

Immunology of Infectious Diseases

Code: 101931
ECTS Credits: 6

| Degree | Type | Year | Semester |
|-----------------------------|------|------|----------|
| 2501230 Biomedical Sciences | OT | 4 | 0 |

Contact

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Use of languages

Principal working language: english (eng)
Some groups entirely in English: Yes
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Teachers

Mercè Martí Ripoll
Francesc Enric Borrás Serres
Julian Miguel Blanco Arbues
Javier Martínez Picado
Christian Brander Silva
Pere Joan Cardona Iglesias
Jesús Aranda Rodríguez

External teachers

Alfred Cortés
Aura Muntasell Castellví
Carlota Dobaño
Esteban Veiga Chacón
Hernando del Portillo

Prerequisites

To access to study "Immunology of Infectious Diseases", the student must have attained the learning skills of Immunology in the course corresponding to their degree.

Objectives and Contextualisation

SECTION I

Review of the main aspects of innate and adaptive immune response

MALT: Mucosa-Associated Lymphoid Tissue

MALT: Morphological and anatomical description. Lymphocyte recirculation

Immune response in the MALT: mechanisms of innate and adaptive immunity.

SECTION II

Immune response to bacteria

Analysis of antibacterial mechanisms mediated by innate and adaptive immunity.

Immune effector mechanisms operating against intra or extracellular bacteria.

Evasion mechanisms that bacteria use to avoid the immune system.

Pathology and treatment of diseases caused by bacterial infections

Learning to recognize and describe diseases caused by bacterial infections that are clinically important.

Identification of emerging bacterial diseases.

Vaccines.

Seminars by specialists

SECTION III

Immune response to parasites

Learning the basics of parasitic infections.

Immune mechanisms used to deal with different types of parasitic infections.

Different strategies and different mechanisms used by parasites to evade the host's immune response.

Pathology and treatment of diseases caused by parasites

Learning to recognize and describe diseases caused by parasitic infections that are clinically important.

Vaccines.

Seminars by specialists

SECTION IV

Immune response to viruses

Basic concepts of antiviral immunity.

Specific mechanisms of innate and adaptive immunity involved in defense against viral infections.

Different strategies used by viruses to evade the antiviral immune response.

Pathology and treatment of diseases caused by infections

Learning to recognize and describe diseases caused by infections that are clinically important.

Identification of emerging viral diseases.

Vaccines.

Seminars by specialists

Skills

- 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 basic life processes on several levels of organisation: molecular, cellular, tissues, organs, individual and populations.
- 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.
- Read and critically analyse original and review papers on biomedical issues and assess and choose the appropriate methodological descriptions for biomedical laboratory research work.
- 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. Analyse the relationship between the nature of the immune response and the molecular and physical characteristics of the antigens that induce it.
2. Contribute to public discussions on cultural matters.
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. Explain the mechanisms of activation and regulation of the cellular and humoral immune response and their link to immunopathology.
9. Explain the relationships between a possible pathogen and its host.
10. Generate innovative and competitive proposals for research and professional activities.
11. Identify and understand the advances and challenges of research.
12. Identify the principal elements intervening in the immune response to infections and tumours, and in the situation of allogeneic transplant.
13. Respect diversity in ideas, people and situations.
14. Understand scientific texts and write review papers on immunology and biology.

15. Understand the scientific literature and the databases specialising in problems of immunology and immunopathology, and interpret the results of a scientific project.
16. Work as part of a group with members of other professions, understanding their viewpoint and establishing a constructive collaboration.

Content

Section I

Review innate and adaptive immunity: inflammasome, TLR signaling, cell lineages Th cells (Th1, Th2, Th17, regulatory T cells)...

MALT anatomy of mucosal lymphocyte recirculation, a description of cellular elements (intraepithelial lymphocytes) and humoral (IgA) and immune response associated with MALT.

Section II.

Immune response to bacteria.

Pathology of diseases caused by bacterial infections.

Seminars include a monographic session on Mycobacterium tuberculosis.

Section III.

Immune response to the parasite.

Pathology of diseases caused by parasites.

Seminars include a monographic session on Plasmodium falciparum.

Section IV.

Immune response to the virus.

Pathology of diseases caused by viral infections.

Seminars include a monographic session on HIV.

Methodology

Lectures:

The subjects of teaching units will be taught in 30 sessions. Some will be taught by guest lecturers and specialists in the field of clinical research in diseases caused by pathogens. The content of the theory program will be taught by teachers mainly in the form of lectures with visual support. The presentations used in class by the teacher will be available prior to the Virtual Campus.

