Ministry of Health of Ukraine
Poltava State Medical University
Department of internal medicine №3 with phthisiology

SILLABUS
INTERNAL MEDICINE
(INCLUDING CLINICAL PHARMACOLOGY, CLINICAL IMMUNOLOGY AND ALLERGOLOGY, OCCUPATIONAL DISEASES)

Module 4. Clinical immunology and allergology

Normative

OK 22 Internal medicine, including clinical pharmacology, clinical immunology and allergology, occupational diseases

academic and professional level	the second (master's) level of higher education
field of knowledge	22 «Healthcare»
Specialty	222 «Medicine»
academic qualification	Master of Medicine
professional qualification	Medical Doctor
academic and professional program	«Medicine»
mode of study	full-time
course(s) and semester(s) of study of the discipline	5th year with a standard term of study - 9th semester, 5th year - 10th semester

Poltava – 2023

INFORMATION ABOUT LECTURERS WHO DELIVER THE ACADEMIC DISCIPLINE

Surname, name, patronymic of the lecturer (lecturers), scientific degree, academic title	Kaidashev Igor Petrovich, MD, PhD, Professor Belan Oksana Vasylivna, Candidate of Medical Science Bilko Valeriia, assistant
Profile of the lecturer (lecturers)	https://int-med-three.pdmu.edu.ua/team
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MAIN CHARACTERISTICS

Module 4. Clinical immunology and allergology

Scope.

Number of credits / hours 1.5 / 45, of which:
Practical (hours) - 24
Independent work (hours) - 17
Lectures (hours) - 4
Type of control - final module control (FMC)

Academic discipline policy

When organizing the educational process at PSMU, teachers and students act in accordance with the following:

Regulations on the organization of the educational process at Poltava State Medical University (https://www.pdmu.edu.ua/n-process/department-npr/normativni-dokumenti).

Regulations on academic integrity of higher education students and staff of Poltava State Medical University(https://www.pdmu.edu.ua/n-process/viddil-monitoryngu-osvity/informaciyi-materiali-n-process-vimo-ek9k).

Internal regulations for students of Poltava State Medical University (https://www.pdmu.edu.ua/n-process/department-npr/normativni-dokumenti).

Regulations on the organization and methodology of evaluation of higher education students' learning activities at Poltava State Medical University ((https://www.pdmu.edu.ua/n-process/department-npr/normativni-dokumenti).

Regulations on the organization of students' self-study at Poltava State Medical University (https://www.pdmu.edu.ua/n-process/department-npr/normativni-dokumenti).

Regulations on non-formal and informal education of participants of the educational process of Poltava State Medical University (https://www.pdmu.edu.ua/n-process/department-npr/normativni-dokumenti).

The Department of Internal Medicine №3 with Phthisiology is located on the basis of the therapeutic department of the Municipal Enterprise "1st City Clinical Hospital of Poltava City Council" at the address: 27a Olesia Honchara St., Poltava.

Students come to class according to the schedule. Late arrivals are not allowed. Classes are held without interruption. The hospital has a dressing room where students change their clothes. During their stay at the department, students must adhere to the professional dress code, which provides for a medical uniform - a gown and a medical cap, preferably white, impeccably clean, ironed. Hats are not allowed in the premises of the department. It is forbidden to wear medical uniforms under outerwear and outside the clinical base. Compliance with the specified dress code is ensured on the basis of moral self-control of each student.

Description of the subject Module 4. Clinical immunology and allergology.

Almost every quarter of a century, qualitative revolutionary changes in theoretical concepts and practical immunology occur, starting with the discovery of phagocytosis, humoral and cellular immune responses, central and peripheral immune organs, immunological tolerance, theories of helper-suppressor regulation and ending with the idea of immunogenetic methods of analysis, Toll-like receptors, types of modern immunobiological therapy, immune-dependent mechanisms of infertility, regenerative medicine and others. In recent decades, the widespread prevalence of allergic diseases, their diagnosis and treatment have become increasingly important. All this encourages in-depth study of applied immunology and allergology as independent clinical disciplines.

Clinical immunology is a clinical and laboratory discipline that deals with the examination, diagnosis and treatment of patients with diseases or pathological processes that develop as a result of immune mechanisms disorders, as well as cases where immunological mechanisms are an important part of therapy and/or prevention.

Allergology is a branch of medicine that studies the increased sensitivity of the body's immune system to foreign structures, pathological manifestations of these reactions, methods of their diagnosis, prevention and treatment.

Prerequisites and co-requisites of the discipline (interdisciplinary connections).

Prerequisites:

The study of Module 4. Clinical immunology and allergology is based on the knowledge gained in medical biological (medical biology, medical, biological and bioorganic chemistry, physiology, histology, cytology, microbiology, virology and immunology, social medicine, public health and the basics of evidence-based medicine and is integrated with these disciplines) and clinical departments.

Post-requisites:

The acquired knowledge in the course of study is integrated into semiotic thinking skills. This involves the development of skills to apply knowledge of clinical immunology and allergology in the process of further study and in professional activities. Also, the study of clinical immunology and allergology lays the foundation for the formation of knowledge, skills and abilities necessary for further professional activities.

Purpose and objectives of the discipline:

- *the purpose of studying*

Module 4. Clinical Immunology and Allergology is to train specialists who have sufficient theoretical knowledge and practical skills to conduct a clinical examination, select the optimal laboratory diagnosis and the most rational drug therapy in a particular patient with manifestations of immune system disorders, taking into account the individual characteristics of the body, the course and form of the disease, the presence of concomitant pathology.

- *the main tasks of studying*

Module 4. Clinical immunology and allergology is to train a specialist with sufficient theoretical and practical knowledge and skills to establish a diagnosis, prescribe adequate treatment; ability to determine the nature of immunological disorders in patients with various pathologies, form risk groups, conduct immunoprophylaxis, identify clinical and laboratory signs of possible immune disorders in patients with acute, recurrent and chronic pathology, establish diagnosis, classify symptoms and syndromes of immunological disorders. Conduct differential diagnosis of hereditary and acquired immune disorders in various pathologies based on anamnesis, clinical and laboratory examination of the patient, make a plan for the examination and treatment of the patient, taking into account immunological processes, age of the patient, health status, season.

Competencies and learning outcomes contributed to by the discipline (integral, general, special) for Module 4. Clinical immunology and allergology

- ***integral:***

The ability to solve complex specialized problems and practical problems in professional activities in the field of health care in the specialty "Medicine" or in the process of study, which involves research and/or innovation and is characterized by complexity and uncertainty of conditions and requirements.

