

66023 - Advanced immunology

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	537 - Master's in Molecular and Cellular Biology
ECTS	6.0
Course	1
Period	Indeterminate
Subject Type	Optional
Module	---

1. Basic info

1.1. Recommendations to take this course

1.2. Activities and key dates for the course

2. Initiation

2.1. Learning outcomes that define the subject

2.2. Introduction

3. Context and competences

3.1. Goals

3.2. Context and meaning of the subject in the degree

3.3. Competences

3.4. Importance of learning outcomes

4. Evaluation

5. Activities and resources

5.1. General methodological presentation

The learning process that is designed for this subject is based on the following: This course is scheduled starting from an intensification of the theoretical knowledge to finish with an eminently practical and applied orientation. It is intended that students are able to apply the theoretical and practical knowledge they have acquired in the course.

5.2. Learning activities

The program offered to the student to achieve the expected results includes the following activities:

1. Theoretical lessons. 30 hours . Basic theoretical knowledge of the subject is presented to the students, using

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PowerPoint presentations and web resources.

2. Practical lessons of cell immunology . 12 hours . They will be held in four sessions of 3 hours each. They will take place in the cell culture Laboratory of the Department of Biochemistry at the Faculty of Sciences in groups of no more than 10 students.

3. Practical lessons of cell cytometry. 6 hours. They will be held at the Center for Biomedical Research of Aragon (CIBA) in two sessions of three hours.

4. Preparation and public exposition of a seminar. Between 9 and 12 hours , depending on the number of students enrolled . In this activity, students collect information on a particular topic , aided by the teacher. The analysis of information should lead to the development of a seminar , which will be presented and discussed in the classroom.

5. Objective test . 3 hours . At the end of the course , students will perform an objective test to evaluate the acquisition of basic concepts , procedures and other theoretical knowledge.

5.3.Program

1. Program of the theoretical lessons

SECTION I. UPDATE

Chapter 1. Update on integration and regulation of the immune response. Questioning the known schemes on integration of the immune response. Antigen presentation and "cross-priming". Migration of effector cells of the adaptive immune system during the immune response. Activation, maturation and migration of antigen presenting cells. Danger signals. Toll-like receptors. Inflammasomes. Mechanisms of peripheral tolerance in the immune system.

SECTION II. MOLECULAR AND CELLULAR MECHANISMS OF DISEASE PREVENTION BY THE IMMUNE SYSTEM

Chapter 2. Immunity against bacteria. Mechanisms involved: humoral response, complement, phagocytosis, mast cells. Activation of the cellular response against certain bacteria. Examples: diphtheria, tuberculosis, listeriosis. Evasion by bacteria of the host defense mechanisms.

Chapter 3. Immunity against viruses. Mechanisms involved: humoral, cytotoxic T lymphocytes (CTL). Examples: influenza, herpes. Virus evasion of host defense mechanisms. CTL effector mechanisms. Mechanism of apoptosis induced via Fas or the perforin/granzyme pathways.

Chapter 4. Vaccines. Active immunization and passive immunization. Design of vaccines for active immunization. Analysis of the different types of vaccines. Immunization schedule established in Spain.

Chapter 5. Immunity against parasites. Protozoal diseases. Examples: malaria, sleeping sickness, Chagas disease. Pathogenesis and immune response. Design of vaccines against these diseases. Diseases caused by helminths. Immune response: IgE, mast cells, complement, eosinophils, neutrophils. Signal transduction mediated by the IgE receptor on mast cells

Chapter 6. Immunity against cancer. 1. Cancer: origin and terminology. Oncogenes. Immune response against cancer: CTL, NK and LAK cells. Tumor evasion of the immune system.

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Chapter 7. Immunity against cancer. 2. Cancer immunotherapy. Handling the costimulatory signal. Cytokine therapy. Monoclonal antibodies currently used in cancer therapy: mechanisms of action. Identification of tumor antigens. Dendritic cells and activation of anti-tumor CTL: cancer vaccination?.

SECTION III. DISEASES RELATED WITH THE IMMUNE SYSTEM

Chapter 8. Organ transplantation and immune rejection. Immunological basis of graft rejection. Molecular bases of allogeneicity. Relationship with positive selection during the ontogeny of T cells. Clinical Manifestations of rejection. HLA typing. General and specific immunosuppressive therapies. Clinical results of several transplants.

Chapter 9. Autoimmune diseases. Organ-specific autoimmunity. Systemic autoimmune diseases. Animal models of autoimmunity. Mechanisms generating these diseases. Treatment of autoimmunity.

Chapter 10. Immunodeficiencies. Phagocytic deficiencies. Humoral deficiencies. Deficiencies in cell-mediated immunity. Combined immunodeficiencies. Deficiencies in complement.

Chapter 11. AIDS. Discovery of AIDS and HIV. Diagnostic methods. Infection of CD4+ T cells: CD4 and chemokine receptors. Subversion of the immune system by HIV. Current treatment of the disease. Development of an AIDS vaccine.

Chapter 12. Hypersensitivity reactions. Gell and Coombs classification. IgE-mediated hypersensitivity (or Type I). Antibody-mediated hypersensitivity (or type II). Immune complex mediated hypersensitivity (or type III). Delayed type hypersensitivity (or Type IV).

2. Program of the practical sessions

1st part.

1st and 2nd session. Apoptosis induced by the death receptor Fas on leukemic cell lines.

3rd and 4th session. Apo2L/TRAIL in anti-tumor therapy.

2nd part.

Separation of CD4+ and CD8+ T lymphocytes from peripheral blood using "sorting" with a FACSAria device.

5.4.Planning and scheduling

The examination period and the specific dates thereof, as well as the academic calendar in general, are available on the Science School website .

Practical lessons schedules , both at the Science School and at CIBA , as well as seminars to be presented by students shall be notified in class and will be posted on the bulletin board in the classroom and in the ADD.

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5.5. Bibliography and recommended resources

- Murphy, Kenneth. Janeway's immunobiology / Kenneth Murphy, Paul Travers, Mark Walport; with contributions by, Michael Ehrenstein ... [et al.]. - 7th ed. New York : Garland Science, cop. 2008
- Abbas, Abul K.. Inmunología celular y molecular / Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai ; [revisión, Juan Manuel Igea Aznar] . - 6ª ed., [reimp.] Barcelona [etc.] : Elsevier, D.L. 2009