

MINISTRY OF HEALTH OF UKRAINE
ODESSA NATIONAL MEDICAL UNIVERSITY
Clinical immunology, genetics and medical biology department



APPROVED

Vice-rector on scientific-academic education professor

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09 _____ 2021

CURRICULUM ON CYCLE
«ACTUAL ASPECTS OF CLINICAL IMMUNOLOGY AND ALLERGOLOGY»

Level of higher education: of the second (master's)


Field of knowledge 22 «Healthcare»

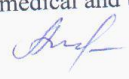
In specialty 221 «Dentistry»

Educational and professional program: Dentistry

Odesa 2021 – 2022

The program is based on the educational-professional program "Medicine", training of specialists of the second (master's) level of higher education in the specialty 222 "Medicine" in the field of knowledge 22 "Health", approved by the Academic Council of ONMedU, from 04.06.2020, protocol №11 .
 Developers: Doctor of Medicine, Professor S.F. Goncharuk

Program was discussed on the methodical meeting of the clinical immunology, genetics and medical biology department
 Protocol №1 at 27.08.2021
 Head of the department, Doctor of medicine, professor  S. F. Goncharuk

The program was approved at the meeting of the subject cycle commission on medical and biological disciplines of ONMedU
 Protocol №1 at 27.08.2021
 Chairman of the subject cycle methodical commission on medical and biological disciplines, Doctor of medicine, professor  O.L. Appelhans

The program was approved at the meeting of the Central Coordination and Methodological Council of ONMedU
 Protocol №1 at 30.08.2021

1. Description of the discipline:

Name of indicators	Characteristics of the discipline	
	Full-time education	
The total number of: Credits - 4 Hours - 120 Content sections - 3	Selective	
	Year of study	1
	Semester	II
	Lectures	16 hours
	Seminars	24 hours
	SSW	80 hours
	Including individual tasks	0
	Type of control	Credit

2. Aims and tasks of the discipline

The purpose: of studying the discipline of clinical immunology and allergology is to form in future doctors an idea of the mechanisms of functioning of the immune system as a single complex; use of this knowledge in practice in solving specific clinical issues and atypical situational problems, as well as mastering the methods of clinical and laboratory diagnosis, treatment, prevention of immune disorders and immunodeficiency diseases underlying recurrent, chronic infectious diseases, allergic, autoimmune diseases, oncoimmune diseases, lymphoproliferative and other processes.

Main tasks:

- to get a modern idea of clinical immunology and allergology as a discipline in general;
- to form an idea of the importance of immunopathological changes in the development of various diseases and the dynamics of the general patterns of immunological parameters at different stages of the body's immune response in normal and in pathology;
- assess the patient's immune status according to the basic immunolaboratory methods and principles of interpretation of immunograms;
- to master modern principles of immunodiagnostics of allergic diseases;
- to master the basic principles of immunoprophylaxis, immunotherapy, to get acquainted with the methods of monitoring the effectiveness of immunotropic treatment, types of immunorehabilitation.

The process of studying the discipline is aimed at forming elements of the following competencies:

- **IC Integral competence** is the ability to solve complex problems and problems in the field of health care in the specialty "Medicine" in a professional activity or in the learning process, which involves research and / or innovation and is characterized by uncertainty of conditions and requirements.

- General competencies:

- GC1 Ability to abstract thinking, analysis and synthesis
- GC2 Knowledge and understanding of the subject area and understanding of the profession
- GC3 Ability to communicate in the state language
- GC4 Ability to adapt and make an informed decision in a new situation
- GC5 Ability to work in a team
- GC6 Ability to evaluate and ensure the quality of work performed
- GC7 Ability to act on the basis of ethical considerations, socially responsible and conscious.

