

Immunopathology

Code: 101929
ECTS Credits: 3

| Degree | Type | Year | Semester |
|-----------------------------|------|------|----------|
| 2501230 Biomedical Sciences | OB | 3 | 1 |

Contact

Name: Oscar de la Calle Martin
Email: Oscar.DeLaCalle@uab.cat

Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Other comments on languages

Un % de les classes s'impartirà en anglès

Teachers

Marta Vives Pi
Oscar de la Calle Martin
Juan Francisco Delgado de la Poza
Eva Maria Martinez Caceres
Candido Juarez Rubio
Manuel Hernández González
Maria Jose Amengual Guedan
Aina Teniente Serra
Laura Martinez Martinez
Maria Esther Moga Naranjo
Roger Colobrán Oriol
Mónica Martínez Gallo

External teachers

Bibiana Quirant Sánchez
Clara Franco Jarava
Gemma Vila Pijoan
Janire Perurena Prieto
Joan Climent Martí
Laura Viñas Giménez

Prerequisites

It is absolutely necessary to have adequate knowledge of:

- Cell Biology
- Structure and Function of Biomolecules (Biochemistry I)
- Human anatomy
- Experimental methods in Biomedicine
- Metabolism of Biomolecules (Biochemistry II)
- Basic Immunology

Objectives and Contextualisation

1) To learn the role of the immune system in the following pathological processes:

- a. Infections
- b. Allergies and hypersensitivity disorders.
- c. Autoimmune diseases
- d. Primary and secondary immunodeficiencies
- e. Neoplasms and paraneoplastic diseases. Anti-tumor response
- f. Transplantation, rejection and graft versus host disease

2) To be familiar, understand and interpret diagnostic tests and studies that have clinical value for immune-mediated diseases.

3) To understand the mechanisms of action of immunology-based therapies, i.e., vaccines, immunosuppressive drugs, immunoglobulins, monoclonal antibodies, cytokines and cellular immunotherapy.

Competences

- Contribute to public discussions on cultural matters.
- Develop critical thinking and reasoning and communicate ideas effectively, both in the mother tongue and in other languages.
- Develop independent learning habits and motivation to continue training at postgraduate level.
- Develop independent learning strategies.
- Develop scientific knowledge, critical reasoning and creativity.
- Display knowledge of the bases and elements applicable to the development and validation of diagnostic and therapeutic techniques.
- Display knowledge of the concepts and language of biomedical sciences in order to follow biomedical literature correctly.
- Display theoretical and practical knowledge of the major molecular and cellular bases of human and animal pathologies.
- Generate innovative and competitive proposals for research and professional activities.
- Identify and understand the advances and challenges of research.
- Respect diversity in ideas, people and situations.
- Work as part of a group with members of other professions, understanding their viewpoint and establishing a constructive collaboration.

Learning Outcomes

1. Contribute to public discussions on cultural matters.
2. Describe the principal mechanisms by which the immune system participates in pathology: immunodeficiencies, hypersensitivity, autoimmunity.
3. Develop critical thinking and reasoning and communicate ideas effectively, both in the mother tongue and in other languages.
4. Develop independent learning habits and motivation to continue training at postgraduate level.
5. Develop independent learning strategies.
6. Develop scientific knowledge, critical reasoning and creativity.
7. Display practical skills in performing a diagnostic analysis in immunopathology.
8. Generate innovative and competitive proposals for research and professional activities.
9. Identify and understand the advances and challenges of research.
10. Identify the principal elements intervening in the immune response to infections and tumours, and in the situation of allogeneic transplant.
11. Respect diversity in ideas, people and situations.
12. Understand the scientific literature and the databases specialising in problems of immunology and immunopathology, and interpret the results of a scientific project.
13. Work as part of a group with members of other professions, understanding their viewpoint and establishing a constructive collaboration.

Content

Immunopathology: a) the immune system as a cause of disease, main mechanisms; b) the immune system for the cure of diseases, main immunology-based therapies

Organized by Teaching Units (TU)

TU1. Immune response and disease

Lectures

1 - Immune response in infectious diseases I. General aspects of the immune response and response to viral infections.

2 - Immune response in infectious diseases II. Immune response to bacteria, protozoa, fungi and helminthes. Emerging infections.

