

SUBJECT 1 – MOLECULAR BIOLOGY IN HUMAN DISEASES

STUDY PLAN 2022-2023

Coordinated by Drs. Manuel Morales and Mariona Pascal Hospital Clínic, IDIBAPS

GENERAL INFORMATION

Subject Name	Molecular Biology in Human Diseases
Code	566658
Type	Compulsory
Teaching	First semester
Coordinators	Drs. Manuel Morales and Mariona Pascal
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ECTS credits	6

OBJECTIVES

The overall objective of the subject is to provide an interdisciplinary, profound and updated background on the fundamental mechanisms involved on the reparation and maintenance of tissues. In that way, four key biological processes are addressed whose interrelationship determine the presence of diseased or normofunctional tissue: 1) inflammation 2) angiogenesis/vascular dysfunction 3) tissue remodeling and 4) cancer.

Specifically, the dual objective pursued on this subject is:

- To gain knowledge about the commonly used concepts in biomedical research, inflammation, angiogenesis, tissue remodeling and theoretical cancer.
- To adopt a holistic view of all the above mentioned processes, addressing their interrelations in different pathophysiological contexts and explore the therapeutic utility of this approach.

COMPETENCES TO BE GAINED DURING THE STUDY

General

- G1: Understand the fundamental basic, clinical and therapeutic principles of pathologies with abnormalities in the mechanisms of inflammation, angiogenesis, tissue remodeling and cancer.
- G2: Understand, interpret and discuss with clinicians pathogenic aspects.
- G3: Meet the analytical procedures used in the translational study of these biological processes.
- G4: Become familiar with advances in biomedical and interdisciplinary research.

Specific

- S1: Be able to design experimental protocols in vitro and in vivo to study processes related to translational medicine.
- S2: Know how to properly formulate hypotheses and research objectives.
- S3: Be able to design research projects potentially applicable.
- S4: Be able to integrate the acquired knowledge on basic research and clinical research.
- S4: Be able to identify public health problems and communicate them to the project rating agencies.

Transverse

- T1: Reflection, synthesis and release of trials.
- T2: Ability to disseminate the acquired knowledge.
- T3: Be able to interact with professionals from different medical specialties resolutely.
- T4: Use of English as a global language in science.

THEMATIC BLOCKS

1. Introduction and holistic view of biological mechanisms
2. Inflammation
3. Angiogenesis and vascular dysfunction
4. Tissue remodeling
5. Cancer and advanced therapies
6. Nanotechnology
7. Research project proposal

METHODOLOGY

Total training hours: 6 credits ECTS x 25h/credit = 150h

- a) Teaching: face-to-face and distance formats* (48h):
- Lectures
 - Research projects presentation
 - Seminars
 - Visit to Research Centers and laboratories
- b) Home training (102h):
- Individual work

The home training time is intended to write projects and doubt resolution.

*For the distance format, the "Blackboard Collaborate" or the "Zoom" tools will be used to set up virtual classrooms.

EVALUATION

To pass the module, students must obtain a minimum of 50 points. The score will be established as follows:

• **Attendance (face-to-face and distance formats):** 50% of the overall grade.

Attendance will be evaluated as: 95%-100% → 50 points / 80% - 95% → 40 points / 30-80% → 20 points / <30% → Subject Failure

• **Research project 50% of the score**

- Minimum requested= 20 points
- Provide a research project that addresses a translational problem in the specific areas of angiogenesis, tissue remodeling, inflammation or cancer (use the file "Project_proposal.doc").
- Projects submitted in English will be able to qualify for higher ratings.
- The deadline for submission of the project will be announced by the coordinator and posted on the Virtual Classroom.
- email the final version of your project to mmoralesruiz@gmail.com (stating in the subject: "Research Project_MMT")

To pass the subject, students will have to fulfill three requisites: Attendance-score $\geq 20/50$, Research project-score $\geq 20/50$, and overall score (attendance + RP) $\geq 50/100$.

Reevaluation: In case of failing the ordinary evaluation, students will have to critically appraise 2 scientific articles and present the analysis in form of an oral presentation. The re-evaluation final score will never get over 50 points. English will be preferred in the presentation, but Catalan or Spanish will be also accepted.

REFERENCES

1. <https://www.niaid.nih.gov/sites/default/files/parrishfull.pdf>
2. Johnson A, DiPietro LA. Apoptosis and angiogenesis: an evolving mechanism for fibrosis. FASEB J. 2013 Oct;27(10):3893-901. doi: 10.1096/fj.12-214189. Epub 2013 Jun 19. Review. PubMed PMID: 23783074.

3. Zeisberg M, Kalluri R. Cellular mechanisms of tissue fibrosis. 1. Common and organ-specific mechanisms associated with tissue fibrosis. *Am J Physiol Cell Physiol*. 2013 Feb 1;304(3):C216-25. doi: 10.1152/ajpcell.00328.2012. Epub 2012 Dec 19. Review. PubMed PMID: 23255577; PubMed Central PMCID: PMC3566435.
4. www.nature.com/nature/insights/6835.html
5. www.nature.com/nature/supplements/insights/inflammation/
6. www.nature.com/nature/supplements/insights/angiogenesis/
7. Morales-Ruiz M, Agrin M. Molecular basis of inflammation, immunity, tissue remodeling, angiogenesis. *Handbook of Translational Medicine*. Pag. 102-108, Ed. Llovet JM, Medical UB. ISBN: 978-84-475-4030-3. 2016.
8. Juan ML, Righini M, Quidant R. Plasmon nano-optical tweezers. *Nature Photonics*. 2011; 5, 349-356.
9. Oiseth SJ, Aziz MS, Cancer immunotherapy: a brief review of the history, possibilities, and challenges ahead. *J. Cancer Metastasis Treat* 2017; 3: 250-261