

**COURSE DATA****Data Subject**

Code	34474
Name	Immunology and immunopathology
Cycle	Grade
ECTS Credits	4.5
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1204 - Degree in Medicine	Faculty of Medicine and Odontology	3	Second term

Subject-matter

Degree	Subject-matter	Character
1204 - Degree in Medicine	13 - Human clinical training II	Obligatory

Coordination

Name	Department
MATA ROIG, MANUEL	285 - Pathology
PRIETO ANDRES, JESUS LUIS	260 - Medicine

SUMMARY

The Immunology constitutes an extensive subject that studies the immune system in physiological and pathological conditions and the way to modulate the response, stimulating or repressing it. The development that the immunology has experienced in the last recent years has contributed importantly for the development of several areas of medicine. Particularly, it has made possible the knowledge of fundamental pathogenic mechanisms and the appearance of new treatments that have modified the course of multiple diseases of the life of many patients. We highlight the organ transplantation, the treatment of the immunodeficiencies, the modulation of immunological mediators in auto-immunity and allergy and the cancer immunotherapy.

Its importance in the field of the health has triggered the constitution of the Immunology as the core subject in the study planning of the Degree in Medicine and as a medical specialty that involve the diagnosis and treatment of the diseases in which the immunitary system has a main role in the pathogenesis or in the therapeutic.



The teaching is directed for the student to acquire the theoretical and practical knowledge that leads him to know and understand the main immuno-pathological mechanisms, as well as the clinical manifestations and the therapeutic orientation of the diseases in which the immunitary system has a main role.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

It is recommend the know ledge of the subjects of Biology, Biochemistry, Physiology and General Pathology Degree in Medicine.

1204 - Degree in Medicine

- Obtain and elaborate a clinical history with relevant information.
- Perform a physical examination and a mental health assessment.
- Have the capacity to make an initial diagnosis and establish a reasonable strategy of diagnosis.
- Establish the diagnosis, prognosis and treatment, applying principles based on the best information available and on conditions of clinical safety.
- Indicate the most accurate therapy in acute and chronic processes prevailing, as well as for terminally ill patients.
- Plan and propose appropriate preventive measures for each clinical situation.
- Acquire proper clinical experience in hospitals, health care centres and other health institutions, under supervision, as well as basic knowledge of clinical management focused on the patient and the correct use of tests, medicines and other resources available in the health care system.
- Know how to use the sources of clinical and biomedical information available, and value them critically in order to obtain, organise, interpret and communicate scientific and sanitary information.
- Know how to use IT in clinical, therapeutic and preventive activities, and those of research.
- Keep and use medical records which contain information about the patient for later analysis, preserving the confidentiality of personal data.
- Organizar y planificar adecuadamente la carga de trabajo y el tiempo en las actividades profesionales.
- Capacidad para trabajar en equipo y para relacionarse con otras personas del mismo o distinto ámbito profesional.



- Criticism and self-criticism skills.
- Capacity for communicating with professional circles from other domains.
- Acknowledge diversity and multiculturality.
- Consideration of ethics as a fundamental value in the professional practise.
- Working capacity to function in an international context.
- Recognises, diagnoses, and guides the management of the main pathologies affecting the immune system.
- Recognises, diagnoses, and guides the management of vital risk situations.
- Knows how to perform a complete anamnesis, focused on the patient and orientated to various pathologies, interpreting its meaning.
- Knows how to evaluate modifications in clinical parameters at different ages.
- Knows how to set an action plan, focused on the patient's needs and the family and social environment, which should be coherent regarding the patient's symptoms and signs.

Once the subject is finished, students must be able to:

1. Describe the components of the immune system and the mechanisms of its functioning as a system, in physiological and pathologic conditions.
 2. Recognize, diagnose and guide the treatment of the main diseases of the immune system –immunodeficiencies, autoimmune diseases, allergic diseases and autoinflammatory diseases.
 3. Describe in general terms the functioning of the vaccines immune foundations, the immune bases, indications and complications of the organ and backbone transplant, the immune response against infectious diseases and the association HLA-disease.
 4. To make a clinical history oriented towards the immune pathology.
 5. Interpret a basic immune analysis: autoimmunity markers, study of immunodeficiencies, IgE, basophiles activation and lymphocyte phenotype.
 6. Formulate a proper treatment plan of the anaphylaxis.
 7. Interpret cutaneous tests. To interpret a study of histocompatibility. Proper communication with patients.
8. Access to bibliographical resources, databases and relevant sources of information. To make a general critical analysis of a scientific publication.
9. Fulfill a work about the content of the program and expose it publicly.



