. Correction principles of acid-base state impairments.

Topic. Disorders of water-electrolytes balance. Pathogenesis of the major syndromes of pathology of water- electrolytes metabolism.

1. The content and distribution of water in the organism. The laws of electroneutrality and isoosmolarity.
2. Neurohormonal regulation of water-electrolyte metabolism and the mechanisms of its violation. Violation of the distribution and exchange of ions between the cell and the extracellular sectors.
3. The disturbances of water-salt metabolism, principles of classification and main types.
4. Hypohydration syndrome: types, causes, pathogenesis, clinical and pathophysiological manifestations, consequences, pathogenetic principles of correction.
5. Hyperhydration syndrome: types, causes, pathogenetic features, symptoms, consequences, principles of correction.
6. Edemas and dropsies (definition). Pathogenetic factors of edema development.
7. Kinds of edemas.
8. Pathogenesis of cardiac, renal, inflammatory, allergic, toxic, cachectetic and other kinds of edemas.
9. The significance of edema for the organism.

Practical work:

No. 1. Determination of hydrophilicity of tissues according to McClure and Aldrich.
No. 2. Qualitative analysis of protein content in effluent fluids (Rivalt test).
No. 3. Quantification of protein in effluent fluids.
Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Disorders of carbohydrate metabolism.

1. Impaired digestion and resorption of carbohydrates in the gastrointestinal tract.
2. Impaired of the synthesis process, the deposit and the splitting of glycogen.
3. Violations of the regulation of carbohydrate metabolism (the value of the nervous and endocrine systems).
4. Hypoglycemic states, their types, mechanisms of development, disorders of physiological functions; hypoglycemic coma.
5. Violation of carbohydrate metabolism in hereditary enzymopathies.
6. Hyperglycemic conditions, their types, mechanisms of development. Pathogenetic significance of hyperglycemia.
7. Diabetes mellitus, its types, etiology, pathogenesis.
8. Complications of diabetes mellitus.
9. Diabetic coma, pathogenesis.

Practical work:

No. 1. Experimental reproduction of hypoglycemic coma.

№ 2. Assessment of metabolic changes in the body in diabetes mellitus.

Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Inflammation.

1. The definition of the notion «inflammation».
2. Inflammation as a typical pathological process.
3. Local and systemic manifestations of inflammation. Etiology of inflammation.
4. The main components of the pathogenesis of the inflammatory process.
5. Primary and secondary alteration in inflammation.
6. Mediators of inflammation; their types, principles of classification, their origin and significance in the dynamics of development and completion of the inflammation.
7. The significance of inflammation mediators in the development of secondary alteration.
8. Metabolic changes in the focus of inflammation.
9. Physical and chemical changes in the focus of inflammation, mechanisms of their development and significance.
10. Impairment stages of peripheral blood circulation in the focus of inflammation and mechanisms of their development.

Practical work:

No. 1. Vascular reactions in the inflamed mesentery of the frog's small intestine (Kongheim experiment).

No. 2. The nature of changes in the microhemocirculation of the mesentery of the small intestine of a frog in the alteration focus.

Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Inflammation.

1. The definition, mechanism and significance of exudation in inflammation.

2. The reasons and mechanisms of increasing the permeability of a vascular wall in the focus of inflammation.
3. Types of exudates, their distinctions from transudate.
4. Stages, ways and mechanisms of leukocytes emigration in inflammation.
5. The definition of the notion and biological significance of phagocytosis.
6. I. I. Mechnikov's study about phagocytosis as a protective reaction of the organism.
7. Factors regulating activity of phagocytes in the focus of inflammation. Chemotaxis mechanisms, factors stimulating and oppressing chemotaxis.
8. Stages of phagocytosis and their mechanisms.
9. The reasons and types of phagocytosis impairments.
10. The proliferation stage, its basic signs and development mechanisms.
11. Endogenic pro- and anti-inflammatory factors.
12. Relationship of damage and adaptive responses in the inflammatory process.
13. The role of the nervous, endocrine and immune systems in the development of inflammation.
14. General biological significance of inflammation. Positive and negative significance of inflammation for the organism.
15. Principles of anti-inflammatory therapy.

Practical work:

No. 1. Determination of the proteolytic activity of purulent exudate.
No. 2. Determination of amylolytic activity of purulent exudate.
No. 3. Determination of lipolytic activity of purulent exudate.
Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Acute phase response. Fever. Hyperthermia.

1. The concept of "acute phase response" (APR). The main mediators of the APR, their origin and biological effects. Manifestations of APR, their pathogenesis. The role of the APR in protecting the body during acute infection and antitumor resistance formation.
2. The definition of the notion «fever». Formation of fever in phylo- and ontogenesis. Fever as a reaction APR.
3. Etiology of fevers. Pyrogenic substances.
4. Pathogenesis of fevers. Action mechanisms of pyrogens.
5. Fever stages. The relationship between heat production and heat emission during various stages of fever.
6. Varieties of fever (by the level of elevation of body temperature). Types of temperature curves in fever.
7. Changes of metabolism, functions of systems and organs in fever.
8. The role of functional condition of the nervous, endocrine and immune systems in formation of a fever response.
9. General biological significance of fever.
10. The concept of "hyperthermia", its types and mechanisms of development.
11. Basic distinction of fever from hyperthermia (overheating).

Practical work:

No. 1. Experimental reproduction of fever.
No. 2. Overheating model of a warm-blooded animal.
Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Pathophysiology of hypoxia.

1. The definition of the notion «hypoxia». The role of hypoxia in the pathogenesis of various diseases and pathological processes. Principles of classification of hypoxic states. Types of hypoxia.
2. Principles of classification of hypoxic conditions. Types of hypoxias.
3. The etiology and pathogenesis of the main types of hypoxias: exogenous, respiratory, circulatory, anemic, tissue (histotoxic), overutilization and substrate hypoxia.
4. Changes of the arterial and venous blood gas parameters in various types of hypoxia.
5. Compensatory-adaptive reactions in hypoxia. Mechanisms of urgent and long-term adaptation to hypoxia.
6. Disorders of metabolism, structure and functions of cells in acute and chronic hypoxia.

Practical work:

No. 1. An experimental model of altitude sickness.
Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Pathophysiology of the Immune System. Allergy. Autoimmune Disorders

1. The structure, function and role of immune surveillance system (ISS)
2. Typical forms of pathology of ISS.
3. Allergy: definition of the notion, general characteristics of allergies.
4. Relationships immunity and allergy, allergy and inflammation.
5. Exogenous and endogenous allergens, their types.
6. Types of allergic reactions, their classification.
7. Etiology, stages, mediators, characteristics of pathogenesis of the I and II types of allergy after Gell and Coombs. Clinical forms.
8. Pseudoallergy, definition, etiology, pathogenesis.

Practical work:

No. 1. Experimental reproduction of anaphylactic shock.
Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Pathophysiology of the Immune System. Allergy. Autoimmune Disorders

1. Etiology, stages, mediators, characteristics of pathogenesis of the III and IV types of allergy after Gell and Coombs. Clinical forms.
2. Mediators of the III, and IV types of allergy after Gell and Coombs.
3. Autoimmune diseases, etiology, pathogenesis, clinical forms. Role external and internal factors in the pathogenesis of autoimmune diseases.
4. Methods of diagnosis, prevention and treatment of allergic diseases.

Practical work:

No. 1. Experimental reproduction of the direct degranulation of peritoneal mast cells.
Registration of protocols of work performed (results, their discussion, conclusions).

Topic. The pathophysiology of tumor process.

1. Characteristics of the notions of «tumor growth», «tumor», «tumor progression». Tumor atypia, its varieties.
2. Etiology of tumors.
3. Chemical carcinogens, their classification.
4. Blastomogenic action of ionizing reactions, UV rays, thermal and mechanical factors.
5. The notion of syn-carcinogensis and co-carcinogensis.
6. Oncogenic viruses, their types. The role of viral oncogens in the carcinogenic effect of oncoviruses.
7. Meaning of hereditary factors, sex, age, chronic disease occurrence and development of tumors in humans.
8. Pathogenesis of tumor growth. The stages of initiation and promotion in the process of carcinogenesis.
9. The concept of pre-cancerous conditions. Obligate and facultative precancer.
10. Malignant and benign tumors, their characteristics.
11. Antineoplastic resistance of the organism.
12. Systemic effect of the tumor on the body. Paraneoplastic syndrome, its pathogenesis, the main manifestations. The pathogenesis of cancer cachexia.

Section 4. Systemic pathophysiology (Pathophysiology of organs and systems)

Topic. Pathophysiology of the heart. Pathogenesis of the main clinical syndromes of heart disease.

1. Blood circulation insufficiency. The definition of the notion, its types.
2. Main hemodynamic indices of the blood circulation insufficiency.
3. Heart failure syndrome; its forms and stages.
4. Myocardial heart failure: etiology and pathogenesis.
5. Cardiac insufficiency due to overloads.
6. Valvular heart disease, its forms, hemodynamic disorders.
7. Mechanisms for urgent and long-term adaptation of the heart to overloads.
8. Characteristics of tonogenic and myogenic dilatation of heart.
9. Hypertrophy of the myocardium, its forms and stages. Features of hypertrophied myocardium, mechanisms of its decompensation.
10. Non-coronarogenic type of the myocardium injury, etiology and pathogenesis.
11. Clinical manifestations and hemodynamic parameters of the heart failure.
12. Ischemic heart diseases: causes, mechanisms of development, ECG-manifestations.
13. Pathogenesis of ischemic and reperfusion syndromes in coronary insufficiency, their manifestations.
14. Syndrome secondary aldosteronism in the pathogenesis of heart failure.

Practical work:

No. 1. Characterization of the heart during heart failure from overload.

Registration of protocols of work performed (results, their discussion, conclusions).

Topic 21. Cardiac arrhythmia

1. The definition of the notion «cardiac arrhythmias». Classification of arrhythmias.
2. Electrocardiogram, the definition of the notion, ECG analysis.
3. Electric axis of the heart, the definition of the notion, methods for determining the position of the electric axis of the heart.
4. Impairments of automatism of sinoatrial node, causes, types, development mechanisms, ECG-manifestations.
5. Extrasystoles, the definition of the notion, its types, causes, mechanisms of development, ECG-manifestations.
6. Paroxysmal tachycardia, the definition of the notion, causes, mechanisms of development, ECG-manifestations.
7. Atrial and ventricular flutter, atrial and ventricular fibrillation, the definition of the notions, causes, mechanisms of development, ECG-manifestations.
8. Cardiac conduction impairments: blockade of the heart (definition of the notion, types).
9. Sinus block, atrial block, the definition of the notions, causes, mechanisms of development, ECG-manifestations.
10. AV-block, the definition of the notion, causes, mechanisms of development, ECG-manifestations.
11. His bundle blocks, its types, causes, mechanisms of development, ECG-manifestations.
12. Wolff-Parkinson-White syndrome, causes, mechanisms of development, ECG-manifestations.
13. Morgagni-Adams-Stokes syndrome, causes, mechanisms of development, ECG-manifestations.

Practical work.

No. 1. The method of experimental reproduction of extrasystoles.

No. 2. ECG characterization in patients with cardiac arrhythmias.

No. 3. Determining the position of the electrical axis of the heart according to the Dyed scheme.

Registration of protocols of work performed (results, their discussion, conclusions).

Topic 22. Disorders of circulation due to alterations of the vascular tone.

1. Arterial hypertension, the definition of the notion, classification.
2. Hypertensive syndrome, types, etiology, pathogenesis, stages.
3. Manifestations and outcomes of the hypertensive states.
4. Substantiation of pathogenetic therapy of the hypertension states.
5. Hypertonic disease, etiology and basic pathogenesis theories.
6. Clinical stages and principles of treatment of essential hypertension.
7. Clinical manifestations of the impairment of organs-targets in arterial hypertension.
8. The role of hyperactivation of renin-angiotensin-aldosterone systems in development of arterial hypertension.
9. Secondary (symptomatic) arterial hypertension: types, their characteristics.
10. Renal arterial hypertension: pathogenesis of renovascular and renoprival (renal parenchymal) hypertension.
11. Pathogenesis of endocrinogenic and neurogenic arterial hypertension.

12. Atherosclerosis, it etiology and pathogenesis. The role of LPLD impairments of receptor interaction in atherogenesis. Pathological and modified lipoproteins, their elimination from the organism by scavenger-receptors.
13. Arterial hypotensions. Classification. Vascular insufficiency of blood circulation: fainting, collapse. Etiology, pathogenesis.
14. Manifestations and consequences of arterial hypotensions.

Topic. Pathophysiology of external breathing. Pathogenesis of the main clinical syndromes of respiration system disease.

