

**MINISTRY OF HEALTH OF UKRAINE**  
**ODESSA NATIONAL MEDICAL UNIVERSITY**

Medical Faculty #1

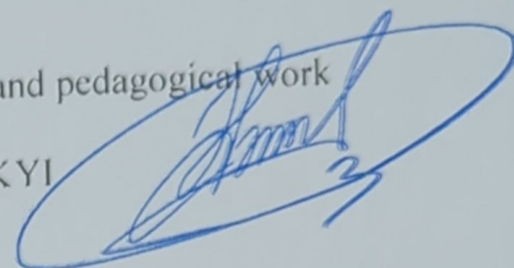
Department of internal medicine No.2

APPROVED

Vice-rector for scientific and pedagogical work

Eduard BURIACHKIVSKYI

01 of September, 2023



**METHODOLOGICAL GUIDELINES**  
**TO PRACTICAL LESSONS**  
**OF THE ELECTIVE COMPONENT**

Faculty of Medicine, **6th year**

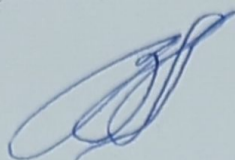
Educational discipline **ASSESSMENT OF THE HUMAN IMMUNE SYSTEM**

**Approved:**

Meeting of the Department of internal medicine No.2  
Odessa National Medical University

Protocol No. 1 dated August 28, 2023.

Head of the Department  
Vasil SHTANKO



**Developers:**

Professor Serhii HONCHARUK  
Assistant Viktoriia OSINTSEVA

## PRACTICAL SESSION

### Content section 1. Patterns of functioning and methods of studying the state of the immune system Practical lesson No. 1

#### TOPIC #1. Functioning patterns of the immune system.

**Purpose:** To study the general structure and basic principles of functioning of the immune system.

**Basic concepts:** organs of the immune system, factors of the nonspecific immune response, factors of the adaptive immune response, cellular factors of the immune system

**Equipment:** Multimedia projector, laptop, multimedia presentations, situational tasks

#### **Plan:**

**I. Organizational measures** (greetings, checking of present applicants, announcement of the topic, purpose of the lesson).

*The motivation of higher education applicants to study the topic:* The relevance of the topic is related to the need for doctors to know the structure of the immune system, the structure and differences of the innate and adaptive immune response, the list and functions of cellular factors of the immune system.

#### **II. Control of the reference level of knowledge (survey of applicants, interview on the subject of the lesson).**

2.1. Requirements for the theoretical readiness of applicants to perform a practical lesson.

*The applicant should know:*

- organs of the immune system
- factors of non-specific immune protection
- list and functional significance of cells of the immune system

2.2. Questions to check basic knowledge on the topic of the practical lesson:

1. Definition and types of immunity.
2. Central and peripheral organs of the immune system.
3. Factors of innate immunity: cellular (monocyte-macrophage system, killer and granulocyte cells), humoral (complement system, cytokines, etc.).
4. Specific immunity, its features, stages of formation and cooperation of immunocompetent cells that participate in the formation of the immune response.
5. Mechanism of antigen presentation.
6. Populations (T- and B-lymphocytes) and subpopulations (T-helper types 1, 2 and 17, T-regulatory, T-CTL) of lymphocytes, stages of their maturation and differentiation, their function.
7. The main complex of histocompatibility: structure, properties, function.
8. Patterns of cellular and humoral immune response formation.
9. General patterns and mechanisms of the immune response.