- ***General competencies (GC):***

GC 1. Ability to think abstractly, analyze and synthesize.

GC 2. Ability to learn and master modern knowledge.

GC 3. Ability to apply knowledge in practical situations.

GC 4. Knowledge and understanding of the subject area and understanding of professional activities.

GC 5. Ability to adapt and act in a new situation.

GC 6. Ability to make informed decisions.

GC 7. Ability to work in a team.

GC 8. Ability to interpersonal interaction.

GC 9. Ability to communicate in a foreign language.

GC 10. Ability to use information and communication technologies.

GC 11. Ability to search, process and analyze information from various sources.

GC 12. Determination and perseverance in tasks and responsibilities.

GC 13. Awareness of equal opportunities and gender issues.

GC 14. Ability to realize their rights and responsibilities as a member of society, to realize the values of civil (free democratic) society and the need for its sustainable development, the rule of law, and the development, the rule of law, human and civil rights and freedoms in Ukraine.

GC 15. The ability to preserve and enhance moral, cultural, scientific values and achievements of society based on an understanding of the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, technology and technology, to use various types and forms of physical activity for active recreation and healthy lifestyle.

- special (professional) competencies (SC):

SC 1. Ability to collect medical information about the patient and analyze clinical data.

SC 2. Ability to determine the necessary list of laboratory and instrumental studies and evaluate their results.

SC 3. Ability to establish a preliminary and clinical diagnosis of the disease.

SC 4. Ability to determine the necessary mode of work and rest in the treatment and prevention of diseases.

SC 5. Ability to determine the nature of nutrition in the treatment and prevention of diseases.

SC 6. Ability to determine the principles and nature of treatment and prevention of diseases.

SC 7. Ability to diagnose emergency conditions.

SC 8. Ability to determine the tactics and provision of emergency medical care.

SC 9. Ability to carry out medical and evacuation measures.

SC 10. Ability to perform medical manipulations.

SC 11. Ability to solve medical problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.

SC 12. Ability to determine the tactics of physiological pregnancy, physiological labor and postpartum period. Skills in counseling on family planning and selection of contraceptive methods.

SC 13. Ability to carry out sanitary and hygienic and preventive measures.

SC 16. Ability to maintain medical records, including electronic forms.

SC 17. Ability to assess the impact of the environment, socio-economic and biological determinants on the health of an individual, family, population.

SC 23. Ability to develop and implement scientific and applied projects in the field of health care.

SC 24. Adherence to ethical principles when working with patients, their relatives, and laboratory animals.

SC 25. Observance of professional and academic integrity, responsibility for the accuracy of scientific results.

Programmatic learning outcomes, which are facilitated by the formation of (PLO):

Module 4. Clinical immunology and allergology.

PLO 1. Have a thorough knowledge of the structure of professional activity. Be able to carry out professional activities that require updating and integrating knowledge. Be responsible for professional development, the ability to further professional training with a high level of autonomy.

PLO 3. Specialized conceptual knowledge, including scientific achievements in the field of health care and is the basis for research, critical thinking of problems in the field of medicine and related interdisciplinary problems.

PLO 4. Select and identify the leading clinical symptoms and syndromes (according to the list 1: anemic syndrome, anuria and oliguria, abdominal pain, vomiting, fever, hemorrhagic syndrome, exanthema, enanthema, hepatomegaly and hepatoliver syndrome, diarrhea, cough, lymphadenopathy, edema syndrome, itching of the skin, joint syndrome, weight loss, partial or complete loss of vision, partial or complete hearing loss); according to standard methods, using preliminary data from the patient's anamnesis, examination data, knowledge about the person, his/her organs and systems, establish a preliminary clinical diagnosis of the disease (according to the list 2: Anemia, congenital (Bruton's disease, Wiskott-Aldridge syndrome) and acquired immunodeficiency states, multiple sclerosis, conjunctivitis, bronchial asthma, enteritis, colitis, glomerulonephritis, blistering dermatoses, dermatomyositis and polymyositis, rheumatoid arthritis, systemic lupus erythematosus, systemic vasculitis, thyroiditis, herpesvirus diseases, influenza and other acute respiratory viral infections, immune conflict during pregnancy, infertility).

PLO 5. Collect complaints, anamnesis of life and diseases, assess the patient's psychomotor and physical development, the state of organs and body systems, evaluate information on the diagnosis based on the results of laboratory and

instrumental studies (according to the list 4: complete blood count, general immunological blood profile, serological reactions in infectious diseases, serological reactions in autoimmune diseases), taking into account the patient's age.

PLO 6. To establish the final clinical diagnosis by making an informed decision and analyzing the obtained subjective and objective data of clinical, additional examination, conducting differential diagnosis, adhering to the relevant ethical and legal standards, under the supervision of a supervising physician in a health care facility (according to the list 2: anemia, congenital (Bruton's disease, Wiskott-Aldridge syndrome) and acquired immunodeficiency states, multiple sclerosis, conjunctivitis, bronchial asthma, enteritis, colitis, glomerulonephritis, blistering dermatoses, dermatomyositis and polymyositis rheumatoid arthritis, systemic lupus erythematosus, systemic vasculitis, thyroiditis, herpesvirus diseases, influenza and other acute respiratory viral infections, immune conflict during pregnancy, infertility).

PLO 7. To prescribe and analyze additional (mandatory and optional) methods of examination (laboratory, functional and/or instrumental) (according to list 4: complete blood count, general immunological blood profile, serological reactions in infectious diseases, serological reactions in autoimmune diseases), patients with diseases of organs and systems of the body for differential diagnosis of diseases (according to list 2: Anemia, congenital (Bruton's disease, Wiskott-Aldridge syndrome) and acquired immunodeficiency states, multiple sclerosis, conjunctivitis, bronchial asthma, enteritis, colitis, glomerulonephritis, blistering dermatoses, dermatomyositis and polymyositis, rheumatoid arthritis, systemic lupus erythematosus, systemic vasculitis, thyroiditis, herpesvirus diseases, influenza and other acute respiratory viral infections, immune conflict during pregnancy, infertility).