	- Special (professional, subject) competencies
SC1	Communication skills and clinical examination of the patient
SC2	Ability to determine the list of necessary clinical and laboratory and instrumental studies and evaluate their results
SC3	Ability to establish an initial and clinical diagnosis of the disease
SC4	Ability to determine the principles of treatment of diseases, the required mode of work and rest and the nature of nutrition
SC5	Ability to diagnose emergencies
SC6	Ability to determine tactics and provide emergency medical care

Expected learning outcomes. As a result of studying the discipline the student must:

To know:

Structure and clinical physiology of the immune system, modern methods of its evaluation

Modern views on the etiology and pathogenesis of various immune disorders: hereditary, congenital and acquired immunodeficiency, autoimmune, allergic, cancer; immune-dependent forms of infertility and immune-dependent conditions

Possibilities and limitations of using immunological methods in the clinic

The nature of changes in immunological parameters under the influence of various factors

The main types of pathological immune reactions

Features of immunograms in pathologies of the immune system

Clinical symptoms and syndromes of different types of immunopathology and their signs

Clinical symptoms of various allergic diseases, principles of their diagnosis and treatment

Be able to:

Identify clinical, hematological and immunological signs of immune disorders in patients with acute, recurrent and chronic pathology, establish an initial and clinical diagnosis

Classify the symptoms of immunological and allergic disorders

To carry out differential diagnosis of hereditary and acquired immune disorders in various pathologies on the basis of immunological anamnesis, analysis of genealogical tree, data of clinical and laboratory examination of patients

Evaluate the data of general blood tests, immunological and allergological studies, taking into account the leading mechanism of immunological disorders in the genesis of different types of immunological and allergic pathology

To make the plan of inspection of the patient, to analyze the received data of researches taking into account immunological processes, age of the patient, a state of health, a season.

To determine the nature and principles of treatment of immunological disorders and allergic diseases in patients with various

pathologies, to form multidispensary groups, risk groups, to carry out immunoprophylaxis

3. Content of the curriculum

Structure and principles of functioning of the immune system

TOPIC 1. Structure and principles of functioning of the immune system. Definitions and types of immunity. Central and peripheral organs of the immune system. Factors of innate immunity: cellular (monocytic-macrophage system, killer and granulocyte cells), humoral (complement system, cytokines, etc.). Antigens and their characteristics. Specific immunity, its features, stages of formation and cooperation of immunocompetent cells involved in the formation of the immune response. Populations (T- and B-lymphocytes) and subpopulations (T-helpers of types 1 and 2, T-regulatory, T-CTL) of lymphocytes, stages of their maturation and differentiation, their function. Immunoglobulins, structure, functions. Thymus-dependent and thymus-independent mechanism of antibody synthesis. Structure and properties of circulating immune complexes. The main complex of histocompatibility: structure, properties, function. Regulation of immunity. Features of immunological anamnesis. Clinical methods of assessing the immune system. Instrumental methods for assessing the immune system. Laboratory methods for assessing the immune system. Humoral innate protection factors. Assessment of cellular immunity. Comprehensive assessment of local immunity. A comprehensive approach to assessing human immune status. Immunogram, interpretation of results. Possibilities and limitations of immunological methods in the clinic. Features of immunological diagnosis. Age features of bone marrow, thymus and peripheral lymphoid organs. Age features of functioning of immunocompetent cells. Age features of cytokine production. Age features of development of inflammatory reactions. Thymus and aging. Immunoregulatory processes in old age. Immune theories of aging. Immunopathology in the elderly.

TOPIC 2. Immune inflammation and infectious diseases. HIV is an infection. 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 protozoan infections. Immunological methods in the diagnosis of infectious diseases. Immune response in acute inflammation. Dynamics of leukogram, proteinogram and immunogram in acute, recurrent and chronic inflammation. Types and features of specific immunoprophylaxis of infectious diseases. Immune-dependent reactions and complications during vaccination. Etiology, immunopathogenesis, immunodiagnostics and immunotherapy of HIV / AIDS. Dynamics of immunogram of HIV-infected and AIDS patients. Immunoprophylaxis of HIV infection.

Immunodeficiency diseases and immune-dependent pathology

TOPIC 3. Diseases of the immune system. Immunodeficiency diseases. Congenital immunodeficiency diseases: definition, classification, mechanisms of development. Clinical signs, immunodiagnostics, doctor's tactics, approaches to treatment: combined, T - and B - dependent immunodeficiencies caused by violation of the phagocytic immune system and deficiency of complement proteins. Acquired immunodeficiency diseases: definition, causes, mechanisms of development, classification, diagnosis. The role of acquired immunodeficiency diseases in the pathogenesis of various diseases. Early detection of secondary immunological insufficiency in the body. The main approaches to treatment and prevention, taking into account the clinical manifestations and features of the course.

