Immunology Lesson plan for international medical students

Kermanshah University of medical sciences (KUMS) international affairs

School of medicine

Department of Immunology

Lecturers:

Dr. Ali Gorgin Karaji

Associated professor of immunology

Dr. Mahdi Taghadosi

Assistant professor of immunology

Dr. Farhad Salari

Assistant professor of immunology

Dr. Alireza Rezaeimanesh

Assistant professor of immunology

Dr. Hanieh Tarokhian

Assistant professor of immunology

Prerequisite course: Physiology 1

Number of units: 3

Main purpose of the course:

Students will recognize the immune system organs, tissues, cells, and its molecules, and will also learn the interaction between the immune system and foreign agents, and furthermore they can describe the immunological concepts such as tolerance, autoimmunity, immunodeficiency as well as transplant immunology and tumor immunology.

A- Main purposes of sessions:

1-Introducing the immunology discipline, general features of the immune response and student tasks during the semester.

2- Cells of the immune system.

3- Organs of the Immune system.

4- Lymphocytes recirculation and homing.

5- Antigens and Immunogens.

6- Antibodies and T cell receptor (TCR).

7- Antibody and antigen interaction and its applications.

8- Innate immunity and its components.

9- Cytokines and their roles in the immune response.

10- Major histocompatibility complex (MHC) and the cellular and molecular mechanism of antigen presentation.

11- Genetic basis of antibody and TCR diversity.

12- Lymphopoiesis and stages of T cell development and B cell development.

13- T cells activation.

14- Effector mechanisms of cell mediated immunity (CMI).

15- Mechanisms of B cell activation and pattern of B cell response to antigens.

16- Effector mechanisms of humoral immunity and complement system.

17- Immunohematology

18- Immunological tolerance.

19- Immunity to Microbes, vaccines and vaccination.

20- Tumor immunology

21- Transplantion immunology

22- Hypersensitivity reactions (type I).

23- Hypersensitivities reactions (type II, III, and IV).

24- Autoimmunity and autoimmune diseases

25- Immunodeficiency.

B- Special purposes for each session:

1- Session one: Introducing the immunology discipline, general features of the immune response and student tasks during the semester.

By finishing this session, the students will be able to:

1-1 Explain the history of immunology discipline
1-2 Define the science of immunology and explain immune response
1-3 Describe different types of immune responses
1-4 Describe properties of innate immunity
1-5 Explain barrier defenses of natural immunity and their roles in defense against microbes.
1-6 Explain characteristics of adaptive immunity.
1-7 Name types of adaptive immunity and their properties.
1-8 Express types of humoral immunity (in terms of their origins).

2- Session two: Cells of the immune system

By finishing this session, the students will be able to:

2-1 Describe the origin of immune cells, their development and differentiation.

2-2 Explain the development of the phagocytic cells (neutrophils, macrophages and monocytes) and their roles in immune system.

2-3 Describe development of non-phagocytic cells such as eosinophils, basophils and mast cells and their roles in immune system.

2-4 Eexplain the differentiation of B cells from hematopoietic stem cells (HSCs) and will explain the role of B cells in immune response.

2-5 Describe the differentiation of T cells from hematopoietic stem cells (HSCs) and will explain the role of T cells in immune response.

2-6 Explain the differentiation of NK cells from hematopoietic stem cells (HSCs) and will explain the role of NK cells in immune response.

3- Session Three: Organs of the Immune system

By finishing this session, the students will be able to:

3-1 Name primary (central) and secondary (peripheral) lymph organs.

3-2 Describe differences between primary and secondary lymph organs in terms of immunological responses.

3-3 Describe bone marrow structure and the role of bone marrow in hematopoiesis and lymphopoiesis.

3-4 Explain the histological structure of thymus and its role in T cell maturation and education.

3-5 Describe Digeorge syndrome (the impairment in thymus development).

3-6 Describe lymphatic system, lymph nodes, lymphatic recirculation

3-7 Explain the structure of lymph nodes and B cells and T cells location in lymph nodes.

3-8 Describe the histology of spleen.

3-9 Outline the immunological and hematological functions of spleen.

3-10 Delineate the importance of spleen in immune response to pathogenic bacteria with capsular polysaccharide.

4- Session Four: Lymphocytes recirculation and homing

By finishing this session, the students will be able to:

4-1. Describe adhesive molecules (selectins and integrins) and their ligands.