DESCRIPTION OF CONTENTS

1. THEORETICAL LESSONS (units from 1 to 6)

Lesson 1. Introduction. The immune system. Innate and adaptive immunity. Humoral and cellular elements. Theory of clonal selection.

Lesson 2. Structures for the recognition of antigens. Immunoglobulins and cell T receptor. Molecular bases of the generation of their diversity and specificity. Integration of the immune response.

Lesson 3. Lymphocytes: differentiation, phenotype, activation and function. Morphology. Heterogeneity. Activation of T lymphocyte. Requirements of the antigen processing. Antigen presenting cells. Activation and proliferation of the T lymphocytes.

Lesson 4. Lymphocytes: origin and maturation. Lymphoid organs and lymphocyte traffic. Origin and differentiation from the lymphocytes. Localization and circulation of lymphocytes: lymphoid organs. Bone marrow: histological structure, maturation and B lymphocytes. Thymus: histological structure, maturation of T lymphocytes, central tolerance. Lymphocyte traffic. Lymph node: entrance of antigens, entrance and extravasation of lymphocytes. Migration of effector T lymphocytes. Migration of lymphocytes. Memory. Spleen: entrance of antigens, entrance and activation of lymphocytes.

Lesson 5. The complement system. General characteristics. Activation: classical via, alternative via, via of lectins. Cellular receptors for proteins of the activated complement. Regulation. Functions: cell lysis, opsonization, elimination of immune complexes.

Lesson 6. Cells of the innate immunity: activation and function. Macrophages, polynuclear leukocytes and dendritic cells. Pathogen-associated molecular patterns and their receptors. Cytotoxic natural cells or natural killer cells: phenotype and function.

2. THEORETICAL LESSONS (Units from 7 to 12)

Lesson 7. Primary immunodeficiency. Immunodeficiency classification. General characteristics, anamnesis and exploration oriented towards the diagnoses of an immunodeficiency. Primary immunodeficiency of the adaptive immunity. Immunodeficiencies predominantly of antibodies, immunodeficiency by primary defects of T lymphocytes and immunodeficiency.

Lesson 8. Primary immunodeficiency. Primary immunodeficiency by defects of the innate immunity. Deficits of complement factors. Defects of phagocytosis. Acquired immunodeficiency: Acquired Immune Deficiency Syndrome (AIDS) immunodeficiency associated with cancer, immunodeficiency associated with malnutrition and states of stress.

Lesson 9. Respiratory allergic diseases. Asthma and rhinitis. Extrinsic allergic alveolitis Epidemiology: genetic and environmental factors. Physiopathology. Clinical forms. Clinical and biological diagnosis. Treatment principles: pharmacotherapy and specific immunotherapy.



Lesson 10. Cutaneous and mucous allergic diseases. Contact eczema, atopic dermatitis and hives: immunopathogenesis, clinical and biological diagnosis.

Lesson 11. Anaphylaxis. Food allergy. Drugs allergy. Physiopathology of the anaphylaxis reaction, causes and treatment. Pathogenic mechanisms, clinical manifestations and diagnosis of the food allergy. Adverse reactions to drugs: classification and diagnosis.

Lesson 12. Molecular bases of the immune response and of the tolerance. Mechanisms that trigger the immune response (presentation and recognition of antigens, cytokine network). Molecular bases of the auto-tolerance and tolerance to foreign antigens. Loss of tolerance: reactions of hypersensitivity and autoimmunity.

3. THEORETICAL LESSONS (Units from 13 to 17)

Lesson 13. Morphological bases of the autoimmune and inflammatory diseases. Pathology of the autoimmune diseases. Mechanisms of injuries productions. Pathology of the vasculitis.

Lesson 14. Autoimmune diseases. Concept: autoimmunity and autoimmune disease. Clinical classification. Epidemiology. Auto-antigens. Auto-antibodies: description and clinical correlation. Other biological alterations in the diagnosis of the autoimmune disease. Pathogen mechanisms of injury: antibodies, immune complexes and T lymphocytes. Autoimmune diseases mediated by immune complexes. Systemic lupus reythematosus and vasculitis by hypersensitivity: immunopathogenesis, clinical and biological data for the diagnosis.

Lesson 15. Autoimmune diseases mediated by T lymphocytes. Immune response mediated by cells. Scleroderma, rheumatoid arthritis and Sjögren's symptom: immunopathogenesis, clinical and biological data for the diagnosis.

Lesson 16. Diseases mediated by T lymphocytes and granulomas. Concept. Classes. Immunopathogenesis. Immune response mediated by Th1 cells. Granulomas formation. Necrotizing systemic vasculitis. ANCA-associated vasculitis: classes, immunopathogenesis, and main clinical and biologic data for the diagnosis. Principles of treatment in the autoimmune diseases.

