

**FEDERAL STATE BUDGETARY EDUCATIONAL INSTITUTION
OF HIGHER EDUCATION
«BASHKIR STATE MEDICAL UNIVERSITY»
OF THE MINISTRY OF HEALTHCARE OF RUSSIAN FEDERATION**

DEPARTMENT REPRODUCTIVE HUMAN HEALTH
WITH COURSE OF IMMUNOLOGY

APPROVED by
Head of the department

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09.06. 2021 г.



**Methodical recommendations For professors
to the practice session on the topic:
«Acquired immunity. Immune-competent cells. Antigens.»**

Discipline: Immunology
Specialty: 31.05.01. «General education»
Course 4
Semester 7
Hours: 4

Methodological instructions for students for practical lessons in the discipline "Clinical Immunology " were developed by the faculty of the department in accordance with the work program of the academic discipline (Ufa, 2021), the curriculum (2021) and taking into account the requirements of the Federal State Educational Standard of Higher Education 3 ++ according to specialty 31.05.01 General education (M., 2020).

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Approval at the meeting No. 1 of the Department of of reproductive human health with course of immunology dated 09.06.2021

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1. The theme "Acquired immunity. Immune-competent cells. Antigens.»

Acquired immunity is formed by the specific interaction of cells of the immune system with the antigen, resulting in antibodies and lymphocytes that adequately recognize this antigen and neutralize its potentially harmful effects on the body. The forms of immune response include: antibody formation, effector function of immune phagocytes, killer function of lymphocytes, allergy, immunological memory, immunological tolerance. An inadequate immune response to various environmental and internal factors, including microorganisms, leads to a number of serious disorders in the activity of the entire body, which underlies the pathogenesis of many pathological conditions. Therefore, future doctors should be familiar with the mechanisms of immunity formation.

2. Learning purpose: mastering knowledge about the concept of Acquired immunity. Immune-competent cells. Antigens, knowledge of pathogenesis of each type of reaction and clinical manifestations.

To form professional competencies, the student must know:

- features of Immune-competent cells;
- the role of each type of Immune-competent cells in anti-infective protection;
- features of antigens

To form professional competencies, the student must be able to:

- be able to distinguish between antigens of foreignness, antigenicity, immunogenicity, specificity;
- be able to explain the specificity of immune interaction based on the structure of the antigenic determinant;
- be able to explain the principles of blood transfusion, transplantation from the standpoint of the presence of antigens in humans;
- be able to explain the diversity of infectious pathology in terms of the diversity of bacterial and viral antigens, the clinical significance of this phenomenon
- master the following competencies: GC 1, GC 6, GPC 5, PC 1, PC 5.

3. Materials for self-preparation to master this topic:

Self-training questions:

1. Acquired immunity, forms (active, passive, natural, artificial, antibacterial, antitoxic, antiviral, sterile, nonsterile, local, etc)
2. Basic differences in the innate and acquired immunity.
3. Forms of immune response.
4. Antigens, property (heterology, antigenicity, immunogenicity, specificity and other)
5. Antigenic determinants, their structure. Manifestation of the antigenic specificity: specific, group, organ, heterospecific.
6. Haptens, the property: autoantigens.
7. Antigens of the man: xenoantigeny, autoantigens, isoantigens, alloantigens, the antigenic markers of the cells of man (SD3-, CD -4, CD8- antigens and others)
8. Main complex of histocompatibility, the antigens of histocompatibility I ,II and III classes.
9. Antigens of bacteria; group, form, tipospecific; protective; the perikaryotic antigens, superantigeny. Antigenic mimicry. Corpuscular, dissoluble, undissolved, thymus-dependent and thymus-independent antigens.
10. Antigenic structure of viruses.

Technological map of the lesson:

№	Stages of classes and their content	Time in min.	Used visual aids, methodological manuals, etc.	Location of classes	Purpose and nature of the activity	
					of the student's activity	The purpose and nature of the teacher's activity
1	2	3	4	5	6	7
1	Organizational stage	5				
2	Control of students' initial knowledge using test tasks	40	Textbook for classroom and extracurricular work of students Tests.	Study room	Assimilation of theoretical material. Solving typical tasks using tests	Control of the initial level of knowledge.
3	Familiarization of students with the content of the lesson	15	Training tables, slides.			
4	Independent work of students under the guidance of a teacher:	105	Training tests, training situational tasks.		Consolidation of knowledge on the topic, self-examination of the level of assimilation of the material	Control over the work of students.
5	Control of the final level of knowledge and skills on the topic	15	Situational tasks that control test tasks.	Study room		Summing up the lesson. Checking the test results, the level of assimilation of the lesson topic
6	Homework assignment	5				

7.1. Control of the initial level of knowledge and skills. Self-control assignments: students' decision on individual sets of test assignments on the topic

Self-control assignments: students' decision on individual sets of test assignments on the topic

1. Xenoantigens are:
 - 1) the antigens of their Own cells
 - 2) antigens From an unrelated donor

- 3) antigens From a genetically identical donor
- 4) antigens of One biological species.