4-2. Describe the function of adhesive molecules in lymphocytes recirculation.

4-3. Describe the various types of chemokines and their structure.

4-4. Explain different types of chemokine receptors.

4-5. Describe biologic roles of chemokine in immune response

4-6. Describe inflammation, mechanisms of inflammation and cells and molecules involved in this process.

4-7. Describe B cells recirculation through blood and lymph.

4-8. Describe T cells recirculation through blood and lymph.

4-9. Describe the recirculation of effector B cells.

4-10. Describe mechanisms of effector T cells recirculation.

4-11. Describe importance of adhesive molecules in the pathogenesis of inflammatory diseases.

4-12. Describe therapeutic effect of anti inflammatory drugs which inhibits adhesive molecules and chemokines.

5- Session five: Antigens and Immunogens.

By finishing this session, the students will be able to:

5-1. Define antigen

5-2. Define immunogen

5-3. Describe properties of immunogen

5-4. Define hapten and carrier.

5-5. Define antigenic determinants and describe its various types

5-6. Describe characteristics of B cell epitope.

5-7. Describe characteristics of T cell epitope

5-8. Name the different types of B cell antigens

5-9. Explain superantigen

5-10. Define mitogen and are able to name different mitogen

5-11. Explain adjuvants and its different types.

6- Session Six: Antibodies and T cell receptor (TCR).

By finishing this session, the students will be able to:

6-1. Describe antibodies.

6-2. Delineate molecular structure of antibody

6-3. Describe different light chains of antibody.

6-4. Discriminate various classes of antibodies.

6-5. Describe terms such as: isotypes, allotypes and idiotypes.

6-6. Name various isotypes of immunoglobulins.

6-7. Describe properties of IgG and its clinical functions and importance

6-8. Describe properties of IgA and its effector function and clinical importance

6-9. Explain properties of IgM and its clinical role and importance.

6-10. Describe biological functions and properties of IgD.

6-11. Explain properties of IgE, its effector function and its clinical importance

6-12. Define polyclonal and monoclonal antibody

6-13. Describe TCR and its structure.

6-14. Compare TCR complex with B cell receptor complex (BCR).

7- Session Seven: Antibody and antigen interactions and its applications.

By finishing this session, the students will be able to:

7-1. Describe clinical and diagnostic applications of antibody-antigen reaction

7-2. Explain induced fit model for antigen antibody interaction

7-3. Describe affinity and avidity in antibody- antigen reaction

7-4. Explain pre- zone and post-zone in antibody-antigen interaction

7-5. Describe terms such as cross-reactivity, specificity and non reactivity

7-6. Introduce some clinical and therapeutic application of antibodies.

7-7. Name tests which have been designed based on antibody - antigen interaction.

7-8. Describe Immunoassay and its application in clinical diagnosis.

7-9. Describe Radioimmunoassay (RIA) and Enzyme-linked immunoaay (ELISA).

7-10. Describe principles of flow cytometry and its clinical application.

7-11. Explain Immunohistochemical (IHC) methods and their clinical applications.

8- Session Eight: Innate immunity

By finishing this session, the students will be able to:

8-1. Describe general principles of innate immunity such as physical barrier.

8-2. Describe the importance of innate immunity and compare it with acquired immunity.

8-3. Explain pathogen associated molecular pattern (PAMP) and Damage associated molecular pattern (DAMP) in innate immune responses.

8-4. Explain different types of innate immune receptors such as: Toll-like receptor, NOD like receptor, and RIG like receptor, and scavenger receptors.

8-5. Describe soluble pattern recognition receptors such as complement protein, pentraxin, collectins, and ficollins.

8-6. Explain the importance of antibacterial peptides such as defensins in innate immune response.

8-7. Describe the role of mononuclear phagocytes (macrophages and monocytes), neutophils, eosinophils, mast cells, dendritic cells and Natural killer cells in immune response.

8-8. Describe the process of phagocytosis and the terms such as opsonin, phagosome, phagolysosome, respiratory burst, and reactive oxygen species (ROS).

8-9. Describe the role of innate immunity in the activation of co-stimulatory signals and adaptive immunity.

9- Session Nine: Cytokines and their roles in the immune response.

By finishing this session, the students will be able to:

9-1. Explain the definition of cytokine molecules.

9-2. Describe mechanisms of cytokine action.

9-3. Describe the effect of cytokines in systemic and local inflammation.

9-4. Describe pleotropic, redundancy, synergistic, and antagonistic effects of cytokines.