**III. Questions (test tasks) to check basic knowledge on the topic of the practical lesson:**  
not provided

#### **IV . Discussion of theoretical issues :**

The discussion of theoretical issues takes place in the form of answers to questions, discussions, demonstration by the teacher of illustrative material (diagrams, drawings, photos) using a multimedia projector, teacher answers to applicant's questions

**V. Topics of reports/abstracts:** not provided

**VI . Summing up lessons:** notification of received grades, assignment of homework.

**VII . List of recommended literature :**

Main:

1. Roitt's Essential Immunology /Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M. Roitt. – 12<sup>th</sup> ed. //Wiley-Blackwell, 2011. – 560 p.
2. 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.
3. Immunology: Understanding the Immune System /Klaus D. Elgert. – 2nd ed. // Wiley-Blackwell, 2009. – 726 p.
4. Bazhora Y.I., Honcharuk S.F. Clinical immunology and allergology. Study guide: ed. 4th, // Odesa: Press - courier, 2018. - 264 p.

**Additional**

1. 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 20 22
2. 5th Edition of Clinical Immunology: Principles and Practice / Robert R. Rich. Elsevier - 2019. C. - 1323.
3. Rich, Robert et al. Clinical Immunology E-Book. 5th ed. Elsevier Health Sciences, 2018. Web. 15 Oct. 2022.

**Electronic information resources**

<https://elifesciences.org/subjects/immunology-inflammation>  
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<http://aalu.org.ua/>  
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**Practical session No. 2**

**TOPIC #2. Clinical methods of assessing the human immune status.**

**Purpose:** To study the main methods of researching the state of the immune system, the significance of changes in the main indicators of the immunogram

**Basic concepts:** composition and functional significance of indicators of immunity, clinical and laboratory methods of assessing the state of the immune system, immune response during the inflammatory process.

**Equipment:** Multimedia projector, laptop, multimedia presentations, situational tasks

**Plan:**

**I. Organizational measures** (greetings, checking of those present, announcement of the topic, purpose of the lesson).

*The motivation of higher education applicants to study the topic:* The relevance of the topic is related to the need for doctors to know indicators of the humoral immune system, methods of assessing immune status, the ability to interpret changes in the main indicators of the immunogram

## **II. Control of the reference level of knowledge (survey of applicants, interview on the subject of the lesson).**

2.1. Requirements for the theoretical readiness of applicants to perform a practical lesson.

*The applicant should know:*

- humoral factors of the immune system
- methods of assessing immune status
- changes in the leukogram and immunogram during the inflammatory process

2.2. Questions to check basic knowledge on the topic of the practical lesson:

1. Features of immunological anamnesis.
2. Clinical methods of evaluating the immune system.
3. Instrumental methods of assessing the immune system.
4. Comprehensive assessment of local immunity.
5. Warning and probable signs of primary and secondary immunodeficiency conditions in humans.
6. Immunological tests of the first and second level.
7. Indications for the study of the immune status of a person.
8. Principles of basic laboratory methods of research of the immune system and its disorders: electrophoresis; immunoelectrophoresis; immunofixation; enzyme immunoassay; immunoblotting; agglutination; radioimmunoassay; immunoprecipitation; immunofluorescence analysis; flow cytometry; immunochromatographic analysis; polymerase chain reaction.
9. A comprehensive approach to assessing a person's immune status. Immunogram, interpretation of results.
10. Possibilities and limitations of immunological methods in the clinic.

**III. Questions (test tasks) to check basic knowledge on the topic of the practical lesson:**  
not provided

## **IV. Discussion of theoretical issues:**

The discussion of theoretical questions takes place in the form of answers to questions, discussions, demonstration by the teacher of illustrative material (diagrams, drawings, photos) using a multimedia projector, teacher answers to applicant's questions, solving situational problems

**V. Topics of reports/abstracts:** not provided

**VI. Summing up lessons:** notification of received grades, assignment of homework.

## **VII. List of recommended literature:**

Main:

1. Roitt's Essential Immunology /Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M. Roitt. – 12<sup>th</sup> ed. //Wiley-Blackwell, 2011. – 560 p.
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<https://www.immunopaedia.org.za/>  
<https://www.worldallergy.org/meetings>

