

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

**Контрольный
экземпляр**

APPROVED

by Rector of the Educational
Institution «Belarusian State
Medical University»



S.P.Rubnikovich

26.06.2024

0911-01-23/24/25/edu.

CLINICAL PATHOLOGICAL PHYSIOLOGY

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

1-79 01 01 «General Medicine»

Curriculum is based on the educational program «Clinical Pathological Physiology», approved 26.06.2024, registration # УД-0911-01-23/2425/уч; on the educational plan in the specialty 1-79 01 01 «General Medicine», approved 15.05.2024, registration # 7-07-0911-01/2425/mf.

COMPILERS:

N.F.Soroka, Professor of the 2nd Department of Internal Diseases of the educational institution «Belarusian State Medical University», Doctor of Medical Sciences, Professor;

A.A.Bova, Professor of the Department of Military Field Therapy of the Military Medical Institute at the educational institution «Belarusian State Medical University», Doctor of Medical Sciences, Professor

RECOMMENDED FOR APPROVAL:

by the 2nd Department of Internal Diseases of the educational institution «Belarusian State Medical University»
(protocol # 13 of April 29, 2024);

by the Department of Military Field Therapy of the Military Medical Institute at the educational institution «Belarusian State Medical University»
(protocol # 11 of February 29, 2024);

by the Scientific and Methodological Council of the educational institution «Belarusian State Medical University»
(protocol # 18 of June 26, 2024)

EXPLANATORY NOTE

«Clinical Pathological Physiology» is an academic discipline within the module «Clinical Pathology and Clinical Diagnosis» containing systematic scientific knowledge about the general patterns and mechanisms of the occurrence, development, and outcomes of the most common diseases for choosing rational pathophysiologically justified approaches to their diagnosis and treatment.

The aim of the discipline «Clinical Pathological Physiology» is the formation of specialized competence for choosing rational pathogenetically justified treatment.

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

- the mechanisms of occurrence, development, and outcomes of pathological processes in the most common diseases;

- mechanisms of compensation for structural and functional disorders of human organs and systems;

- principles of disease diagnosis formation;

- pathophysiologically justified methods of diagnosis, treatment, and prevention of diseases;

- skills and abilities necessary for interpreting the results of laboratory and instrumental research methods.

Studying the educational discipline «Clinical Pathological Physiology» should ensure the formation of students' specialized competencies: perform pathophysiological analysis of disease symptoms and syndromes, including the data of clinical, laboratory and other methods of patient examination.

As a result of studying the academic discipline «Clinical Pathological Physiology» a student should:

know:

- the role and significance of the causes, conditions, and reactive properties of the human body in the occurrence, development, and outcome of diseases;

- etiology, pathogenesis, and key manifestations of typical pathological processes and reactions, their significance for the human body;

- principles of pathogenetic treatment of typical disorders of the human body;

- the origin and mechanisms of development of disease symptoms and syndromes;

- principles of diagnosing the most common diseases;

be able to:

- use functional diagnostic methods to assess the degree of organ or system dysfunction in the human body;

- justify pathogenetic treatment methods;

master:

- skills of pathophysiological analysis of clinical symptoms and syndromes, clinical-laboratory functional, and other patient examination methods;

- skills of choosing a pathogenetically justified method of disease treatment.

Total number of hours for the study of the discipline is 44 academic hours, of which 27 classroom hours and 17 hours of student independent work. Classroom hours according to the types of studies: lectures – 9 hours (including 3 hours of supervised student independent work (SSIW)), practical classes – 18 hours.

Intermediate assessment is carried out according to the syllabus of the specialty in the form of a credit (7th semester).

Form of higher education – full-time.