9-5. Describe cytokines involved in the innate immunity.

9-6. Describe cytokines involved in the adaptive immunity.

9-7. Describe hematopoietic cytokines.

9-8. Describe biologic effect of proinflammatory cytokine including TNF-α, IL-1 and IL-6.

9-9. Describe IL-10 and IL-12, their cellular source and their roles in the immune system.

9-10. Describe type 1 Interferons (IFN-α and IFN-β), their cellular source and their function.

9-11. Describe the pathogenic effect of proinflammatory cytokines in inflammation and septic shock.

9-12. Introduce cytokines such as IL-2,IL-4, IL-5, IFN-γ, and TGF-β which involved in adaptive immune responses.

9-13. Describe the role of G-CSF, M-CSF, GM-CSF, IL-7, IL-3 in proliferation and maturation of bone marrow precursor cells.

9-14. Describe the clinical application of cytokines.

9-15. Describe anti-cytokines monoclonal antibodies that are used as a biologic drugs.

10- Session Ten: Major Histocompatibility Complex (MHC) and the cellular and molecular mechanism of antigen presentation.

By finishing this session, the students will be able to:

10-1. Describe the mechanisms of antigen recognition by T lymphocytes.

10-2. Describe antigen presenting cells (APCs) and their roles in the immune system.

10-3. Explain the history of HLA discovery as a great scientific achievement.

10-4. Describe using the term of HLA instead of MHC and the limitations of this nomenclature.

10-5. Describe the reason that why T cells are restricted to MHC molecules for recognition of peptide antigens.

10-6. Describe the structure of MHC locus genes and also define three classes of MHC genes.

10-7. Describe polymorphism and polymorphic genes including MHC genes.

10-8. Describe MHC class I and Class II proteins and compare them.

10-9. Describe the genes which are located in class III region of MHC genes.

10-10. Describe the concept of antigen presentation and mention different antigen presentation pathways.

10-11. Describe class I pathway (cytosolic) of antigen presentation to the CD8+ T cells and importance of this pathway in tumor immunology and antiviral responses.

10-12. Describe the structure of proteasome and its role in processing of cytosolic antigens.

10-13. Describe the class II pathway (endosomal-lysosomal) of antigen presentation to the CD4+ helper T cells.

10-14. Describe the importance of the cross-presentation pathway in priming CD8+ response.

11- Session Eleven: Genetic basis of antibody and TCR diversity.

By finishing this session, the students will be able to:

11-1. Describe somatic recombination in the TCR and BCR gene locuses.

11-2. Explain genetic loci of immunoglobulin light chains (Kappa and lambda) and their location oin chromosomes.

11-3. Describe genetic loci of immunoglobulin heavy chains (gamma, alpha, mu, delta, and epsilon) and their location on chromosomes.

11-4. Describe Recombination signal sequences (RSS) including heptamer and nonamer sequences and spacer sequences in the germ line arrangement of immunoglobulin and TCR genes.

11-5. Describe the role of Recombination activator gene-1 (RAG-1) and RAG-2 in somatic recombination of Immunoglobulin and TCR genes.

11-6. Describe the role of combinational diversity and junctional diversity in Immunoglobulin and TCR diversification.

12- Session Twelve: Lymphopoesis and stages of T cell and B cell development.

By finishing this session, the students will be able to:

12-1. Explain differentiation of lymphoid lineage from stem cells

12-2. Explain stages of B cell development from HSCs in bone marrow.

12-3. Explain order of immunoglobulin heavy chain and light chain rearrangement.

12-4. Introduce allelic exclusion and isotypic exclusion in B cell receptor rearrangement.

12-5. Explain mechanism of alternative splicing for expression of IgM and IgG molecules simultaneously.

12-6. Explain mechanisms of receptor editing in development of B cells.

12-7. Describe positive and negative selection and their role in formation of mature B cells repertoire.

12-8. Describe stages of T cell development in thymus.

12-9. Describe order of TCR gene rearrangement.

12-10. Describe allelic exclusion in T cell development.

12-11. Describe positive selection (MHC-restriction) and negative selection (the the deletion of autoreative T cells) in T cell development.

13- Session Thirteen: Activation of T lymphocytes

By finishing this session, the students will be able to:

13-1. Describe the importance of T cell activation

13-2. Introduce place of naïve T cells activation.

13-3. Explain necessary signals for the activation of T cells and the source of these signals.