### **Practical session No. 3**

#### **TOPIC #3. Human cellular immunity state assessment.**

**Purpose:** To study the classification of immunodeficiencies, their clinical and laboratory signs.

**Basic concepts:** born and acquired immunodeficiency diseases, clinical signs of immunodeficiency diseases, laboratory indicators of immunodeficiency

**Equipment:** Multimedia projector, laptop, multimedia presentations, situational tasks

**Plan:**

**I. Organizational measures** (greetings, checking of those present, announcement of the topic, purpose of the lesson).

*The motivation of higher education applicants to study the topic:* The relevance of the topic is related to the need for doctors to know the clinical and laboratory signs of immunodeficiency diseases

**II. Control of the reference level of knowledge (survey of applicants, interview on the subject of the lesson).**

2.1. Requirements for the theoretical readiness of applicants to perform a practical lesson.

*The applicant should know:*

- clinical symptoms of immunodeficiency states
- laboratory signs of immunodeficiency
- causes of secondary immunodeficiencies

2.2. Questions to check basic knowledge on the topic of the practical lesson:

1. Immunophenotyping. Cellular expression of the most significant CD molecules.
2. Modern methods of studying the state of cellular immunity and their interpretation: visual streptavidin-biotin method; lymphocytolysis reaction; determination of cytotoxic activity of lymphocytes; phagocytic activity of neutrophils; NST test; determination of the metabolic activity of neutrophils by the chemiluminescence method; the reaction of inhibiting the migration of leukocytes; lymphocyte blast transformation reaction; method of immunomagnetic separation of cells; the method of immune spots (ELISPOT).
3. Clinical interpretation of changes in the absolute and percentage content of cells of the immune system in various pathological conditions of the human body.

**III. Questions (test tasks) to check basic knowledge on the topic of the practical lesson:**  
not provided

**IV . Discussion of theoretical issues :**

The discussion of theoretical questions takes place in the form of answers to questions, discussions, demonstration by the teacher of illustrative material (diagrams, drawings, photos) using a multimedia projector, teacher answers to applicant's questions, solving situational problems

**V. Topics of reports/abstracts:** not provided

**VI. Summing up lessons:** notification of received grades, assignment of homework.

**VII. List of recommended literature:**

Main:

1. Roitt's Essential Immunology /Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M. Roitt. – 12<sup>th</sup> ed. //Wiley-Blackwell, 2011. – 560 p.
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## Practical session No. 4

### TOPIC #4. Human humoral immunity state assessment.

**Purpose:** To study the etiology, pathogenesis, principles of diagnosis and treatment of immunodependent diseases

**Basic concepts:** concepts of atopy and allergy, main stages of allergic reactions, methods of allergy examination, molecular allergology, elimination measures for allergic diseases, antiallergic drugs, specific immunotherapy with allergens

**Equipment:** Multimedia projector, laptop, multimedia presentations, situational tasks

#### Plan:

**I. Organizational measures** (greetings, checking of those present, announcement of the topic, purpose of the lesson).

*The motivation of higher education applicants to study the topic:* The relevance of the topic is related to the need for doctors to know the etiology, pathogenesis, principles of diagnosis and treatment of allergic (atopic) diseases

**II. Control of the reference level of knowledge (survey of applicants, interview on the subject of the lesson).**

2.1. Requirements for the theoretical readiness of applicants to perform a practical lesson.

*The applicant should know:*

- pathogenesis of immunodependent diseases
- methods of diagnosis, treatment and prevention of immunodependent diseases

2.2. Questions to check basic knowledge on the topic of the practical lesson:

1. Mechanisms of humoral immune response formation.
2. Factors of the humoral immune response.
3. Mechanism of formation of primary and secondary humoral immune response.
4. The structure of immunoglobulins.
5. Concepts of affinity and avidity.
6. The role of immunoglobulins in the immune response.
7. Functional significance of the main classes of immunoglobulins.
8. Deviations of immunoglobulins in children.
9. The value of the complement system in the process of the immune response.
10. Cytokines. Participation of cytokines in immune response mechanisms. Chemokines.
11. Scheme of providing cytokines for the antibacterial immune response.
12. Proteins of the immune system.