ALLOCATION OF ACADEMIC TIME ACCORDING TO SEMESTERS OF STUDY

Code, name of the specialty	semester	Number of academic hours						Form of intermediate assessment
		total	in-class	including			out-of-class self-studies	
				lectures	supervised student independent work	practical classes		
1-79 01 01 «General Medicine»	7	44	27	6	3	18	17	credit

THEMATIC PLAN

Section (topic) name	Number of class hours	
	lectures (incl. SSIW)	practical
1. Clinical pathophysiology of inflammation	3	-
2. Clinical pathophysiology of metabolic disorders in the human body	3	-
3. Clinical pathophysiology of respiratory disorders	1,5	-
4. Clinical pathophysiology of the digestive system	1,5	-
5. Clinical pathophysiology of the cardiovascular system	-	6
6. Clinical pathophysiology of the kidneys	-	6
7. Clinical pathophysiology of the blood and hemostasis system	-	6
Total hours	9	18

CONTENT OF THE EDUCATIONAL MATERIAL

1. Clinical Pathophysiology of Inflammation

Dialectical interconnection of damage and protective-adaptive reactions in the inflammatory process. Biological significance of inflammation. Acute and chronic inflammation. Inflammation stimuli and effectors, role of mediators and cytokines. Acute phase proteins in inflammation. Inflammation in infectious diseases, immune inflammation, immunoinflammatory process, allergic inflammation. Connection of inflammation, immunity, and allergy. Inflammation and regulatory systems of the human body. Pathophysiological mechanisms of febrile syndrome.

Pathophysiological characterization of the systemic inflammatory response syndrome: definition, diagnostic criteria, stages, principles of diagnosis, and treatment. Interrelation of systemic inflammatory response syndrome, disseminated intravascular coagulation, and multiple organ failure. Outcomes of inflammation. Principles of anti-inflammatory therapy.

2. Clinical Pathophysiology of Metabolic Disorders in the Human Body

Pathogenesis of different types of obesity. Metabolic disorders in obesity. Endocrine dysregulation in obesity. Metabolically healthy obesity. Obesity as the main cause of metabolic syndrome. Principles of prevention and treatment of metabolic syndrome.

Hyperlipidemias (hyperlipoproteinemias), pathogenic significance. Lipid hypothesis of atherosclerosis. Atherogenic and non-atherogenic lipoproteins. Lipidogram.

Clinical pathophysiology of diabetes mellitus and its complications. Assessment of carbohydrate metabolism. Disorders of acid-base balance in diabetes mellitus.

3. Clinical Pathophysiology of Respiratory Disorders

Typical forms of external respiration disorders. Compensatory-adaptive processes in the external respiration system. Pathophysiological justification for the use of functional diagnostic tests to detect external respiration system disorders. Evaluation of spirometry. Obstructive and restrictive types of alveolar hypoventilation, their clinical signs. Disorders of external respiration regulation, pulmonary perfusion disorders (pulmonary hypo- and hypertension), ventilation-perfusion ratio disorders, pathophysiological justification for dyspnea.

Acute respiratory distress syndrome: mechanisms of development and pathophysiological justification for treatment.

4. Clinical Pathophysiology of the Digestive System

Causes and pathological physiology of gastroesophageal reflux disease. Pathophysiological mechanisms of peptic ulcers.

Digestive disorders in the intestine: cavity and membrane. Causes of cavity digestion insufficiency: stomach diseases (gastrogenic maldigestion), pancreatic diseases (pancreatic maldigestion), hepatobiliary system diseases (chologenic maldigestion). Membrane digestion disorders in small intestine diseases. Decreased synthesis of intestinal enzymes, poor tolerance of certain foods, significance of dietary history. Conditions for the development of small intestine bacterial overgrowth syndrome.

Malabsorption syndrome: signs of impaired absorption of fats, carbohydrates, proteins, vitamins, and minerals.

Main causes of liver function disorders. Hepatic failure: types, causes, general pathogenesis, consequences. Mechanisms of liver function compensation. Hepatic coma: etiology, pathogenesis. Clinical pathophysiology of jaundice, their types and characteristics. Principles of prevention and pathogenetic therapy of liver diseases.

Principles of Prevention and Treatment of Digestive System Diseases

5. Clinical Pathophysiology of the Cardiovascular System

Pathophysiological mechanisms of arterial hypertension.