1. Characteristics of the notion of respiratory insufficiency; its types.
2. Disorders of alveolar ventilation, etiology and pathogenesis.
3. Etiology and pathogenesis of lungs ventilation disorders of the obstructive type. Emphysema, bronchial asthma, pneumonia, pneumothorax.
4. Pathophysiology of broncho-obstructive syndrome: pathogenesis of symptoms, mechanisms of compensation, substantiation of pathogenetic therapy.
5. Pathophysiology of restrictive syndrome: pathogenesis of symptoms, mechanisms of compensation, substantiation of pathogenetic therapy.
6. Functional diagnostics of disorders of alveolar ventilation.
7. Principal causes and pathogenesis of the impairment of pulmonary perfusion.
8. Ventilation-perfusion mismatch.
9. Impairments of gas diffusion through the lung membrane, principal causes and manifestations.
10. Regulation impairments of respiration. Pathological forms of breathing: tachypnea, bradypnea, hyperpnea, Kussmaul's respiration, etc. Etiology and pathogenesis of pathological forms of respiration.
11. Periodic respiration, forms, pathogenetic characteristic, development mechanisms.
12. Asphyxia. Etiology, pathogenesis, development stages.
13. Coughing, sneezing, etiology and pathogenesis.
14. Breathlessness, characteristic of the concept, types, etiology and mechanism of development.
15. Changes in the gas composition of blood and acid-base state in respiratory failure in the stage of compensation and decompensation.
16. Adults respiratory distress-syndrome; its difference from the respiratory distress syndrome of newborns.

Practical work:

No. 1. Reproduction of reflex apnea in guinea pig.

No. 2. The nature of changes in external respiration during experimental damage to the lung tissue.

Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Pathophysiology of gastrointestinal tract. Pathogenesis of the main clinical syndromes of gastrointestinal disease.

1.General etiology and pathogenesis of digestive system disorders.

2.Disorders of appetite and taste: etiology, clinical manifestations, consequences for the organism

3. Disorders of salivation: hypo- and hypersalivation. Disorders of mastication and swallowing. Disturbances of the esophagus function.

4.Disorders of the reservoir function of the stomach. Types of pathological gastric secretion.

5.Disorders of the motor function of the stomach, causes, mechanisms of development, consequences for the organism.

6.Nausea, belching, vomiting, heartburn, the definitions of the notions, causes, mechanisms of development, consequences.

7.Acute and chronic gastritis, causes, mechanisms of development, consequences for the organism.

8.Abnormalities of the intralumenal and terminal digestion; abnormal absorption in small intestine, causes, consequences.

9.Disorders of motility of the intestine. Diarrhea, constipation, intestinal obstruction, types, etiology and mechanism of development, consequences for the organism.

10. Syndrome of intestinal autointoxication, etiology, pathogenesis, manifestations, the main protective and detoxifying systems of the body (liver, immune system).

11. Gastric ulcer and duodenal ulcer. Development theories of ulcer. Modern conceptions of etiology and pathogenesis of gastric ulcer. The role of H. pylori in pathogenesis of the diseases.

12. Acute and chronic pancreatitis: causes, mechanisms of development, digestive disorders.

13. Enteritis and colitis: etiology, pathogenesis, clinical manifestations.

Practical work:

No. 1. Characterization of the secretory and digesting ability of the stomach with its ulcer in a rabbit.

Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Pathophysiology of liver. Pathogenesis of the main clinical syndromes of the liver diseases.

1. Main functions of the liver. Experimental methods of studying functions of the liver (N. V. Ekk, E. S. London, I. P. Pavlov) changes in the organism in the given interventions.
2. Hepatic insufficiency: characteristics of the notion; classification.
3. Etiology and pathogenesis of hepatic insufficiency.
4. Pathogenetic variants of hepatic insufficiency: cholestatic, hepatic-cellular, vascular, mixed.
5. Basic syndromes in pathology of the liver and bile ducts: cytolytic syndrome, hepatic-cell syndrome, dyspeptic syndrome, asteno-vegetative syndrome, immuno-inflammatory syndrome, hepatolienal syndrome, portal hypertension, the syndrome of cholestasis (primary and secondary), acholia, cholemia, jaundice, hepatic encephalopathy syndrome.
6. Hepatic-cell insufficiency syndrome: causes, clinical manifestations, diagnostic methods.
7. Disorders of metabolism in hepatic insufficiency.
8. Violations of the barrier and detoxification function of the liver.

9. Hepatic encephalopathy, types, stages, mechanism of development, causes hepatic encephalopathy.
10. Hepatic coma: types, its etiology and pathogenesis.
11. The syndrome of portal hypertension. The definition, forms, clinical symptoms.
12. Methods of diagnosis of the functional state of the liver.
13. Violations of the processes of bile formation, causes, mechanism of development.
14. The main stages of the exchange of the bile pigments in the body.
15. The definition of the notion of jaundice, its types.
16. Prehepatic (hemolytic) jaundice, etiology, pathogenesis, differential diagnostics.
17. Intrahepatic (hepatic) jaundice, etiology, pathogenesis, differential diagnostics.
18. Posthepatic (mechanical, obstructive) jaundice, etiology, pathogenesis, differential diagnostics.
19. Neonatal jaundice, types, etiology, pathogenesis.
20. Gallstone disease (cholelithiasis), etiology, mechanism of gallstones formation.

Practical work:

No. 1. Characterization of the general toxic effect of bile.
No. 2. The effect of bile on the Türk reflex.
No. 3. The effect of bile on the blood.
Number 4. Quantitative determination of bilirubin in serum according to Bokalchuk.
No. 5. Qualitative determination of bilirubin in urine (Rosen test).
No. 6. Qualitative determination of urobilin in urine (Bogomolov test).
Registration of protocols of work performed (results, their discussion, conclusions)

Topic. Pathophysiology of kidneys. Pathogenesis of the main clinical syndromes of the renal diseases

1. Impairment mechanisms of glomerular filtrations, proximal and distal reabsorption, canaliculi secretion, causes, mechanisms of development.
2. Violations of the diluent and concentration ability of kidneys (hypo-, hyper- and isosthenuria; their causes and diagnostic value.
3. Characteristic changes in diuresis (poly-, oligo-, anuria), etiology, pathogenesis.
4. Principles of functional examination of the kidneys (evaluation of renal concentration function, clearance tests and other).
5. Syndromes associated with glomerular and tubular dysfunctions.
6. Urinary syndrome (proteinuria, hematuria, leukocyteuria, cylidruria; their types, causes and diagnostic significance).
7. Extrarenal symptoms and syndromes in renal diseases. Pathogenesis of renal hypertension, edema, azotemias and anemia.
8. Glomerulonephritis (etiology, pathogenesis and clinical manifestations).
9. Nephrotic syndrome, pathogenesis and clinical manifestations.
10. Nephrolithiasis: etiology, pathogenesis, clinical manifestations, consequences.
11. Syndrome of acute renal failure (ARF): forms, etiology, pathogenesis, stages, principles of treatment. The importance hemodialysis in the treatment of ARF; principles of hemodialysis.

12. Syndrome of chronic renal failure CRF): etiology, stages, features of pathogenesis. Uremia; principles of its treatment.

Practical work:

No. 1. Microscopic examination of urine sediment.
No. 2. Determination of blood pigment in urine.
No. 3. Qualitative determination of protein in the urine.
Number 4. Quantification of protein in urine.
No. 5. Change in diuresis with the accumulation of nitrogenous toxins in the blood.
Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Pathophysiology of red blood cells system. Pathogenesis of the main clinical syndromes due to the pathology of erythrocytes.

1. Erythrocytosis, the definition of the notion, types, clinical manifestations.
2. Characteristics of absolute and relative, hereditary and acquired types of erythrocytosis, their etiology, pathogenesis.
3. Anemia, the definition of the notion, principles of classification (according to etiopathogenesis, the hemopoiesis type, the color parameter, the abilities of the bone marrow for regeneration, size and shape of erythrocytes).
4. Etiology, pathogenesis, general characteristic, hematological manifestations in anemia due to blood loss:

- acute posthemorrhagic anemia;
- chronic posthemorrhagic anemia.

5. Hemolytic anemia, types, etiology, pathogenesis, general characteristic, hematological manifestations (anemia due to exposure of antibodies and other damaging factors, membranopathies, enzymopathies, hemoglobinopathies).
6. Iron-deficiency anemia, etiology, pathogenesis, general characteristic, hematological manifestations.
7. B12-(folic acid) deficiency anemia, etiology, pathogenesis, general characteristic, hematological manifestations.
8. Hypo- and aplastic anemia, etiology, pathogenesis, general characteristic, hematological manifestations.
9. Clinical manifestations and compensatory-adaptive processes in the organism in anemia.
10. Etiology and pathogenesis of anemic and hemolytic syndromes.
11. Principles of diagnostic and therapy of anemia.
12. Osmotic resistance of erythrocytes, the definition of the notion, types.
13. Causes and mechanism of impairments of osmotic resistance and sedimentation rate of erythrocytes.

Practical work:

No. 1. Assessment of osmotic resistance of red blood cells in posthemorrhagic and hemolytic anemia in rabbits.

No. 2. Characterization of the cellular composition of the blood of patients with various types of anemia.

Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Pathophysiology of white blood cells system. Pathogenesis of the main clinical syndromes due to the pathology of leukocytes.

1. Leukocytosis, the definition of the notion, the causes. The concept of physiological and pathological leukocytosis.
2. Leukocyte formula changes, absolute and relative changes of some types of leukocytes, pathogenetic and prognostic characteristic.
3. Disorders of the structure and function of various types of leukocytes; the role of these disorders in pathological processes.
4. The characteristic, pathogenetic and prognostic characteristic of various types of the leukocyte formula shifts.
5. Leucopenia, the definition of the notion, the cause and developmental mechanisms, its types.
6. Agranulocytosis, the definition of the notion. Types of agranulocytosis, the causes and their developmental mechanisms. Peripheral blood pattern in various types of agranulocytosis.
7. Etiology, pathogenesis, clinical manifestations of leucopenic syndrome.
8. Leukemoid reactions, types, etiology, pathogenesis, changes in the morphological composition of peripheral blood, differentiation from leukemia, significance for the organism.

Practical work:

No. 1. The nature of changes in the leukocyte formula with leukocytosis.

Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Leukemia

1. Leukemia, the definition of the notion. General characteristic and principles of classification.
2. Etiology and pathogenesis of leukemia. Modern theories of the origin of leukemia. The tumoral nature of leukemia.
3. Peculiarities of leukemic cells, their morphological, cytochemical and cytogenetic characteristic.
4. Peculiarities of hemopoiesis and cellular content of the blood in various types of leukemia (acute and chronic).
5. Basic impairments in the organism in leukemia, their mechanisms.
6. Leukemoid reactions. Basic types, causes, blood pattern, differentiation from leukemia.
7. Principles of diagnosis and therapy of leukemia.

Practical work:

No. 1 The nature of changes in the leukocyte formula in leukemia.

Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Impairments of hemostasis

1. The hemostasis system. The definition of the notion, functional purpose. The modern scheme of blood coagulation, regulation mechanisms.

2. Antithrombotic properties of the vascular wall and the causes of their violations.
3. The definition of the notions: the vascular-platelet (primary) hemostasis and coagulation (secondary) hemostasis.
4. Basic tests characterizing vascular-platelet and coagulation hemostasis, their diagnostic value.
5. Hypercoagulation-thrombotic syndrome. Etiology, pathogenesis, clinical manifestations.
6. The role of thrombogenicity of vessels, adhesion and aggregation of platelets in the development of thrombophilia.
7. Incidence causes, development mechanisms, clinical and hematological manifestations of thrombocytoses (reactive and primary)
8. Characteristics of thrombi formation in arterial and venous vessels.
9. Hypocoagulation-hemorrhagic states: types, etiology, pathogenesis, clinical manifestations.
10. Disorders of the primary hemostasis: role of thrombocytopenia and thrombocytopathy.
11. Disorders of secondary hemostasis: deficit of procoagulants (prothrombine, fibrinogen, antihemophylic globulins), predominance of anticoagulation system.
12. Thrombohemorrhagic syndrome (DIC-syndrome (disseminated intravascular coagulation)) or a syndrome of intravascular microcoagulation of blood. Etiologic and pathogenetic factors of development, clinical manifestations laboratory diagnostics, principles of treatment.
13. Principles of pathogenetic treatment of hemostasiopathies.

Practical work:

No. 1. The nature of coagulation disorders in a rabbit with DIC.
Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Pathophysiology of the endocrine system.

1. General etiology and pathogenesis of endocrine pathology.
2. The role of violations of central trans- and parahypophysar regulation in the development of endocrinopathies.
3. The role of feedback in endocrine pathology.
4. Total (Simmonds disease) and partial hypofunction of adenohypophysis (Hypophyseal nannism, infantilism), causes, mechanism of development.
5. Hyperfunction of the adenohypophysis: hypophyseal giantism, acromegally, disease of Itsenko–Cushing, clinical manifestations.
6. The pathology of a posterior lobe of the hypophysis: signs of hypo- and hypersecretions of vasopressin.
7. Hypofunction of the cortical substance of adrenal glands. Acute and chronic insufficiency of adrenal glands, etiology, pathogenesis, clinical manifestations.
8. Hyper- and dysfunction of the cortical and medulla substance of adrenal glands. Syndrome of Itsenko-Cushing, primary and secondary hyperaldosteronism, adreno-genital syndrome, pheochromocytoma, etiology, pathogenesis, clinical manifestations.

9. Endemic and toxic goiter (Basedow's disease/Graves disease), cretinism, myxedema. Iodine deficiency disorders, hypothyroidism in children, etiology, pathogenesis, clinical manifestations, principles of diagnosis and treatment.
10. Hyper- and hypofunction of parathyroid glands, etiology, pathogenesis, clinical manifestations

Practical work:

No. 1. The role of nonspecific resistance in hypoxia.