**III. Questions (test tasks) to check basic knowledge on the topic of the practical lesson:**  
not provided

#### IV. Discussion of theoretical issues:

The discussion of theoretical questions takes place in the form of answers to questions, discussions, demonstration by the teacher of illustrative material (diagrams, drawings, photos) using a multimedia projector, teacher answers to students' questions, solving situational problems

**V. Topics of reports/abstracts:** not provided

**VI. Summing up lessons:** notification of received grades, assignment of homework.

#### VII. List of recommended literature :

1. Roitt's Essential Immunology /Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan



- M. Roitt. – 12<sup>th</sup> ed. //Wiley-Blackwell, 2011. – 560 p.
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5. Global Atlas of ALLERGY. Published by the European Academy of Allergy and Clinical Immunology 2014.  
GLOBAL ATLAS OF SKIN ALLERGY. Published by the European Academy of Allergy and Clinical Immunology 2019.

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## **Content section 2. Diagnosis of allergic diseases**

### **Practical session No. 5**

#### **Topic #5. Methods of allergy diagnosis.**

**Purpose:** To study the classification of allergic (non-atopic and atopic) diseases, their etiology, features of pathogenesis, principles of diagnosis and treatment.

**Basic concepts:** allergic diseases, classifications of hypersensitivity reactions, mechanisms of autoimmune reactions.

**Equipment:** Multimedia projector, laptop, multimedia presentations, situational tasks

#### **Plan:**

**I. Organizational measures** (greetings, checking of those present, announcement of the topic, purpose of the lesson).

*The motivation of higher education applicants to study the topic:* The relevance of the topic is related to the need for doctors to know the classification and mechanisms of hypersensitivity

reactions, the pathogenesis of autoimmune diseases

## **II. Control of the reference level of knowledge (survey of applicants, interview on the subject of the lesson).**

2.1. Requirements for the theoretical readiness of applicants to perform a practical lesson.

*The applicant should know:*

- Classifications of hypersensitivity reaction (Gel and Coombs, modern)
- features of the pathogenesis of various types of allergic reactions, diseases

2.2. Questions to check basic knowledge on the topic of the practical lesson:

1. Classification of hypersensitivity reactions according to Gel and Coombs.
2. Modern classification of hypersensitivity reaction
3. The main mechanisms of the occurrence and development of immunopathological conditions, their role in the development of various diseases.
4. Mechanisms of development of humoral cytotoxic reactions.
5. Mechanisms of reaction development of immune complex formation.
6. Mechanisms of development of pathological immune reactions mediated by T-sensitized lymphocytes.
7. Mechanisms of autosensitization caused by antibodies.
8. Problematic aspects of the diagnosis of allergic diseases. IgE-positive and IgE-negative forms of allergic diseases.
9. Pseudoallergy. Causes of pseudoallergic reactions.
10. Characteristics of the most significant allergens.
11. Candidate genes for atopy and bronchial asthma.
12. Diagnosis of allergic diseases: allergy history; review; functional research methods; allergy diagnosis methods.
13. Concept of molecular allergology.

## **III. Questions (test tasks) to check basic knowledge on the topic of the practical lesson:** not provided

## **IV. Discussion of theoretical issues:**

The discussion of theoretical issues takes place in the form of answers to questions, discussions, demonstration by the teacher of illustrative material (diagrams, drawings, photos) using a multimedia projector, teacher answers to applicant's questions

## **V. Topics of reports/abstracts:** not provided

## **VI. Summing up lessons:** notification of received grades, assignment of homework.

## **VII. List of recommended literature:**

Main:

1. Roitt's Essential Immunology /Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M. Roitt. – 12<sup>th</sup> ed. //Wiley-Blackwell, 2011. – 560 p.
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#### Additional

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