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

**APPROVED**
by Rector of the Educational Institution «Belarusian State Medical University»
_____ S.P.Rubnikovich
26.06.2025
Reg. # UD-0911-01-43/2526edu.

Контрольный экземпляр

# CLINICAL IMMUNOLOGY AND ALLERGOLOGY

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

**1-79 01 01 «General Medicine»**

2025

Curriculum is based on the educational program «Clinical Immunology, Allergology», approved 26.06.2025, registration # УД-0911-01-43/2526/уч.; on the educational plan in the specialty 1-79 01 01 «General Medicine», approved 16.04.2025, registration # 7-07-0911-01/2526/mf.

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**RECOMMENDED FOR APPROVAL:**

by the Department of Propaedeutics of Internal Medicine of the Educational Institution «Belarusian State Medical University»
(protocol # 10 of 23.04.2025);

by the Department of Pulmonology, Phthisiology, Allergology and Occupational Pathology with a course for advanced training and retraining of the Educational Institution «Belarusian State Medical University»
(protocol # 22 of 24.06.2025);

by the Scientific and Methodological Council of the Educational Institution «Belarusian State Medical University»
(protocol # 10 of 26.06.2025)

## EXPLANATORY NOTE

«Clinical Immunology, Allergology» – the educational discipline of the Internal Diseases Module, which contains systematized scientific knowledge about the structure and functions of the human immune system in health and disease; epidemiology, etiology and pathogenesis of various types of immunopathology, methods and means of diagnosis, treatment and prevention of human diseases that are based on disorders in the immune system and/or immunological mechanisms of development.

The aim of the discipline «Clinical Immunology, Allergology» is the formation of specialized competencies for providing primary and specialized medical care for allergic and immunopathological diseases, including emergency and life-threatening conditions, mastering methods of interpreting tests for the diagnosis of autoimmune and allergic diseases, the results of laboratory and immunological monitoring during pathogenetic therapy.

The objectives of the discipline «Clinical Immunology, Allergology» are to form students' scientific knowledge about the basic concepts of immunology and allergology; epidemiology, etiology, pathogenesis, clinical manifestations of immunopathological diseases; immunogenic risk factors for the development and exacerbation of diseases of internal organs; skills and abilities necessary for

examination of patients;

interpretation of results of laboratory and instrumental research methods;

diagnosis formulation;

diagnosis, treatment and prevention of allergic and immunopathological diseases;

first aid for allergic and immunopathological diseases and conditions that threaten human life and health.

**Relations to other educational disciplines**

The knowledge, skills and abilities acquired during the study of the educational discipline «Clinical Immunology, Allergology» are necessary for successful mastering of the following educational disciplines: «Internal Diseases», «Infectious Diseases», «Professional Diseases».

Studying the educational discipline «Clinical Immunology, Allergology» should ensure the formation of students' specialized competencies - provide primary and specialized medical care in cases of internal organs pathology, including urgent and life-threatening conditions, occupational diseases; conduct medical and social expertise of internal organs pathology, including occupational diseases; apply methods of tests interpretation for the diagnosis of autoimmune and allergic diseases, laboratory and immunological control data assessment during pathogenetic therapy.

**As a result of studying the discipline «Clinical Immunology, Allergology» student should**

**know:**

basic concepts of the human immune system;

normal test results used to diagnose the main immunopathological and allergic diseases;

mechanisms of development of various forms of immunological aberrations (immunodeficiency, allergy, autoimmune diseases);

etiology, pathogenesis, classification, clinical manifestations, methods of treatment and prevention of allergic and immunopathological diseases;

indications for various types of immunotherapy and limitations due to possible adverse reactions to drugs;

rules of medical ethics and deontology;

**be able to:**

determine indications for immunodiagnostics and perform clinical interpretation of the results obtained;

perform differential diagnostics of diseases based on clinical immunology and allergology, take into account the conclusion of medical specialists when establishing the final clinical diagnosis;

**master:**

methods for interpreting test results used to diagnose allergic and immunopathological diseases;

methods for interpreting test results used for immunological monitoring of the effectiveness of pathogenetic therapy for allergic and immunopathological diseases.