Lesson 17. Organ transplant. Morphological bases. Graft versus host diseases. Opportunistic infections in the immunosuppression state.

4. PRACTICAL LESSONS

SEMINARS

1. Major Histocompatibility Complex. Structure and function. HLA and transplant. HLA and disease.
2. Innate immunity: inflammatory reaction. Mediators. Inflammatory syndrome.
3. Mechanisms of hypersensitivity.
4. Allogenic transplant of hematopoietic progenitor cells. Immune double barrier: rejection and reaction of the graft against the host.



5. Autoinflammatory and autoimmune diseases. Autoinflammatory diseases: clinical grounds, biological and genetic.
6. Immune response to infection. Acquired immunodeficiency syndrome.
7. Semiology immunodeficiencies. Clinical physics and exploration data. Lab tests.
8. Treatments in immunology: immunomodulatory molecules.

LABORATORY PRACTICES

1. Microscopy of the immune system cells.
2. Microscopy of the immune system organs.
3. Microscopic morphological aspects in the diagnosis of the autoimmune diseases (I)
4. Microscopic morphological aspects in the diagnosis of the autoimmune diseases (II)

HOSPITAL PRACTICES

Tutored clinical practices in the hospital services where patients with immune system diseases-allergic, autoimmune and immunodeficiency diseases- are diagnosed and treated.

ANALYSIS OF CLINICAL CASES AND LABORATORY SEMINARS

Clinical cases in the immune pathology and analysis of the diagnostic and treatment methods.

WORKLOAD

ACTIVITY	Hours	% To be attended
Seminars	19,00	100
Theory classes	19,00	100
Laboratory practices	6,00	100
Clinical practice	12,00	100
Study and independent work	30,00	0
Readings supplementary material	6,25	0
Preparation of practical classes and problem	10,00	0
Resolution of case studies	10,00	0
TOTAL	112,25	

TEACHING METHODOLOGY

In the theoretical credits the professor will expose the content of the program. The practical credits will be made through seminars, laboratory practices and clinical practices. The seminars will involve the content that completes the theoretical program and its application to the clinic. In the laboratory practices, the students will observe the microscope and will identify cells and other structures of the immunitary system. They will also learn to distinguish the microscopic morphological facts that characterize, and are distinguished between them, the different autoimmune and inflammatory diseases used in the diagnosis. The clinical practices will train the students into the realization of a clinical history and in the interpretation of diagnostic tests focused on the immunitary pathology. The students will also observe



generally the indications of the different treatments of immunological basis. The theoretical and practical modalities of the teaching will involve, with different methodologies, the same general objectives of the subject. So, the theoretical and practical contents are not independent, but complementary and they are related between them.

EVALUATION

Theoretical evaluation: 50% of the final grade.

It will cover the contents of the theory syllabus and will be the same for all groups. It will be integrated by a multiple-choice test, consisting of up to 100 questions. Correct answers will have a value of 1 point, incorrect answers will subtract 0.333 and unanswered questions will be awarded 0 points. Maximum score: 10, pass mark: 5 points.

Practical evaluation: 50% of the final grade.

This evaluation will be integrated by a multiple choice test with maximum of 65 questions on seminars and clinical skills (up to 50 questions) and up to 15 questions on laboratory practice. Maximum score: 10, pass mark: 5 points.

Final grade: (Theory evaluation + practice evaluation)/2. It is necessary to overcome both parts (theory and practice) to pass the subject.

Attendance to practical sessions is mandatory. Unjustified non-attendance to more than 20% of the sessions will make it impossible to pass the course.

Throughout the course, a continuous evaluation could be carried out, on the subject matter (theoretical and/or practical) explained. This evaluation is voluntary and can be integrated by a multiple-choice test, short questions and other modalities. This mark will be only added to the final score of the subject when the theoretical and practice evaluations have been passed.

Students are reminded of the importance of carrying out evaluation surveys on all the teaching staff of the degree subjects.

REFERENCES

Basic

- Abbas AK, Lichtman AH, Pillai S. Cellular and molecular immunology. (Tenth Edition). Elsevier. 2021
- Helbert M. Immunology for medical students. (Third Edition). 2017
- Fainboim L and Geffner J. Introducción a la inmunología humana. (6ª Ed). Editorial Médica Panamericana. 2011



Additional

- Murphy KM, Weaver C, Berg LI. Janeways Immunobiology. (10th Edition). WW Norton and Company. 2022
- Fauci AS, Braunwald DL, Kasper SL, Hauser DL, Longo JL, Jameson JL and Loscalzo J. Harrison's Principles of Internal Medicine. (21 Ed). 2022.
- Recursos-e Salut: ClínicaKey Student. Elsevier (Scopus, ScienceDirect).
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