Clinical consequences of myocardial ischemia. Hibernation, stunning, and ischemic preconditioning of the myocardium. Pathophysiological characteristics of myocardial infarction and its complications. Justification of the principles of myocardial infarction treatment: coronary artery reperfusion, limitation of necrosis zone, and myocardial hemodynamic unloading. Laboratory markers of myocardial damage. Major urgent conditions in cardiology: cardiogenic pulmonary edema, pulmonary artery thromboembolism, cardiogenic shock, life-threatening arrhythmias. Causes and mechanisms of their development. Pathophysiological rationale for urgent care principles in these forms of pathology.

Pathophysiological basis of diagnosis, prevention, and treatment of heart failure. Importance of brain natriuretic peptide.

Examination of patients with myocardial infarction and angina pectoris. Development of a plan for examination and treatment of patients with myocardial infarction and angina pectoris.

6. Clinical Pathophysiology of the Kidneys

Typical forms of kidney pathology: causes, mechanisms of onset and development, outcomes, types. Pathophysiology of proteinuria. Selective and non-selective proteinuria. The role of proteinuria in the development of sclerotic processes in renal tissue. Nephrotic syndrome in kidney diseases and its causes.

Physiological mechanism of glomerular filtration and its disturbances in kidney diseases (chronic kidney disease, acute kidney injury). Methods for calculating glomerular filtration rate (GFR). GFR as the primary criterion for assessing the stage of chronic kidney disease.

Pathophysiological aspects and pathogenesis, clinical syndromes in chronic kidney failure. Mechanisms of secondary arterial hypertension formation. Pathophysiology of water-electrolyte, hormonal disorders, anemic syndrome, principles of correction. Mechanisms of compensation for impaired functions. Pathophysiology of acute kidney injury. Principles of prevention and treatment of kidney diseases.

Examination of patients with chronic kidney disease, kidney injury in diabetes mellitus and arterial hypertension. Development of a plan for examination and treatment of patients with chronic kidney disease.

7. Clinical Pathophysiology of the Blood and Hemostasis System

Erythrocytoses: types, causes, mechanisms of development, significance. Anemia: definition, classification, etiology, pathogenesis, manifestations. Adaptive reactions of the human body in anemias.

Typical changes in the leukocyte system (leukocytosis, leukopenia, agranulocytosis): types, causes, mechanisms of development, typical changes in the leukocyte formula. Disorders of leukocyte structure and function, their role in pathological processes.

Thrombocythemias and thrombocytopenias: causes, mechanisms of development. Pathophysiological basis of diagnostic algorithms for changes in the blood content of erythrocytes, leukocytes, and platelets. Differential diagnosis of leukemias and leukemoid reactions. Pathophysiological basis for the treatment of the most common blood disorders. Bone marrow examination in the diagnosis of blood system diseases.

Pathophysiological basics of diagnosing disorders of the hemostasis system. Principles of diagnosing thrombophilia and hemorrhagic syndrome. Pathogenesis features and manifestations of disseminated intravascular coagulation (DIC) syndrome. Pathophysiological basics of prevention and treatment of DIC syndrome.

Examination of patients with anemia, thrombophilia. Development of a plan for examination and treatment of patients with iron-deficiency anemia, thrombophilia.

ACADEMIC DISCIPLINE CURRICULAR CHART FOR THE DISCIPLINE «CLINICAL PATHOLOGICAL PHYSIOLOGY»

№	Section (topic) name	Number of classroom hours		Supervised student independent work	Practical Skills	Form of control	
		lectures	practical classes			of practical skills	of current / intermediate assessment
	Lectures	6		3			
1.	Clinical pathophysiology of inflammation	1,5	-	1,5			electronic testing
2.	Clinical pathophysiology of metabolic disorders	1,5	-	1,5			electronic testing
3.	Clinical pathophysiology of respiratory disorders	1,5	-	-			
4.	Clinical pathophysiology of digestive system	1,5	-	-			
	Practical Classes						
5.	Clinical pathophysiology of cardiovascular system	-	6	-	Interpretation of cardiac markers and ECG	Problem-solving scenarios	Quiz, control work*
6.	Clinical pathophysiology of kidneys	-	6	-	Interpretation of urine analysis, glomerular filtration rate	Problem-solving scenarios	Quiz, control work *
7.	Clinical pathophysiology of blood system and hemostasis	-	6	-	Interpretation of blood analysis, coagulation profile, D-dimers, bone marrow examination	Problem-solving scenarios *	Quiz, control work Credit
		9	18	3			

* is a mandatory form of current assessment.