**Total number** of hours for the study of the discipline is 60 academic hours, of which 39 classroom hours and 21 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 – 30 hours.

Form of higher education – full-time.

Intermediate assessment is carried out according to the syllabus in the academic disciplines «Clinical Immunology, Allergology», «Internal Medicine» of the Internal Medicine Module in the form of a credit (9 (10) semester).

## ALLOCATION OF ACADEMIC TIME ACCORDING TO SEMESTERS OF STUDY

| Code, name of the specialty | Semester | Total number of academic hours | Number of classroom hours | | | | Out-of-class self-studies | Form of intermediate assessment |
|---|---|---|---|---|---|---|---|---|
| | | | Number of classroom hours | including | | | | |
| | | | | class lectures | SSIW | practicals | | |
| 1-79 01 01 «General Medicine» | 9(10) | 60 | 39 | 6 | 3 | 30 | 21 | credit |

## THEMATIC PLAN

| Section (topic) name | Number of class hours | |
|---|---|---|
| | lectures (incl. SSIW) | practical |
| 1. Organization of immunological and allergy care in the Republic of Belarus. Immunity. Immunopathology. Immunodiagnosis | 1,5 | 6 |
| 2. Immunodeficiency diseases. Immunoprophylaxis of infectious complications | 3 | 6 |
| 3. Allergy. Allergens. Allergy diagnostics in vivo and in vitro. Allergen-specific immunotherapy, non-specific immunotherapy. Drug allergy. Life-threatening allergic diseases | 1,5 | 6 |
| 4. Allergic diseases of the respiratory system. Insect and food allergies. Allergic skin diseases | 1,5 | 6 |
| 5. Transplant immunity. Immune pathology of reproduction. Immunodiagnostics of autoimmune diseases. Principles of immunotherapy. Vaccination: local and systemic complications | 1,5 | 6 |
| **Total hours** | **9** | **30** |

## CONTENT OF THE EDUCATIONAL DISCIPLINE

**1. Organization of immunological and allergy care in the Republic of Belarus. Immunity. Immunopathology. Immunodiagnosis**

Clinical Immunology and Allergology as an educational discipline: subject, objectives, relations to other educational disciplines. Stages of development of immunology and allergology as a science. Organization of allergy care and immunology treatment in the Republic of Belarus. Indications for immunological examination. Formation of diagnosis, medical and social examination in immunopathology. Medical ethics and deontology.

Structure and functions of immunity. Factors of non-specific resistance of the organism. Differentiating CD antigens. Human leukocyte antigen system (HLA system). Cytokines. Innate and adaptive immunity. Regulation of the immune response. Cellular and humoral types of immune response. Immunopathological reactions (according to Gell-Coombs).

Immunodiagnostics. Enzyme immunoassay, radioimmune, immunofluorescent methods. Immunophenotyping. Concept of immune status, levels of immune status assessment. Assessment of innate immunity (level of granulocytes, monocytes, complement system and phagocytosis indicators). Assessment of adaptive immunity: cellular immunity (lymphocyte subpopulations, lymphocyte blast transformation reaction), humoral immunity (immunoglobulins A, G, M, E, D,

immune complex level, cytokine determination). Lymphocyte blast transformation reaction.

Immunodeficiency: definition, epidemiology, classification. Primary (congenital) and secondary immunodeficiency.

Clinical forms and manifestations of immunodeficiencies in children and adults. Humoral, cellular and combined immunodeficiency. Deficiencies of the complement system. Defects of phagocytosis.

**2. Immunodeficiency diseases. Immunoprophylaxis of infectious complications**

Primary immunodeficiency in adults: anamnesis, clinical picture, laboratory diagnostics. Certain forms of primary immunodeficiency in adults. Common variable immunodeficiency (CVID): clinical presentation, diagnostics, treatment. Hyper-IgE syndrome (Job's syndrome): clinical presentation, diagnostics, treatment. Chronic granulomatous disease: clinical presentation, diagnostics, treatment. Hereditary angioedema (HAE): clinical features, diagnostics, treatment. Selective IgA deficiency: clinical features, diagnostics, treatment. Autoinflammatory immunodeficiency syndromes.