PLO 8. Determine the main clinical syndrome or what causes the severity of the victim's/injured person's condition (according to list 3: asphyxia (including neonatal), acute anaphylactic reactions, snake, insect, animal bites) by making an informed decision and assessing the human condition under any circumstances (in a health care facility, outside), including in an emergency and hostilities, in the field, in conditions of lack of information and limited time.

PLO 9. Determine the nature and principles of treatment of patients (conservative, surgical) with diseases (according to the list 2: anemia, congenital (Bruton's disease, Wiskott-Aldridge syndrome) and acquired immunodeficiency states, multiple sclerosis, conjunctivitis, bronchial asthma, enteritis, colitis, glomerulonephritis, blistering dermatoses, dermatomyositis and polymyositis, rheumatoid arthritis, systemic lupus erythematosus, systemic vasculitis, thyroiditis, herpesvirus diseases, influenza and other acute respiratory viral infections, immune conflict during pregnancy, infertility), taking into account the patient's age, in a healthcare facility, outside the facility and during medical evacuation, including including in the field, on the basis of a preliminary clinical diagnosis, in compliance with relevant ethical and legal standards, by making an informed decision according to existing algorithms and standard schemes, if necessary, expand the standard

scheme, be able to justify personalized recommendations under the supervision of a supervising physician in a medical institution.

PLO 10. Determine the necessary regimen of work, rest and nutrition based on the final clinical diagnosis, observing the relevant ethical and legal standards, by making an informed decision based on existing algorithms and standard schemes.

PLO 16. To formulate rational medical routes for patients; organize interaction with colleagues in their own and other institutions, organizations and institutions; apply tools for promoting medical services in the market, based on an analysis of the needs of the population, in the conditions of functioning of a health care institution, its unit, in a competitive environment.

PLO 17. Perform medical manipulations (according to the list 5) in a medical institution, at home or at work on the basis of a preliminary clinical diagnosis and/or indicators of the patient's condition by making an informed decision, adhering to the relevant ethical and legal standards.

PLO 21. Search for necessary information in professional literature and databases of other sources, analyze, evaluate and apply this information.

PLO 22. Apply modern digital technologies, specialized software, statistical methods of data analysis to solve complex health care problems.

PLO 25. To clearly and unambiguously communicate own knowledge, conclusions and arguments on 13 health care problems and related issues to specialists and non-specialists.

PLO 27: Communicate fluently in the state language and English, both orally and in writing, to discuss professional activities, research and projects. To use international Greek-Latin terms, abbreviations and clichés in professional oral and written communication.

Learning outcomes for Module 4. Clinical immunology.

According to the requirements of the educational and professional program, students must:

know:

- Standard schemes of interviewing and clinical examination of patients with immunodeficiencies, immune-dependent and allergic diseases .
- Leading clinical symptoms and syndromes of immunodeficiencies, immunodeficient and allergic diseases.
- Criteria for the preliminary diagnosis of immunodeficiencies, immunodeficient and allergic diseases.
- Diagnosis of immunodeficiencies, immune-dependent and allergic diseases.
- Required mandatory and additional (laboratory and instrumental) research methods and their diagnostic value.
- Differential diagnosis of immunodeficiencies, immunodeficient and allergic diseases.
- Criteria for the clinical diagnosis of immunodeficiencies, immunodeficient and allergic diseases .

- Necessary work, rest and nutrition regimen for patients with immunodeficiency and allergic diseases.
- Principles and types of treatment of immunodeficiencies, immunodeficient and allergic diseases.
- Algorithms and standardized treatment regimens for immunodeficiencies, immunodeficient and allergic diseases.
- Criteria for diagnosing emergency conditions in acute allergic diseases.
- Tactics and provision of emergency medical care in case of emergency conditions in acute allergic diseases.
- Algorithms for performing medical manipulations.
- Primary and secondary prevention, prognosis and working capacity of patients with immunodeficiencies, immune-dependent and allergic diseases.
- Medical documentation, including electronic forms.
- The system of official document flow in the professional work of a doctor, including modern computer information technologies.
- Ethical principles when working with patients.
- Principles of professional and academic integrity.

Be able to:

- Take complaints, medical and life history, and evaluate clinical findings
- Identify the leading clinical symptom or syndrome.
- Establish a preliminary diagnosis of immunodeficiencies, immune-dependent and allergic diseases.
- Prescribe laboratory and instrumental (mandatory and additional) methods of examination of patients with immunodeficiencies, immunodeficient and allergic diseases and analyze their results.
- Conduct differential diagnosis of immunodeficiencies, immune-dependent and allergic diseases.
- Establish a clinical diagnosis of immunodeficiencies, immunodeficient and allergic diseases based on the analysis of the data obtained from clinical, additional examination, differential diagnosis.
- Determine the necessary regimen of work, rest, nutrition for patients with immunodeficiencies, immunodeficient and allergic diseases.
- Determine the principles of treatment of immunodeficiencies, immunodeficient and allergic diseases, taking into account the patient's age, based on the clinical diagnosis according to existing algorithms and standardized schemes.
- To carry out primary and secondary prevention of acquired immunodeficiencies, immunodeficient and allergic diseases.
- Determine the ability to work and assess the prognosis of patients with immunodeficiencies, immunodeficient and allergic diseases.
- Diagnose emergency conditions.

- Determine the tactics and provide emergency medical care in case of allergic diseases emergencies.
- Perform medical procedures.
- Maintain medical records, including electronic forms.
- Search for necessary information in professional literature and databases of other sources, analyze, evaluate and apply this information.
- Apply modern digital technologies, specialized software, statistical methods of data analysis to solve complex health care problems.
- Follow ethical principles when working with patients.
- Follow professional and academic integrity, to be responsible for the accuracy of the scientific results obtained.