TOPIC 4 Principles of immunodiagnostics, immunotherapy, immunorehabilitation and immunoprophylaxis. Classification of immunotropic drugs, mechanism of action, side effects. Principles of clinical use of immunotropic drugs, indications and contraindications for use. Principles of immunoprophylaxis.

TOPIC 5. Fundamentals of transplant immunity. Basic concepts, terminology (auto-, allo-, xeno-graft). Pre-transplant monitoring. Mechanisms of allograft rejection: superacute, acute and chronic. Posttransplant infectious complications, diagnostic criteria. Immunosuppressive therapy: mechanisms of action, principles of appointment, complications. New immunological methods of diagnosis and therapy in transplantologists.

TOPIC 6. Immunology of tumors. Antitumor and pro-tumor mechanisms of interaction of the immune system of the organism "host" and "tumor". Factors of immunological resistance of the tumor. The concept of tumor-associated antigens. Immunosuppressive effect of tumors. Immune changes in cancer patients. Immunodiagnostics, including differential according to the CD phenotype of tumor cells. Modern approaches to immunotherapy of a patient with oncological diseases.

TOPIC 7. Immune aspects of autoimmune pathology Definition of the concept of autoimmune reactions, autoimmune disease. Mechanisms of immunological tolerance failure, the role of genetic factors. Immunodiagnostics, immunopathogenesis. The role of immunological research methods in the early verification of the diagnosis of autoimmune diseases. Autoimmune component in the immunopathogenesis of various human diseases. Modern approaches to the use of new generation immunotropic drugs in the treatment of patients with autoimmune pathology.

Allergic diseases.

TOPIC 8. Atopic diseases. The role of genetic factors and the environment in the immunopathogenesis of allergies. Modern ideas about allergies and atopy. Atopy as a systemic disease. Types and main stages of immunological reactions. Methods of allergological examination (allergological anamnesis, physical examinations, skin tests) Modern aspects of allergological diagnosis. Screening methods in the assessment of allergies. Elimination and provocative tests in allergology. Principles of treatment of allergic diseases. Allergen-specific immunotherapy, indications and contraindications. Features of immunopathogenesis of bronchial asthma, hay fever, allergic rhinitis, urticaria, etc. Drug allergy: causes, immunopathogenesis, clinic, allergy diagnosis and prevention.

TOPIC 9. Allergic (non-atopic) diseases Classification of hypersensitivity reactions by Jell and Coombs. The main mechanisms of occurrence and development of immunopathological conditions, their role in the development of various diseases. Mechanisms of development of anaphylactic reactions. Mechanisms of development of humoral cytotoxic reactions. Mechanisms of development of reactions of formation of immune complexes. Mechanisms of development of pathological immune reactions mediated by T-sensitized lymphocytes. Mechanisms of development of autosensitization caused by antibodies. Non-atopic diseases, immunopathogenesis, immunodiagnostics, clinical manifestations and differential diagnosis. Allergic diseases (serum sickness, exogenous allergic alveolitis, etc.): immunopathogenesis, clinic, immunodiagnostics, immunotherapy. Differential diagnosis of diseases caused by allergic processes and pseudoallergic reactions. Principles of antiallergic therapy and immunotropic treatments in allergology.

4. Structure of the discipline

Topic	Lectures	Seminars	SSW	Individual work
Immune status, principles of assessment and ways of correction				
Topic 1. Structure and principles of functioning of the immune system.	4	6		–
Topic №2. Immune inflammation and infectious diseases. HIV infection			20	
Immunodeficiency diseases and immune-dependent pathology				

Topic 3. Diseases of the immune system. Immunodeficiency diseases.	4	4		–
Topic 4. Principles of immunodiagnostics, immunotherapy, immunorehabilitation and immunoprophylaxis.			20	
Topic 5. Fundamentals of transplant immunity			20	
Topic 6. Immunology of tumors			20	
Topic 7. Immune aspects autoimmune pathology		2		
Allergic diseases				
Topic 8. Atopic diseases	2	4		–
Topic 9. Allergic (non-atopic) disease	6	6		
Final control		2		
Total:	16	24	80	

5. THEMATIC PLAN OF LECTURES

№	Topic	Hours
1.	Structure and principles of functioning of the immune system	4
2.	Diseases of the immune system. Immunodeficiency diseases.	4
3.	Principles of immunodiagnostics, immunotherapy, immunorehabilitation and immunoprophylaxis.	2
4.	Allergic (atopic) diseases.	4
5.	Allergic (non-atopic) diseases	2
Total		16

