66023 - Advanced immunology

Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	537 - Master's in Molecular and Cellular Biology
ECTS	6.0
Year	1
Semester	Indeterminate
Subject Type	Optional
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

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

5.2.Learning tasks

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The course includes the following learning tasks:

1. Lectures. 30 hours. Basic theoretical knowledge of the course is presented to the students, using PowerPoint presentations and web resources.

2. Practice sessions 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 Science in groups of no more than 10 students.

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

4. Preparation and public exposition of a seminar. Between 9 and 12 hours , depending on the number of students enrolled . In t his activity, students collect information on a particular topic , helped 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. Assessment . 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.Syllabus

The course will address the following topics:

1. Lectures

SECTION I. UPDATE

Topic 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

Topic 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.

Topic 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.

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Topic 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.

Topic 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

Topic 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.

Topic 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

Topic 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.

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

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

Topic 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.

Topic 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. Practice 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.

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2nd part.

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

5.4.Course planning and calendar

Further information concerning the timetable, classroom, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the Faculty of Science website.

Practice sessions' calendar , both at the Faculty of Science and at CIBA , as well as seminars lead by students shall be notified in class, posted on the bulletin board in the classroom, and in the virtual plantform ADD.

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