The Teaching Program of Medical Immunology

(for 8-year Clinical Medicine and Stomatology)

Code of curriculum :1000101

The person in charge : Zhang XiaoLian (章晓联)

Chinese name of curriculum : 医学免疫学(英语教学)

English name of curriculum : medical immunology

Category of curriculum : required

Credits of curriculum : 3, involving two of theory study and one of experiment .

Class hours : 36 hours of theory class and the same time spend on experiment , totally 72 hours of class

Teaching term: the fifth (three credits)

Teaching object : 8-year student of clinical medicine and stomatology

Teaching unit: WuHan University School of Basic Medical Science

Preceding courses : cytobiology , genetics , human anatomy , histology and embryology , physiology , biochemistry and microbiology

1. Goal and requisition of teaching

The main studying purpose of medical immunology is to research the composition , function , mechanism, rule and effect of the immune response , of human immune system; It is also a course of the immune pathogenesis , diagnose and prevention of the diseases . Immunology is an advancing subject of multi-margins and multi-chiasm . It is the basal course for medical subjects such as clinic, prevention , nursing , laboratory medicine and so on . Its main mission is to let students understand the basal knowledge of concepts , principles and application of the medical immunology to prepare for the latter courses . At the same time , it is also our aim to cultivate the ability of independent thinking and working , and rigid scientific attitude by combining with teaching practices and the interest and inspiration to devote themselves to the science . The teaching method is combining theory education to experiment education through multimedia .

2.Educational content and allocation of class hours

The table of educational content and allocation of class hours

Content	Class hours
Section 1 Fundaments of immunology	0.5
Section 2 Brief history and prospect of immunology	0.5
Section 3 Antigen	2
Section 4 Immunoglobulins	2
Section 5 The complement system	1
Section 6 Cytokines	1
Section 7 Major histocompatible complex	1
Section 8 Leukocyte differentiation antigens and adhesion molecules	1
Section 9 Hematopoietic stem cells	0.5
Section 10 Cells of innate immunity	0.5
Section 11 T lymphocytes	2
Section 12 B lymphocytes	1
Section 13 Organization and diversity of antigen receptor genes	0.5
Section 14 Innate immune response	0.5
Section 15 Antigen presentation	1
Section 16 T cells recognitions and responses of antigens	2
Section 17 B cell recognition and response of antigens	2

Section 18 Immunoregulation	1
Section 19 Immune tolerance	1
Section 20 Hypersensitivity	3
Section 21 Autoimmunity and autoimmune diseases	2
Section 22 Immunodeficiency diseases	1
Section 23 Tumor immunology	2
Section 24 Transplantation immunology	2
Section 25 Immunodiagnosis	2
Section 26 Immunotherapy	1
Section 27 Immunoprevention	2
The Content of Experiment	36

Section 1 Fundaments of immunology

Objective and requirement :

1.Master the concept ,function and classification of immunity response.

2.Comprehend the composition and function of immune system

Contents:

Chapter 1 Elemental contents of immunology

1. Overview of immunology (concept and function)

2. Types and functions of immunity responses

Chapter 2 Immune cells

1.Phagocytes

2.Lymphocytes

3.Antigen presentingcells

Chapter 3 Lymphoid tissues and organs

Chapter 4 Pathological immunity and immune diseases

Focal points :

1.Concept of immunity

2.Functions of immunity

3.Functions and concept of innate immunity

4.Functions and concept of adaptive immunity

5.Compositions and functions of immune system

Section 2 Brief history and prospect of immunology

Objective and requirement :

Comprehend history ,and status ,function, prospect of immunology in medicine

Contents:

Chapter 1 Empircal immunology

Chapter 2 Scientific immunology (experimental immunology)

Chapter 3 Modern immunology

Focal Points:

Evens contribute to immunology in period of modern immunology

Section 3 Antigen

Objective and requirement :

1.Master concept of antigen, hapten, CDR,TD-Ag, TI-Ag, adjuvant, superantigen, and two characteristics of antigen.

