UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Immunology I

1920-2-H4102D011-H4102D033M

Aims

The Immunology I course provides students with the fundamentals of modern cellular and molecular immunology.

The course deals with the investigation of pathological mechanisms of immunology common to all pathologies, functional alterations and clinical significance. It focuses on the immunological aspects of various diseases. The course allows students to understand how and why the immune system protects us, its cells, what are the clinical manifestations that appear following the body's immune reaction. At the end of the course the student will be able to understand the immunological basis of alterations in human health and associated clinical manifestations and to clarify the physiopathological principles underlying immunology and therefore of treatment.

Contents

• Immune response.

• Cells, tissues and organs of the immune system.

• Antibodies and antibody response.

• Major Histocompatibility Complex (MHC I and MHC II or HLA; Human Leukocyte Antigens) and antigen Presentation.

• Regulation of the immune response.

• Tolerance.

• Immediate hypersensitivity reactions.

• Delayed hypersensitivity reactions.

• Autoimmunity.

• Primary and Acquired Immunodeficiencies.

• Transplant immunology.

• Principles of immunosuppressive therapy.

Detailed program

• Immune response. General properties of the immune system. Innate immunity and acquired immunity. The cells of the immune system. Soluble mediators. Antigens. The immune response. Inflammation. Defence mechanisms against intra- and extra-cellular pathogens. Humoral immunity. Cell mediated immunity.

• **Cells, tissues and organs of the immune system**. Cells of innate immunity, phagocytes: polymorphonuclear cells- Neutrophils, Basophils, Eosinophils; Monocytes and Macrophages. Platelets and Natural Killer Cells. Cells of acquired immunity: Antigen Presenting Cells; T lymphocytes - differentiation, activation and functions, B lymphocytes - differentiation, activation and functions. Primary lymphoid organs and tissues: Bone marrow; Thymus. Secondary lymphoid organs and tissues: Lymph nodes, Spleen, mucous associated Lymphoid tissue (MALT). Leukocyte trafficking.

• **Antibodies and antibody response**. Structure and functions. Antigen-Antibody Interaction. Fc receptors. Antibody response. Generation of antibody diversity. The cooperation of cells in the antibody response.

• **Major Histocompatibility Complex (MHC I and MHC II or HLA**; **Human Leukocyte Antigens) and antigen Presentation.** T Cell Receptor: structure and functions. MHC I and II: gene organization and expression; structure and function; interaction with the antigen. Antigen presentation. Costimulatory molecules. cell-mediated cytotoxicity.

• **Regulation of the immune response**. Regulation due to: antigens, antibodies, lymphocytes, NK cells. Idiotype modulation. Neuroendocrine modulation. Genetic control.

• **Tolerance**. Experimental induction of tolerance. Thymic tolerance to self antigens. Selection and Development of T Cells. Post-thymic (peripheral) tolerance to self antigens. Privileged sites. Role of T cells and Dendritic cells. Tolerance of B cells to self antigens.

• **Immediate hypersensitivity reactions**. Hypersensitivity reactions Type I. IgE. Allergens. Role of T Cells, Mast cells and Basophils. Genetics of allergies. Type II hypersensitivity reactions I. Mechanism of damage. Reactions against platelets and blood cells. ABO system. Reactions against tissue antigens.

• **Delayed hypersensitivity reactions.** Immune complex diseases. Formation, persistence and deposition of immune complexes in tissues. Delayed hypersensitivity reactions. Hypersensitivity reactions Type IV. Contact hypersensitivity. Cellular reactions: Granulomas.

• **Autoimmunity**. Genetic factors. Aetiology and Pathogenesis of autoimmune diseases. Immune response in infectious diseases. Immunity to viruses, bacteria and fungi. Evasion of immune defences. Mechanisms of the response to LPS.

• **Primary and Acquired Immunodeficiencies**. Deficiency of Innate and Acquired Immune. Acquired or secondary

immunodeficiencies (AIDS, malnutrition, etc.).

• **Transplant immunology**. Immunological barriers to transplantation. Histocompatibility antigens. The rejection. Role of lymphocytes in rejection. Prevention of rejection.

• **Principles of immunosuppressive therapy**.

Prerequisites

Knowledge of the introductory courses indicated in the regulation of the degree course

Teaching form

Lectures with the help of power point presentations - interactive lessons based on clinical questions

Textbook and teaching resource

Abul Abbas Andrew H. Lichtman Shiv Pillai- "Basic Immunology"-ed. Elsevier

Casey Weaver, Kenneth Murphy-Janeway "Immunobiology" - ed. Garland Science

Semester

I Semester

Assessment method

The exam includes a written test with multiple choice questions on subjects of Immunology. The questions will assess the degree of depth achieved by the student. In the specific case of Immunology, questions are asked on all the fundamental aspects of the individual parts of the Program above. The test will also include an open-ended question (essay) that will assess the ability to link the different topics covered.

The exam is considered passed only if at least 60% of the questions including the open-ended question are answered.

Office hours