13-4. Describe co-stimulatory molecules on the surface of APCs and their relevant ligands on the surface of T cells.

13-5. Introduce critical molecules for activation of T cells.

13-6. Name important transcription factors which become activated during T cell activation.

13-7. Describe T cell inhibitory receptors.

13-8. Explain alteration in surface molecules of T cells after their activation.

13-9. Name cytokine which are produced during T cell activation and explain their effector function

13-10. Explain T cell clonal expansion.

13-11. Explain differentiation of effector T cells after their clonal expansion.

13-12. Describe types of immune reaction which is created by various effector T cells.

13-13. Describe the role of each effector T cell in defense against pathogens and in pathogenesis of autoimmune diseases.

13-14. Describe the mechanism of Th1 cell differentiation and the role microbes, cytokines, and transcription factor in this process.

13-15. Describe the mechanism of Th2 cell differentiation and the role microbes, cytokines, and transcription factor in this process.

13-16. Describe the mechanism of Th17 cell differentiation and the role microbes, cytokines, and transcription factor in this process.

13-17. Describe the mechanism of cytotoxic T cells differentiation and the role microbes, cytokines, and transcription factor in this process.

13-18. Describe the mechanisms of memory T cell differentiation and also explain the properties of these cells.

14- Session Fourteen: Effector mechanisms of T cell mediated immunity (CMI).

By finishing this session, the students will be able to:

14-1. Describe various types of effector function of cell mediated immunity.

14-2. Describe different aspects of cell mediated immunity in the host defense.

14-3. Describe the role of critical factors in selective migration of effector cells to the site of infection

14-4. Describe specific chemokine receptor on the surface of effector cells and their respective ligands.

14-5. Describe the role of Th1 cells on the promotion of macrophages and B cells function.

14-6. Describe factors that define migration or remaining of Th1 cells in the site of infection.

14-7. Describe the effector function of Th2 cells and their respective cytokines in immune response.

14-8. Describe the contradictory effect of Th1and Th2 cells on macrophages.

14-9. Describe the role of Th17 cells in defense against microbes and their unwanted effects in the pathogenesis of autoimmune diseases.

14-10. Describe cytokines elaborated by Th17 cells and their roles in immune system.

14-11. Describe the effector function of CTLs.

14-12. Describe the underlying mechanisms of cytotoxic action of CTLs.

15- Session Fifteen: B cell activation and antibody production.

By finishing this session, the students will be able to:

15-1. Describe the importance of B cell activation.

15-2. Explain the general feature of humoral immune response.

15-3. Describe B cell subpopulation and describe types of antigen recognized by each of them.

15-4. Describe the anatomic site of B cell activation and describe the ways in which different antigens with various molecular weight are presented to these cells.

15-5. Describe the role of antigen in the activation of T cells and how this process is facilitated by accessory molecules.

15-6. Describe the functional effect various antigens on B cell activation.

15-7. Describe the role of T cells in the activation of B cell in response to protein antigens.

15-8. Introduce the order of events in B cell response to the protein antigen

15-9. Introduce the ligation of CD40-ligand on T cells to CD40 on B cells and its role in B cell activation.

15-10. Explain B cell response to protein antigen in the germinal center of secondary lymphoid follicles and in outside of germinal center.

15-11. Introduce the underlying mechanisms of isotype switching, affinity maturation, creation of memory B cells and long live d plasma cells in the germinal center.

15-12. Explain the effect of follicular helper T cells (Tfh) on isotype switching, affinity maturation, creation of memory B cells and long lived plasma cells.

15-13. Describe molecular mechanisms of isotype switching and affinity maturation.

15-14. Describe mechanisms of plasma cell and B cell differentiation from activated B cells.

15-15. Describe mechanisms of B cell activation by thymus independent antigens.

15-16. Describe properties of T cell independent humoral immune response.

16- Session Sixteen: Effector mechanisms of humoral immunity and complement system

By finishing this session, the students will be able to:

16-1. Name effector functions of antibodies.

16-2. Describe the various type of antibody receptors.

16-3. Describe complement system.

16-4. Describe pathways of complement activation.

16-5. Describe steps in classical pathway of complement activation.

16-6. Explain steps in activation of alternative pathway of complement and molecules which activate this pathway.

16-7. Describe lectin pathway of complement activation.

16-8. Describe terminal pathway or membrane attack complex (MAC) of complement activation.