3 - Tolerance and autoimmunity. Concept of tolerance to self-antigens. General mechanisms of T cell and B-cell Tolerance. Sequestered antigens. Tolerance failures and disease.

4 - Autoimmunity. Concept. Epidemiology and classification. Main autoimmune diseases. Etiology. Mechanisms of tissue damage. Hypothesis of the multiple check-points.

5 - Allergy. Concepts of allergy and atopy. Basic mechanisms. Main allergic diseases. Diagnosis of allergic diseases.

6 - Immunodeficiencies. Types of immunodeficiencies. Deficiencies of cellular immunity. Deficiencies of humoral immunity. Deficiencies of natural immunity. Other immunodeficiencies.

S1 Immunopathology Seminar 1: animal models of autoimmune diseases.

S2 Immunopathology Seminar 2: proliferations of cells of the immune system and disease, presentation of a case of myeloma and of lymphoma.

TU2. Immune responses in special clinical situations

Lectures

7 - Transplantation. Types of transplantation. Immunological basis of organs, tissue and cell transplantation. Clinical manifestations of rejection. Non-specific immunosuppressive treatments. Main forms of clinical transplant. Immune tolerance to transplant.

8 - AIDS: the epidemic. The human immunodeficiency virus (HIV). Mechanisms of infection. Natural history of the infection. The immune response to HIV. Perspectives for a vaccine.

9 - Tumor Immunology. Cancer biology and the immune response. Tumor antigens. How tumors avoid the immune response, concepts of immune surveillance and of immuno-editing. Immunotherapy of cancer, immunological check-points.

S3 Immunopathology Seminar 3: The problem of histocompatibility and its approach in the HLA typing laboratory.

S4 Immunopathology Seminar 4: Approaches in the diagnosis of immunodeficiencies and discussion of paradigmatic cases.

TU3. The laboratory of diagnostic immunology

S5 Immunopathology Seminar 5: The diagnostic process. The properties of the diagnostics tests, the test catalog. The quality system and regulations. Laboratory the accreditations. The laboratory of diagnostic immunology: contributions to disease prevention and diagnosis and treatment monitoring.

P1 Practical - demonstration 1: Diagnosis of plasma cell diseases in the laboratory. Demonstration of the techniques and interpretation of results.

P2 Practical - demonstration 2: Flow cytometry applied to diagnosis. Interpretation of the plots and results.

P3 Practical - demonstration 3: Use of indirect immunofluorescence (IFL) for the diagnosis of autoimmune diseases. Interpretation of the most frequent IFL patterns and their correspondence with the antigens recognized by ELISA and immunoblot.

P4 Practical - demonstration 4: HLA typing, methodologies and the quest for the best kidney and hematopoietic stem cell donors.

TU4. Therapies based on immunology

Lectures

10 - Immunotherapy I. General concepts. Vaccines, serum therapy, intravenous immunoglobulins.

11 - Immunotherapy II. Cytokines and anti-cytokines. Cell therapies, from transfusion to advanced cell therapies.

Methodology

This subject is based on the concepts, skills and attitudes acquired from the subject Immunology, previously studied during the second year.

The methodology combines:

1) Lectures within which questions to be answered by the whole class will be interspersed in individual ad hoc questionnaires, to encourage participation and constitute an element of continuous evaluation.

2) Seminars where topics that lend themselves to group learning and dialogue will be discussed on previously distributed material. Some seminars will consist of the discussion of paradigmatic clinical cases. At the end of the seminar a questionnaire will be delivered answering the questions that have been addressed during the seminar.

3) Practices - demonstration. The laboratories of clinical diagnosis of immunology are not suitable for practices, but the exhibition will combine the diagnostic problems addressed in these laboratories, followed by visits in which demonstrations of the most representative techniques of immunology will be carried out. At the end of the practice a questionnaire must be submitted answering the questions that have been addressed during the session.