Registration of protocols of work performed (results, their discussion, conclusions).

Topic. Pathophysiology of the nervous system and higher nervous functions

1. General etiology and mechanisms of damage of the nervous system.
2. Pathophysiology of the denervation tissue.
3. Neurogenic disturbances of the locomotor function. Hypokinetic conditions: paresis and paralysis, their mechanisms and characteristic.
4. Hyperkinesis. The definition of the notion. Types of hyperkinesis.
5. Neurogenic impairments of sensitivity, their types, mechanisms and clinical manifestations.
6. Pain. The definition of the notion, its biological significance. Pathogenesis of a pain syndrome. The antinociceptive system and its characteristic.
7. Pathophysiological basis of medical anesthesia.
8. Functional impairments of the vegetative nervous system, their types and mechanisms.
9. The impairments of higher nervous activity, neurosis. The significance of the types of higher nervous activity in the development of neuroses. The causes of neurosis, their characteristic, principles of therapy.

Practical work:

No. 1. Determination of the Türk reflex time in experimental dysfunction of the spinal cord in frogs.

No. 2. Modeling of epilepsy in mice by camphor injection.

No. 3. Motor paralysis of central and peripheral origin in a frog.

Registration of protocols of work performed (results, their discussion, conclusions).

7. LABORATORY PRACTICE - This type of work is not provided for by the curriculum**.**

8. SUBJECT OF COURSEWORK, CONTROL WORKS, ABSTRACTS - This type of work is not provided by the curriculum.

9. LIST OF QUESTIONS TO THE CREDIT AND EXAM

9.1. Exemplary questions of credit for "Pathophysiology, clinical pathophysiology".

Competence index	№ assignment	Question wording
GPC-5	1.	Concepts of «health» and «disease». Disease criteria. Concepts of pathological process, pathological state, typical pathological processes, examples.
GPC-5	2.	The cause-and-effect relationship in the pathogenesis of the disease. Local and general reactions to injury, their relationship. Leading links of the pathogenesis, the vicious circle in the patho-

		genesis of the disease, examples. Specific and nonspecific in the development of the disease.
GPC-5	3.	Injury as the initial link of the pathogenesis. Manifestations of damage at different levels of the body's integration.
GPC-5	4.	The significance of reasons and conditions of disease development. The notion of environmental and internal causes and factors of risk of disease.
GPC-5	5.	Regularities in the formation of reactivity in phylo- and ontogenesis. Characterization of the notions «reactivity» and «resistance», their relationship.
GPC-5	6.	The structure and functions of microcirculatory bed. Mechanisms of neuro-humoral regulation of microcirculation.
GPC-5	7.	Intravascular disorders of blood microcirculation, etiology, pathogenesis. «Sludge» -phenomenon.
GPC-5	8.	Transmural and extravascular disorders of blood microcirculation, etiology, pathogenesis, clinical manifestations and consequences. Stasis, its types, mechanisms of development, consequences.
GPC-5	9.	Arterial hyperemia, its types, etiology, pathogenesis, disorders of microcirculation and tissue metabolism, symptoms and significance for the organism.
GPC-5	10.	Venous hyperemia, its causes, mechanisms of development, disorders of microcirculation and tissue metabolism, symptoms and significance for the organism.
GPC-5	11.	Ischemia, its types, etiology, pathogenesis, disorders of microcirculation and tissue metabolism, symptoms, compensation mechanisms, consequences. Factors that influence on the consequences of ischemia.
GPC-5	12.	Embolism, its types. The patterns of emboli travel. Classification of embolism, embolism of vessels of large and small circles of blood circulation, embolism of portal vein, causes, consequences.
GPC-5	13.	The content and distribution of water in the organism. The laws of electroneutrality and isoosmolarity. Neurohormonal regulation of water-electrolyte metabolism and the mechanisms of its violation.
GPC-5	14.	Pathogenetic factors of edema development, its classification.
GPC-5	15.	The pathogenesis of cardiac, renal, inflammatory, toxic, allergic, starvation types of edema. Local and systemic disturbances in edema.
GPC-5	16.	Mechanisms of disturbance of Na, K, Ca metabolism regulation.
GPC-5	17.	Hyperhydration syndrome: types, causes, pathogenetic features, symptoms, consequences, principles of correction.
GPC-5	18.	Hypohydration syndrome: types, causes, pathogenesis, clinical and pathophysiological manifestations, consequences, pathogenetic principles of correction.
GPC-5	19.	Particularities of metabolism at alteration, physicochemical changes at alteration, their role in the pathogenesis of inflammation.
GPC-5	20.	Proliferation, its development mechanisms, stimulators and in-

		hibitors of proliferation. Principles of anti-inflammatory therapy.
GPC-5	21.	Stages, and mechanisms of leukocytes emigration in inflammation. Factors of chemotaxis.
GPC-5	22.	Impairment stages of peripheral blood circulation in the focus of inflammation and mechanisms of their development.
GPC-5	23.	Mediators of inflammation; their types, principles of classification, their origin and significance in the dynamics of development and completion of the inflammation. Interrelation of various mediators.
GPC-5	24.	Disorders of the final stages of protein metabolism, causes, consequences for the organism. Hyperazotemia.
GPC-5	25.	Violations of metabolism of amino acids and amino acid composition of the blood, causes, consequences for the organism. balance.
GPC-5	26.	Etiology and pathogenesis of insulin-dependent (type 1) and non-insulin-dependent (type 2) diabetes mellitus. Mechanism of hyperglycemia in insulin deficiency.
GPC-5	27.	Disorders of carbohydrate and other kinds of metabolism in diabetes, complications of diabetes.
GPC-5	28.	Hypoglycemic states, their types, mechanisms of development, disorders of physiological functions; hypoglycemic coma.
GPC-5	29.	Hyperglycemic conditions, their types, mechanisms of development. Pathogenetic significance of hyperglycemia.
GPC-5	30.	Pathology of digestion, transport and metabolism of fats. Hyperlipidemia types, causes, pathogenesis.
GPC-5	31.	Violations of protein digestion of food, positive and negative nitrogen balance. Violations of the protein composition of blood plasma: hyper-, hypo- and dysproteinemia.
GPC-5	32.	Allergy: definition of the notion, etiology, stages. Types of allergic reactions, their classification.
GPC-5	33.	Type I allergic reaction (anaphylactic), characteristics of allergens, stages, mediators, clinical forms.
GPC-5	34.	Type II allergic reaction (cytotoxic), characteristics of allergens, stages, mediators, clinical forms.
GPC-5	35.	Type IV allergic reaction (cell-mediated), characteristics of allergens, stages, mediators, clinical forms.
GPC-5	36.	Autoallergy, etiology, pathogenesis, clinical forms.
GPC-5	37.	Primary immunodeficiencies, types, causes of development and manifestations (examples). The consequences for the organism.
GPC-5	38.	The definition of the notion «hypoxia». Principles of classification of hypoxic states. Mechanisms of urgent and long-term adaptation to hypoxia. Stability of individual organs and tissues to hypoxia.
GPC-5	39.	Respiratory hypoxia, etiology, pathogenesis, functional-metabolic manifestations, changes of the arterial and venous blood gas parameters.
GPC-5	40.	Circulatory hypoxia, etiology, pathogenesis, functional-metabolic manifestations, changes of the arterial and venous blood gas parameters.

GPC-5	41.	Exogenous hypoxia, types, etiology, pathogenesis, functional-metabolic manifestations, changes of the arterial and venous blood gas parameters.
GPC-5	42.	Anemic hypoxia, etiology, pathogenesis, functional-metabolic manifestations, changes of the arterial and venous blood gas parameters.
GPC-5	43.	Tissue hypoxia, etiology, pathogenesis, functional-metabolic manifestations, changes of the arterial and venous blood gas parameters.
GPC-5	44.	The concept of "acute phase response" (APR). The main mediators of the APR, their origin and biological effects.
GPC-5	45.	Pyrogenic substances, their types, mechanism of action, mediators of fever.
GPC-5	46.	Thermoregulation during various stages of fever. Varieties of fever. Changes of metabolism, functions of systems and organs in fever. General biological significance of fever.
GPC-5	47.	The concept of "hyperthermia", its types and mechanisms of development. Basic distinction of fever from hyperthermia (overheating).
GPC-5	48.	The concept of the acid-base balance of the organism. The role of buffer systems, kidneys, lungs, liver, and gastro-intestinal tract in the regulation of acid-base balance. Basic laboratory estimation criteria of acid-base balance impairments.
GPC-5	49.	Syndromes non-respiratory and respiratory alkalosis, etiology, pathogenesis, parameters, mechanisms of compensation, changes in the function of organs and systems.
GPC-5	50.	Syndromes non-respiratory and respiratory acidosis, etiology, pathogenesis, parameters, mechanisms of compensation, changes in the function of organs and systems.

9.2. Exemplary questions of exam for "Pathophysiology, clinical pathophysiology".

Competence index	№ assignment	Question wording
GPC-5	1.	Pathophysiology as a theoretical and methodological basis of modern medicine. Brief information from the history of pathophysiology, the main stages of its development.
GPC-5	2.	Modeling of the pathological process, types of experimental techniques. Importance of experiment in the development of pathophysiology and clinical medicine.
GPC-5	3.	Concepts of «health» and «disease». Disease criteria. The importance of biological and social factors in the emergence of human diseases.
GPC-5	4.	Concepts of pathological process, pathological state, typical pathological processes, examples.
GPC-5	5.	Disease as a dialectical unity of injuries and protective-adaptive reactions of the body. Stages of the disease. Principles of disease classification.

GPC-5	6.	The significance of reasons and conditions of disease development. The notion of environmental and internal causes and factors of risk of disease.
GPC-5	7.	Injury as the initial link of the pathogenesis. Manifestations of damage at different levels of the body's integration.
GPC-5	8.	Unity of structural and functional alterations in the pathogenesis of the disease (examples).
GPC-5	9.	The cause-and-effect relationship in the pathogenesis of the disease. Local and general reactions to injury, their relationship.
GPC-5	10.	Leading links of the pathogenesis, the vicious circle in the pathogenesis of the disease. Specific and nonspecific in the development of the disease.
GPC-5	11.	Pathogenic effects of accelerations and overloads on the organism. Kinetosis, etiology, development mechanism, clinical signs.
GPC-5	12.	Pathogenic effect of electric current. Local changes and general reactions of the organism with electric trauma. Factors determining the damaging effect of electric current.
GPC-5	13.	Definition of the notion «reactivity», types of reactivity (examples). Factors determining the reactivity of the organism.
GPC-5	14.	Regularities in the formation of reactivity in phylo- and ontogenesis. Features of human reactivity, the role of social factors
GPC-5	15.	Characterization of the notions «reactivity» and «resistance». Their relationship. Forms of reactivity (normergy, hypoergy, hyperergy, dysergy). Examples.
GPC-5	16.	The role of heredity factors in pathology. Phenocopies: the definition, causes of development, examples.
GPC-5	17.	Mutagen factors, their kinds. Mutations, their varieties. Combinative variability and environmental factors as causes of hereditary diseases.
GPC-5	18.	Diseases with hereditary predisposition. The concept of penetrance and expressivity of genes, determining clinical polymorphism of hereditary diseases.
GPC-5	19.	Genetic diseases and chromosome diseases, their manifestations and pathological features (examples of diseases).
GPC-5	20.	Methods of studying hereditary forms of pathology; principles of their prophylaxis and possible treatment.
GPC-5	21.	Causes and mechanisms of cell damage. Impairment of permeability and transport functions of cell membranes, energy generation, changes in transmembrane redistribution of ions.
GPC-5	22.	Manifestations of the structure and function of certain cellular organelles and receptor properties of the cell.
GPC-5	23.	The definition of the notion «inflammation». Etiology of inflammation. Local and systemic manifestations of inflammation. Biological significance of inflammation.
GPC-5	24.	Mechanisms of primary and secondary alteration in inflammation.
GPC-5	25.	Impairment stages of peripheral blood circulation in the focus of inflammation and mechanisms of their development.
GPC-5	26.	Metabolic changes in the focus of inflammation. Physical and