Thematic plan of lectures (by modules) with an indication of the main issues to be considered at the lecture

№	Topic title	Number of hours
1	**The main tasks and problems of clinical immunology. Principles of immune system functioning, clinical and laboratory assessment of its disorders. Diseases of the immune system. Principles of immunodiagnostics, immunotherapy, immunorehabilitation and immunoprophylaxis.** Mechanisms of immune protection in bacterial and viral infections. The role of the immune system in antifungal immunity and protection against helminths. The importance of the immune system in the development of opportunistic and protozoal infections. Immunological methods in the diagnosis of infectious diseases. Immune response in acute inflammatory process. Innate immunodeficiency diseases: definition, classification, mechanisms of development. Etiology, immunopathogenesis, diagnosis and immunotherapy of AIDS. Immunological methods in the diagnosis of AIDS. Immunogram dynamics of HIV-infected and AIDS patients. Immunoprophylaxis of HIV infection. Classification of immunotropic drugs, mechanism of action, side effects. Principles of clinical use of immunotropic drugs, indications and contraindications for prescription, dose selection, immunological monitoring of therapeutic efficacy: immunosuppressive drugs; immunocorrective drugs; blockers of mediators of immune reactions; anti-inflammatory drugs; replacement therapy; cytokine therapy, antireceptor drugs, etc. Therapeutic forms of monoclonal antibodies: classification, features of application. Basic principles of immunoprophylaxis of bacterial and viral infections.	2
2	**Modern views on atopic diseases as systemic diseases. Allergic diseases. Classification, clinical examples.**	2

	Modern concepts of allergy and atopy. The role of genetic factors and the environment in the immunopathogenesis of allergy. Allergy as a systemic disease. Types and main stages of immunological reactions. The concept of hypersensitivity and its varieties. Types of allergens. Allergopathology developing by the reactive type: principles of diagnosis, prevention and treatment. Diseases developing according to the second, third and fourth types of immune response: clinic, features of diagnosis and treatment. Types of laboratory allergy diagnostics: the concept of specific immunoglobulins, major and minor allergens. Modern methods of specific, pathogenetic and symptomatic therapy of allergic diseases. Mechanisms of development, clinic and diagnosis of emergency conditions in allergology. Peculiarities of treatment of emergency conditions Drug allergy: causes, immunopathogenesis, clinic, allergy diagnostics and prevention.	
Total		4

Thematic plan of seminar classes by modules and content modules with an indication of the main issues to be considered at the seminar class (According to the working curriculum - not provided).

Thematic plan of practical classes with an indication of the main issues to be considered at the practical class

Module 4. Clinical immunology and allergology		
1	**Modern views on the structure and function of the immune system. Supervision of patients.** Definition and types of immunity. Central and peripheral organs of the immune system. Factors of innate immunity: cellular (monocyte-macrophage system, killer cells), humoral (complement system, cytokines, etc.). Specific adaptive immunity. Populations (T- and B-lymphocytes) and subpopulations (T-helper type 1 and 2, T-regulatory, T-CTL) of lymphocytes, stages of their maturation and differentiation, their function. Immunoglobulins circulating immune complexes: structure, properties, functions. Major histocompatibility complex: structure, properties, function. Features of the structure and immune response of mucous membranes.	2
2	**Immunological methods of research. The concept of immunogram.** Features of immunological history. Clinical methods of immune system assessment. Laboratory and instrumental methods for assessing the immune system. Monoclonal antibodies as a factor in immunodiagnostics. Methods used to assess humoral innate defense factors, cellular immunity. Comprehensive assessment of local	2

	immunity. Modern methods of rapid diagnostics, laboratory diagnostics based on flow cytometry, multiplex analysis. Immunogram, clinical interpretation of results. Prospects for immunogenetic research, immunogenomics.	
3	**Immune inflammation and infectious diseases.** General characteristics of the infectious process. Mechanisms of immune defense in bacterial infections. Immune response in viral infections (herpes virus, COVID-19, etc.). The role of the immune system in antifungal immunity and protection against helminths. The importance of the immune system in the development of opportunistic infections. Features of the use of immunological methods in the diagnosis of infectious diseases. Types and features of specific immunoprophylaxis of infectious diseases.	2
4	**Innate immunodeficiency diseases. Age immunology.** Innate immunodeficiency diseases: definition, classification, mechanisms of development. Clinical signs, immunogenetic diagnostics, physician's tactics, approaches to treatment: combined, T- and B-dependent immunodeficiencies caused by impaired phagocytic immunity and complement protein deficiency. Age-related features of the functioning of central and peripheral organs of the immune system.	2
5	**Acquired immunodeficiency diseases. AIDS, immunopathogenesis, immunodiagnosis, immunocorrection.** Acquired immunodeficiency diseases: definition, causes, mechanisms of development, classification, diagnosis. The role of acquired immunodeficiency diseases in the pathogenesis of various diseases. Etiology, immunopathogenesis, diagnosis and immunotherapy of AIDS. Features of the development of opportunistic infections depending on immunity. Immunogram dynamics of HIV-infected and AIDS patients.	2
6	**Immune aspects of autoimmune pathology.** Definition of the concept of autoimmune reactions, autoimmune disease. Mechanisms of immunological tolerance disruption, the role of genetic factors. Immunodiagnostics, immunopathogenesis. Autoimmune component in the immunopathogenesis of various human diseases. The role of immunological research methods in the early verification of the diagnosis of autoimmune diseases. Modern approaches to the use of new generation bio- and immunotropic drugs in the treatment of patients with autoimmune pathology.	2
7	**Fundamentals of transplantation and regenerative immunity.** Basic concepts, terminology (auto-, allo-, xenograft). The concept of pre-existing antibodies. Pre-transplant monitoring, the role of modern methods of diagnosing ABO compatibility. Features of bone marrow, kidney and other organ transplantation. Mechanisms of allograft rejection: superacute, acute and chronic. Post-transplantation infectious	2

	complications, diagnostic criteria. Immunosuppressive therapy: mechanisms of action, principles of prescription, complications. Basic immune mechanisms of organ and tissue regeneration. The use of growth factors and plasmolifting. Clinical and immunological aspects of tissue engineering.	
8	**Immunology of tumors. Basic concepts of reproductive immunology. Pseudoallergy.** Antiblastomal and problastomal mechanisms of interaction between the immune system of the host and tumor. Factors of tumor immunological resistance. The concept of tumor-associated antigens. Immunosuppressive effect of tumors. Immune changes in cancer patients. Immunodiagnostics, including differential immunodiagnostics according to the CD-phenotype of tumor cells. The use of monoclonal antibodies directed at various factors of the immune response to tumor agents. The main immune mechanisms of physiological and pathological pregnancy. Immune-dependent forms of infertility, modern methods of immunodiagnosis and treatment Immune relationships in the father-mother and mother-fetus systems.	2
9	**Atopy and allergy. Immune mechanisms of allergy development. Laboratory allergy diagnostics. Non-reactive manifestations of allergy. Principles of treatment of allergic pathologies.** Modern concepts of allergy and atopy. The role of genetic factors and the environment in the immunopathogenesis of allergy. Allergy as a systemic disease. Types and main stages of immunological reactions. The concept of hypersensitivity and its varieties. Types of allergens. Allergopathology developing by the reactive type: principles of diagnosis, prevention and treatment. Diseases developing according to the second, third and fourth types of immune response: clinic, features of diagnosis and treatment. Types of laboratory allergy diagnostics: the concept of specific immunoglobulins, major and minor allergens. Modern methods of specific, pathogenetic and symptomatic therapy of allergic diseases.	2
10	**Basic principles of immunotropic therapy prescription. Immunorehabilitation, immunoprophylaxis.** Classification of immunotropic drugs, mechanism of action, side effects. Principles of clinical use of immunotropic drugs, indications and contraindications for prescription, dose selection, immunological monitoring of therapeutic efficacy: immunosuppressive drugs; immunocorrective drugs; blockers of mediators of immune reactions; anti-inflammatory drugs; replacement therapy; cytokine therapy, antireceptor drugs, etc. Therapeutic forms of monoclonal antibodies: classification, features of application. Basic principles of	2

