

In the Name of God



**Hamadan University of Medical Sciences and Health Services
Educational Deputy of the University
Center for Studies and Development of Medical Sciences Education**

Medical Immunology

Dear Colleagues,

As the teaching-learning process is one that cannot achieve its objectives without planning, it is essential to develop a lesson plan at the beginning of the educational process (as a roadmap and guide for instructors and students). Therefore, it is requested that esteemed instructors exercise utmost care in completing the lesson plan.

Course and Instructor Details (Completion of all items in this section is mandatory)

Course and Instructor Details

Field	Details
Course Title	Medical Immunology
Instructors	Dr. Alireza Zamani, Dr. Mohsen Rastgari Pouyani
Course Coordinator	Dr. Alireza Zamani
Department Head	Dr. Mahdi Behzad
Credit Hours	Theory: 1.76 units, Practical: 0.24 units
Student Major and Level	Medicine – Basic Sciences/Clinical Foundations
Semester	First: <input type="checkbox"/> , Second: <input checked="" type="checkbox"/>
Teaching Location	Medical School Classroom

Session	Topic	Learning Objectives	Learning Domain	Teaching Method	Duration	Teaching Aids	Assessment Method
1	History of Immunology, Overview of Immunology, Types of Immunity (Innate and Acquired), Immunization	<ol style="list-style-type: none"> 1. Name at least 5 famous immunologists. 2. Define immunology and explain it. 3. Differentiate types of immunity with diagrams and examples. 4. Explain the application and necessity of immunology in medicine. 	<ol style="list-style-type: none"> 1. Cognitive (Knowledge) 2. Cognitive (Knowledge and Comprehension) 3. a. Cognitive (Analysis); b. Cognitive (Comprehension) 4. Cognitive (Comprehension) 	Lecture	90 minutes	Project or	Q&A
2	Immune System Cells	<ol style="list-style-type: none"> 1. Explain the origin and types of immune cells, the importance of CD molecules, and the role of each immune cell. 2. Describe the communication between immune system cells. 	<ol style="list-style-type: none"> 1. Cognitive (Comprehension) 2. Cognitive (Knowledge) 	Lecture-Discussion	90 minutes	Project or	Q&A
3	Organs and Tissues of the Immune System	<ol style="list-style-type: none"> 1. Describe the characteristics of immune tissues and organs. 2. Compare primary and secondary lymphoid organs. 3. Explain the structure and role of bone marrow, thymus, vessels, lymph nodes, spleen, and mucosal 	<ol style="list-style-type: none"> 1. Cognitive (Comprehension) 2. Cognitive (Evaluation) 3. Cognitive (Comprehension) 	Lecture-Multimedia	90 minutes	Project or	Q&A

		lymphoid tissues.					
4	Introduction to Antigens and Their Properties	<p>1. a. Define concepts such as antigen, immunogen, tolerogen, allergen, mitogen, super antigen, and hapten; b. Compare them.</p> <p>2. State conditions for immunogenicity.</p> <p>3. a. Explain types of epitopes and their effects on the immune system; b. Compare them.</p>	<p>1. a. Cognitive (Knowledge); b. Cognitive (Evaluation)</p> <p>2. Cognitive (Knowledge)</p> <p>3. a. Cognitive (Comprehension); b. Cognitive (Evaluation)</p>	Lecture-Discussion	90 minutes	Project or	Q&A
5	Antibodies and Their Types	<p>1. a. Illustrate an antibody and distinguish its components. b. Name different classes of antibodies and compare their features.</p> <p>2. List at least three functions of various antibodies.</p> <p>3. Explain the rearrangement of immunoglobulin genes and the assembly of light and heavy antibody chains.</p> <p>4. a. Distinguish between polyclonal and monoclonal antibodies, mouse, chimeric, humanized, and fully human</p>	<p>1. a. Cognitive (Analysis); b. Cognitive (Analysis)</p> <p>2. a. Cognitive (Knowledge); b. Cognitive (Evaluation)</p> <p>3. Cognitive (Knowledge)</p> <p>4. Cognitive (Comprehension)</p> <p>5. a. Cognitive (Analysis); b. Cognitive (Knowledge)</p>	Lecture-Discussion-Multimedia	90 minutes	Project or	Q&A

		antibodies; b. Name several therapeutic monoclonal antibodies and their applications.					
6	Antigen-Antibody Reactions	1. Name and explain the forces between antigens and antibodies. 2. a. List types of antigen-antibody reactions; b. Compare them; c. Provide examples for each.	1. Cognitive (Knowledge and Comprehension) 2. a. Cognitive (Knowledge); b. Cognitive (Evaluation); c. Cognitive (Comprehension)	Lecture-Discussion	90 minutes	Project or	Q&A
7	Complement System and Its Role in Body Defense	1. Explain the position of the complement system in the defense system and its activation pathways. 2. Describe the biological properties of complement and its mechanisms in defending against microbial agents and tissue destruction. 3. a. Name molecules involved in complement regulation; b. Relate deficiencies of these molecules to certain diseases.	1. Cognitive (Comprehension) 2. Cognitive (Comprehension) 3. a. Cognitive (Knowledge); b. Cognitive (Evaluation)	Lecture-Multimedia	90 minutes	Project or	Q&A
8	MHC System and	1. a. Illustrate MHC antigens	1. a. Cognitive	Lecture-Discussion-	90 minutes	Project or	Q&A