		chemical changes in the focus of inflammation, mechanisms of their development and significance.
GPC-5	27.	Mediators of inflammation; their types, principles of classification, their origin and significance in the dynamics of development and completion of the inflammation. Interrelation of various mediators.
GPC-5	28.	Exudation, mechanisms of development. Types of exudates. The difference between serous exudate and transudate. The role of mediators and physico-chemical changes in the development of exudation in the focus of inflammation.
GPC-5	29.	Stages, and mechanisms of leukocytes emigration in inflammation.
GPC-5	30.	Phagocytosis, its types, stages, and mechanisms of development. Inadequacy of phagocytosis, causes and consequences.
GPC-5	31.	Proliferation, its development mechanisms, stimulators and inhibitors of proliferation. Principles of anti-inflammatory therapy.
GPC-5	32.	The concept of "acute phase response" (APR). The main mediators of the APR, their origin and biological effects.
GPC-5	33.	The definition of the notion «fever». Etiology and pathogenesis of fevers. Fever stages.
GPC-5	34.	Pyrogenic substances, their types, mechanism of action.
GPC-5	35.	Thermoregulation during various stages of fever. Varieties of fever.
GPC-5	36.	Changes of metabolism, functions of systems and organs in fever. General biological significance of fever.
GPC-5	37.	The concept of "hyperthermia", its types and mechanisms of development. Basic distinction of fever from hyperthermia (overheating).
GPC-5	38.	Hypohydration syndrome: types, causes, pathogenesis, clinical and pathophysiological manifestations, consequences, pathogenetic principles of correction.
GPC-5	39.	Hyperhydration syndrome: types, causes, pathogenetic features, symptoms, consequences, principles of correction
GPC-5	40.	The pathogenesis of cardiac, renal, inflammatory, toxic, allergic, starvation types of edema. Local and systemic disturbances in edema.
GPC-5	41.	The concept of the acid-base balance of the organism. The role of buffer systems, kidneys, lungs, liver, and gastro-intestinal tract in the regulation of acid-base balance. Basic laboratory estimation criteria of acid-base balance impairments.
GPC-5	42.	Syndromes non-respiratory and respiratory acidosis, etiology, pathogenesis, parameters, mechanisms of compensation, changes in the function of organs and systems.
GPC-5	43.	Syndromes non-respiratory and respiratory alkalosis, etiology, pathogenesis, parameters, mechanisms of compensation, changes in the function of organs and systems.
GPC-5	44.	Hyperglycemic conditions, their types, mechanisms of development. Pathogenetic significance of hyperglycemia.
GPC-5	45.	Etiology and pathogenesis of insulin-dependent (type 1) and non-

		insulin-dependent (type 2) diabetes mellitus. Mechanism of hyperglycemia in insulin deficiency.
GPC-5	46.	Disorders of carbohydrate and other kinds of metabolism in diabetes, complications of diabetes.
GPC-5	47.	Diabetic coma, etiology, pathogenesis, main manifestations.
GPC-5	48.	Hypoglycemic state, their types, mechanisms of development, disorders of physiological functions; hypoglycemic coma.
GPC-5	49.	Violations of protein digestion of food, positive and negative nitrogen balance. Violations of the protein composition of blood plasma: hyper-, hypo- and dysproteinemia.
GPC-5	50.	Violations of metabolism of amino acids and amino acid composition of the blood, causes, consequences for the organism.
GPC-5	51.	Disorders of the final stages of protein metabolism, causes, consequences for the organism. Hyperazotemia.
GPC-5	52.	Pathology of digestion, transport and metabolism of fats. Hyperlipidemia types.
GPC-5	53.	Obesity, types, causes, mechanisms of development, consequences for the organism.
GPC-5	54.	The structure and function of microcirculatory bed. Mechanisms of neuro-humoral regulation of microcirculation.
GPC-5	55.	The reasons, developmental mechanisms of intravascular impairments of microcirculation. «Sludge» -phenomenon, types, consequences.
GPC-5	56.	Typical forms of disorders of blood microcirculation (transmural, extravascular), etiology, pathogenesis, clinical manifestations and consequences. Stasis, mechanisms of development and consequences.
GPC-5	57.	Typical impairments of lymphodynamics, types, mechanisms of development, consequences.
GPC-5	58.	The definition of the notion «embolism». The patterns of emboli travel. Classification of embolism, consequences.
GPC-5	59.	Arterial hyperemia, its types, development mechanisms, disorders of microcirculation, metabolism of tissues, symptoms, importance for the organism.
GPC-5	60.	Venous hyperemia, its causes, pathogenesis, disorders of microcirculation, metabolism of tissues, symptoms, consequences.
GPC-5	61.	Ischemia, its types, development mechanisms, disorders of microcirculation, metabolism of tissues, symptoms, compensation system, consequences. Factors determining the tolerance of tissues and organs to ischemia
GPC-5	62.	The definition of the notion «hypoxia». Principles of classification of hypoxic states. Mechanisms of urgent and long-term adaptation to hypoxia. Stability of individual organs and tissues to hypoxia.
GPC-5	63.	Respiratory hypoxia, etiology, pathogenesis, functional-metabolic manifestations, parameters of the arterial and venous blood gases.
GPC-5	64.	Anemic hypoxia, etiology, pathogenesis, functional-metabolic manifestations, parameters of the arterial and venous blood gas-

		es.
GPC-5	65.	Exogenous hypoxia, etiology, pathogenesis, functional-metabolic manifestations, parameters of the arterial and venous blood gases.
GPC-5	66.	Circulatory hypoxia, etiology, pathogenesis, functional-metabolic manifestations, parameters of the arterial and venous blood gases
GPC-5	67.	Tissue hypoxia, etiology, pathogenesis, functional-metabolic manifestations, parameters of the arterial and venous blood gases
GPC-5	68.	The concept of stress and general adaptation syndrome, stages and mechanisms of development. Protective-adaptive and pathogenic significance of stress.
GPC-5	69.	Shock: characteristics of the notion, types. The general pathogenesis of the shock states, stages of development. Functional and structural changes at various stages of shock.
GPC-5	70.	Coma: types, etiology, pathogenesis, stages. Disorders of the functions of the body in comatose states. Principles of therapy of coma.
GPC-5	71.	Primary immunodeficiencies, types, causes of development and manifestations (examples). The consequences for the organism.
GPC-5	72.	Secondary (acquired) immunodeficiency and imunodepressive state, causes of development and manifestations.
GPC-5	73.	Acquired immunodeficiency syndrome (AIDS). Etiology and ways infection, pathogenesis, clinical forms, the principles of prevention and treatment.
GPC-5	74.	Allergy: definition of the notion, etiology, stages. Types of allergic reactions, their classification.
GPC-5	75.	Allergens, their types, classification.
GPC-5	76.	Type I allergic reaction (anaphylactic), characteristics of allergens, stages, mediators, clinical forms.
GPC-5	77.	Type II allergic reaction (cytotoxic), characteristics of allergens, stages, mediators, clinical forms.
GPC-5	78.	Type III allergic reaction (immune complex-associated), characteristics of allergens, stages, mediators, clinical forms.
GPC-5	79.	Type IV allergic reaction (cell-mediated), characteristics of allergens, stages, mediators, clinical forms.
GPC-5	80.	Autoallergy, etiology, pathogenesis, clinical forms.
GPC-5	81.	Characteristics of the notions of «tumor growth», «tumor», «tumor progression».
GPC-5	82.	Etiology of tumors. Precancerous diseases.
GPC-5	83.	Mechanisms of carcinogenesis. The significance of oncogenes, the role of oncoproteins in carcinogenesis. Mechanisms of infiltrative growth and metastasis of tumors.
GPC-5	84.	Malignant and benign tumors, their characteristics. Tumor atypia, its varieties.
GPC-5	85.	Systemic effect of the tumor on the organism. Cachexia syndrome.
GPC-5	86.	Antineoplastic resistance of the organism. Pathophysiological basis of tumor growth prevention.

GPC-5	87.	Heart failure syndrome; definition of the concept, forms, clinical manifestations and pathophysiological indices.
GPC-5	88.	Myocardial heart failure: etiology and pathogenesis, main manifestations. Ischemic heart disease: forms, causes, mechanisms of development, consequences.
GPC-5	89.	Cardiac insufficiency due to overload, types, its causes. Compensation mechanisms.
GPC-5	90.	Non-coronarogenic type of the myocardium injury, etiology and pathogenesis.
GPC-5	91.	Hypertrophy of the myocardium, its forms and stages. Structural, functional and metabolic features of hypertrophied myocardium, mechanisms of its decompensation.
GPC-5	92.	The definition of the notion «cardiac arrhythmias». Extrasystoles, the definition of the notion, its types, causes, mechanisms of development, ECG-manifestations.
GPC-5	93.	Impairments of automatism of sinoatrial node, causes, types, development mechanisms, ECG-manifestations. Paroxysmal tachycardia, the definition of the notion, causes, mechanisms of development, ECG-manifestations.
GPC-5	94.	Atrial and ventricular fibrillation, the definition of the notions, causes, mechanisms of development, consequences, ECG-manifestations.
GPC-5	95.	Heart Block (definition of the notion, types, its ECG-manifestations).
GPC-5	96.	Hypertensive syndrome, types, etiology (risk factors for the development of hypertension), pathogenesis.
GPC-5	97.	Hypertonic disease, etiology and basic pathogenesis theories, clinical stages and principles of treatment.
GPC-5	98.	Secondary (symptomatic) arterial hypertension: types, causes, mechanisms of development, complications and consequences of arterial hypertension.
GPC-5	99.	Atherosclerosis, it etiology and pathogenesis. The role of risk factors, metabolic and angiogenic factors in the pathogenesis of atherosclerosis
GPC-5	100.	Arterial hypotensions, types, etiology, pathogenesis. Complications and consequences of hypotensive states.
GPC-5	101.	Collapse: the definition of the notion, types, causes, mechanisms of development. Pathogenetic characteristics of the main types of collapse.
GPC-5	102.	The main causes and mechanisms of violations of external respiration. Indicators of respiratory failure.
GPC-5	103.	Characteristics of the notion of respiratory insufficiency; its types.
GPC-5	104.	Broncho-obstructive syndrome: etiology, pathogenesis, changes in ventilation parameters, disturbances in gas composition of blood and acid-base state. Examples of diseases with obstruction of the upper and lower respiratory tract.
GPC-5	105.	Restrictive syndrome: etiology, pathogenesis, changes in ventilation parameters, disturbances in gas composition of blood and

		acid-base state. Examples of diseases.
GPC-5	106.	Regulation impairments of respiration. Pathological forms of respiration (remitting, intermittent), their etiology and pathogenesis.
GPC-5	107.	Principal causes and pathogenesis of the impairment of pulmonary perfusion. Ventilation-perfusion mismatch, its estimate.
GPC-5	108.	Impairments of gas diffusion through the lung membrane, principal causes, pathogenesis and manifestations.
GPC-5	109.	Asphyxia. Etiology, pathogenesis, development stages.
GPC-5	110.	Breathlessness, characteristic of the concept, types, etiology and mechanism of development.
GPC-5	111.	Disorders of appetite: types, etiology, consequences for the organism. Disorders of salivation, mastication, swallowing, disturbances of the esophagus function, etiology, mechanism of development, consequences.
GPC-5	112.	Disorders of secretory and motor function of the stomach. Acute and chronic gastritis, causes, mechanisms of development, consequences for the organism. Types of pathological gastric secretion.
GPC-5	113.	Disorders of secretory function of the intestine and pancreas, causes, mechanisms of development, consequences for the organism. Pathogenesis of pancreatitis.
GPC-5	114.	Abnormalities of the intralumenal and terminal digestion; abnormal absorption in small intestine, causes, consequences.
GPC-5	115.	Gastric ulcer and duodenal ulcer. Development theories of ulcer. Modern conceptions of etiology and pathogenesis of gastric ulcer.
GPC-5	116.	Disorders of motility of the intestine. Diarrhea, constipation, intestinal obstruction, types, etiology and mechanism of development, consequences for the organism.
GPC-5	117.	Ileac passion, forms, mechanisms of development. Syndrome of intestinal autointoxication
GPC-5	118.	Hepatic insufficiency: characteristics of the notion; classification, pathogenetic variants, causes. Disorders of metabolism in hepatic insufficiency.
GPC-5	119.	Disorders of bile production and biliary excretions. Clinicolaboratory diagnostics of jaundice.
GPC-5	120.	Prehepatic (hemolytic) jaundice, etiology, pathogenesis, differential diagnostics.
GPC-5	121.	Intrahepatic (hepatic) jaundice, etiology, pathogenesis, differential diagnostics.
GPC-5	122.	Posthepatic (mechanical, obstructive) jaundice, etiology, pathogenesis, differential diagnostics.
GPC-5	123.	Hepatic coma: types, its etiology and pathogenesis.
GPC-5	124.	Impairment mechanisms of glomerular filtrations in kidneys. Renal and extrarenal causes of filtration violations, mechanisms of development, consequences.
GPC-5	125.	Proteinuria, hematuria, leukocyturia; their types, causes, mechanisms of development and diagnostic significance.