Principles of treatment of primary immunodeficiency. Bone marrow, stem cell, thymus transplantation, genetic engineering methods. Replacement immunotherapy: intravenous immunoglobulins, principles of application. Treatment and prevention of HAE. Features of antibacterial and antiviral therapy of immunodeficiency.

Secondary immunodeficiency, causes, classification, clinical manifestations, laboratory diagnostics. Certain types of secondary immunodeficiency. HIV infection, clinical and laboratory signs, stages. Bacterial infections as a manifestation of immunodeficiency. Sepsis, a manifestation of immunodeficiency and autoinflammatory syndromes. Secondary immunodeficiency in nutritional disorders (cachexia, malabsorption); in metabolic diseases, etc.; after exposure to biological, physical, chemical agents, etc. Iatrogenic immunodeficiency. Modern immunomodulatory drugs.

Clinical analysis of patients with immune system pathology: collection of complaints and disease history, physical examination of the patient, formation of an examination plan, interpretation of the results of laboratory and instrumental examination methods, diagnosis rationale, determination of treatment tactics.

**3. Allergy. Allergens. Allergy diagnostics in vivo and in vitro. Allergen-specific immunotherapy, non-specific immunotherapy. Drug allergy. Life-threatening allergic diseases**

Epidemiology of allergic diseases. Factors contributing to the growth of prevalence of allergic diseases. Allergens, classification. Non-infectious (household, mite, epidermal, food, pollen, medicinal) and infectious allergens (fungal, bacterial). Chemical allergens. Classification of allergic reactions.

Allergy diagnostics. Allergy history. Allergological examination in vitro and in vivo. Total and allergen-specific IgE and IgG. Molecular allergy diagnostics. Skin allergy tests (prick test, scarification and intradermal tests). Provocation tests.

Types of drug hypersensitivity. Drugs and medications as allergens. Drug hypersensitivity: classification, pathogenesis, clinical manifestations, diagnosis and differential diagnosis, medical history, skin tests, provocation tests, laboratory methods, clinical evaluation. Visceral involvement in drug hypersensitivity: hematologic, renal, cardiac, nervous system and other organ manifestations.

Principles of treatment and emergency care for allergic diseases. Antihistamines, mast cell stabilizers, other drugs. Corticosteroids, systemic and topical. Allergen-specific (ASIT) and non-specific immunotherapy.

Life-threatening allergic diseases (angioedema, anaphylaxis, toxic epidermal necrosis). Angioedema: pathogenesis, clinical manifestations, emergency medical care. Anaphylaxis. Causes of anaphylactic shock, the role of allergens and nonspecific agents, pathogenesis and clinical manifestations. Emergency therapy for shock. Prevention of anaphylactic reactions. Lesions of the skin and mucous membranes. Lyell's syndrome, Stevens-Johnson syndrome. Visceral lesions in drug hypersensitivity of the blood, kidneys, heart, nervous system and other organs.

**4. Allergic diseases of the respiratory system. Insect and food allergies. Allergic skin diseases**

Bronchial asthma, classification. Phenotypes of bronchial asthma. Clinical manifestations, laboratory and instrumental diagnostics. Asthmatic status. Spirometry technique. Conducting a test with bronchodilators. Evaluation of spirogram indicators, differential diagnostics of bronchial asthma and COPD. Principles of drug treatment of bronchial asthma: drugs of basic therapy and drugs of emergency care. Genetically engineered (biological) therapy of bronchial asthma.

Allergic rhinitis, year-round and seasonal, clinical picture, diagnostics. Pollen allergens, «pollen» waves in the Republic of Belarus.

Insect allergy. Hymenoptera insect stings: diagnostics, clinical manifestations. Allergic reactions to bites of blood-sucking insects. Treatment and prevention of insect allergy.