	Immunogenetics	<p>and indicate their gene loci; b. Explain the chemical structure of HLA I and II and their biological roles in immune responses. 2. Describe the relationship of HLA with diseases, demographics, cellular distribution, polymorphism, genetics, inheritance, and the pivotal role of this antigen system in organ transplantation. 3. a. Name antigen-presenting cells in the immune system; b. Compare different antigen presentation pathways; c. Interpret their relationship with host immune responses.</p>	<p>(Analysis); b. Cognitive (Comprehension) 2. Cognitive (Comprehension) 3. a. Cognitive (Knowledge); b. Cognitive (Evaluation); c. Cognitive (Evaluation)</p>	Multimedia	tes		
9	Cytokines and Chemokines	<p>1. Define cytokines and classify them correctly. 2. a. Explain various cytokines (pro-inflammatory and anti-inflammatory) involved in innate and acquired immune responses; b. Compare them.</p>	<p>1. Cognitive (Synthesis) 2. a. Cognitive (Comprehension); b. Cognitive (Evaluation) 3. Cognitive (Knowledge) 4. a. Cognitive (Synthesis); b. Cognitive (Knowledge)</p>	Lecture-Multimedia	90 minutes	Project or	Q&A

		<p>3. Name hematopoietic cytokines and therapeutic cytokines, explaining their applications.</p> <p>4. a. Classify chemokines and their receptors; b. Name significant chemokines in the immune system and describe their effects.</p> <p>5. Classify and compare types of cytokine receptors correctly.</p>	<p>and Comprehension)</p> <p>5. Cognitive (Synthesis and Evaluation)</p>				
10	Innate Immunity 1	<p>1. Correctly classify and compare immune system responses.</p> <p>2. Explain various lines of innate immune system activation.</p> <p>3. Name and explain various receptors and mediators of innate immunity.</p> <p>4. Describe the function of various innate immune cells including neutrophils, monocytes/macrophages, mast cells, dendritic cells, and innate lymphoid cells.</p>	<p>1. Cognitive (Synthesis and Evaluation)</p> <p>2. Cognitive (Comprehension)</p> <p>3. Cognitive (Knowledge and Comprehension)</p> <p>4. Cognitive (Comprehension)</p>	Lecture-Discussion-Multimedia	90 minutes	Project or	Q&A
11	Innate Immunity 2	<p>1. Explain the activation and function of</p>	<p>1. Cognitive (Comprehension)</p>	Lecture-Multimedia	90 minutes	Project or	Q&A

		<p>natural killer (NK) cells.</p> <p>2. Describe the role of inflammation, phagocytosis, and antiviral defense in innate immune responses.</p> <p>3. Name the regulation of innate immune responses and some involved molecules.</p> <p>4. Explain how innate immunity affects acquired immune responses.</p>	<p>2. Cognitive (Comprehension)</p> <p>3. Cognitive (Knowledge)</p> <p>4. Cognitive (Comprehension)</p>				
12	Mechanisms of Humoral Immunity	<p>1. Explain the activation of B lymphocytes and the phases of humoral immune responses to antigens.</p> <p>2. Describe responses to thymus-independent and -dependent antigens and compare them.</p> <p>3. Explain class switching and maturation of antibody affinity and germinal center reactions.</p> <p>4. Describe the regulation of humoral immune responses.</p>	<p>1. Cognitive (Comprehension)</p> <p>2. Cognitive (Comprehension and Evaluation)</p> <p>3. Cognitive (Comprehension)</p> <p>4. Cognitive (Comprehension)</p>	Lecture-Multimedia-Discussion	90 minutes	Project or	Q&A
13	Mechanisms of Cellular Immunity	<p>1. a. Explain the activation of T lymphocytes; b. Compare T lymphocyte</p>	<p>1. a. Cognitive (Comprehension); b. Cognitive</p>	Lecture-Multimedia-Discussion	90 minutes	Project or	Q&A

		<p>activation with B lymphocyte activation in humoral immunity and state the differences.</p> <p>2. a. Name signals and molecules involved in the immunological synapse that activate T lymphocytes; b. Illustrate this synapse and its involved molecules; c. Explain the function of various molecules involved in this synapse.</p> <p>3. Describe the differentiation of CD8+ T lymphocytes into effector cells and the mechanisms of target cell killing.</p> <p>4. Classify various subtypes of CD4+ T lymphocytes based on their roles in immunity and other characteristics.</p>	<p>(Evaluation)</p> <p>2. a. Cognitive (Knowledge); b. Cognitive (Analysis); c. Cognitive (Comprehension)</p> <p>3. Cognitive (Comprehension)</p> <p>4. Cognitive (Synthesis)</p>				
14	Immunological Tolerance	<p>1. Explain the concept of immunological tolerance and its necessity and importance.</p> <p>2. Compare types of tolerance based</p>	<p>1. Cognitive (Comprehension)</p> <p>2. Cognitive (Evaluation)</p> <p>3. Cognitive (Comprehension and Evaluation)</p>	Lecture-Discussion	90 minutes	Project or	Q&A