	immunoprophylaxis of bacterial and viral infections.	
11	**Drug allergy. Emergency conditions in allergology.** Drug allergy: the relevance of the problem in the work of a clinician, features of pathogenesis, clinical manifestations and analysis of in vitro and in vivo diagnostic results, algorithms for providing care and general and personalized prevention. Mechanisms of development, clinic and diagnosis of emergency conditions in allergology. Features of emergency treatment. Systemic anaphylaxis: features of pathogenesis, diagnosis of various clinical forms, differential diagnosis, principles of treatment, primary and secondary prevention.	2
12	**Medical cases history defense.**	1*****
13	**Final module control.**	1
Total		24

Note: * indicates a topic for which a positive grade is required.

Individual work

№	Topic title	Number of hours
Module 4. Clinical immunology and allergology		
1.	Preparation for practical classes - theoretical preparation and development of practical skills. Writing a medical history.	7 6
2.	Preparing for the final module control.	4
Total for module 4		**17**

Individual tasks

Individual tasks for Module 4. Clinical immunology and allergology is one of the forms of organization of education at the university, which aims to deepen, generalize and consolidate the knowledge that students receive in the process of studying, as well as apply this knowledge in practice. Individual tasks are performed by students independently under the guidance of a teacher. The tasks for independent work include the study of topics in clinical immunology and allergology that are not included in the mandatory plan of practical classes. Creating and presenting multimedia presentations, writing abstracts and translating scientific literature.
Participation in the first stage of the All-Ukrainian Olympiad in Clinical Immunology and Allergology**.**

List of theoretical questions to prepare students for the final module control

Module 4. Clinical immunology and allergology

1. Subject and objectives of clinical immunology and allergology.
2. Modern understanding of the structure, function and ontogeny of the immune system. Central and peripheral organs of the immune system.

3. Features of the functioning of the immune system in children of different ages and the elderly.
4. Cellular innate defense factors, their interaction in the realization of the immune response.
5. Monocyte-macrophage system: functions, features, role in the formation and realization of the immune response. Modern aspects of phagocytosis.
6. Humoral factors of innate immunity.
7. Complement system. Biological consequences of activation of the complement system.
8. Antigens: structure, functions. Haptens.
9. Stages of maturation and differentiation of T- and B-lymphocytes.
10. T-lymphocytes. Structure of the T-cell receptor. Subpopulations of T-lymphocytes. Main markers and clusters of differentiation.
11. T- lymphocytes - helpers of the 1st and 2nd type. The value of functional balance between T-helper (Th1\Th2).
12. Regulatory T-lymphocytes, main functions.
13. Apoptosis as a special type of cell death. Its role in physiological and pathological processes.
14. B-lymphocytes, their subclasses. Main markers and functions. Structure of the receptor that recognizes antigen. The concept of T-dependent and T-independent types of immune response.
15. Immunoglobulins: structure, functions, classes. The role of immune complexes in the development of pathology.
16. Cytokines - mediators of the immune system. Interleukins, classification, functions and participation in immune processes.
17. Growth factors, tumor necrosis factors, interferons and adhesion molecules. Characterization. Participation in the formation of the immune response.
18. Immunological system of mucous membranes. Lymphoid tissue associated with the gastrointestinal tract, bronchopulmonary system.
19. Modern understanding of the structure and function of the major histocompatibility complex. Structure of HLA antigens. Susceptibility to diseases depending on the HLA phenotype.
20. Quantitative and functional immunological tests. Immunogram, basic indicators.
21. Methods for determining the quantitative and functional characteristics of T-lymphocytes: rosette tests, tests using monoclonal antibodies, RBTL with mitogens.
22. Methods for determining the quantitative and functional characteristics of B lymphocytes: rosette tests, tests using monoclonal antibodies, RBTL with mitogens, CEC level.
23. Methods for determining the phagocytic activity of lymphocytes.
25. Basic principles of classification of immunodeficiencies. Congenital combined immunodeficiencies and immunodeficiencies of B-, T-cell units: mechanisms of development, features of clinical course, immunodiagnostics and treatment.

26. Congenital immunodeficiencies of the phagocytic link of the immune system and the complement system: mechanisms of development, features of clinical course, immunodiagnosis and treatment.
27. The concept of acquired immunodeficiency. Causes, clinical signs, immunodiagnostics and immunotherapy.
28. Prolonged fever syndrome: etiology, clinical, instrumental, laboratory and immunological diagnostic criteria, differential diagnosis, basic principles of immunotherapy and immunoprophylaxis.
29. Lymphadenopathy syndrome: etiology, pathogenesis, classification, research methods, immunological criteria for diagnosis, differential diagnosis, basic principles of immunotherapy and immunoprophylaxis.
30. Immunopathogenesis, stages of development, classification of HIV/AIDS.
31. Clinical and laboratory criteria for diagnosis, principles of treatment of HIV/AIDS.
32. Basic principles of HIV/AIDS prevention in Ukraine. Health care workers as persons of "risk group" of increased risk of HIV/AIDS.
33. Classification of harmful environmental factors, periods of their influence on the state of the immune system.
34. Definition of autoimmunity, autoimmune disease, syndrome. Mechanisms of tolerance failure, genetic prerequisites for the development of autoimmune diseases.
35. Classification, general principles of immunolaboratory diagnosis of autoimmune diseases. Modern approaches to the use of immunotropic drugs.
36. Laboratory criteria for immunodiagnosis of autoimmune diseases.
37. Classification of immunotropic drugs, mechanism of action, side effects.
38. Principles of clinical use of immunotropic drugs, indications and contraindications for prescription, dose selection, monitoring of therapeutic efficacy.
39. The main types of immunorehabilitation, its strategy, tactics and basic principles.
40. Transplantation immunology. Immunological indications and contraindications for organ and tissue transplantation. Selection of a donor-recipient pair. Pre-existing anti-lymphocytotoxic antibodies, their prognostic value.
41. Features of pre- and post-transplantation immunological monitoring. Types of rejection crises, their clinical and immunological characteristics and prognosis.
42. Features of the immune response in tissue regeneration. The use of biologics to improve regeneration.
43. Immune status of pregnant women. Immunology of fertilization.
44. Immune-dependent forms of infertility in married couples. Causes and mechanisms of formation of autoantibodies to germ cells in men and women. Immunopathogenesis of infertility, its diagnosis. Immunological approaches to the treatment of infertility.
45. Antitumor factors, tumor immunoresistance factors, problastic factors that suppress immunity, as well as problastic factors that enhance tumor growth. The concept of tumor-associated antigens.
46. Immune changes in cancer patients. Immunodiagnostics in oncology. Modern approaches to immunotherapy of patients with cancer.