Food allergy. Types of food intolerance. Food allergens, food additives. Differential and specific diagnostics of food allergy (food diary, elimination tests, provocative tests), treatment, elimination diets, non-specific and specific therapy. Latex allergy, clinical picture, diagnostics and treatment.

Allergic dermatitis, contact allergic dermatitis, photoallergic dermatitis: clinical manifestations, diagnostics, treatment, prevention of exacerbations. Atopic dermatitis in adults: clinical presentation, diagnostics and treatment. Diagnostic algorithm, treatment tactics for acute and chronic urticaria.

**5. Transplant immunity. Immune pathology of reproduction. Immunodiagnostics of autoimmune diseases. Principles of immunotherapy. Vaccination: local and systemic complications**

Transplantation immunity. Immunology of reproduction. Immunological approaches in related fields. Immunological methods of diagnostics of autoimmune diseases of connective tissue, liver, kidneys, nervous system, intestines.

Treatment based on immunological principles. CAR T-cell therapy. Biological therapy. Vaccination, mechanisms, local and systemic complications. Immunoglobulin-based drugs.

## EDUCATIONAL DISCIPLINE CURRICULAR CHART

| Section, topic # | Section (topic) name | Number of class hours | | SSIW | Literature | Practical skills | Form of control | |
|---|---|---|---|---|---|---|---|---|
| | | lectures | practical | | | | of practical skills | of current / intermediate assessment |
| | **Lectures** | **6** | **-** | **3** | | | | |
| 1. | Organization of immunological and allergy care in the Republic of Belarus. Immunity. Immunopathology. Immunodiagnosis | 1,5 | - | - | 1, 2, 3, 6 | | | |
| 2. | Immunodeficiency diseases. Immunoprophylaxis of infectious complications | 1,5 | - | 1,5 | 1, 2, 3, 6 | | | Testing; defense of the abstract (report) |
| 3. | Allergy. Allergens. Allergy Diagnostics in vivo and in vitro. Allergen-specific immunotherapy, non-specific immunotherapy. Drug allergy. Life-threatening allergic diseases | 1,5 | - | - | 1, 2, 3, 5, 6 | | | |
| 4. | Allergic diseases of the respiratory system. Insect and food allergies. Allergic skin diseases | 1,5 | - | - | 1, 2, 3, 4, 6 | | | Testing; defense of the abstract (report) |
| 5. | Transplant immunity. Immune pathology of reproduction. Immunodiagnostics of autoimmune diseases. Principles of immunotherapy. Vaccination: local and systemic complications | - | - | 1,5 | 1, 2, 3, 6 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Practical lessons** | **-** | **30** | | - | | | |
| 1. | Organization of immunological and allergy care in the Republic of Belarus. Immunity. Immunopathology. Immunodiagnosis | - | 6 | - | 1, 2, 3, 6 | Hand hygiene | Visual assessment of practical skill performance | Interview |
| 2. | Immunodeficiency diseases. Immunoprophylaxis of infectious complications | - | 6 | - | 1, 2, 3, 6 | Interpretation of immunological test results | Case study analysis | Interview, control work, testing |
| 3. | Allergy. Allergens. Allergy Diagnostics in vivo and in vitro. Allergen-specific immunotherapy, non-specific immunotherapy. Drug allergy. Life-threatening allergic diseases | - | 6 | - | 1, 2, 3, 5, 6 | Providing medical care for anaphylaxis* | Performing a practical skill on simulation equipment* | Interview, control work, testing |
| 4. | Allergic diseases of the respiratory system. Insect and food allergies. Allergic skin diseases | - | 6 | - | 1, 2, 3, 4, 6 | Interpretation of the spirometry results. Interpretation of the peak flow test results | Case study analysis | Interview, control work, testing |
| 5. | Transplant immunity. Immune pathology of reproduction. Immunodiagnostics of autoimmune diseases. Principles of immunotherapy. Vaccination: local and systemic complications | - | 6 | - | 1, 2, 3, 6 | Interpretation of allergy test results | Case study analysis | Defense of the abstract (report) |
| | **Total hours** | **6** | **30** | **3** | | | | |

*This is a mandatory form of current certification.

