

Medical Immunology

Course introduction

Code: BMS0802

Classes: 48h including 36h lectures and 12h lab practices

Credits: 3

Open semester: 5th semester

Responsible Department: Department of Immunology, School of Basic Medicine, Tongji Medical college, Huazhong University of Science and Technology.

Reference Textbooks:

- Medical Immunology (医学免疫学). 人民卫生出版社 (Elsevier), 2017, Sep1.
- How the Immune System Works. Lauren Sompayrac. 4th edition
- Cellular and molecular Immunology. Abul K. Abbas. 9th edition
- Janeway's Immunobiology. Kenneth Murphy. 8th edition
- Roitt's Essential Immunology. Peter J. Delves/Seamus J. Martin/Dennis R. Burton/Ivan M. Roitt. 12th edition

Course organization:

Attendance 10%; Experiment 10%; Final examination 80%

Contents and lecturing hours

Contents	Lecturing	Class Discussion	Self-study	Lab
Chapter 1 introduction to immunology	2			
Chapter 2 Organs and tissues of the immune system	0.5			
Chapter 3 Antigens	1.5			
Chapter 4 Immunoglobulins	2			
Chapter 5 Complement	2			
Chapter 6 Cytokine	2			
Chapter 7 Leukocyte differentiation antigen and adhesion molecule	2			
Chapter 8 Major histocompatibility antigen	2			

Chapter 9 Lymphocytes	4			
Chapter 10 Antigen presenting cells and antigen presentation	2			
Chapter 11 T cell-mediated immune response	4			
Chapter 12 B cell-mediated immune response	2			
Chapter 13 Features of adaptive immune response	2			
Chapter 14 Regulation of immune response	2			
Chapter 15 Innate immunity	2			
Chapter 16 Hypersensitivity	4			
Experiment 1 Precipitation including Rocket Electrophoresis and Double Immunodiffusion				3
Experiment 2 Enzyme-Linked Immunosorbent Assay (ELISA)				3
Experiment 3 Separation and purification of immune cells; NK cell activity analysis				3
Experiment 4 Immune organs observation and T cell apoptosis detection				3
Total	36			12

Chapter 1 Introduction (2h)

Key points:

The components of immune system, the three major function of immune system.

Major points:

The definition of immune and immunology.

Minor points:

The history of immunology, the significance of immunology in medical biology.

Chapter 2 Organs and tissues of the immune system (0.5h)

Key points:

1. The definition of central immune organ. It is the site where immune cells develop, which includes thymus and bone marrow.
2. The definition of peripheral immune organ. It is the site where immune cells located and immune responses mediated by lymphocytes, which includes lymph nodes, spleen and MALT.

Major points:

1. The d function of thymus, bone marrow, lymph nodes, spleen and MALT.
2. The definition of mucosal immunity.

Minor points:

The structure of thymus, bone marrow, lymph nodes, spleen and MALT.

Chapter 3 Antigens (1.5h)

Key points:

1. The definition of antigen; two characteristics of antigen, namely immunogenicity and antigenicity.
2. The definition of antigenic determinant/epitope; the definitions and features of B cell epitope and T cell epitope; thymus dependent antigen (TD-Ag) and thymus independent antigens (TI-Ag).

Major points:

1. The factors which influence immunogenicity, including factors of antigen and host.
2. The definition, mechanism and significance of cross reaction.
3. The definitions of antigen classify.

Minor points:

The definitions and actions of adjuvant, superantigen and mitogen.

Chapter 4 Immunoglobulins (2h)

Key points:

1. The definition of Immunoglobulin.
2. The basic structure and functional regions of immunoglobulin.
3. The function of immunoglobulin.

Major points:

1. The definition of monoclonal antibody and polyclonal antibody.
2. The features of five types of Ig.

3. The definition and types of immunoglobulin superfamily.

Minor points:

1. The heterogeneity of Ig, the definition of idiotype.
2. The preparation method of Ab(mAb, polyclonal Ab and genetic engineering antibody).

chapter 5 Complement (2h)

Key points:

1. The definition, designation and the components of the complement system.
2. The three pathways of the complement activation, including the activators and processes.
3. The similarity and the difference among the three pathways.
4. The biology functions of the complement.