47. Causes of allergic pathology formation. Stages of allergic reaction formation.
48. Allergy and atopy. Classification of allergens. Causes and mechanisms of formation of allergic conditions.
49. Methods of diagnosing allergies: laboratory methods, skin tests and provocative tests.
50. Principles of antiallergic therapy and immunotropic methods of treatment in allergology. Specific immunotherapy, mechanism of action, indications and contraindications, prognosis of effectiveness.
51. Pollinosis, allergic rhinitis, allergic conjunctivitis: etiology, immunopathogenesis, clinic, allergy diagnostics, basic principles of immunotherapy.
52. Drug allergy. Immunopathogenesis, clinic, allergy diagnostics, treatment, allergy prevention.
53. The concept of allergy and pseudoallergy, differential diagnosis. Histamine liberation mechanisms of pseudoallergic reactions. Principles of treatment.
Development of pseudoallergic reactions in disorders of activation of the complement system and arachidonic acid metabolism. Principles of treatment.

List of practical skills for the final module control

Module 4. Clinical immunology and allergology

1. Conduct a survey and physical examination of patients with immunodeficiency diseases (collect immunological history, determine hereditary predisposition to the development of immunodeficiencies, evaluate the data of physical examination methods, etc.)
2. Be able to fill out an immunological questionnaire of the patient, based on which to determine the "risk group" for immunopathology.
3. Mastering the skills of determining the necessary range of immunological tests for the examination of patients with immunodeficiency pathology.
4. Identify the presence of the main clinical symptoms of immune disorders syndromes.
5. To make a differential diagnosis, to substantiate and formulate a diagnosis of major immunodeficiency syndromes based on the analysis of laboratory and instrumental examination data.
6. Conduct clinical and immunological differential diagnosis of congenital and acquired immunodeficiencies.
7. Mastering the skills of data interpretation and the basic principles of interpretation of leukogram and immunogram data, taking into account the clinic, period of illness, immunological history, etc.
8. Mastering the skills of assessing the impact of negative environmental factors on immunological parameters.
9. Identify clinical signs of decompensation of local immunity.
10. Identify signs of irritation of the immune system according to the leukogram.
11. To prescribe immunotropic treatment, determine prognosis, and perform primary and secondary immunoprophylaxis in immunodeficient diseases.

12. To know the basic principles of prescribing immunotropic therapy in the complex treatment of immunosuppressed diseases.
13. Be able to carry out preventive measures during vaccination. To know the principles of immunoprophylaxis.
14. Mastering the skills of determining the need for clinical and allergic examination.
15. Conduct a survey and physical examination of patients with allergic pathology (be able to collect an allergic history, determine the presence of a genetic predisposition to the formation of allergic pathology).
16. Make a plan for the examination of patients with allergic diseases.
17. Master the skills to perform skin allergy tests (prick and patch tests).
18. Mastering the skills of evaluating laboratory allergy test data.
19. Master the skills of identifying allergens with oriental antigenic determinants to make recommendations for allergic prevention.
20. Master the skills of performing patch flowmetry and evaluating its parameters.
21. To make a differential diagnosis, to substantiate and formulate a diagnosis of major allergic diseases based on the analysis of laboratory and instrumental examination data.
22. To prescribe treatment, determine the prognosis, conduct primary and secondary prevention of allergic diseases.
23. Provide emergency care in acute allergic or pseudoallergic pathology.
24. To apply in practice the standards of diagnosis and treatment of allergic diseases.
25. To master the skills of prescribing anti-allergic drugs, to know the formulation of the main anti-allergic drugs.
26. Mastering the skills of evaluating laboratory results to determine the immunological criteria for autoimmune pathology.
27. To apply in practice the standards of immunodiagnosis and prescription of immunosuppressive therapy with an assessment of its effectiveness in autoimmune diseases.
28. Mastering the skills of determining the need for clinical and immunological examination of spouses in case of suspected immune-dependent infertility.
29. To master the principles of immunodiagnostics and immunotherapy of infertility caused by immunodeficiency diseases in women.
30. To know the principles of immunodiagnosis and immunotherapy of infertility caused by antigametic immune conflict.
31. To know the principles of immunodiagnostics and immunotherapy of infertility caused by increased histocompatibility of spouses.
32. Interpret test data for the selection of donor and recipient for transplantation.
33. Mastering the skills to diagnose ultra-acute, acute and chronic rejection crises in organ and tissue transplantation.
34. Perform differential diagnosis of rejection crisis and infectious complications in patients after transplantation.
35. Prescribe immunosuppressive therapy and evaluate its effectiveness after organ and tissue transplantation.
36. Interpret immunograms in cancer patients with an assessment of antiblastoma protective factors.

37. Evaluate the results of determining tumor-associated antigens in the early immunodiagnosis of tumors and early detection of recurrence.
38. To master the principles of immunotherapy and immunoprophylaxis of tumors.
39. Provide emergency care in acute allergic or pseudoallergic pathology.
40. To prescribe immunotropic therapy in the complex treatment of infectious diseases.
41. Evaluate the effectiveness of prescribed immunotherapy in the dynamics.
42. To know the principles of immunoprophylaxis and use them in the clinic.
43. Conduct replacement therapy with immunoglobulin preparations.
44. Conduct antiviral immunotherapy with the appointment of interferon and interferon inducers.
45. To prescribe and evaluate the effectiveness of specific immunotherapy in the treatment of pollenosis and allergic rhinitis.