2. Master detemination factors of immunogenicity

3. Familiarity with types of antigenic determinant and classification of antigen

4.Comprehend species and mechanism of action about adjuvant, superantigen and mitogen

Contents:

Chapter 1 Properties of antigen

Chapter 2 Characteristics of antigen

Chapter 3 Factors influencing immunogenicity

Chapter 4 Classification of antigen

Chapter 5 Non-specific stimulators

Focal points:

1. Concept and characteristics of antigen and half- antigen

2. Immunogenicity and specificity of Antigen

3. Material fundament of antigenic specificity----- antigenic determinant (epitopes in T cell and B cell)

4. Influencing factors about antigenic immune response (antigen and host)

5.Classification of antigen (TD-Ag, TI antigen, Forssman antigen and superantigen)

Section4 Immunoglobulin(Ig)

Objective and requirement:

1. Master the concept of Ig, Ab, Id, and mAb

2. Master the structure and biological functions of Ig

3. Familiarity with the biological properties of Ig classes

4. Comprehend the heterogeneity of Ig

5. Comprehend the variety and prepared methods of artificial antibodies

Contents:

Chapter 1 Organization of immunoglobulins

Chapter 2 Immunoglobulin classes and subclasses

Chapter 3 Biological activities of immunoglobulin

Chapter 4 Biological properties and functions of immunoglobulin classes

Chapter 5 Antibody technology

Focal points

1. Concept and relation between Ig and Ab

2. Basic structure of Ig

3. Functions of Ig

4. Characteristics and functions of immunoglobulin classes

Section 5 The complement system

Objective and requirement:

1. Master the basic concepts, nomenclature and component of complement system

2. Master the major difference in three pathways of complement activation

3. Master the biological consequences of complement activation

4. Familiar with the character of complement and three pathways of complement activation

5. Comprehend the regulation in three pathways of complement activation

Contents:

Chapter 1 Introduction (concept, composition and denomination)

Chapter 2 Pathway of complement activation

Chapter 3 Regulation of complement system activation

Chapter 4 Biological consequences of complement activation

Focal points

1.Three pathways of complement activation

2.Biological consequences of complement activation

Section 6 Cytokines

Objective and requirement :

1.Master concept of cytokines and its denomination

2. Master common features of cytokines

3. Familiar with functions of cytokines in immune response

4. Comprehend molecular structure of cytokines and its receptor

5. Comprehend detection method of cytokines and the relation between cytokines and clinical application

Contents:

Chapter 1 Introduction

Chapter 2 Classification and biological activities of cytokines

Chapter 3 Cytokines receptors

Chapter 4 Clinical application

Focal points

1.Concept and common feature of cytokines

2.Classification and biological activities of cytokines

Section 7 Major histocompatible complex

Objective and requirement :

1. Master concept of MHC and HLA

2. Master structure of HLA antigen and its distribution in tissue

3. Master biological function of MHC

4. Familiar with structure and hereditary character of human MHC(HLA) complex

5. Comprehend significance of HLA in clinical application

Contents:

Chapter 1 Structure and genetics of MHC

Chapter 2 MHC polymorphism

Chapter 3 Peptide-MHC interaction

Chapter 4 HLA and clinical medicine

Focal points:

1.Concept of MHC and HLA

2.Structure of MHC complex(I,II) and genetics character

3.Structure of HLA and its distribution in tissue

4.Biological function of MHC

Section 8 Leukocyte differentiation antigens and adhesion molecules

Objective and requirement :

1. Master concept of leukocyte differentiation antigens and adhesion molecules

2. Familiar with CD molecules important in immune response

3. Familiar with classification of cell adhesion molecules and its function in immune response

4. Comprehend physiological functions and pathology functions of cell adhesion molecules

Contents:

Chapter **1** Leukocyte differentiation antigen

Chapter **2** Cell adhesion molecules

Chapter **3** Clinical application of CD , adhesion molecules and its monoclonal antibody

Focal points

1.Concept of HLA,CD and their relationship

2.Common CD molecules

3.Classification of AM and its function

Section 9 hematopoietic stem cells

Objective and requirement :

1. Master development of T cells and B cells (Positive & Negative Seletion)

2. Comprehend main characteristics of hematopoietic stem cells and its marks on surface

Contents:

Chapter **1** Origin and surface markers of hematopoietic stem cells

Chapter **2** Differentiation of hematopoietic stem cells (the full-ability stem cells and lymphocytes)

Focal points:

1.Characteristics of hematopoietic stem cells

2.Development of T cells and B cells

Section10 Cells of innate immunity

Objective and requirement :

1 Familiar with cells which take part in innate immunity

2 Familiar with characteristics and functions of MΦ,DC,NK γ δ T cell,B-1B cells

Contents:

Chapter 1 Phase of innate immunity

Chapter 2 Cells of innate immunity

Chapter 3 Receptors of innate immunity

Focal point:

Characteristic and function of main cells (MΦ,DC,NK) which take part in innate immunity

Section 11 T lymphocytes

Objective and requirement :

1.Master main surface molecules of T lymphocytes and its function

2.Master classification of T lymphocytes subsets and its function

Contents:

Chapter 1 T cell ontogeny

Chapter 2 Surface proteins of T lymphocytes

Chapter 3 T lymphocytes subsets and functions

Focal points:

1.Main surface molecules of T lymphocytes and its biological function

2.Function of CD4+helper cells (*TH1 and TH2*), CD8+ T cells

Section 12 B lymphocytes

Objective and requirement :

1 . Master main surface molecules of B lymphocytes and its function

2 . Familiar with B lymphocytes subsets and its function

Contents:

Chapter 1 Development of B lymphocytes

Chapter 2 Surface markers of B lymphocytes

Chapter 3 Subsets and function of B lymphocytes

Focal point:

Major surface markers of B lymphocytes

Section 13 Organization and diversity of antigen receptor genes

Objective and requirement :

1. Comprehend process of rearrangement of antigen receptor genes

2. Comprehend mechanism of the diversity antigen receptor genes

Contents :

chapter 1 Structure of antigen receptor genes

chapter 2 Rearrangement of antigen receptor genes

chapter 3 The diversity antigen receptor genes

Focal point :

The mechanism of diversity antigen receptor genes

Section 14 Innate immune response

Objective and requirement :

1. Comprehend tissue barriers and functions of innate immune response

2. Master concept and classes of pattern recognition receptor

3. Master characteristic of innate immune response and adaptive immune response and relationship between them

Contents:

Chapter 1 Components involved in innate immune response

Chapter 2 The recognition mechanism of innate immune response

Chapter 3 The biological significance of innate immune response

Focal points:

1. The recognition mechanism of innate immune response

2. The biological significance of innate immune response

Section 15 Antigen presentation

Objective and requirement :

1.Master concept and types of antigen presenting cells (MΦ , DC , BC and target cells)

2.Master the pathway of MHC class I and MHC class II antigen presentation

Contents :

Chapter 1 Antigen presenting cells

Chapter 2 Antigen processing and presentation

Focal points :

1. The concept ,classes ,and characteristic of antigen presenting cells

2. Processing of exogenous and endogenous antigens

Section 16 T cells recognition and response of antigen

Objective and requirement :

1. Master characteristic of T cells recognition of antigen

2. Master signals for T cells activation

3. Master procedure of CD_4^+T cells and CD_8^+T cells mediated immune response

4. Comprehend signal transduction of T cells activation

Contents :

Chapter 1 T cell recognition of antigens

Chapter 2 Signals for T cells activation

Chapter 3 Signal transduction of sT cells activation

Chapter 4 Transcription factor activation and gene expression

Chapter 5 Functions of effector T cells

Focal points :

1.T cells recognition of antigens

2.Double signals for T cells activation

3.The progress of activation of CD_4^+T cells and CD_8^+T cells

Section 17 B cell recognition and response of antigens

Objective and requirement :

1. Master basic progress of B cell response to T-Cell-Dependent Antigen

2. Master the characteristics of antigen recognition of B cells

3. Master rules of antibody response

4. Be familiar with B cell response to T Cell-Independent-Antigen

5. Be familiar with mucosal immune response

6 . Comprehend development, proliferation and differentiation of B cells

Contents:

Chapter 1 B cell response to T-Cell-Dependent Antigen

Chapter 2 B cell response to T Cell-Independent-Antigen

Chapter 3 Rules of antibody production

Chapter 4 Mucosal Immune Response

Focal points :

1.B cell response to T-Cell-Dependent Antigen and T Cell-Independent-Antigen

2. Rules of antibody production

Section 18 Immunoregulation

Objective and requirement :

1. Master conception and significance of immunoregulation

2 .Be familiar with antigen, antibody, complement, immune cells and the idiotypic network regulation to immune response

3 . Comprehend immunoregulation of signal transmission

4. Comprehend immunoregulation of neuroendocrine system and idiotypic network

5 . Comprehend immunoregulation among population

Contents:

Chapter 1 Role of antigen, antibody and complement

Chapter 2 Role of signaling components and molecules

Chapter 3 Role of cell

Chapter 4 Neuroendocrine system immunoregulation

Focal points :

1. Immunoregulation of antigen, antibody and complement

2. Immunoregulation of cell level

Section 19 Immune tolerance

Objective and requirement :

1. Master conception and forming mechanism of immune tolerance

2. Be familiar with the main affect factors of Immune tolerance development

3. Comprehend immune tolerance and clinical medicine

Contents:

Chapter 1 The development and representation of immune tolerance

Chapter 2 Mechanisms of immune tolerance

Chapter 3 Immune tolerance and clinical medicine

Focal points :

1.Conception of immune tolerance;

2.The relationship between immune iolerance and immunodepression;

3.Mechanisms of immune tolerance;

4.The main factors affecting the development of immune tolerance;

Section 20 Hypersensitivity

Purpose and requisition:

1.Master concept of hypersensitivity, characteristics and pathogenesis of type Ⅰ, Ⅱ, Ⅲ, Ⅳ hypersensitivity;

2. Comprehend common clinical manifestations caused by type Ⅰ, Ⅱ, Ⅲ, Ⅳ hypersensitivity reactions and mechanisms of these diseases;

3. Comprehend prevention and cure principle of type Ⅰ hypersensitivity.

Contents:

Chapter1 Type Ⅰ hypersensitivity;

Chapter 2 Type Ⅱ hypersensitivity;

Chapter 3 Type Ⅲ hypersensitivity;

Chapter 4 Type Ⅳ hypersensitivity.

Focal points :

1.Concept of hypersensitivity;

2.Characteristics and mechanisms of type Ⅰ, Ⅱ, Ⅲ, Ⅳ hypersensitivity;

3.Common hypersensitivity reactions and diseases caused by hypersensitivity reactions in clinic.

Section 21 Autoimmunity and autoimmune diseases

Purpose and requisition:

1.Master concept of autoimmunity and autoimmune diseases;

2. Comprehend etiological factors and pathogenesis of autoimmune diseases;

3. Comprehend immune principle of prevention and therapy of autoimmune diseases;

Contents:

Chapter 1: Introduction

Chapter 2: Immunologic pathogenesis and typical diseases;

Chapter 3: Factors in development of autoimmune

Chapter 4: Treatment of autoimmune diseases.

Focal points :

1Concept of autoimmune reactions and autoimmune diseases;

2.Relationship between autoimmune reactions and autoimmune diseases;

3.Etiological factors and mechanisms of immune damage of autoimmune diseases;

Section 22 Immunodeficiency diseases

Purpose and requisition:

1.Master concept ,common characteristics and classification of immunodeficiency diseases;

2.Master pathogenesis ,immunology dysfunction and examination principle in lab of acquired immunodeficiency syndrome (AIDS);

4. Comprehend immunology pathogenesis of primary immunodeficiency diseases;

Contents:

Chapter 1: Introduction (concept, common characteristics and classification principle);

Chapter 2: Primary immunodeficiency diseases;

Chapter 3: Secondary immunodeficiency diseases;

Chapter 4: Treatment of immunodeficiency diseases.