Major points:

1. The character and the synthesis of complement.
2. The regulation of complement activation, the important inactivators of complement regulation protein.

Chapter 6 Cytokine (2h)

Key points:

1. The definition and nomenclature of cytokine.
2. The common characters of cytokine.

Major points:

Biological activities of cytokine.

Minor points:

1. The structure of receptors for cytokine.
2. Assay methods for cytokine and the relationship between cytokine and clinic.

Chapter 7 Leukocyte differentiation antigen and adhesion molecule (2h)

Key points:

1. The definition of cluster of differentiation (CD).
2. The definition and classification of adhesion molecule.

Major points:

1. Major CD molecules involved in immune response.
2. Major adhesion molecules involved in leukocyte effusion, lymphocyte homing and immune response.

Minor points:

1. The classification and application of CD.
2. The physiological and pathological functions of adhesion molecules.

Chapter 8 Major histocompatibility antigen (2h)

Key points:

1. The definition of MHC.
2. The structure and distribution of HLA molecule.

3. The biological functions of MHC.

Major points:

The genetic characters of HLA complex.

Minor points:

1. The structure of mouse H-2 complex.
2. The significance of HLA in medicine.

Chapter 9 Lymphocytes (4h)

Key points:

1. The major surface molecules on T cell.
2. The classification and function of T cell subsets.
3. The development and its mechanism of T cell in thymus.
4. The major surface molecules on B cell.
5. The definition of natural killer cell and the mechanism of how to distinguish “self” and “non self”.

Major points:

1. The development of T cell in thymus.
2. The development of B cell in bone-marrow and peripheral immune organ.

Minor points:

1. The B cell subsets.
2. The function and significance of “missing self”

Chapter 10 Antigen presenting cells and antigen presentation (2h)

Key points:

1. The process of MHC I- associated antigen presentation pathway.
2. The process of MHCII-associated antigen presentation pathway.

Major points:

Definitions, members and features of antigen presenting cells (macrophages, dendritic cells, B cells and target cells).

Minor points:

Cross presentation and CD1-associated presentation pathway.

Chapter 11 T cell-mediated immune response (4h)

Key points:

1. The features of antigen recognition by T cells.
2. The activatory signals of T cells.
3. The processes of CD4+ T cells and CD8+ T cells mediated immune responses.
4. The physiological and pathophysiological significances of T cell-mediated immune response.

Major points:

Signal transduction of T cell activation.

Chapter 12 B cell-mediated immune response (2h)

Key points:

1. The features of antigen recognition by B cells.
2. Activatory signals of B cells
3. The process of B cell-mediated immune response to TD antigens;
4. The changes of humoral response to secondary challenge.

Major points:

1. The important events and their significances of B cell development in germinal center.
2. B cell response to TI antigens.

Chapter 13 Features of adaptive immune response (2h)

Key points:

1. The definition of immune tolerance.
2. Central and peripheral tolerance.

Major points:

1. Mechanisms for generation of diversity of TCR and BCR.
2. The factors which influence acquired tolerance.

Minor points:

1. Gene rearrangement of TCR and BCR.
2. The cellular basis of immune memory of T cells and B cells.
3. Classify of immune tolerance.
4. The factors which maintain tolerance or terminate tolerance.

Chapter 14 Regulation of immune response (2h)

Key points:

1. Definition and significance of immune regulation.
2. Definition of activation induced cell death (AICD)

Minor points:

1. Ir gene (MHC) and its possible mechanisms
2. Molecular and cellular mechanisms involved in regulation of immune response.
3. Interaction of immune components and neuroendocrine system.

Chapter 15 Innate immunity (2h)

Key points:

1. The definitions, types, characteristics and significance of pathogen-associated molecular pattern (PAMP) and pattern recognition receptor (PRR).
2. The interaction between innate immunity and adaptive immunity.

Major points:

1. Molecular and cellular components involved in innate immunity.
2. Recognition mechanisms involved in innate immunity.

Chapter 16 Hypersensitivity (4h)

Key points:

1. The definition and significance of hypersensitivity.
2. The definitions and immunological mechanisms of four type of hypersensitivity.

Major points:

Common diseases of hypersensitivity type I , II ,III,IV.