6. THEMATIC PLAN OF SEMINARS

№	Topic	Hours
1.	Structure and principles of functioning of the immune system.	6
2.	Congenital and acquired immunodeficiency states	4
3.	Immune aspects of autoimmune pathology	2
4.	Atopic diseases	6
5.	Allergic (non-atopic) diseases	4
	Final control	2
Total		24

7. THEMATIC PLAN OF SELF-STUDY WORK

№	Preparation to the practical classes and final module control	Hours
1.	Immune inflammation and infectious diseases. HIV is an infection. 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 protozoan infections. Immunological methods in the diagnosis of infectious diseases. Immune response in acute inflammation. Dynamics of leukogram, proteinogram and immunogram in acute, recurrent and chronic inflammation. Types and features of specific immunoprophylaxis of infectious diseases. Immune-dependent	20

	reactions and complications during vaccination. Etiology, immunopathogenesis, immunodiagnostics and immunotherapy of HIV / AIDS. Dynamics of immunogram of HIV-infected and AIDS patients. Immunoprophylaxis of HIV infection.	
2.	Fundamentals of transplant immunity. Basic concepts, terminology (auto-, allo-, xeno-graft). Pre-transplant monitoring. Mechanism of allograft rejection: superacute, acute and chronic. Posttransplant infectious complications, diagnostic criteria. Immunosuppressive therapy: mechanisms of action, principles of appointment, complications. New immunological methods of diagnosis and therapy in transplantologists.	20
3.	Principles of immunodiagnostics, immunotherapy, immunorehabilitation and immunoprophylaxis. Classification of immunotropic drugs, mechanism of action, side effects. Principles of clinical use of immunotropic drugs, indications and contraindications for use. Principles of immunoprophylaxis.	20
4.	Fundamentals of transplant immunity. Basic concepts, terminology (auto-, allo-, xeno-graft).	20
Total		80

8. Individual student work - Not provided.

9. Teaching methods

Practical classes: conversation, solving clinical situational problems, practicing patient examination skills, training exercises on differential diagnosis and treatment of immune and allergic diseases.

Independent work: independent work with the textbook, independent work with the bank of test tasks KROK-2, independent solution of clinical problems.

10. Methods of control and criteria for evaluating learning outcomes

Ongoing control: Assessment of current performance is based on the results of students' participation in discussions, in the discussion of abstracts or reports, interviews in a seminar, in the process of solving situational problems. Assessment of student activity in class.

Final control: credit

The structure of the current assessment at the seminar:

Assessment of current performance is based on the results:

- Participation of students in discussions;
- interviews at the seminar;
- activities in the preparation of abstracts, presentations on the topic of the lesson;
- solving situational problems;

1. Assessment of theoretical knowledge on the topic of the lesson:

- methods: surveys, interviews at the seminar, analysis of student activity in discussions, analysis of the quality of prepared essays or presentations on the topic of the lesson, solving situational problems;

- maximum grade - 5, minimum grade - 3, unsatisfactory grade - 2.

2. Assessment of practical skills on the topic of the lesson:

- methods: assessment of the correctness of practical skills

- maximum grade - 5, minimum grade - 3, unsatisfactory grade - 2.

Criteria for current assessment at the seminar:

The current educational activity of the student at seminars is evaluated on a 4-point (traditional) scale.

The value of the assessment is "excellent". 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.

The value of the assessment is "good". The student is fluent in the studied amount of material, applies it in practice, freely solves problems in standard situations, independently corrects mistakes, the number of which is insignificant.

The value of the assessment is "satisfactory". The student reproduces a significant part of the theoretical material, shows knowledge and understanding of the basic principles; with the help of the teacher can analyze the educational material, correct mistakes, among which there are a significant number of significant ones.

The value of the assessment is "unsatisfactory". The student has the material at the level of individual fragments, which are an insignificant part of the study material.

Assessment of the learning performance of all students is not required in every seminar. At least 30% of students must be evaluated.

At the end of the study, the current performance is calculated - the average current score (arithmetic mean of all current grades on a traditional scale, rounded to two decimal places).

Final control of the discipline - credit.

The test is evaluated on a two-point scale - "credited" / "not credited".