In the seminars given by guest lecturers, the teaching language will be Catalan, Spanish or English, depending on the preference of the speaker.

SELF-LEARNING:

The autonomous learning is based on achieving specific learning skills that will accompany the start of each block. It is advised that students consult regularly the recommended books in the reference section of this guide teachers to consolidate and clarify, if necessary, the contents explained in class. In this sense it is also

recommended that students use the links listed on the Virtual Campus, which contain videos and animations related to the processes explained in class.

COOPERATIVE LEARNING:

Scheduled sessions of problem-based learning (PBL). To solve problems a methodology of cooperative learning will be applied: they make groups of 3 or 4 students. Case information will be posted on the Virtual Campus (CV). The resolution of cases will target students seeking general, analyze and synthesize information on the disease that causes the immune response that develops mechanisms evasion, diagnosis and treatment for a particular microorganism. For the implementation and development of the case, students must:

1) Prepare a written work that consists of parts: Introduction and current state of the subject, objectives, development of information gathering, discussion and conclusions.

2) Prepare an oral presentation: choosing the key parts of the work and expose it to the rest of the class in an exhibition of 12 minutes questions for each group. They assessed positively the students to make oral presentations and slides in English.

Activities

| Title | Hours | ECTS | Learning outcomes |
|--|-------|------|---|
| Type: Directed | | | |
| Classes | 30 | 1.2 | 1, 2, 5, 8, 9, 12, 11, 13 |
| Classroom practicals | 12 | 0.48 | 1, 15, 14, 2, 7, 6, 5, 4, 3, 8, 9, 10, 12, 11, 13, 16 |
| Type: Supervised | | | |
| Collective work report by each of the group members | 1 | 0.04 | 6, 3, 10, 11, 13, 16 |
| Preparation of oral presentation | 15 | 0.6 | 1, 15, 14, 2, 7, 6, 4, 3, 8, 9, 10, 12, 11, 13, 16 |
| Preparation of written report | 16.5 | 0.66 | 1, 15, 14, 2, 7, 6, 5, 4, 3, 8, 9, 10, 12, 11, 13, 16 |
| Type: Autonomous | | | |
| Interpretation of data from a scientific publication or from a clinical case | 20 | 0.8 | 1, 15, 14, 2, 7, 6, 5, 4, 3, 8, 9, 10, 12, 11, 13, 16 |
| Study hours | 50 | 2 | 1, 15, 14, 7, 6, 5, 4, 8, 9, 12, 11 |

Evaluation

The evaluation of the course will be continued through individual tests that assess:

- Individual learning by students from exams
- Cooperative learning from the training activities scheduled as classroom practices, written and oral presentation skills.

Evaluation activities planned in the course of Immunology are:

Exams: two partial exams. Each test will be worth 35% of the final grade. Exams will be multiple choice questions of a minim of 25 questions with five options and only one correct. A correction value of 1/5 will be

subtracted per every incorrect answer. To pass this part of the course, the sum of the partial exams must be more than 50% weight of the total grade. Students must achieve a minimum 40% in partial 1 to compensate with partial 2.

Cases (ABP): The cases are for cooperative work in groups of 3-4 students. They will be practical problems. The aim is for students to develop their skills of self-learning search and selection of information and eventually develop the ability to synthesize and written communication. Also workgroup.

The evaluation of cases represent 30% of the final grade in the course as follows:

- i) 10% for the written work.
- ii) 20% oral presentation.

To pass this part of the course grades must be greater than 50% of their total value.

The final grade for the course will be composed of the score of the two partial exams and cases.

Along the semester, there will be questionnaires online or in class that will serve as continuous evaluation and can help the final scores.

If they fail to pass the course or want to improve grades, students can retake a full or partial final exam. By doing an exam to improve grades, the student renounces to the previous score obtained.

Failure to appear to any of the tests must be justified to get a second chance.

To be eligible for the retake process, the student should have been previously evaluated in a set of activities equaling at least two thirds of the final score of the course. Thus, the student will be graded as Non-evaluable if the weighing of all conducted evaluation activities is less than 67% of the final score.