GPC-5	126.	Violations of the processes of reabsorption in the tubules of the kidneys, mechanisms of development. Renal and extrarenal causes of reabsorption violations, mechanisms of development, consequences.
GPC-5	127.	Changes in diuresis (poly-, oligo-, anuria) and changes in the relative density of urine, etiology, pathogenesis. Criteria for assessing the filtration and concentration ability of the kidneys.
GPC-5	128.	Extrarenal symptoms and syndromes in renal diseases. Pathogenesis of renal hypertension, edema, azotemia and anemia.
GPC-5	129.	Nephrotic syndrome, etiology, pathogenesis. Pathogenesis of edema in renal pathology.
GPC-5	130.	Syndrome of acute renal failure (ARF): forms, etiology, pathogenesis, stages, clinical manifestations. Concept of hemodialysis.
GPC-5	131.	Syndrome of chronic renal failure CRF): etiology, stages, pathogenesis, clinical manifestations. Uremia.
GPC-5	132.	Nephrolithiasis: etiology, pathogenesis, clinical manifestations.
GPC-5	133.	Erythrocytosis, the definition of the notion, types, etiology, pathogenesis, clinical manifestations.
GPC-5	134.	Anemia, the definition of the notion, principles of classification. Changes in the function of organs and systems in anemia.
GPC-5	135.	Acute posthemorrhagic anemia, etiology, pathogenesis, compensatory-adaptive reactions, hematological manifestations.
GPC-5	136.	Hemolytic anemia, types, etiology, pathogenesis, hematological manifestations.
GPC-5	137.	Iron-deficiency anemia, etiology, pathogenesis, hematological manifestations
GPC-5	138.	B12-(folic acid) deficiency anemia, etiology, pathogenesis, general characteristic, hematological manifestations.
GPC-5	139.	Hypo- and aplastic anemia, etiology, pathogenesis, hematological manifestations.
GPC-5	140.	Leucopenia, its types, the causes and developmental mechanisms, leukocyte formula changes. Agranulocytosis, pathogenesis, consequences for the organism.
GPC-5	141.	Leukocytosis, its types, the causes, pathogenesis, leukocyte formula changes, importance for the organism. Leukemoid reactions, types, etiology, pathogenesis.
GPC-5	142.	Leukemia, principles of classification, etiology, pathogenesis. Peculiarities of hemopoiesis and cellular content of the blood in various types of leukemia (acute and chronic). Basic impairments in the organism in leukemia, their mechanisms.
GPC-5	143.	Violations of the system of vascular-platelet hemostasis, causes, principles of diagnosis. Antithrombotic properties of the vascular wall and the causes of their violations. The role of platelets in primary and secondary hemostasis.
GPC-5	144.	Hypocoagulation-hemorrhagic states: types, etiology, pathogenesis, principles of diagnosis.
GPC-5	145.	Hypercoagulation-thrombotic syndrome. Thrombosis, etiology, pathogenesis, consequences.

GPC-5	146.	Thrombohemorrhagic syndrome (DIC-syndrome (disseminated intravascular coagulation)) or a syndrome of intravascular microcoagulation of blood. Etiology, stages, mechanisms of development, consequences. Principles of diagnosis of DIC syndrome.
GPC-5	147.	Neuroendocrine relationships and their role in the development of endocrinopathies. Violations of central trans- and parahypophysar regulation in the development of endocrinopathies.
GPC-5	148.	General etiology and pathogenesis of endocrine pathology. The role of feedback in endocrine pathology.
GPC-5	149.	Hyper- and hypofunction of adenohypophysis, causes, mechanisms of developing disorders in the organism.
GPC-5	150.	Hyper- and hypofunction of the thyroid gland, causes, mechanisms of developing disorders in the organism. Endemic goiter, etiology, pathogenesis.
GPC-5	151.	Hyper- and hypofunction of parathyroid glands, causes, mechanisms of developing disorders in the organism.
GPC-5	152.	The pathology of the adrenal glands, the causes of hyper- and hypofunction, mechanisms of disorders developing in the organism. Adrenogenital syndrome, development mechanism, clinical manifestations.
GPC-5	153.	Aldosteronism, the types, causes, nature and mechanisms of disorders developing in the organism, consequences.
GPC-5	154.	General etiology and mechanisms of disorders of nerve control of movement control. Hypokinesia (paralysis, paresis), hyperkinesia (convulsions, tremor, tick, etc.), etiology, pathogenesis.
GPC-5	155.	Pain, types. Nociceptive stimuli and mechanisms of their perception. Mediators of pain sensitivity. Vegetative and behavioral reactions in pain.
GPC-5	156.	The impairments of higher nervous activity, classification, mechanisms of the origin of pathology.

10. SELF-STUDY WORK OF STUDENTS

Title of sections and topics	*Type of independent work*	*Volume in hours*	*Form of control*
Section 1. The subject and tasks of pathological physiology. General nosology. ***Topic. Subject and tasks of pathological physiology. General nosology.*** 1. The subject and tasks of pathological physiology. Its place in the system of the higher medical education. Pathological physiology as a theoretical basis of modern clinical medicine. 2. General characteristic of three basic parts of pathological physiology.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*1h*	Interview and discussion on issues during practical

3. Methods of pathophysiology. Modeling of diseases. Sharp and chronic experiment (Claude Bernard, I. P. Paulov). 4. The requirements to the experiment and the researcher. 5. The basic conditions of performing a biological experiment. 6. Moral-ethical aspects of experimenting on animals. 7. Concepts of normalcy, health, predisease, pathological process, pathological reaction, pathological state, typical pathological processes, remission, recurrence, complication. 8. The notions of the disease, disease criteria, stages of the disease. Principles of disease classification.			class; colloquium, credit, exam.
Topic 2. General etiology. General pathogenesis. 1. Principle of determinism in pathology. The significance of reasons and conditions in beginnings of the disease. 2. The notion of environmental and internal causes and factors of risk of disease. 3. The notion of polyetiologic disease. 4. Principles of etiotropic prevention and treatment of disease. 5. The essence of monocausealism, conditionalism and constitutionalism, genetic determinism and others. 6. Injury as the initial link of the pathogenesis. Unity of structural and functional alterations in the pathogenesis of the disease. 7. The cause-and-effect relationship in the pathogenesis of the disease. 8. Localization and generalization of the injury; local and general reactions to injury, their relationship. 9. Leading links of the pathogenesis, the vicious circle in the pathogenesis of the disease. 10. The outcomes of the disease. Pathogenic principles of therapy of the diseases. 11. Terminal conditions. Pathophysiological	Study of educational material on isssues of the topic. Preparation for passing the colloquium, credit, exam.	*1h*	Colloquium, credit, exam.

bases for resuscitation the organism.			
Topic. Pathogenic effects of environmental. 1. The notions of etiology and pathogenesis. The significance of reasons and conditions of disease development. 2. The notion of environmental and internal causes and factors of risk of disease. 3. The essence of monocausealism, conditionalism and constitutionalism. 4. Injury as the initial link of the pathogenesis. ***5.*** The damaging effect of physical factors. Effects of ultraviolet rays. Pathogenic effect of electric current. The reasons of lethal electrocutions and their mechanisms. «Imaginary death». 6. The effect of chemical factors on the organism. 7. The impact of mechanical factors. 8. Kinetosis, etiology, development mechanism, clinical signs. 9. The pathogenic effect of biological factors. 10. Psychogenic pathogenic factors; Iatrogenic diseases. 11. The importance of social factors in the emergence of human diseases.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*2h*	Interview and discussion on issues during practical class; colloquium, credit, exam.
Section 2. Reactivity and resistance of the organism, their role in pathology ***Topic. Reactivity and resistance of the organism, their role in pathology*** 7. Definition of the notions «reactivity» and «resistance». Their relationship. 8. Classification of reactivity. 9. Factors determining the reactivity of the body. 10. The role of the nervous and endocrine systems in the mechanism of reactivity. 11. Forms of reactivity (normergy, hypoergy, hyperergy, dysergy). 12. Basic parameters of reactivity, their characteristic, mechanisms, master factors. 13. The relationship between reactivity and resistance.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*2h*	Interview and discussion on issues during practical class; colloquium, credit, exam.

14. The importance of reactivity in the development of pathological processes. 15. Phylo- and ontogenesis of reactivity and resistance. Peculiarities of reactivity depending on sex and age.			
Topic 5. The role of heredity in pathology. 1. Health and disease as the expression of the genetic control of the organism's homeostasis. 2. Difference and similarity of hereditary, congenital and acquired forms of pathology. 3. Phenocopies: the definition, causes of development, examples. 4. Mechanisms of stability and variability of the genotype. 5. Mutagen factors, their kinds. Mutations: point, chromosome, genome; spontaneous and induced. 6. Typical variants of pathogenesis of hereditary pathology. 7. Classification of hereditary pathology. Mono- and polygenic hereditary diseases. 8. The concept of penetrance and expressivity of genes. 9. Diseases with hereditary predisposition. 10. Chromosomal diseases: polyploidy and aneuploidy, their manifestations and features of pathogenesis. 11. Methods of studying hereditary forms of pathology; principles of their prophylaxis and possible treatment. 12. Importance of critical periods in the pathology of the embryo and fetus. Gametopathies, blastopathies, embriopathies, phetopathies. Relationship of fetal pathology with harmful effects on the maternal organism. 13. A pathogenetic role of hypoxia, hormonal and metabolic impairments, infection, industrial and household intoxications; harmfulness of alcoholism and smoking. Immune tolerance in pregnancy.	Study of educational material on isssues of the topic. Preparation for passing the colloquium, credit, exam.	*2h*	Colloquium, credit, exam.

Section 3. Typical pathological processes ***Topic. Cell injury.*** 1. The definition of the notion «damage». Damage as a typical pathological process. 2. Principal causes and types of cell damage. Direct and indirect effect of a damaging agent on a cell. 3. General mechanisms of cell damage. 4. The impairment of energetic supply of processes taking place in cells, as one of master mechanisms of damage. 5. The role of damage of membranes and enzymes in the impairment of cellular vital activity, mechanisms of its development. 6. The role of genetic program impairments and its realization mechanisms in damaging a cell. 7. The role of Na+, K+, Ca2+, and water disbalance in cell injury. 8. Specific and nonspecific manifestations in cell damage. 9. Mechanisms of adaptation and compensation in response to damage. 10. Integrated mechanisms of cellular damage and death (mechanisms of hypoxic necrobiosis and apoptosis). 11. Apoptosis, its role in physiological and pathological processes.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*2h*	Interview and discussion on issues during practical class; colloquium, credit, exam.
Topic. Disorders of microcirculation. 1. The definition of the notions «system of microcirculation», «microcirculatory unit of the organ», their components. 2. Methods of studying of microcirculation. 3. Principal causes and forms of typical impairments of microcirculation. 4. Developmental mechanisms of intravascular impairments of microcirculation. 5. The reasons, developmental mechanisms, manifestations of transmural impairments of microcirculation. 6. The reasons, developmental mechanisms, manifestations of extravascular impairments of	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*1h*	Interview and discussion on issues during practical class; colloquium, credit, exam.

microcirculation. 7. The definition of the notion «sludge»; the reasons, developmental mechanisms; manifestations, consequences, the significance for the organism. 8. The definition of the notion «capillarotrophic insufficiency», developmental mechanisms and consequences. 9. Typical impairments of lymphodynamics (mechanical, dynamic, resorptional insufficiency of lymphatic vessels) and their role in microcirculation impairments. 10. Microcirculatory disorders in patients with cardiovascular disease, acute and chronic renal failure, extreme conditions, diabetes and other endocrinopathy.			
Topic. Disturbances of the peripheral blood-flow. 1. Typical forms of impairments of peripheral blood circulation. General characteristic. 2. The definition of the notion of arterial and venous hyperemias, ischemia; external manifestations, the reasons and development mechanisms, outcomes. 3. Changes in tissues in the area of arterial and venous hyperemias and ischemias, their significance and possible consequences. 4. The state of microcirculation in peripheral blood circulation impairments: ischemia, arterial and venous hyperemia. 5. Compensatory reactions in the impairments of local blood circulation. Post-ischemic reperfusion. Mechanisms of triggering and developing collateral blood circulation. Types collaterals. Cerebral and cardiac steal syndromes. 6. General changes in the organism during impairments of peripheral blood circulation (arterial and venous hyperemias, ischemia) in vital organs (the heart, the brain). 7. The definition of the notion «embolism». General characteristic. 8. The reasons and mechanisms of embolus formation.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*2h*	Interview and discussion on issues during practical class; colloquium, credit, exam.

9. Types of embolism. The significance, outcomes and consequences of embolism for the organism. Prophylaxis of embolism.			
Topic. Pathophysiology of acid-base imbalance. Pathogenesis of the major syndromes of acidosis and alkalosis. 1. The concept of the acid-base balance of the organism. 2. Basic laboratory estimation criteria of acid-base state impairments. 3. Mechanisms of control of acid-base balance. The role of buffer systems, kidneys, lungs, liver, and gastro-intestinal tract in the regulation of acid-base balance. 4. Classification of acid-base balance impairments. 5. Etiology and pathogenesis of respiratory acidosis and alkalosis. 6. Etiology and pathogenesis of non-respiratory acidosis and alkalosis. 7. Interrelation of acid-base state mechanisms and water-electrolyte balance. 8. Compensatory mechanisms in acid-base state impairments, laboratory criteria of their estimation. 9. Basic clinical manifestations in non-compensated acidosis and alkalosis. 10. The mechanism of development of violations of the acid-base state in acute heart failure, acute renal failure, acute liver failure and other critical conditions 11. Mixed disorders of acid-base state of blood (respiratory alkalosis + metabolic acidosis, etc.). 12. Correction principles of acid-base state impairments.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*3h*	Interview and discussion on issues during practical class; colloquium, credit, exam.
Topic. Disorders of water-electrolytes balance. Pathogenesis of the major syndromes of pathology of water- electrolytes metabolism. 1. The content and distribution of water in the o rganism. The laws of electroneutrality and isoosmolarity. 2. Neurohormonal regulation of water-	Study of educational material on isssues of	*2h*	Interview and discus-

electrolyte metabolism and the mechanisms of its violation. Violation of the distribution and exchange of ions between the cell and the extracellular sectors. 3. The disturbances of water-salt metabolism, principles of classification and main types. 4. Hypohydration syndrome: types, causes, pathogenesis, clinical and pathophysiological manifestations, consequences, pathogenetic principles of correction. 5. Hyperhydration syndrome: types, causes, pathogenetic features, symptoms, consequences, principles of correction. 6. Edemas and dropsies (definition). Pathogenetic factors of edema development. 7. Kinds of edemas. 8. Pathogenesis of cardiac, renal, inflammatory, allergic, toxic, cachectetic and other kinds of edemas. 9. The significance of edema for the organism.	the topic, preparation for passing the colloquium, credit, exam.		sion on issues during practical class; colloquium, credit, exam.
Topic 11. Disorders of protein and lipid metabolisms. 1. Positive and negative nitrogen balance. 2. Violations of protein digestion of food; 3. metabolism of amino acids and amino acid composition of the blood. 4. Disorders of the final stages of protein metabolism, the synthesis of urea. Hyperasotemia. 5. Violations of the protein composition of blood plasma: hyper-, hypo- and dysproteinemia. Protein-energy malnutrition. 6. Violations of the exchange purine and pyrimidine bases. Gout, the role of exogenous and endogenous factors, pathogenesis. 7. Pathology of digestion, transport and metabolism of fats. 8. Hyperlipidemia types, a value for the organism. 9. Obesity, types, causes, mechanisms of development, consequences.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*3h*	Colloquium, credit, exam.
Topic. Disorders of carbohydrate metabolism.			