Students who have fully completed the curriculum in the discipline, have no academic debt, have an average score of current performance of 3.00 or more, in the last class receive credit.

Criteria for evaluating the learning outcomes of students on the test:

The grade "passed" is given to a student who has completed the curriculum of the discipline, has no academic debt; level of competence - high (creative);

the grade "not credited" is given to a student who has not fulfilled the curriculum of the discipline, has an academic debt (average score below 3.0 and / or absences); level of competence - low (receptive-productive).

11. The list of theoretical questions to the differential test

1. The main biological tasks and functions of the body's immune system.
2. Classification of immune system organs. Apoptosis (concept and role in the functioning of the organism).
3. Differences between specific and nonspecific immune response.
4. The main factors of nonspecific immune response.
5. The main factors of specific (adaptive) immune response.
6. Antigen presentation: a role in the formation of the immune response. Antigen-presenting cells.
7. Phagocytosis: a role in the implementation of nonspecific and specific immune response. Phagocytosis of cells.
8. Humoral factors of nonspecific immune protection of an organism.

9. Killer cells: basic types, their functions and features.
10. Granulocytes: functions and role in the immune response. Diagnostic significance in various pathological conditions.
11. Agranulocytes: functions and role in the immune response. Diagnostic significance in various pathological conditions.
12. Complement system. Biological consequences of complement system activation. Ways of activation.
13. B-lymphocytes: markers and functions. Diagnostic significance in various pathological conditions.
14. T-lymphocytes: types and main markers. Diagnostic significance in various pathological conditions.
15. T-helpers of I and II types: differences in mechanisms of action.
16. Immunoglobulins: structure, function, classes. Diagnostic significance in various pathological conditions of Ig M and IgG
17. Immunoglobulins: structure, function, classes. Diagnostic significance in various pathological conditions Ig E and Ig A
18. Cellular and humoral immune response of adaptive immunity: features and differences.
19. Cytokines: basic classes and their functions.
20. The main complex of human histocompatibility. Classes of antigens and their role in the formation of the immune response.
21. The main complex of human histocompatibility. Concept. Location. Mechanisms of imitation.
22. Factors of antibacterial immune protection of an organism. Cellular and humoral immune response.
23. Antiviral immune response.
24. Mechanisms of protection of an organism against multicellular parasites.
25. Classification of immunodeficiency states. Diagnostic criteria.
26. Classification of immunodeficiency states. Primary immunodeficiency states with disorders in the humoral (B-cell) and T-cell links: basic syndromes, features of the clinical course, diagnosis, principles of therapy.
27. Classification of immunodeficiency states. Primary immunodeficiency states with deficiency of phagocyte functions, insufficiency of the complement system and combined primary immunodeficiency states: basic syndromes, features of the clinical course, diagnosis, principles of therapy.
28. Secondary immunodeficiency states: causes, classification, features of the clinical course, diagnosis, principles of therapy.
29. Classification of transplants. Mechanisms of rejection reactions. Types of rejection reactions.
30. Types of rejection reactions. Stages of rejection reactions. The concept of "pre-existing" antibodies.
31. Features of pre- and post-transplant immunological monitoring.
32. The concept of carcinogen, oncogene. Classification of oncogenes. Causes of tumors.
33. Separation of tumors by sensitivity to the immune response. The sequence of the body's immune response to the presence of a tumor.
34. The mechanism of cell-induced cytotoxicity (mechanism of action of killer cells).
35. The role and mechanisms of participation in antitumor protection of the body T-killers, T-helpers type I, natural killers, LAK-cells, specific antibodies.
36. Factors immunoresistance of tumors and tumor cells. Tumor cell antigens. Oncomarkers.
37. Principles of tumor immunotherapy: the main groups of drugs. Immunoprophylaxis of tumors.
38. The concept of immune hypersensitivity. Classification by Jell and Coombs.
39. The concept of immune hypersensitivity. Modern classification of hypersensitivity reactions.
40. Mechanisms of development of anaphylactic reactions. Diseases caused by anaphylactic reactions.
41. Mechanisms of development of cytotoxic reactions. Diseases caused by cytotoxic reactions.