INFORMATION AND INSTRUCTIONAL UNIT

LITERATURE

Basic (relevant):

1. Litvitsky, P. F. Clinical pathophysiology. Concise lectures, tests, cases = Клиническая патофизиология. Курс лекций, тесты, задачи : учебное пособие : student manual / P. F. Litvitsky, S. V. Pirozhkov, E. B. Tezиков. - Moscow : GEOTAR-Media, 2018. - 432 p.

Additional:

2. Беляева, Л. Е. Клиническая патофизиология: основы = Clinical pathophysiology: the essentials / Л. Е. Беляева. – Витебск : ВГМУ, 2018. – 355 с.

3. Патологическая физиология = Pathophysiology / Н. Е. Максимович [и др.]. – Гродно : ГрГМУ, 2014. – 291 с.

4. Pathophysiology of Disease: An Introduction to Clinical Medicine, 8e Eds. Gary D. Hammer, and Stephen J. McPhee. McGraw-Hill Education, 2019 – 832 p.

5. Berkowitz, Aaron. Clinical Pathophysiology Made Ridiculously Simple. – Edition 2. Miami, Florida : MedMaster, Inc, 2021. – 222 p.

6. Hubert, Robert J., Karin VanMeter, and Barbara E. Gould. Gould's pathophysiology for the health professions. Philadelphia: Saunders, 2018 – 704 p.

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

The allocated time for independent work can be utilized by students for:
 preparation for lectures and practical classes;
 preparation for credit;
 solving situational tasks;
 taking notes from educational literature.

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

Main forms of supervised student independent work:
 writing and presenting essays;
 delivering reports;
 taking notes from primary sources (monographs, textbooks);
 computer-based testing;
 students creating tests for mutual assessment;
 creating didactic materials;
 preparation and participation in active learning forms.

LIST OF AVAILABLE DIAGNOSTIC TOOLS

The following forms of current assessment are used to diagnose competencies:
 quiz,
 control work.
 solving situational tasks.

LIST OF AVAILABLE TEACHING METHODS

Linear (traditional) method;
 Active (interactive) methods:
 Problem-Based Learning (PBL).
 Case-Based Learning (CBL).

LIST OF PRACTICAL SKILLS

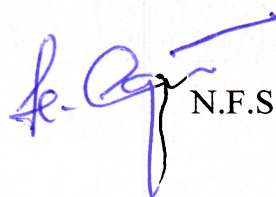
Name of practical skills	Form of practical skills control
1. Interpretation of blood analysis, coagulation profile, D-dimers, bone marrow examination	Solving situational tasks
2. Interpretation of electrocardiogram	Solving situational tasks
3. Interpretation of markers of myocardial damage and heart failure	Solving situational tasks
4. Interpretation of urine analysis, determination of glomerular filtration rate	Solving situational tasks

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

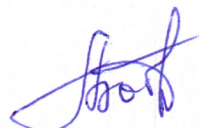
Title of the discipline requiring approval	Department	Amendments to the curriculum in the academic discipline	Decision of the department, which designed the curriculum (date, protocol #)
Pathological Physiology	Department of Pathological Physiology	No comments	protocol # 13 of April 29, 2024
Internal Medicine	2nd Department of Internal Diseases	No comments	protocol # 13 of April 29, 2024

COMPILERS:

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I.V.Nagornov

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

Dean of the Medical Faculty for International Students of the educational institution «Belarusian State Medical University»


O.S.Ishutin

24.06.2024

Methodologist of the Educational and Methodological Department of the Office of Educational Activities of the educational institution «Belarusian State Medical University»


S.V.Zaturanova

24.06.2024