2. CD-antigens are:

- 1) human cell Markers
- 2) cell surface Molecules
- 3) Proteins
- 4) are Recognized by MHC antigens
- 5) Polysaccharides.

3. Superantigens cause:

- 1) Polyclonal activation of lymphocytes
- 2) antigen-Specific activation of lymphocytes
- 3) Hyperproduction of cytokines
- 4) the Destruction of tissue
- 5) T cell Death

4. Tolerogens cause

- 1) Allergies
- 2) Autoimmune diseases
- 3) Immunological tolerance
- 4) Immunological memory

5. The Main histocompatibility complex is:

- 1) gene Complex
- 2) Genes located on chromosome 6
- 3) protein Complex
- 4) Encode the synthesis of MHC class I antigens
- 5) Encode the synthesis of MHC class II antigens

6. Immunological specificity.

- 1) Refers to the ability of immune system cells to differentiate between "their" and "someone else's".
- 2) Reflects the ability to selectively respond to antigens.
- 3) it is related to the concept of "cloning of lymphocytes»
- 4) Manifests itself at the stage of immunogenesis.
- 5) Manifests itself at the stage of implementation of the immune response

7. Possible sources of human antigens:

- 1) Microorganisms
- 2) Animals.
- 3) Plants.
- 4) Synthetic products.
- 5) Other people.
- 6) Own fabrics.

8. Factors that determine the immunogenicity of the antigen:

- 1) Structural foreignness
- 2) Molecular weight.
- 3) Chemical nature.
- 4) The route of administration.

- 5) Dosage.
- 6) Adjuvant support.
 9. Properties and functions of antigen-related epitopes (antigenic determinants)
 - 1) Immunogenicity.
 - 2) Specificity.
 - 3) Complementarity. Conspecific receptors of lymphocytes.
 - 4) Adjuvant activity.
 - 5) Activation of antigen-presenting cells.
 - 10 Properties and functions of the antigen associated with the carrier:
 - 1) Specificity (humoral immunity)
 - 2) Immunogenicity (Generalny immunity).
 - 3) Immunogenicity (cellular immunity).
 - 4) Specificity (T-cell immunity).
 - 5) Adjuvant activity.
11. the Reason why haptens are devoid of immunogenicity:
 - 1) Lack of foreignness.
 - 2) Lack of an epitope.
 - 3) The absence of the carrier.
 - 4) Low molecular weight.
 - 5) Immunological tolerance.
12. Properties of haptens:
 - 1) Immunogenicity.
 - 2) The foreignness.
 - 3) Specificity.
 - 4) ability to bind to preformed antibodies.
 - 5) Ability to perform the function of epitopes.
13. A situation in which the haptens become immunogenic:
 - 1) Conjugation with a protein carrier.
 - 2) conjugation with epitopes.
 - 3) Complexing with adjuvants.
 - 4) Processing in antigen-presenting cells.
 - 5) Presentation by MHC molecules.
14. MNC-phenotype.
 - 1) Determined by the MHC-1 polymorphism.
 - 2) Determined by the MHC-2 polymorphism.
 - 3) the Result of co-expression of two haplotypes.
15. HLA-phenotype.
 - 1) It is Represented by various classes of molecules.
 - 2) Identity of close relatives.
 - 3) represented by alloantigens of nucleated cells.
 - 4) Responsible for tissue incompatibility.
 - 5) it is related to the regulation of the immune response.
16. Physiological functions of MHC:

- 1) Presentation of antigens to T-lymphocytes.
 - 2) Functional cooperation of immune system cells.
 - 3) Presentation of antigens to B-lymphocytes.
 - 4) Tissue incompatibility.
 - 5) Regulation of the immune response.
17. Provisions valid for MHC-1 molecules.
- 1) Present on all nucleated cells.
 - 2) Are expressed primarily on professional antigen-presenting cells.
 - 3) Present CD 8 antigens to T-lymphocytes.
 - 4) Present CD4 antigens to T-lymphocytes.
- 5) Participate in the T-dependent regulation of antibody formation.
18. Mechanisms and concepts related to MHC-restriction of the immune response:
- 1) Double recognition of antigens by B-lymphocytes.
 - 2) expressed mainly on professional antigen-presenting cells.
 - 3) Present CD 8 antigens to T-lymphocytes.
 - 4) Present CD4 antigens to T-lymphocytes
- 5) Participate in the T-dependent regulation of antibody formation.
19. Mechanisms and concepts related to MHC-restriction of the immune response:
- 1) Double recognition of antigens by B-lymphocytes.
 - 2) MHC-dependent representation of T-epitopes.
- 3) Processing of antigens in b-lymphocytes.
20. the involvement of MHC (HLA) in the regulation of the immune response is determined by the following factors and mechanisms:
- 1) Selective binding of antigenic peptides.
 - 2) Regulation of MHC (HLA) expression on antigen-presenting cells
 - 3) Polymorphism of the MHC (HLA)
 - 4) MHC-I dependent presentation of CD8 antigens to T-lymphocytes.
 - 5) MHC-II dependent presentation of CD4 antigens to T-lymphocytes.

Typical tasks.

Task 1. In the children's group, there is an outbreak of acute intestinal diseases that correspond to the clinical picture of dysentery. The disease is associated with the arrival of a new nanny at work.

Questions:

- 1) How to determine the source of infection?
- 2) What microbiological studies should be conducted for this purpose?

Task 2. Two students of the MU passed the SCP in the GICB No.

1. The student Sidorova E., mainly worked in the treatment room, and the student-Ivanova R. - in the wards (carried out nursing care for patients with hepatitis). Two weeks after passing the UPP, Ivanova R. felt unwell, and after 3 days, her urine began to darken (to resemble the color of beer). After 4 months, the same symptoms of the disease appeared in Sidorova E., which is typical for patients with infectious hepatitis.

Questions:

1. What are the microbes that most often cause infectious hepatitis?
2. What are the characteristic properties of the causative agents of such hepatitis?

3. The most well-known pathogens of these infectious hepatitis?
4. What are the mechanisms of transmission characteristic of different types of pathogens?
5. What is the hidden period of the disease? What is its duration in these patients?

Task 3. Two female employees from among the maintenance staff of the GIKB No. 1-Evseeva V. and Astafyeva N. fell ill with infectious hepatitis. It was known that Evseeva V. (part-time) constantly cleaned the bathrooms, and Astafyeva N. carried out pre-sterilization cleaning of the material, often contaminated with biological fluids from patients, including blood.

Questions:

1. Given the different working conditions, what types of hepatitis could most likely be infected by Evseeva V. and Astafyeva N.?
2. What could contribute to the infection of workers?
3. What ways of infection are most likely for each of the cases?
4. What hepatitis viruses are transmitted by parenteral and sexual routes?
5. How should hands be disinfected if blood or any other biological material from patients gets on them?

7.2. Analysis with the teacher of the key questions necessary for the development of the topic of the lesson.

7.3. Presentation by the teacher of the methodology for assessing the state of factors of non-specific protection of the body in the laboratory.

7.4. Independent work of students under the supervision of a teacher (draw in a notebook the stages of phagocytosis, the main schemes of complement activation).

7.5. Control of the final level of assimilation of the topic:

The teacher checks the students' oral answers to the questions of self-preparation.

Checking the presence of drawings of phagocytosis stages and the main schemes of complement activation in the notebooks.

Materials for monitoring the level of development of the topic:

- a set of test tasks,
- situational tasks.

Place of self-training: study room for independent work of students.

Educational and research work of students on this topic (conducted during school hours): working with the main and additional literature.

The main literature

Serial №	Title	Author(s)	Year, place of publication	Number of copies	
				In library	At the department
1	2	3	4	7	8
	Basic Immunology: Functions and Disorders of the Immune System [Текст] : [учебноиздание]	A. K. Abbas, A. H. Lichtman, S. Pillai.	Elsevier, 2016 – 335 p.	80	0

Additional literature

Serial №	Title	Author(s)	Year, place of publication	Number of copies	
				In library	At the department
1	2	3	4	7	8
•	Lectures in immunology: курс лекций	Maianskii, A. N.	N. Novgorod: Publishing house NSMA, 2004 – 256 p.	40	0
•	IMMUNOLOGY	Khaitov R.M.	2008 – 256 c.on-line.	access mode: ЭБС «Консультант студента» http://www.studmedlib.ru/book/ISBN9785970407042.html	unlimited access
•	Fundamental Immunology.	Lippincott Williams & Wilkins	2008 –on-line	access mode: Database«LWW Medical Book Collection 2011» http://ovidsp.ovid.com	unlimited access