Evaluation activities

| Title | Weighting | Hours | ECTS | Learning outcomes |
|---|-----------|-------|------|---|
| Final Examination (only the student does not reach 50% of the total in the two partial exams) | 70% | 2 | 0.08 | 1, 7, 6, 5, 4, 8, 9, 12 |
| Oral presentation of collective work | 10% | 0.5 | 0.02 | 1, 15, 14, 2, 7, 6, 5, 4, 3, 8, 9, 10, 12, 11, 13, 16 |
| Partial Examination P1 | 35% | 1.5 | 0.06 | 1, 7, 6, 5, 4, 8, 9, 12 |
| Partial Examination P2 | 35% | 1.5 | 0.06 | 1, 15, 14, 7, 6, 5, 4, 8, 9, 12 |
| Written Report | 20% | 0 | 0 | 1, 15, 14, 2, 7, 6, 5, 4, 3, 8, 9, 10, 12, 11, 13, 16 |

Bibliography

- Books in English:

Primer to the Immune Response, 2nd Edition, by Tak W. Mak, Mary Saunders and Bradley Jett. ELSEVIER

Review of Medical Microbiology and Immunology by W. Levinson. Mc Graw Hill, 11e, (2010).

Deja Review **Microbiology & Immunology**, by E. Chen, S. Kasturi, McGraw-Hill Ed. 2nd ed (2010).

Elsevier's Integrated Review **Immunology and Microbiology**: With STUDENT CONSULT Online Access, by Jeffrey K. Actor - Elsevier Science Health Science Division (2011)

BRS **Microbiology and Immunology**, by Arthur G. Johnson, Richard J. Ziegler, Louise Hawley - Lippincott Williams & Wilkins (2009).

Janeway's Immunobiology by K Murphy. Ltd/Garland Science, NY & London, 8th ed (2011)

Kuby Immunology (with web support) by T.J. Kindt, R.A. Goldsby, B.A. Osborne. W.H. Freeman Co., 6th ed (2006)

Cellular and Molecular Immunology by Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai, Saunders, 7th ed (2011).

Immunology, by David K. Male, Jonathan Brostoff, Ivan Maurice Roitt, David B. Roth Mosby Elsevier Ed., 7th ed (2006)

Roitt's Essential Immunology, by [Peter Delves](#), [Seamus Martin](#), [Dennis Burton](#), [Ivan Roitt](#), Wiley-Blackwell Ed., 12th ed (2011)

Principles of Mucosal Immunology (Society for Mucosal Immunology), by Phillip D. Smith, Thomas T. McDonald, Richard S. Blumberg Ed. Garland Science 1st ed. (2013).

Mim's Pathogenesis of Infectious disease. A.A; Nash, R.G. Dalziel & J. R. Fitzgerald. Academic Press Ed. 6th Edition. (2015)

Principles of Molecular Virology. A.J Cann. Academic Press Ed. 6th Edition. (2016)

- Books in Catalan or in Spanish:

Microbiología e inmunología médicas de W. Levinson. Mc Graw Hill interamericana, 8ª ed, (2006).

Inmunobiología de Janeway: K Murphy, P. Travers, M. Walport, Mc Graw Hill, 7ª ed, (2008).

Inmunología Celular y Molecular de A.Abbas, W. Lichtman, S Pillai. W. B. Saunders Co., Philadelphia, 7ª ed, (2012).

Introducción a la Inmunología Humana de L. Faimboim, J. Geffner. Ed Medica Panamericana, 7ª ed (2011).

Inmunología de Kuby by T.J. Kindt, R.A. Goldsby, B.A. Osborne. Mc Graw Hill 6ª ed., (2007).

Inmunología de P. Parham. Ed. Panamericana, 2ª ed. (2006).

Inmunología, Biología y Patología del Sistema Inmunitario de JR Regueiro, C López Larrea, S González Rodríguez, E Martínez Naves. Ed Médica Panamericana, 4ª ed, 2011.

Diccionari d'immunologia de TERMCAT, Centre de Terminologia, Ed Masson, Barcelona, 2005

- **Complementary Bibliography**

Advances in Immunology

http://www.elsevier.com/wps/find/bookdescription.cws_home/716912/description#description

<http://www.sciencedirect.com/science/bookseries/00652776>

Annual Review of Immunology

<http://arjournals.annualreviews.org/loi/immunol>

Current Opinion in Immunology

http://www.elsevier.com/wps/find/journaldescription.cws_home/601305/description#description

<http://www.sciencedirect.com/science/journal/09527915>

Immunological Reviews

<http://www3.interscience.wiley.com/journal/118503650/home>

Nature Reviews in Immunology

<http://www.nature.com/nri/index.html>

Seminars in Immunology

http://www.elsevier.com/wps/find/journaldescription.cws_home/622945/description#description

Trends in Immunology

<http://www.cell.com/trends/immunology/>

Microbiology and Immunology

<http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291348-0421>

Journal of Microbiology, Immunology and Infection

<http://www.e-jmii.com/>

Comparative Immunology, Microbiology and Infectious Diseases

http://www.elsevier.com/wps/find/journaldescription.cws_home/496/description#description