1. Impaired digestion and resorption of carbohydrates in the gastrointestinal tract. 2. Impaired of the synthesis process, the deposit and the splitting of glycogen. 3. Violations of the regulation of carbohydrate metabolism (the value of the nervous and endocrine systems). 4. Hypoglycemic states, their types, mechanisms of development, disorders of physiological functions; hypoglycemic coma. 5. Violation of carbohydrate metabolism in hereditary enzymopathies. 6. Hyperglycemic conditions, their types, mechanisms of development. Pathogenetic significance of hyperglycemia. 7. Diabetes mellitus, its types, etiology, pathogenesis. 8. Complications of diabetes mellitus. 9. Diabetic coma, pathogenesis.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*2h*	Interview and discussion on issues during practical class; colloquium, credit, exam.
Topic 13. Pathophysiology of starvation. Disturbances in vitamines metabolism. 1. Starvation, types. 2. Periods of starvation, changes in metabolism and physiological functions in different periods of starvation. 3. The concept of therapeutic starvation. 4. Violations of vitamin metabolism. Hypo-, hyper-, dys- and avitaminosis, causes, mechanism of development, clinical manifestations and consequences. 5. Exogenous (primary) and endogenous (secondary) hypovitaminosis due to lack of food, malabsorption, violations of transport, deposition, recovery and vitamin metabolism.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*3h*	Colloquium, credit, exam.
Topic. Inflammation. 1. The definition of the notion «inflammation». 2. Inflammation as a typical pathological process. 3. Local and systemic manifestations of inflammation. Etiology of inflammation. 4. The main components of the pathogenesis of	Study of educational material on isssues of	*3h*	Interview and discus-

the inflammatory process. 5. Primary and secondary alteration in inflammation. 6. Mediators of inflammation; their types, principles of classification, their origin and significance in the dynamics of development and completion of the inflammation. 7. The significance of inflammation mediators in the development of secondary alteration. 8. Metabolic changes in the focus of inflammation. 9. Physical and chemical changes in the focus of inflammation, mechanisms of their development and significance. 10. Impairment stages of peripheral blood circulation in the focus of inflammation and mechanisms of their development. 11. The definition, mechanism and significance of exudation in inflammation. 12. The reasons and mechanisms of increasing the permeability of a vascular wall in the focus of inflammation. 13. Types of exudates, their distinctions from transudate. 14. Stages, ways and mechanisms of leukocytes emigration in inflammation. 15. The definition of the notion and biological significance of phagocytosis. 16. I. I. Mechnikov's study about phagocytosis as a protective reaction of the organism. 17. Factors regulating activity of phagocytes in the focus of inflammation. Chemotaxis mechanisms, factors stimulating and oppressing chemotaxis. 18. Stages of phagocytosis and their mechanisms. 19. The reasons and types of phagocytosis impairments. 20. The proliferation stage, its basic signs and development mechanisms. 21. Endogenic pro- and anti-inflammatory factors. 22. Relationship of damage and adaptive re-	the topic, preparation for passing the colloquium, credit, exam.		sion on issues during practical class; colloquium, credit, exam.

sponses in the inflammatory process. 23. The role of the nervous, endocrine and immune systems in the development of inflammation. 24. General biological significance of inflammation. Positive and negative significance of inflammation for the organism. 25. Principles of anti-inflammatory therapy.			
Topic. Acute phase response. Fever. Hyperthermia. 15. The concept of "acute phase response" (APR). The main mediators of the APR, their origin and biological effects. Manifestations of APR, their pathogenesis. The role of the APR in protecting the body during acute infection and antitumor resistance formation. 16. The definition of the notion «fever». Formation of fever in phylo- and ontogenesis. Fever as a reaction APR. 17. Etiology of fevers. Pyrogenic substances. 18. Pathogenesis of fevers. Action mechanisms of pyrogens. 19. Fever stages. The relationship between heat production and heat emission during various stages of fever. 20. Varieties of fever (by the level of elevation of body temperature). Types of temperature curves in fever. 21. Changes of metabolism, functions of systems and organs in fever. 22. The role of functional condition of the nervous, endocrine and immune systems in formation of a fever response. 23. General biological significance of fever. 24. The concept of "hyperthermia", its types and mechanisms of development. 25. Basic distinction of fever from hyperthermia (overheating).	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*2h*	Interview and discussion on issues during practical class; colloquium, credit, exam.
Topic. Pathophysiology of hypoxia. 1. The definition of the notion «hypoxia». The role of hypoxia in the pathogenesis of various			

diseases and pathological processes. Principles of classification of hypoxic states. Types of hypoxia. 2. Principles of classification of hypoxic conditions. Types of hypoxias. 3. The etiology and pathogenesis of the main types of hypoxias: exogenous, respiratory, circulatory, anemic, tissue (histotoxic), overutilization and substrate hypoxia. 4. Changes of the arterial and venous blood gas parameters in various types of hypoxia. 5. Compensatory-adaptive reactions in hypoxia. Mechanisms of urgent and long-term adaptation to hypoxia. 6. Disorders of metabolism, structure and functions of cells in acute and chronic hypoxia.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*1h*	Interview and discussion on issues during practical class; colloquium, credit, exam.
Topic. Pathophysiology of the Immune System. Allergy. Autoimmune Disorders 1. The structure, function and role of immune surveillance system (ISS) 2. Typical forms of pathology of ISS. 3. Allergy: definition of the notion, general characteristics of allergies. 4. Relationships immunity and allergy, allergy and inflammation. 5. Exogenous and endogenous allergens, their types. 6. Types of allergic reactions, their classification. 7. Etiology, stages, mediators, characteristics of pathogenesis of the I and II types of allergy after Gell and Coombs. Clinical forms. 8. Pseudoallergy, definition, etiology, pathogenesis. 9. Etiology, stages, mediators, characteristics of pathogenesis of the III and IV types of allergy after Gell and Coombs. Clinical forms. 10. Mediators of the III, and IV types of allergy after Gell and Coombs. 11. Autoimmune diseases, etiology, pathogenesis, clinical forms. Role external and internal factors in the pathogenesis of autoimmune dis-	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*2h*	Interview and discussion on issues during practical class; colloquium, credit, exam.

eases. 12. Methods of diagnosis, prevention and treatment of allergic diseases.			
Topic 18. Immunodeficiency states. 1. Primary immunodeficiencies. 2. The predominant failure of cellular immunity (T-systems). 3. Immunodeficiencies with impaired antibody production (disordes of the B-systems). 4. Immunodeficiencies with impaired of A-cells of the immune system. 5. Combined immunodeficiencies (defect of T-, B- and A-systems). 6. Secondary (acquired) Immunodeficiency and imunodepressive state in infections, radiation injuries, cancer, endocrinopathy (diabetes), and others. 7. Acquired immunodeficiency syndrome (AIDS). Etiology and ways infection, pathogenesis, clinical forms, the principles of prevention and treatment.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*2h*	Colloquium, credit, exam.
Topic. The pathophysiology of tumor process. 1. Characteristics of the notions of «tumor growth», «tumor», «tumor progression». Tumor atypia, its varieties. 2. Etiology of tumors. 3. Chemical carcinogens, their classification. 4. Blastomogenic action of ionizing reactions, UV rays, thermal and mechanical factors. 5. The notion of syn-carcinogensis and co-carcinogensis. 6. Oncogenic viruses, their types. The role of viral oncogens in the carcinogenic effect of oncoviruses. 7. Meaning of hereditary factors, sex, age, chronic disease occurrence and development of tumors in humans. 8. Pathogenesis of tumor growth. The stages of initiation and promotion in the process of carcinogenesis. 9. The concept of pre-cancerous conditions. Obligate and facultative precancer.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*2h*	Interview and discussion on issues during practical class; colloquium, credit, exam.

10. Malignant and benign tumors, their characteristics. 11. Antineoplastic resistance of the organism. 12. Systemic effect of the tumor on the body. Paraneoplastic syndrome, its pathogenesis, the main manifestations. The pathogenesis of cancer cachexia.			
Section 4. Systemic pathophysiology (Pathophysiology of organs and systems) ***Topic. Pathophysiology of the heart. Pathogenesis of the main clinical syndromes of heart disease.*** 1. Blood circulation insufficiency. The definition of the notion, its types. 2. Main hemodynamic indices of the blood circulation insufficiency. 3. Heart failure syndrome; its forms and stages. 4. Myocardial heart failure: etiology and pathogenesis. 5. Cardiac insufficiency due to overloads. 6. Valvular heart disease, its forms, hemodynamic disorders. 7. Mechanisms for urgent and long-term adaptation of the heart to overloads. 8. Characteristics of tonogenic and myogenic dilatation of heart. 9. Hypertrophy of the myocardium, its forms and stages. Features of hypertrophied myocardium, mechanisms of its decompensation. 10. Non-coronarogenic type of the myocardium injury, etiology and pathogenesis. 11. Clinical manifestations and hemodynamic parameters of the heart failure. 12. Ischemic heart diseases: causes, mechanisms of development, ECG-manifestations. 13. Pathogenesis of ischemic and reperfusion syndromes in coronary insufficiency, their manifestations. 14. Syndrome secondary aldosteronism in the pathogenesis of heart failure.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*1h*	Interview and discussion on issues during practical class; colloquium, credit, exam.

Topic 21. Cardiac arrhythmia 1. The definition of the notion «cardiac arrhythmias». Classification of arrhythmias. 2. Electrocardiogram, the definition of the notion, ECG analysis. 3. Electric axis of the heart, the definition of the notion, methods for determining the position of the electric axis of the heart. 4. Impairments of automatism of sinoatrial node, causes, types, development mechanisms, ECG-manifestations. 5. Extrasystoles, the definition of the notion, its types, causes, mechanisms of development, ECG-manifestations. 6. Paroxysmal tachycardia, the definition of the notion, causes, mechanisms of development, ECG-manifestations. 7. Atrial and ventricular flutter, atrial and ventricular fibrillation, the definition of the notions, causes, mechanisms of development, ECG-manifestations. 8. Cardiac conduction impairments: blockade of the heart (definition of the notion, types). 9. Sinus block, atrial block, the definition of the notions, causes, mechanisms of development, ECG-manifestations. 10. AV-block, the definition of the notion, causes, mechanisms of development, ECG-manifestations. 11. His bundle blocks, its types, causes, mechanisms of development, ECG-manifestations. 12. Wolff-Parkinson-White syndrome, causes, mechanisms of development, ECG-manifestations. 13. Morgagni-Adams-Stokes syndrome, causes, mechanisms of development, ECG-manifestations.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*1h*	Interview and discussion on issues during practical class; colloquium, credit, exam.
Topic 22. Disorders of circulation due to alterations of the vascular tone. 1. Arterial hypertension, the definition of the notion, classification. 2. Hypertensive syndrome, types, etiology, path-			

ogenesis, stages. 3. Manifestations and outcomes of the hypertensive states. 4. Substantiation of pathogenetic therapy of the hypertension states. 5. Hypertonic disease, etiology and basic pathogenesis theories. 6. Clinical stages and principles of treatment of essential hypertension. 7. Clinical manifestations of the impairment of organs-targets in arterial hypertension. 8. The role of hyperactivation of renin-angiotensin-aldosterone 9. systems in development of arterial hypertension. 10. Secondary (symptomatic) arterial hypertension: types, their characteristics. 11. Renal arterial hypertension: pathogenesis of renovascular and renoprival (renal parenchymal) hypertension. 12. Pathogenesis of endocrinogenic and neurogenic arterial hypertension. 13. Atherosclerosis, it etiology and pathogenesis. The role of LPLD impairments of receptor interaction in atherogenesis. Pathological and modified lipoproteins, their elimination from the organism by scavenger-receptors. 14. Arterial hypotensions. Classification. Vascular insufficiency of blood circulation: fainting, collapse. Etiology, pathogenesis. 15. Manifestations and consequences of arterial hypotensions.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*2h*	Interview and discussion on issues during practical class; colloquium, credit, exam.
Topic. Pathophysiology of external breathing. Pathogenesis of the main clinical syndromes of respiration system disease. 3 Characteristics of the notion of respiratory insufficiency; its types. 4 Disorders of alveolar ventilation, etiology and pathogenesis. 5 Etiology and pathogenesis of lungs ventilation disorders of the obstructive type. Emphysema, bronchial asthma, pneumonia, pneumothorax.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*2h*	Interview and discussion on issues during practical class;