16-9. Describe regulatory molecules in complement activation.

16-10. Describe complement receptors and their role in immune system.

16-11. Describe biologic function of complement.

16 12. Describe immunodeficiencies related to the complement system.

17- Session Seventeen: Immunohematology

By finishing this session, the students will be able to:

17-1. Decribe the discipline of immunohematology

17-2. Define the blood group and its major and minor types.

17-3. Describe reasons for blood groups studying.

17-4. Describe ABO blood groups.

17-5. Describe ABO gentotype and its antigenic structure.

17-6. Describe the differences between A, B and H antigens.

17-7. Explain differences between Bombay blood group and O blood group.

17-8. Describe sub-types of ABO blood group.

17-9. Describe isohemagglutinin and types of isohemagglutinin that is produced in each ABO blood group.

17-10. Describe methods of ABO blood group determination by cell type (Direct) and backtype (indirect methods).

17-11. Describe Rh system and its relevant genotypes.

17-12. Describe D and Du antigens.

17-13. Describe minor blood group, Lewis, and its antigenic structure.

17-14. Describe the I blood group and its antigenic structure.

17-15. Name minor blood groups.

17-16. Describe blood transfusion reactions.

17-17. Explain the pathophysiology of hemolytic disease of newborn (HDNB).

17-18. Describe the HDNB as a consequence of Rh incompatibility.

17-19. Describe the HDNB as a consequence of ABO incompatibility

18- Session Eighteen: Immunologic tolerance

By finishing this session, the students will be able to:

18-1. Describe tolerance and tolergen.

18-2. Describe central and peripheral tolerance.

18-3. Describe role of thymus in negative selection and the clinical consequence of this process.

18-4. Describe anergy and the mechanisms of peripheral tolerance.

18-5. Introduce inhibitory molecules and their role in the lymphocyte tolerance.

18-6. Explain the immuniological and molecular properties of Treg cells.

18-7. Describe how Treg cells control immune responses and explain the clinical conditions that are related to the impairment of regulatory T cells.

18-8. Describe apoptosis and its role in immunological tolerance.

18-9. Describe mechanisms of B cell tolerance.

18-10. Describe the concept of oral tolerance.

18-11. Explain clonal exhaustion and its importance in chronic viral infection such as HIV.

19- Session Nineteen: Immunity to Microbes, vaccines and vaccination.

By finishing this session, the students will be able to:

19-1. Describe effector mechanisms of innate and adaptive immunity against exteacellular bacteria.

19-2. Describe mechanisms of immune evasion by extracellular bacteria.

19-3. Describe effector mechanisms of innate and adaptive immune response against intra cellular bacteria.

19-4. Describe mechanisms of immune evasion by intracellular bacteria

19-5. Introduce mechanisms of innate and adaptive immune response against fungi.

19-6. Explain mechanisms of fungi evasion from immune system.

19-7. Describe effector mechanisms of innate and adaptive immune response against viral infections.

19-8. Explain mechanisms of immune evasion by the viruses.

19-9. Introduce mechanisms of innate and adaptive immune response against helminthes.

19-9. Describe evasion of helminthes from immune system.

19-10. Type of vaccine and beneficial and deleterious (side effects) of various type of vaccination.

20- Session Twenties: Immunity to tumors

By finishing this session, the students will be able to:

20-1. Describe general properties of immune response to the tumors.

20-2. Desribe experimental evidence of tumor immunity.

20-3. Describe various type of tumor immune antigens with their examples.

20-4. Describe the role of humoral immune response against tumors.

20-5. Describe the role of macrophage against tumors

20-6. Describe the role of NK cells in tumor response.

20-7. Describe the role of CTL as the most important cells against tumors.

20-8. Describe mechanisms of tumor evasion from anti-tumor immunity.

20-9. Describe the immunotherapy modalities against tumors.

20-10. Describe active immunotherapy such as vaccination against tumors.

20-11. Describe types of tumor immunotherapy on the basis of the inactivation of inhibitory molecules.

20-12. Describe passive immunization against tumor including specific and nonspecific immunization such as lymphokine activated killer cell (LAK) and Chimeric antigen receptor T cell (CART) therapy.

20-13. Describe application of monoclonal antibodies in the tumors immunotherapy.

21- Session Twenty one: Transplantation immunology

By finishing this session, the students will be able to:

21-1. Define transplantation and its various types.

21-2. Describe the role of the immune response in graft rejection.