Focal points :

1.Common characteristics of immunodeficiency diseases. ;

2.Classification principle;

4.Pathogenesis and immunological characteristic of acquired immunodeficiency syndrome (AIDS);

Section 23 Tumor immunology

Purpose and requisition :

1. Master concept and classification of tumor antigen

2. Master mechanisms of anti-tumor effects

3. Be familiar with mechanisms of tumor escape

4. Comprehend immunological detection, prevention, and therapy

Contents:

Chapter 1 tumor antigen

Chapter 2 mechanisms of anti-tumor effects

Chapter 3 mechanisms of tumor escape

Chapter 4 tumor immunodiagnosis

Chapter 5 immunotherapy

Focal points :

1.Concept of TSA,TRA

2.Mechanisms of anti-tumor effects

3.Mechanisms of tumor escape

Section 24 Transplantation immunology

Purpose and requisition :

1. Master classification of allotype graft rejection and its immunological mechanisms

2. Be familiar with allograft rejection types and mechanisms

3. Comprehend methods to prolong the graft survival

Contents:

Chapter 1 Immunologic basis of allograft rejection

Chapter 2 Allograft rejection types and mechanisms

Chapter 3 Prevention and treatment of allograft rejection

Focal points :

1.Allograft rejection types

2.Allograft rejection mechanisms

Section 25 Immunodiagnosis

Purpose and requisition :

1. Master detection method and significance of humoral immunity's

2. Be familiar with detection method of cell immunity

3. Comprehend application of molecular biology methods in immunologic detection

Contents:

Chapter 1 Detection of antigens and antibodies

Chapter 2 Detection of cellular immunity

Chapter 3 Clinical analysis of immune system by molecular genetic techniques

Chapter 4 Application of immunologic tests

Focal points :

1.Features of Ag-Ab reaction and influencing factors

2 Classes of common Ag-Ab reaction

Section26 Immumotherapy

Purpose and requisition :

1 . Master conception and classification of immumotherapy

2 . Comprehend immumotherapy agents which be used

Contents:

Chapter1 Definition and classification

Chapter2 Molecular immumotherapy

Chapter3 Cellular immunotherapy

Chapter4 BRMs and immunosupressors

Focal point :

Conception and classification of immumotherapy

Section27 Immunoprevention

Purpose and requisition :

1 . Master conception of artificial active immunization and artificial passive immunization

2. Comprehend artificial immunization and preservation agents which be used

3 . Comprehend development of new vaccines

Contents:

Chapter1 Artificial immunization

Chapter2 Development of new vaccines

Chapter3 Application of vaccines

Focal points :

Artificial active immunization and artificial passive immunization

The Content of Experiment (36 class hours)

The Fist Class **(9 class hours)**

1. Ag-Ab reactions: Countercurrent Electrophoresis.Precipitation Reaction
2. Measurement of phagocytosis by phagocytes.
3. Display: Double immunodiffusion,Single radial immunodiffusion ,Rocket Electrophoresis,Immunoelectrophoresis.
4. Hemolytic Plaque Assay

The Second Class **(9 class hours)**

1. Detection of T lymphotyte Subgroup, T cell typing by SAP method
2. Display: Lymphocyte transformation test,

Erythrocyte rosette forming cell test, ERFC.

The Third Class **(9 class hours)**

1.Indirect immunofluorescence assay.

2. Enzyme-Linked Immunosorbent Assay

The Fourth Class **(9 class hours)**

DNA agarose gel electrophoresis method of analyzing apoptotic cells.

Textbook and reference

Textbook : 1. Textbook of Medical Immunology

Publication of bios scientific publishers limited ,2006

Chief editors adaptation edition: Tan Jinquan Yao Kun

2. Current Protocols in Immunology A Laboratory technology in Both English and Chinese

Publication of scientific publishers limited ,2006

Chief editors: Zhang Xiaolian

Reference: 1. Medical Immunology, Jin Boquan, 2009, Renmin Healthy Publisher

2. Medical Immunology (edition 1), Science Publishing House ,Gong Feili,2003

3. Immunology (edition 6), People's Medical Publishing House, translated by Zhou Guangyan,2002

4. Medical Immunology (edition 1), Science Publishing House ,Sunwen Sheng and Wang Fuqing, 2004

Homework and examination modus

Ask and answer in the class

Written examination