The list of questions that a student must master in the course of studying the discipline (form of control - test) is not provided for in the program.

Teaching methods.

Verbal: lecture, explanation, narration, conversation.
Visual: observation, illustration, demonstration;
Practical (practice to develop skills and abilities).
Independent work of students to comprehend and learn new material.
Practical classes, according to the method of their organization, are clinical and include:
1. Supervision of thematic patients, which is carried out according to a given algorithm of students' actions.
2. Mastering practical skills (examination of the patient, identification of syndromes, evaluation of the results of additional examination).
3. Consideration of theoretical issues related to the acquisition of practical skills according to standardized lists for each practical lesson and during control.
4. Analysis of archival case histories.
5. Solving situational problems.
6. Standardized test control, oral and written questioning.
7. Active teaching methods: thematic discussions, brainstorming, case study analysis (case method), simulation tasks.

Forms and methods of assessment.

Verbal questioning: frontal, individual, combined, interview.
Written examination: written examination is carried out in the form of a test (control) work, writing notes.
Test control: closed-form tests are used, which involve choosing an answer from a certain number of options.
Programmed control is carried out with the help of individual automated means.

Practical examination: practical professional skills are tested during practical classes.

System of current and final control.
The form of final control of learning progress (FMC).

When assessing the mastery of each module topic, the student is given a grade on a 4-point (traditional) scale using the standardized generalized criteria for assessing student knowledge for the discipline. This takes into account all types of work provided for in the methodological guidelines for the study of topics.

Table 1: Standardized generalized criteria for assessing the knowledge of higher education students at PSMU

For 4-point Scale	Assessment in ECTS	Evaluation criteria
5 (excellent)	A	The student shows special creative abilities, is able to acquire knowledge independently, without the help of the teacher finds and processes the necessary information, is able to use the acquired knowledge and skills for decision-making in unusual situations, convincingly argues answers, independently reveals own talents and inclinations, possesses not less than 90 % knowledge of the topic both during the survey and all types of control.
4 (good)	B	The student is fluent in the studied amount of material, applies it in practice, freely solves exercises and problems in standardized situations, independently corrects errors, the number of which is insignificant, has at least 85% knowledge of the topic as during the survey, and all types of control .
	C	The student is able to compare, summarize, systematize information under the guidance of a scientific and pedagogical worker, in general, independently apply it in practice, control their own activities; to correct mistakes, among which there are significant ones, to choose arguments to confirm opinions, has at least 75% of knowledge on the topic both during the survey and all types of control.
3 (satisfactory)	D	The student reproduces a significant part of theoretical material, shows knowledge and understanding of the basic provisions with the help of a researcher can analyze educational material, correct errors, among which there are a significant number of significant, has at least 65% knowledge of the topic, and during the survey, and all types of control.
	E	The student has the educational material at a level higher than the initial, a significant part of it reproduces at the reproductive

		level. has at least 60% knowledge of the topic both during the survey and all types of control.
2 (unsatisfactory)	FX	The student has the material at the level of individual fragments that make up a small part of the material, has less than 60% knowledge of the topic both during the survey and all types of control.
	F	The student has the material at the level of elementary recognition and reproduction of individual facts, elements, has less than 60% knowledge of the topic as during the survey, and all types of control.

The current performance is equal to the arithmetic mean of the grades of the current control for practical classes and independent work (taking notes, medical documentation, writing a medical history, working in departments). The assessment of students' independent work, which is provided for in the topic along with classroom work, is carried out during the current control of the topic at the relevant classroom session.

The teacher enters the points after converting them from the grade point average according to the table. The minimum number of points that students receive for current performance is 72.

The score is determined according to Table 2:

Average score for current performance (A)	Points for current success in the module (A * 24)	Points for FMC from the module (A * 16)	Points for the module and / or exam (A * 24 + A * 16)	Category ECTS	By 4-point scale
2	48	32	80	**F FX**	**2 (unsatisfactory**
2,1	50	34	84		
2,15	52	34	86		
2,2	53	35	88		
2,25	54	36	90		
2,3	55	37	92		
2,35	56	38	94		
2,4	58	38	96		
2,45	59	39	98		
2,5	60	40	100		
2,55	61	41	102		
2,6	62	42	104		
2,65	64	42	106		
2,7	65	43	108		
2,75	66	44	110		
2,8	67	45	112		
2,85	68	46	114		
2,9	70	46	116		
2,95	71	47	118		

3	72	50	122	**E**	**3 (satisfactory)**
3,05	73	50	123		
3,1	74	50	124		
3,15	76	50	126		
3,2	77	51	128		
3,25	78	52	130	**D**	
3,3	79	53	132		
3,35	80	54	134		
3,4	82	54	136		
3,45	83	55	138		
3,5	84	56	140	**C**	**4 (good)**
3,55	85	57	142		
3,6	86	58	144		
3,65	88	58	146		
3,7	89	59	148		
3,75	90	60	150		
3,8	91	61	152		
3,85	92	62	154		
3,9	94	62	156		
3,95	95	63	158		
4	96	64	160	**B**	
4,05	97	65	162		
4,1	98	66	164		
4,15	100	66	166		
4,2	101	67	168		
4,25	102	68	170		
4,3	103	69	172		
4,35	104	70	174		
4,4	106	70	176		
4,45	107	71	178		
4,5	108	72	180	**A**	**5 (excellent)**
4,55	109	73	182		
4,6	110	74	184		
4,65	112	74	186		
4,7	113	75	188		
4,75	114	76	190		
4,8	115	77	192		
4,85	116	78	194		
4,9	118	78	196		
4,95	119	79	198		
5	120	80	200		

Students who have attended all the classroom training sessions provided for by the discipline curriculum, completed independent work and scored at least the minimum number of points in the module are allowed to take the final module control. A student who has missed classes for valid reasons will have his/her

individual curriculum adjusted and will be allowed to work off academic debt by a certain deadline.