21-3. Describe immunological principles of graft rejection.

21-4. Describe various types of transplant according to the genetic similarities and immune response.

21-5. Describe the role of MHC molecules in the graft rejection.

21-6. Describe presentation of allogenic MHC molecules to the recipient T cells.

21-7. Compare allogenic immune response with anti microbial immunity.

21-8. Describe the role of co-stimulatory molecule in allogenic immune responses.

21-9. Describe pathology of graft rejection regarding to type of immune response and rate of rejection.

21-10. Describe procedure of the donor and recipient matching.

21-11. Describe immunosuppressor drugs and their mechanisms of action.

21-12. Describe hematopoietic stem cell transplantation.

21-13. Describe HSCT modalities in treatment of malignancies, immunodefficenies and some kind of autoimmune disease.

21-14. Describe Graft versus host disease (GVHD) and graft versus leukemia (GVL).

21-15. Describe prophylaxis regimen and treatment of GVHD.

22- Session Twenty two: Hypersensitivity Type I (allergic reactions).

By finishing this session, the students will be able to:

22-1. Describe various types of hypersensitivity reactions.

22-2. Explain the definition of type I hypersensitivity or allergies.

22-3. Describe the general properties of allergic reactions.

22-4. Describe steps in allergic reaction development.

22-5. Define allergens.

22-6. Describe the characteristics of the allergen molecule.

22-7. Name various types of allergenic molecules.

22-8. Describe types of mast cells and their properties.

22-9. Describe the e allergic mediators produced by mast cells, basophils, and eosinophils. And explain their pharmacologic properties.

22-10. Describe clinical manifestations of a allergic reactions

22-11. Define allergic rhinitis.

22-12. Describe allergic asthma and its characteristics.

22-13. Describe urticaria and eczema.

22-14. Describe anaphylaxis reaction.

22-15. Describe treatment modalities for allergic disease.

22-16. Describe the pharmacology of the drugs for treatment of allergic disease and other immunotherapies modalities.

23- Session Twenty three: Hypersensitivity reactions (Type II, III, and IV).

By finishing this session, the students will be able to:

23-1. Describe typeII hypersensitivity.

23-2. Describe the mechanisms of cellular damage in type II hypersensitivity.

23-3. Name the diseases that their underlying pathogenesis is type II hypersensitivity.

23-4. Describe the harmful reactions after incompatible blood transfusion.

23-5. Describe various types of hemolytic anemia and their relevant mechanisms

23-6. Describe miscellaneous disease which is mediated by type II hypersensitivity and antibodies and antigens involved in their pathogenesis.

23-7. Describe type III hypersensitivity

23-8. Describe mechanisms of cellular and tissue injuries in type III hypersensitivity.

23-9. Describe various types of diseases which are consequence of Type III hypersensitivity.

23-10. Describe experimental model and animal models for type III hypersensitivity

23-11. Describe the immunological basis for type III hypersensitivity occurrence.

23-12. Describe type IV hypersensitivity (T cell mediated hypersensitivity).

23-13. Describe the underlying mechanisms of Type IV hypersensitivity

23-14. Describe disorders which their underlying pathogenesis is mediated by T cell cytokines.

23-15. Describe the contact dermatitis and its pathogenesis.

23-16. Describe delayed type hypersensitivity (DTH) reaction.

23-17. Describe tuberculin and granulomatous reactions.

23-18. Describe the diseases that their underlying pathologic mechanisms are mediated by CTLs.

23-19. Describe the immunologic treatment modalities.

24- Session Twenty four: Autoimmunity and autoimmune diseases

By finishing this session, the students will be able to:

24-1. Describe the autoimmunity

24-2. Compare autoimmunity and auto inflammation.

24-3. Describe genetic, environmental, and immunological basis of autoimmune diseases.

24-4. Describe general features of autoimmune disease and describe organ specific and systemic autoimmune diseases.

24-5. Describe self-tolerance mechanisms and autoreactive lymphocyte responses.

24-6. Describe the pattern of genetic inheritance of autoimmune diseases.

24-7. Describe the effect of HLA genes and other immune response gene on the development of autoimmune diseases.

24-8. Make an example of autoimmune diseases with Mendalian inheritance and mention their relevant genes.

24-9. Describe the effects of microbial pathogens in the development of autoimmune diseases.

24-10. Describe the effect of environmental factor in pathogenesis of autoimmune diseases.