		<p>on anatomical location and physiological time, and their inducing mechanisms.</p> <p>3. Describe how tolerance breakdown leads to autoimmune diseases, some genetic defects involved in autoimmune diseases, the relationship between MHC molecules and autoimmune diseases, and therapeutic approaches based on immunopathological mechanisms.</p>					
15	Mucosal Immunity	<p>1. Describe the lymphoid structure of skin and mucosa and the role and importance of these tissues in immune responses to mucosal antigens.</p> <p>2. Explain the production of IgA antibodies at mucosal surfaces and their transfer, as well as how immune responses are generated at mucosal surfaces.</p> <p>3. Describe how tolerance to</p>	<p>1. Cognitive (Comprehension)</p> <p>2. Cognitive (Comprehension)</p> <p>3. Cognitive (Comprehension)</p>	Lecture-Discussion	90 minutes	Project or	Q&A

		commensal microbes is maintained at mucosal surfaces.					
P 1							
1	Antigen-Antibody Reaction, Immunoprecipitation	1. Explain the basis of antigen-antibody reactions and compare different types. 2. Describe immunoprecipitation. 3. Perform Ouchterlony, SRID, and Ascoli tests.	1. Cognitive (Comprehension and Evaluation) 2. Cognitive (Comprehension) 3. Psychomotor	Lecture-Practical in Lab	90 minutes	Projector and Lab Equipment	Lab Reports, Discipline in Lab
2	CRP Test, RF Test, and Anti-CCP Antibodies (Theory)	1. Describe types of agglutination reactions. 2. Explain acute phase proteins and CRP test principles. 3. Perform CRP test independently and interpret results. 4. Explain RF test principles and applications. 5. Describe Anti-CCP antibody production and its measurement applications.	1. Cognitive (Comprehension) 2. Cognitive (Comprehension) 3. Psychomotor 4. Cognitive (Comprehension) 5. Cognitive (Comprehension)	Lecture-Practical in Lab	90 minutes	Projector and Lab Equipment	Lab Reports, Discipline in Lab
3	Wright Test, Vidal Test	1. Explain methods for	1. Cognitive	Lecture-Practical in	90 min	Projector	Lab Repo

	Theory	<p>diagnosing brucellosis and the Wright test.</p> <p>2. Perform Wright test independently and interpret results.</p> <p>3. Describe Wright and 2ME Wright tests and their uses.</p> <p>4. Explain the Vidal test and its applications.</p>	<p>(Comprehension)</p> <p>2. Psychomotor</p> <p>3. Cognitive (Comprehension)</p> <p>4. Cognitive (Comprehension)</p>	Lab	utes	and Lab Equipment	rts, Discipline in Lab
4	Blood Grouping, Crossmatch, and Coombs	<p>1. Classify ABO and Rh blood groups based on their antigens.</p> <p>2. Explain the principles of blood agglutination tests.</p> <p>3. Perform blood grouping and Rh tests independently and interpret results.</p> <p>4. Explain the principles and applications of crossmatch tests.</p> <p>5. Describe the principles and applications of Coombs tests.</p>	<p>1. Cognitive (Synthesis)</p> <p>2. Cognitive (Comprehension)</p> <p>3. Psychomotor</p> <p>4. Cognitive (Comprehension)</p> <p>5. Cognitive (Comprehension)</p>	Lecture-Practical in Lab	90 minutes	Projector and Lab Equipment	Lab Reports, Discipline in Lab
5	Flocculation, RPR Test, VDRL Test Theory, and ELISA	<p>1. Explain the flocculation reaction.</p> <p>2. Name methods for</p>	<p>1. Cognitive (Comprehension)</p> <p>2.</p>	Lecture-Practical in Lab	90 minutes	Projector and Lab Equipment	Written Exam, Lab Report

		diagnosing syphilis and compare them. 3. Perform RPR test independently and interpret results. 4. Describe ELISA and its types and applications.	Cognitive (Knowledge and Evaluation) 3. Psychomotor 4. Cognitive (Comprehension)			ment	rts, Discipline in Lab, Final Practical Exam
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Grading Scheme

Assessment Type	Assessment Tool	Total Points
Quiz	-	-
Project Presentation	-	-
Midterm Exam	-	-
Final Exam	Theory: MCQ Test	16 points
	Practical: MCQ Test Practical Exam Lab Report	1.25 points
		0.625 points
Other	Oral Quizzes	1.5 points
Total		20 points

1- Reference

2- Basic Immunology by: Abul K. Abbas and A.H. Lichman (latest edition)

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3- Cellular and molecular Immunology by: Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai (latest edition)

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