Activities

| Title | Hours | ECTS | Learning Outcomes |
|--|-------|------|-----------------------|
| Type: Directed | | | |
| Discussion Seminars | 8 | 0.32 | 1, 6, 13 |
| Master Classes | 11 | 0.44 | 5, 3, 9 |
| Type: Supervised | | | |
| Answer online questionnaires | 1 | 0.04 | 12, 7, 2, 6, 5, 4, 10 |
| Delivery of work in the Virtual Campus | 2 | 0.08 | 7, 6, 5, 4, 3, 9 |
| Demonstrations and laboratory practices | 8 | 0.32 | 12, 7, 6, 11, 13 |
| Type: Autonomous | | | |
| Individual study, consultation of the bibliography, preparation of the topics, resolution of the problems proposed by the professor and realization of works | 39 | 1.56 | |

Assessment

Continuous assessment

The practices and seminars are mandatory: the questionnaires of practices and online will account for 25% of the grade of the subject.

The written evaluation consists of two tests: a questionnaire with multiple answers and one with conceptual questions. These two tests represent 40% and 35% of the grade to pass the course respectively and it is necessary that the mark of each one of the written tests is equal to or greater than 5. The grade of the continuous assessment will be added to the evaluations of the tests written only in the case of having overcome them.

Final evaluation and recovery

Students suspended per course (<5.0) or not presented will be eligible for recovery, provided they have approved practices and seminars. The recovery consists of a written essay test with two topics to develop and five conceptual questions and includes the subject of all the teaching units (including practices). The topics will be scored at 2.5 points and the short questions at 1.0. The grade to pass the subject is 5.

Assessment Activities

| Title | Weighting | Hours | ECTS | Learning Outcomes |
|-------|-----------|-------|------|-------------------|
|-------|-----------|-------|------|-------------------|

| | | | | |
|---|----|-----|------|--------------------------------|
| Answer online questionnaires | 5 | 0.5 | 0.02 | 1, 2, 6, 5, 4, 3, 8, 10, 9, 11 |
| Delivery of work to the virtual campus | 10 | 2 | 0.08 | 12, 2, 6, 5, 4, 3, 10, 9 |
| Exam (Test-type questionnaire and short questions) | 75 | 1.5 | 0.06 | 2, 5, 4, 10, 9 |
| Questionnaires for seminars and practices, including group work | 10 | 2 | 0.08 | 7, 5, 13 |

Bibliography

General bibliography

Abul K. Abbas, Andrew H. Lichtman, and Shiv Pillai. Cellular and Molecular Immunology. 9th ed. Elsevier 2014; in cases of difficulty ask for help from the library; Kenneth Murphy and Casey Weaver. Janeway's Immunobiology. 9th ed. Kenneth Murphy and Casey Weaver. Garland Science, 2014; in cases of difficulty ask for help from the library; Other texts of quality, Roitt's Essential Immunology, Peter J. Delves, Seamus J. Martin, Dennis Kuby - Immunology. 7th ed. Ed. WH Freeman 2013; in cases of difficulty ask for help from the library; Peter Parham; The Immune System, Garland Science, 4th edition, 2014; Leonardo Faingold and Jorge Geffner. Introduction to human immunology. Query texts Clinical Immunology, Principles and Practice. Robert R Rich. 5th edition (2012). Ed. Elsevier; Fundamental Immunology. WE. Paul. 7th edition (2012). Ed. Lippincott Williams & Wilkins; The sections devoted to Immunology in medical texts are also recommended: Internal Medicine. Farreras. 18th edition (2016). Ed. Elsevier.

Specific bibliography

Autoantibodies, Third Edition - 2014, Yehuda Shoenfeld (Editor), Pier Luigi Cervera (Editor), Elsevier, 2014, ISBN-13: 978-0195389838
 Primary Immunodeficiency Diseases: A Molecular & Cellular Approach. Pier Luigi Cervera, Yehuda Shoenfeld, Elsevier, 2014, ISBN-13: 978-0195389838
 Magazines and Internet Resources (accessible through the UAB Online Library)
 Annual Review of Pathology: Mechanisms of Diseases
 Blood
 Clinical Immunology
 Clinical and Experimental Immunology
 Federation of Clinical Immunology Societies
 Frontiers in immunology
 Journal of Autoimmunity
 Journal of Allergy and Clinical Immunology
 Transplantation
 Immunoma project
 Immunotolerance network
 Videos on line
 Von Adrian's laboratory