42. Mechanisms of development of immunocomplex reactions. Diseases caused by immunocomplex reactions.
43. Mechanisms of development of cell-mediated reactions. Diseases caused by cell-mediated reactions.
44. Mechanisms of development of reactions of stimulating type. Diseases caused by stimulant-type reactions.
45. The concept - autoimmune reaction and autoimmune disease. The differences between them. Classification of autoimmune diseases.
46. Methods of diagnosis of autoimmune diseases.
47. Principles of treatment of autoimmune diseases.
48. The reasons for the formation of allergic pathology. Stages of pathogenesis of allergic reactions.
49. Classification of allergens.
50. Pseudoallergy: concepts and causes.
51. Allergic history (components). Clinical manifestations of allergic diseases. Provocative tests with allergens.
52. Laboratory methods for diagnosing allergic diseases.
53. Skin allergy tests: types; methods of conducting; interpretation of results.
54. Drugs for antiallergic therapy: groups of drugs and the main representatives.
55. Antihistamines. The difference between antihistamines of the first generation from the second.
56. Glucocorticosteroids for the course of therapy of atopic diseases and emergency care.

12. Methodical support:

- Curriculum of the discipline
- The syllabus of the discipline
- Textbook: Bajora YI, Goncharuk SF Clinical immunology and allergology. Textbook: ed. 4th, add. // Odessa: Press - Courier, 2018. - 264 p.
- Multimedia presentations
- Situational clinical tasks
- Methodical development of practical classes
- Electronic bank of test tasks by divisions of the discipline.

13. Recommended literature

Main:

1. Clinical immunology and allergology. - Textbook of medical universities of the IV level of accreditation and medical faculties of universities (edited by: OM Bilovola, PG Kravchun, VD Babadjan, LV Kuznetsova). - Kharkiv "Vulture". - 2011. - 550 p
2. Drannik GN Clinical immunology and allergology / Manual for students, interns, immunologists, allergists, doctors of medical specialties of all specialties. - 4th ed., Ext. // Kiev: - LLC "POLYGRAPH PLUS" .- 2011. - 482 p.
3. Bajora YI, Goncharuk SF Clinical immunology and allergology. Textbook: ed. 4th, add. // Odessa: Press - Courier, 2018. - 264 p.

Additional:

1. Oxford Handbook of Clinical Immunology and Allergy /G. Spickett. – 2nd ed. // Oxford University Press, USA, 2006. – 584 p.

2. Clinical Immunology: Disease, Principles, Mechanisms /J. Bellanti. – 1st ed. // Informa Health Care, 2010. – 500 p.
3. Clinical Immunology: Principles and Practice /Robert R. Rich, Thomas A. Fleisher, William T. Shearer, Harry W. Schroeder, Anthony J. Frew, Cornelia M. Weyand. – 3rd ed. // Mosby, 2008. – 1616 p.
4. Immunology for Medical Students /R. Nairn, M. Helbert – 2nd ed. // Mosby, 2006. – 320 p.
5. EAACI European Academy of Allergy and Clinical Immunology White Paper on Research, Innovation and Quality Care. Published by the European Academy of Allergy and Clinical Immunology 2018
6. Global Atlas of ALLERGY. Published by the European Academy of Allergy and Clinical Immunology 2014.
7. GLOBAL ATLAS OF SKIN ALLERGY. Published by the European Academy of Allergy and Clinical Immunology 2019.
8. Basic immunology : functions and disorders of the immune system / Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai ; Illustrations by David L. Baker, Alexandra Baker. -- Fifth edition. 318 p. ; cm. Includes bibliographical references and index.
9. ISBN 978-0-323-39082-8 I. Lichtman, Andrew H., author. II. Pillai, Shiv, author. III. Title. [DNLM: 1. Immunity. 2. Hypersensitivity. 3. Immune System--physiology. 4. Immunologic Deficiency Syndromes. QW 504] QR181 616.07'9--dc23.
10. 5th Edition of Clinical Immunology: Principles and Practice / Robert R. Rich. Elsevier – 2019. C. – 1323.

14. Electronic information resources

<http://moz.gov.ua>

<https://elifesciences.org/subjects/immunology-inflammation>

<https://www.eaaci.org/>

<https://www.facebook.com/EAACI>

<http://aalu.org.ua/>

<https://allergy.immunologyconferences.com/events-list/asthma>

<https://www.immunopaedia.org.za/>

<https://www.worldallergy.org/meetings>