6 Pathophysiology of broncho-obstructive syndrome: pathogenesis of symptoms, mechanisms of compensation, substantiation of pathogenetic therapy. 7 Pathophysiology of restrictive syndrome: pathogenesis of symptoms, mechanisms of compensation, substantiation of pathogenetic therapy. 8 Functional diagnostics of disorders of alveolar ventilation. 9 Principal causes and pathogenesis of the impairment of pulmonary perfusion. 10 Ventilation-perfusion mismatch. 11 Impairments of gas diffusion through the lung membrane, principal causes and manifestations. 12 Regulation impairments of respiration. Pathological forms of breathing: tachypnea, bradypnea, hyperpnea, Kussmaul's respiration, etc. Etiology and pathogenesis of pathological forms of respiration. 13 Periodic respiration, forms, pathogenetic characteristic, development mechanisms. 14 Asphyxia. Etiology, pathogenesis, development stages. 15 Coughing, sneezing, etiology and pathogenesis. 16 Breathlessness, characteristic of the concept, types, etiology and mechanism of development. 17 Changes in the gas composition of blood and acid-base state in respiratory failure in the stage of compensation and decompensation. 18 Adults respiratory distress-syndrome; its difference from the respiratory distress syndrome of newborns.			colloquium, credit, exam.
Topic. Pathophysiology of gastrointestinal tract. Pathogenesis of the main clinical syndromes of gastrointestinal disease. 1. General etiology and pathogenesis of digestive system disorders. 2. Disorders of appetite and taste: etiology,	Study of educational	*2h*	Interview

clinical manifestations, consequences for the organism 3. Disorders of salivation: hypo- and hypersalivation. Disorders of mastication and swallowing. Disturbances of the esophagus function. 4. Disorders of the reservoir function of the stomach. Types of pathological gastric secretion. 5. Disorders of the motor function of the stomach, causes, mechanisms of development, consequences for the organism. 6. Nausea, belching, vomiting, heartburn, the definitions of the notions, causes, mechanisms of development, consequences. 7. Acute and chronic gastritis, causes, mechanisms of development, consequences for the organism. 8. Abnormalities of the intralumenal and terminal digestion; abnormal absorption in small intestine, causes, consequences. 9. Disorders of motility of the intestine. Diarrhea, constipation, intestinal obstruction, types, etiology and mechanism of development, consequences for the organism. 10. Syndrome of intestinal autointoxication, etiology, pathogenesis, manifestations, the main protective and detoxifying systems of the body (liver, immune system). 11. Gastric ulcer and duodenal ulcer. Development theories of ulcer. Modern conceptions of etiology and pathogenesis of gastric ulcer. The role of H. pylori in pathogenesis of the diseases. 12. Acute and chronic pancreatitis: causes, mechanisms of development, digestive disorders. 13. Enteritis and colitis: etiology, pathogenesis, clinical manifestations.	material on isssues of the topic, preparation for passing the colloquium, credit, exam.		and discussion on issues during practical class; colloquium, credit, exam.
Topic. Pathophysiology of liver. Pathogenesis of the main clinical syndromes of the liver diseases. 1. Main functions of the liver. Experimental methods of studying functions of the liver (N. V. Ekk, E. S. London, I. P. Pavlov) changes in the	Study of educational	*1h*	Interview

organism in the given interventions. 2. Hepatic insufficiency: characteristics of the notion; classification. 3. Etiology and pathogenesis of hepatic insufficiency. 4. Pathogenetic variants of hepatic insufficiency: cholestatic, hepatic-cellular, vascular, mixed. 5. Basic syndromes in pathology of the liver and bile ducts: cytolytic syndrome, hepatic-cell syndrome, dyspeptic syndrome, asteno-vegetative syndrome, immuno-inflammatory syndrome, hepatolienal syndrome, portal hypertension, the syndrome of cholestasis (primary and secondary), acholia, cholemia, jaundice, hepatic encephalopathy syndrome. 6. Hepatic-cell insufficiency syndrome: causes, clinical manifestations, diagnostic methods. 7. Disorders of metabolism in hepatic insufficiency. 8. Violations of the barrier and detoxification function of the liver. 9. Hepatic encephalopathy, types, stages, mechanism of development, causes hepatic encephalopathy. 10. Hepatic coma: types, its etiology and pathogenesis. 11. The syndrome of portal hypertension. The definition, forms, clinical symptoms. 12. Methods of diagnosis of the functional state of the liver. 13. Violations of the processes of bile formation, causes, mechanism of development. 14. The main stages of the exchange of the bile pigments in the body. 15. The definition of the notion of jaundice, its types. 16. Prehepatic (hemolytic) jaundice, etiology, pathogenesis, differential diagnostics. 17. Intrahepatic (hepatic) jaundice, etiology, pathogenesis, differential diagnostics. 18. Posthepatic (mechanical, obstructive) jaundice, etiology, pathogenesis, differential diagnostics.	material on isssues of the topic, preparation for passing the colloquium, credit, exam.		and discussion on issues during practical class; colloquium, credit, exam.

19. Neonatal jaundice, types, etiology, pathogenesis. 20. Gallstone disease (cholelithiasis), etiology, mechanism of gallstones formation.			
Topic. Pathophysiology of kidneys. Pathogenesis of the main clinical syndromes of the renal diseases 1. Impairment mechanisms of glomerular filtrations, proximal and distal reabsorption, canaliculi secretion, causes, mechanisms of development. 2. Violations of the diluent and concentration ability of kidneys (hypo-, hyper- and isosthenuria; their causes and diagnostic value. 3. Characteristic changes in diuresis (poly-, oligo-, anuria), etiology, pathogenesis. 4. Principles of functional examination of the kidneys (evaluation of renal concentration function, clearance tests and other). 5. Syndromes associated with glomerular and tubular dysfunctions. 6. Urinary syndrome (proteinuria, hematuria, leukocyteuria, cylidruria; their types, causes and diagnostic significance). 7. Extrarenal symptoms and syndromes in renal diseases. Pathogenesis of renal hypertension, edema, azotemias and anemia. 8. Glomerulonephritis (etiology, pathogenesis and clinical manifestations). 9. Nephrotic syndrome, pathogenesis and clinical manifestations. 10. Nephrolithiasis: etiology, pathogenesis, clinical manifestations, consequences. 11. Syndrome of acute renal failure (ARF): forms, etiology, pathogenesis, stages, principles of treatment. The importance hemodialysis in the treatment of ARF; principles of hemodialysis. *12.* Syndrome of chronic renal failure CRF): etiology, stages, features of pathogenesis. Uremia; principles of its treatment.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*1h*	Interview and discussion on issues during practical class; colloquium, credit, exam.
Topic. Pathophysiology of red blood cells system. Pathogenesis of the main clinical syn-			

dromes due to the pathology of erythrocytes. 1. Erythrocytosis, the definition of the notion, types, clinical manifestations. 2. Characteristics of absolute and relative, hereditary and acquired types of erythrocytosis, their etiology, pathogenesis. 3. Anemia, the definition of the notion, principles of classification (according to etiopathogenesis, the hemopoiesis type, the color parameter, the abilities of the bone marrow for regeneration, size and shape of erythrocytes). 4. Etiology, pathogenesis, general characteristic, hematological manifestations in anemia due to blood loss: 5. acute posthemorrhagic anemia; 6. chronic posthemorrhagic anemia. 7. Hemolytic anemia, types, etiology, pathogenesis, general characteristic, hematological manifestations (anemia due to exposure of antibodies and other damaging factors, membranopathies, enzymopathies, hemoglobinopathies). 8. Iron-deficiency anemia, etiology, pathogenesis, general characteristic, hematological manifestations. 9. B12-(folic acid) deficiency anemia, etiology, pathogenesis, general characteristic, hematological manifestations. 10. Hypo- and aplastic anemia, etiology, pathogenesis, general characteristic, hematological manifestations. 11. Clinical manifestations and compensatory-adaptive processes in the organism in anemia. 12. Etiology and pathogenesis of anemic and hemolytic syndromes. 13. Principles of diagnostic and therapy of anemia. 14. Osmotic resistance of erythrocytes, the definition of the notion, types. 15. Causes and mechanism of impairments of osmotic resistance and sedimentation rate of erythrocytes.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*1h*	Interview and discussion on issues during practical class; colloquium, credit, exam.
Topic. Pathophysiology of white blood cells system. Pathogenesis of the main clinical			

syndromes due to the pathology of leukocytes. *1.* Leukocytosis, the definition of the notion, the causes. The concept of physiological and pathological leukocytosis. *2.* Leukocyte formula changes, absolute and relative changes of some types of leukocytes, pathogenetic and prognostic characteristic. *3.* Disorders of the structure and function of various types of leukocytes; the role of these disorders in pathological processes. *4.* The characteristic, pathogenetic and prognostic characteristic of various types of the leukocyte formula shifts. *5.* Leucopenia, the definition of the notion, the cause and developmental mechanisms, its types. *6.* Agranulocytosis, the definition of the notion. Types of agranulocytosis, the causes and their developmental mechanisms. Peripheral blood pattern in various types of agranulocytosis. *7.* Etiology, pathogenesis, clinical manifestations of leucopenic syndrome. *8.* Leukemoid reactions, types, etiology, pathogenesis, changes in the morphological composition of peripheral blood, differentiation from leukemia, significance for the organism.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*1h*	Interview and discussion on issues during practical class; colloquium, credit, exam.
Topic. Leukemia 1. Leukemia, the definition of the notion. General characteristic and principles of classification. 2. Etiology and pathogenesis of leukemia. Modern theories of the origin of leukemia. The tumoral nature of leukemia. 3. Peculiarities of leukemic cells, their morphological, cytochemical and cytogenetic characteristic. 4. Peculiarities of hemopoiesis and cellular content of the blood in various types of leukemia (acute and chronic). 5. Basic impairments in the organism in leukemia, their mechanisms. 6. Leukemoid reactions. Basic types, causes, blood pattern, differentiation from leukemia. 7. Principles of diagnosis and therapy of leuke-	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*1h*	Interview and discussion on issues during practical class; colloquium, credit, exam.

mia.			
Topic. Impairments of hemostasis *1.* The hemostasis system. The definition of the notion, functional purpose. The modern scheme of blood coagulation, regulation mechanisms. *2.* Antithrombotic properties of the vascular wall and the causes of their violations. *3.* The definition of the notions: the vascular-platelet (primary) hemostasis and coagulation (secondary) hemostasis. ***4.*** Basic tests characterizing vascular-platelet and coagulation hemostasis, their diagnostic value. *5.* Hypercoagulation-thrombotic syndrome. Etiology, pathogenesis, clinical manifestations. *6.* The role of thrombogenicity of vessels, adhesion and aggregation of platelets in the development of thrombophilia. *7.* Incidence causes, development mechanisms, clinical and hematological manifestations of thrombocytoses (reactive and primary) *8.* Characteristics of thrombi formation in arterial and venous vessels. *9.* Hypocoagulation-hemorrhagic states: types, etiology, pathogenesis, clinical manifestations. *10.* Disorders of the primary hemostasis: role of thrombocytopenia and thrombocytopathy. *11.* Disorders of secondary hemostasis: deficit of procoagulants (prothrombine, fibrinogen, antihemophylic globulins), predominance of anticoagulation system. *12.* Thrombohemorrhagic syndrome (DIC-syndrome (disseminated intravascular coagulation)) or a syndrome of intravascular microcoagulation of blood. Etiologic and pathogenetic factors of development, clinical manifestations laboratory diagnostics, principles of treatment. *13.* Principles of pathogenetic treatment of hemostasiopathies.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*1h*	Interview and discussion on issues during practical class; colloquium, credit, exam.
Topic 31. Pathophysiology of the emergency states 1. Emergency and terminal states: characteristics of the notions, types, etiology and the key			

points of pathogenesis; manifestations and consequences. 2. Collapse: types, causes, mechanisms of development, manifestations, outcomes, and principles of therapy. 3. Shock: characteristics of the notion, types. 4. The general pathogenesis of the shock states; similarity and differences of the various types of shock. 5. Stages of shock. The main functional and structural changes at various stages of shock. Irreversible disorders in shock. 6. Pathophysiological basis of prophylaxis and therapy of shock. 7. The concept of the crush syndrome; its causes and the main links of pathogenesis. 8. Coma: types, etiology, pathogenesis, stages. Disorders of the functions of the body in comatose states. 9. Principles of therapy of coma. 10. The syndrome of polyorganic insufficiency.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*1h*	Colloquium, credit, exam.
Topic. Pathophysiology of the endocrine system. 1. General etiology and pathogenesis of endocrine pathology. 2. The role of violations of central trans- and parahypophysar regulation in the development of endocrinopathies. 3. The role of feedback in endocrine pathology. 4. Total (Simmonds disease) and partial hypofunction of adenohypophysis (Hypophyseal nannism, infantilism), causes, mechanism of development. 5. Hyperfunction of the adenohypophysis: hypophyseal giantism, acromegally, disease of Itsenko–Cushing, clinical manifestations. 6. The pathology of a posterior lobe of the hypophysis: signs of hypo- and hypersecretions of vasopressin. 7. Hypofunction of the cortical substance of adrenal glands. Acute and chronic insufficiency of adrenal glands, etiology, pathogenesis, clinical manifestations.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*1h*	Interview and discussion on issues during practical class; colloquium, credit, exam.