The presence of a grade of "2" for the current academic performance does not deprive the student of the right to be admitted to the final module control with the permissible minimum number of points for the current academic performance. A student has no right to retake current grades of "2" if he or she has the minimum amount of points for admission to the control measures. Current grades of "3" or "4" are not retaken. The student is obliged to retake the grade "2" if the average score of current academic performance for the module does not reach the minimum (3.0 points) for admission to the FMC. Permission to work out the current grade "2" is granted by the head of the department only in order for the student to achieve the minimum number of points for admission to the final control.

The retake is carried out by a teacher appointed by the head of the department according to the schedule of consultations and work on missed classes, which is agreed with the dean's office.

The number of retakes of the current "2" is limited to two attempts. Students who have a grade point average of less than 3.0 have the right to retake the current "2", but no later than the beginning of the new semester.

The final module control is carried out after studying the module program in the discipline and is held at the last lesson of the module. For the final module control, the hours provided in the curriculum for practical classes are used. Students who have an average grade point average of 4.0 to 5.0 during the course of the discipline are exempted from passing the FMC and automatically (by agreement) receive a final grade in accordance with Table 2, while the presence of the student at the FMC is mandatory. In case of disagreement with the grade, this category of higher education students passes the FMC according to the general rules.

The result of the FMC is evaluated in points and is not converted to the traditional 4-point grade. The maximum number of points for the FMC is 80 points. The minimum number of points of the FMC, at which the control is considered passed, is 50 points. The maximum number of points per module is 200 points (including up to 120 points for current performance).

The control of theoretical and practical training during the final module control is carried out by conducting a computer test control (performing 20 test tasks of a selective type).

Students who have passed the FMC are entered in the "Statement of final module control", after filling out the statement they are referred to the relevant dean's office.

For students who have not passed the FMC, the exact reason for failure is also entered in the "Record of final module control" and individual student curricula. The reasons for non-enrollment may be as follows:

a) the student has unexcused absences from classes and/or lectures. The mark “not admitted” in the column "points for FMC";

b) a student who has attended all classes (practical, lecture) but has not scored the minimum number of points for the current learning activity; has not completed

independent work (notes); has not written a medical history is not allowed to participate in the FMC;

c) the student attended all classes and scored the number of points for the current learning activity and was admitted to the FMC, but did not appear for the FMC. The mark “did not appear” in the column points for the FMC.

The student has the right to pass and two retakes of the FMC.

Methodological support

1. Working curriculum of the discipline;
2. Silhouette of the discipline;
3. Plans of practical classes and independent work of students;
4. Test tasks for practical classes (tests of different levels of difficulty, tests from the bank of licensing exams "Step- 2", situational tasks).
5. List of practical skills;
6. Medical histories, examination results, examination algorithms, care kits;
7. Multimedia presentations of the department's lecture course.
8. Clinical analyzes.

Recommended reading

Basic (available in the PSMU library):

1. Bazhora S.F. Clinical immunology and allergology: textbook / Bazhora S.F. - Vinnytsia: New book, 2014.
2. Fundamentals of immunology: functions and disorders of the immune system: 6th edition / Abul K. Abbas, Andrew G. Lichtman, Shiv Pillai; scientific editor of the translation V. Chopyak. - K.: Medicine, 2020. 328 p.
3. Clinical immunology: a textbook / V.I. Lyakhovsky, N.V. Lyakhovska, T.V. Akhramchuk - Poltava: Garage, 2019. - 251 c.
4. Clinical immunology and allergology: a textbook / V.V. Chopyak, G.O. Potemkina, A.M. Havryliuk et al.

Additional:

1. Clinical and Laboratory Immunology: Textbook / Kuznetsova L.V., Babadzhan V.D., Frolov V.M. et al.
2. Pediatric immunology. Textbook / L.I. Chernysheva, A.P. Volokha, L.V. Kostyuchenko et al. Kostyuchenko et al; edited by L.I. Chernysheva, A.P. Volokha. - K.: Medicine, 2013. 720 p.
3. Bilovol OM, Kravchun PG, Babadzhan VD, Kuznetsova LV Clinical immunology and allergology Kharkiv "Grif", 2011, - 550 p.
4. Textbook of Allergy for the Clinician Edited By Pudupakkam K. Vedanthan, Harold S. Nelson, Shripad N. Agashe, PA Mahesh, Rohit Katial, 2nd Edition, Copyright Year, 2022, 444 p.
5. Kaplan Medical. Immunology and Microbiology. Step 1. Lecture notes. 2017

6. Matricardi, P. M., Kleine-Tebbe, J., Hoffmann, H. J., Valenta, R., Hilger, C., Hofmaier, S., ... & Ollert, M. (2016). EAACI molecular allergology user's guide. Pediatric Allergy and Immunology, 27, 1-250.

7. Baldo, Brian A., and Nghia H. Pham. "Drug allergy: clinical aspects, diagnosis, mechanisms, structure-activity relationships." (2020).

Electronic resources:

1. 1. Drannik G.M. Clinical immunology and allergology: Textbook [Electronic resources] / H.M. Drannik, O.S. Prylutskyi, Y.I. Bazhora - Accessed at http://kingmed.info/knigi/Immynologia_i_allergologia/book_706/Klinichna_imunologiya_ta_alergologiya-Drannik_GM_Prilutskiy_OS_Bajora_YuI-2006-pdf

2. 2. Clinical immunology and allergology: [textbook of medical universities of IV accreditation level and medical faculties of universities] [Electronic resources] / O.M. Bilovol, P.G. Kravchun, V.D. Babadzhan and others: http://repository.ldufk.edu.ua:8080/bitstream/34606048/10065/1/%D0%9A%D0%BB%D1%96%D0%BD%D1%96%D1%87%D0%BD%D0%B0%20%D1%96%D0%BC%D1%83%D0%BD%D0%BE%D0%BB%D0%BE%D0%B3%D1%96%D1%8F%20%D1%82%D0%B0%20%D0%B0%D0%BB%D0%B5%D1%80%D0%B3%D0%BE%D0%BB%D0%BE%D0%B3%D1%96%D1%8F_%D0%BD%D0%B0%D0%B2%D1%87.%20%D0%BF%D0%BE%D1%81%D1%96%D0%B1..pdf

Information resources:

- Vernadsky National Library of Ukraine http://www.nbuv.gov.ua/
- National Scientific Medical Library of Ukraine https://library.gov.ua/
- National Library of Medicine of the National Institutes of Health https://www.nlm.nih.gov/
- Ukrainian Library Association www.ula.org.ua
- www.allergen.org
- www.allergyeducation-ma.com

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