# INFORMATION AND INSTRUCTIONAL UNIT

## LITERATURE

**Basic (relevant):**

1. Khaitov, R. M. Immunology : textbook / R. M. Khaitov. – 2nd ed. – Moscow : GEOTAR-Media, 2022. – 272 p.

**Additional:**

2. Immunology. An Introductory Textbook. – Ed. by Anil K. Sharma. – Pan Stanford Publishing Pte. Ltd., 2019. – 261 p.

3. Chernoshey, D. A. Immunology : laboratory practical training / D. A. Chernoshey, V. V. Slizen, T. A. Kanashkova. – 10nd ed. – Minsk : BSMU, 2023. – 64 p.

**Normative regulatory acts:**

4. Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention, 2025. Available from: www.ginasthma.org.

5. Anaphylaxis : Emergency treatment guidelines. Available from: www.allergy.org.au.

**Electronic courseware for the educational discipline «Clinical immunology, allergology»:**

6. https://etest.bsmu.by/course/view.php?id=1605.

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

The time allocated for independent work can be used by students for:
preparing for lectures, practical classes;
preparing for credit in the academic discipline;
studying the topics (issues) designed for independent work;
preparing thematic reports, abstracts, presentations;
taking notes of educational literature.

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

**APPROXIMATE LIST OF TASKS FOR SUPERVISED STUDENT INDEPENDENT WORK:**

preparation of thematic reports, abstracts, presentations;
taking notes of original sources (monographs, textbooks, etc.);
preparation of tests for the organization of mutual control;
design of information and demonstration materials (stands, posters, graphs, tables, newspapers, etc.).

**FORMS OF CONTROL OF SUPERVISED STUDENT INDEPENDENT WORK:**

defense of the abstract (report);
testing (electronic testing).

## LIST OF AVAILABLE DIAGNOSTIC TOOLS

The following forms of current certification are used to diagnose competencies:
defense of the abstract (report);
interview;
situational tasks;
testing;
control work.

## LIST OF AVAILABLE TEACHING METHODS

Traditional method;
active (interactive) methods:
Problem-Based Learning (PBL);
Team-Based Learning (TBL);
Case-Based Learning (CBL);
Research-Based Learning (RBL);
training based on simulation technologies.

## LIST OF PRACTICAL SKILLS

| Name of practical skills | Form of practical skills control |
|---|---|
| 1. Interpretation of immunological test results | Case study analysis |
| 2. Interpretation of the spirometry results | Case study analysis |
| 3. Interpretation of allergy test results | Case study analysis |
| 4. Interpretation of the peak flow test results | Case study analysis |
| 5. Providing medical care for anaphylaxis | Performing a practical skill on simulation equipment |
| 6. Hand hygiene | Visual assessment of practical skill performance |

## LIST OF SIMULATION EQUIPMENT USED

1. A mannequin (simulator) that provides the opportunity to perform a practical skill of emergency medical care in case of anaphylactic shock.

# PROTOCOL OF THE CURRICULUM APPROVAL BY OTHER DEPARTMENTS

| Title of the discipline requiring approval | Department | Amendments to the curriculum in the academic discipline | Decision of the department, which designed the curriculum (date, protocol # ) |
|---|---|---|---|
| 1. Internal diseases | Internal Medicine, Gastroenterology and Nutrition with training and advanced training courses | No offers | Protocol # 10 23.04.2025 |
| | Internal Diseases, Cardiology and Rheumatology with a course of advanced training and retraining | No offers | Protocol # 10 23.04.2025 |
| | Cardiology and Internal Diseases | No offers | Protocol # 10 23.04.2025 |
| 2. Infectious diseases | Infectious diseases | No offers | Protocol # 10 23.04.2025 |

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

Head of the Office of Educational Activities of the educational institution «Belarusian State Medical University» I.L.Kotovich
24.06.2025

Methodologist of the Educational and Methodological Department of the Office of Educational Activities of the educational institution «Belarusian State Medical University» S.V.Zaturanova
24.06.2025