8. Hyper- and dysfunction of the cortical and medulla substance of adrenal glands. Syndrome of Itsenko-Cushing, primary and secondary hyperaldosteronism, adreno-genital syndrome, pheochromocytoma, etiology, pathogenesis, clinical manifestations. 9. Endemic and toxic goiter (Basedow's disease/Graves disease), cretinism, myxedema. Iodine deficiency disorders, hypothyroidism in children, etiology, pathogenesis, clinical manifestations, principles of diagnosis and treatment. 10. Hyper- and hypofunction of parathyroid glands, etiology, pathogenesis, clinical manifestations.			
Topic 32. Stress, the concept of the general adaptation syndrome, and their role in pathology. 1. The concept of stress as a nonspecific reaction of the organism to the effect of various extreme stimuli. 2. Stages and mechanisms of stress development; the role of neuro-hormonal factors. 3. The main manifestations of stress. 4. The concept of "adaptation diseases", the mechanism of their development. 5. The role of stress and the general adaptation syndrome in the development of ischemic heart disease, stomach ulcer and duodenal ulcer, hypertensive disease, etc. 6. Stress-limiting systems of the body.	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*1h*	Interview and discussion on issues during practical class; colloquium, credit, exam.
Topic. Pathophysiology of the nervous system and higher nervous functions 1. General etiology and mechanisms of damage of the nervous system. 2. Pathophysiology of the denervation tissue. 3. Neurogenic disturbances of the locomotor function. Hypokinetic conditions: paresis and paralysis, their mechanisms and characteristic. 4. Hyperkinesis. The definition of the notion. Types of hyperkinesis. 5. Neurogenic impairments of sensitivity, their	Study of educational material on isssues of the topic, preparation for passing the colloquium, credit, exam.	*3h*	Interview and discussion on issues during practical class;

types, mechanisms and clinical manifestations. 6. Pain. The definition of the notion, its biological significance. Pathogenesis of a pain syndrome. The antinociceptive system and its characteristic. 7. Pathophysiological basis of medical anesthesia. 8. Functional impairments of the vegetative nervous system, their types and mechanisms. 9. The impairments of higher nervous activity, neurosis. The significance of the types of higher nervous activity in the development of neuroses. The causes of neurosis, their characteristic, principles of therapy.			colloquium, credit, exam.

11. INSTRUCTIONAL AND INFRORMATION SUPPORT OF THE SUBJECT "PATHOPHYSIOLOGY, CLINICAL PATHOPHYSIOLOGY"

a) The list of recommended literature

Essential literature:

1. Литвицкий, П. Ф. Clinical pathophysiology : concise lectures, tests, cases = Клиническая патофизиология : курс лекций, тесты, задачи : учебное пособие для студентов учреждений высшего образования / П. Ф. Литвицкий, С. В. Пирожков, Е. Б. Тезиков. - 3-е изд. , перераб. и доп. - Москва : ГЭОТАР-Медиа, 2021. - 432 с. - 432 с. - ISBN 978-5-9704-6100-6. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : https://www.studentlibrary.ru/book/ISBN9785970461006.html
2. Литвицкий П.Ф., Патофизиология Pathophysiology : лекции, тесты, задачи : учеб. пособие для студентов учреждений высш. проф. образования / Литвицкий П. Ф., Пирожков С. В., Тезиков Е. Б. - М. : ГЭОТАР-Медиа, 2016. - 432 с. - ISBN 978-5-9704-3600-4 - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : https://www.studentlibrary.ru/book/ISBN9785970436004.html
3. Лапкин, М. М. Избранные лекции по нормальной физиологии = Selected Lectures on Normal Physiology : учебное пособие на русском и английском языках / М. М. Лапкин, Е. А. Трутнева. - Москва : ГЭОТАР-Медиа, 2021. - 544 с. - ISBN 978-5-9704-5972-0. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : https://www.studentlibrary.ru/book/ISBN9785970459720.html

Additional literature:

1. Practice guide on general pathophysiology for students of medical department : Learning guide / М. В. Осиков, А. А. Агеева, К. С. Савчук, Л. В. Воргова. - Челябинск : ЮУГМУ, 2021. - 96 с. - Текст : электронный // ЭБС "Букап" : [сайт]. - URL : https://www.books-up.ru/ru/book/practice-guide-on-general-pathophysiology-for-students-of-medical-department-13465231/
2. Рогова Л. Н. Manual for pathophysiology practicals / Л. Н. Рогова. - Волгоград : ВолгГМУ, 2019. - 144 с. - Текст : электронный // ЭБС "Букап" : [сайт]. - URL : https://www.books-up.ru/ru/book/manual-for-pathophysiology-practicals-9757146/
3. Khaitov, R. M. Immunology : textbook / Rakhim M. Khaitov. - 2nd updated edition. - Moscow : GEOTAR-Media, 2021. - 272 с. - ISBN 978-5-9704-5861-7. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL :

https://www.studentlibrary.ru/book/ISBN9785970458617.html

4. Kseiko D. A. Pathophysiology of **Inflammation**: study guide for the 3rd year students of the medical faculty specialty 31.05.01 General medicine / D. A. Kseiko, T. V. Abakumova, S. O. Gening; Ulyanovsk State University, Faculty of Medicine. - Ulyanovsk : UlSU, 2022. - 56 p. - На англ. яз.; Загл. с экрана. - URL: http://lib.ulsu.ru/MegaPro/Download/MObject/14075. - Режим доступа: ЭБС УлГУ. - Текст : электронный.
5. 1 Kolesnikov, L. L. Textbook of Human Anatomy. In 3 vol. Vol. 1. Locomotor apparatus / L. L. Kolesnikov, D. B. Nikitiuk, S. V. Klochkova, I. G. Stelnikova. - Москва : GEOTAR-Media, 2020. - 288 p. - 288 с. - ISBN 978-5-9704-5763-4. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : https://www.studentlibrary.ru/book/ISBN9785970457634.html

5.2 L., L. Kolesnikov Textbook of Human Anatomy. In 3 vol. Vol. 2. Splanchnology and cardiovascular system / L. L. Kolesnikov, D. B. Nikitiuk, S. V. Klochkova, I. G. Stelnikova. - Москва : GEOTAR-Media, 2020. - 320 p. - 320 с. - ISBN 978-5-9704-5764-1. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : https://www.studentlibrary.ru/book/ISBN9785970457641.html

Educational-methodical literature:

1. Methodological instructions for organization of self-study work of students in discipline "Pathophysiology, clinical pathophysiology" for specialty 31.05.01 "General medicine" / D. A. Kseiko, M. N. Avakova; Ulyanovsk State University, Faculty of Medicine, Department of Human Anatomy. - Ulyanovsk : UlSU, 2021. - 63 p. - Неопубликованный ресурс. - URL: http://lib.ulsu.ru/MegaPro/Download/MObject/10640 . - Режим доступа: ЭБС УлГУ. - Текст : электронный.
2. Methodological instructions for students on practical classes in the discipline of pathophysiology, clinical pathophysiology for the specialty 31.05.01. "General medicine". Part 2 : Systemic pathophysiology / D. A. Kseiko, M. N. Avakova; Ulyanovsk State University, Faculty of Medicine, Department of Human Anatomy. - Ulyanovsk : UlSU, 2021. - 39 p. - Неопубликованный ресурс. - URL: http://lib.ulsu.ru/MegaPro/Download/MObject/10639 . - Режим доступа: ЭБС УлГУ. - Текст : электронный.
3. Methodological instructions for students on practical classes in the discipline of pathophysiology, clinical pathophysiology for the specialty 31.05.01. "General medicine". Part 1 : General pathophysiology / D. A. Kseiko, M. N. Avakova; Ulyanovsk State University, Faculty of Medicine, Department of Human Anatomy. - Ulyanovsk : UlSU, 2021. - 40 p. - Неопубликованный ресурс. - URL: http://lib.ulsu.ru/MegaPro/Download/MObject/10638 . - Режим доступа: ЭБС УлГУ. - Текст : электронный.

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1.2. Образовательная платформа ЮРАЙТ : образовательный ресурс, электронная библиотека : сайт / ООО Электронное издательство «ЮРАЙТ». – Москва, [2024]. - URL: https://urait.ru . – Режим доступа: для зарегистрир. пользователей. - Текст : электронный.

1.3. База данных «Электронная библиотека технического ВУЗа (ЭБС «Консультант студента») : электронно-библиотечная система : сайт / ООО «Политехресурс». – Москва, [2024]. – URL: https://www.studentlibrary.ru/cgi-bin/mb4x. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.4. Консультант врача. Электронная медицинская библиотека : база данных : сайт / ООО «Высшая школа организации и управления здравоохранением-Комплексный медицинский консалтинг». – Москва, [2024]. – URL: https://www.rosmedlib.ru. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.5. Большая медицинская библиотека : электронно-библиотечная система : сайт / ООО «Букап». – Томск, [2024]. – URL: https://www.books-up.ru/ru/library/ . – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.6. ЭБС Лань : электронно-библиотечная система : сайт / ООО ЭБС «Лань». – Санкт-Петербург, [2024]. – URL: https://e.lanbook.com. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.7. ЭБС Znanium.com : электронно-библиотечная система : сайт / ООО «Знаниум». - Москва, [2024]. - URL: http://znanium.com . – Режим доступа : для зарегистрир. пользователей. - Текст : электронный.

2. КонсультантПлюс [Электронный ресурс]: справочная правовая система. / ООО «Консультант Плюс» - Электрон. дан. - Москва : КонсультантПлюс, [2024].

3. eLIBRARY.RU: научная электронная библиотека : сайт / ООО «Научная Электронная Библиотека». – Москва, [2024]. – URL: http://elibrary.ru. – Режим доступа : для авториз. пользователей. – Текст : электронный

4. Федеральная государственная информационная система «Национальная электронная библиотека» : электронная библиотека : сайт / ФГБУ РГБ. – Москва, [2024]. – URL: https://нэб.рф. – Режим доступа : для пользователей научной библиотеки. – Текст : электронный.

5. Российское образование : федеральный портал / учредитель ФГАУ «ФИЦТО». – URL: http://www.edu.ru. – Текст : электронный.

6. Электронная библиотечная система УлГУ : модуль «Электронная библиотека» АБИС Мега-ПРО / ООО «Дата Экспресс». – URL: http://lib.ulsu.ru/MegaPro/Web. – Режим доступа : для пользователей научной библиотеки. – Текст : электронный.

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12. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE:

The auditoriums for practical training, for monitoring and intermediate certification are equipped with specialized furniture, a blackboard, and there are also

- tables by the number of sections in the total number - 173 pcs.
- slides - 102 pcs.
- devices used for practical (laboratory) studies:

1. Photoelectric colorimeter KFK-2MP - 1 piece.
2. Electrocardiographs EK-1-TS-3M - 2 pcs.
3. Microscopes - BIOLAM - 15 pcs.
4. OI-19 illuminators - 10 pcs.
5. Laboratory centrifuge OS-6M - 1 pc.
6. Thermostat - 1 pc.
7. Goryaev's camera - 5 pcs.
8. Laboratory counters - 8 pcs.
9. Phonendoscope - 2 pcs.

Classrooms (2), equipped with table lighting (1), (building of the medical faculty, st.Arkh.Livchak 2)

The lecture halls are equipped with specialized furniture, a chalkboard, and there are also multimedia equipment for working with a large audience.

13. SPECIAL CONDITIONS FOR STUDENTS WITH DISABILITIES

If necessary, students from among persons with disabilities (at the request of the student) may be offered one of the following options for perception of information, taking into account their individual psychophysical characteristics:

- for persons with visual impairments: in printed form in an enlarged font; in the form of an electronic document; in the form of an audio file (translation of educational materials into audio format); in printed form in Braille; individual consultations with the involvement of a tiflosurd interpreter; individual assignments and consultations;
- for persons with hearing impairments: in printed form; in the form of an electronic document; videos with subtitles; individual consultations with the involvement of a sign language interpreter; individual assignments and consultations;
- for persons with disabilities of the musculoskeletal system: in printed form; in the form of an electronic document; in the form of an audio file; individual assignments and consultations.

If it is necessary to use partially / exclusively distance educational technologies in the educational process, the organization of work of teaching staff with students with disabilities and disabled people is provided in the electronic information and educational environment, taking into account their individual psychophysical characteristics.

Developer _____ Associate Professor Kseiko D.A.
Signature position name