24-11. Describe the relationship between gender, sex hormones and autoimmunity.

25-Session Twenty five: Immunodeficiency diseases

By finishing this session, the students will be able to:

25-1. Describe primary and secondary immunodeficiencies

25-2. Describe clinical manifestation of immunodeficiencies.

25-3. Describe clinical manifestation of T cells and B cells immunodefficiencies.

25-4. Describe the cellular and molecular basis of the Chronic granulomatous disease (CGD), leukocyte adhesion deficiency (LAD) and chediak-higashi syndrome, and their diagnosis and treatment.

25-5. Describe severe combined immunodeficiency (SCID), its pathology, diagnosis and treatment.

25-6. Describe various type of humoral immunodefficiencies, their diagnosis and treatment.

25-7. Describe the diagnostic and therapeutic approaches for treatment of humoral immunodeficiencies.

25-8. Describe immunodeficiency with miscellaneous manifestation and explain their underlying molecular pathogenesis.

25-9. Describe the most important etiology of acquired immunodefficiencies.

25-10. Define acquired immunodeficiency syndrome (AIDS).

25-11. Describe properties of human immunodeficiency virus (HIV).

25-12. Describe pathogenesis of AIDS.

25-13. Describe diagnosis steps of HIV infection.

25-14. Describe route of transfer and prevention of HIV infection and explain the most updated HIV infection treatment.

25-15. Describe why some people including non-progressor and elite controller are resistant to HIV infection.

References:

Abbas, Abul K., Andrew HH Lichtman, and Shiv Pillai. *Cellular and molecular immunology E-book*. Elsevier Health Sciences, 5 th deition2016

. Abbas, Abul K., Andrew HH Lichtman, and Shiv Pillai. *Cellular and molecular immunology E-book*. Elsevier Health Sciences, 8 th edition 2018.

Teaching methods:

Lecture, answer and question, playing movie

Educational tools:

PowerPoint

Exam	method	Share of the total score	date	Time
Midterm	Multiple choice Test	38%	97/08/06	12.15 PM
Final	Multiple choice Test	59%		
Class attendance	Presence & Question	3%		

No.	Session Order	Session Subject	Lecturer
1	First Session	Introduction to immune response and General properties of Immune system	Dr. Salari
2	Second Session	Cells of Immune System	Dr. Salari
3	Third session	Organs of Immune system	Dr. Taghadosi
4	Fourth Session	Lymphocytes recirculation and homing	Dr. Rezaei manesh
5	Fifth Session	Antigens and Immunogens	Dr. Gorgin
6	Sixth Session	Innate immunity and its components.	Dr. Salari
7	Seventh session	Antibodies and T cell receptor (TCR).	Dr. Gorgin
8	Eighth Session	Antibody and antigen interaction and its applications	Dr. Taghadosi
9	Ninth Session	Cytokines and their roles in the immune response	Dr. Tarokhian
10	Tenth Session	Major histocompatibility complex (MHC) and cellular and molecular mechanism of antigen presentation	Dr. Rezaei manesh
11	Eleventh Session	Genetic basis of antibody and TCR diversity.	Dr. Rezaei manesh

12	Twelfth Session	Lymphopoiesis and stages of T cell and B cell development	Dr. Salari
13	Thirteenth Session	T cells activation	Dr. Tarokhian
14	Fourteenth Session	Effector mechanisms of cell mediated immunity (CMI)	Dr. Gorgin
15	Fifteenth session	Mechanisms of B cell activation and pattern of B cell response to antigens	Dr. Salari
16	Sixteenth Session	Effector mechanisms of humoral immunity and complement system	Dr. Rezaei manesh
17	Seventeenth Session	Immunohematology	Dr. Gorgin
18	Eighteenth Session	Immunological tolerance	Dr. Taghadosi
19	Nineteenth Session	Immunity to Microbes, vaccines and vaccination	Dr. Salari
20	Twentieth Session	Tumor immunology	Dr. Rezaei manesh
21	Twenty-First Session	Transplantion immunology	Dr. Taghadosi
22	Twenty-Second Session	Hypersensitivity reactions (type I)	Dr. Tarokhian
23	Twenty- Third Session	Hypersensitivities reactions (type II, III, and IV)	Dr. Gorgin
24	Twenty- Fourth Session	Autoimmunity and autoimmune diseases	Dr. Taghadosi
25	Twenty- Fifth Session	Immunodeficiency	Dr. Taghadosi