

## 66018 - Advances in Molecular Pathology

### Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	537 - Master's in Molecular and Cellular Biology
ECTS	6.0
Course	1
Period	Indeterminate
Subject Type	Optional
Module	---

### 1. Basic info

#### 1.1. Recommendations to take this course

#### 1.2. Activities and key dates for the course

### 2. Initiation

#### 2.1. Learning outcomes that define the subject

#### 2.2. Introduction

### 3. Context and competences

#### 3.1. Goals

#### 3.2. Context and meaning of the subject in the degree

#### 3.3. Competences

#### 3.4. Importance of learning outcomes

### 4. Evaluation

### 5. Activities and resources

#### 5.1. General methodological presentation

The learning process that is designed for this subject is based on the following:

Lectures by teachers on the latest developments in different research topics related to molecular pathobiology and seminars presented by the students.

#### 5.2. Learning activities

The program that is offered to students intends to help them to achieve the expected results and includes the following activities:

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Theoretical classes and workshops in the classroom: 45 hours. The work and the latest advances in leading areas of research in molecular pathobiology will be presented to students, as detailed in the program. Also discussion workshops, focusing on hot and controversial topics, will be performed. The teacher will do a small presentation, based on some key articles and then a discussion in which students pose each 1 or 2 subject questions will be held will be carried out.

Tabling and work. Presencial, 8 hours; non-contact, 60 hours. This activity is that students collect information on a particular topic, aided by the teacher. The analysis of information should lead to the development of a public presentation of the chosen topic. The teacher will monitor the individual work of students in tutoring sessions. After the presentation it will be discussed by the student and 2-3 teachers of the subject.

### 5.3.Program

1- Course introduction. Dr. Javier Naval.

2- Advances in the mechanisms involved in intestinal absorption of sterols, plasma cholesterol levels and sterol removal: implications for cardiovascular risk and other pathologies. Dr. Miguel Pocovi

3- Obesity: predisposition or incorrect nutrition? Genetic predisposition. Genes and obesity relationships: interplay with food intake and satiety; interplay with inflammatory state. Factors associated to adipose tissue differentiation and metabolic control. Epigenetics. Obesity and the thrifty phenotype. Adipogenesis. Obesity and chronobiology. Dra. Maria Iturralde

4- Gaucher Syndrome: clinical, genetic and epidemiological characteristics. Dra. Pilar Giraldo.

5- 1)Importance of programmed cell death. Apoptosis, Necroptosis, Autophagy. Discovery of apoptosis in the worm *Caenorhabditis elegans*. Apoptosis in *Drosophila melanogaster*.

2)Apoptosis in mammals. Extrinsic pathway. Caspases. Caspase inhibitors. Intrinsic pathway. Inhibitors of apoptosis. Dr. Javier Naval

6- Role of mitochondria in apoptosis. Cytochrome c, AIF, Smac/Diablo. Apoptosis regulation by Bcl-2 family proteins. Dra. Isabel Marzo

7- Apoptosis in the Immune System I. Central tolerance. Mechanisms of control of peripheral tolerance. Dr. Alberto Anel

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8- Apoptosis in the Immune System II. Cell-mediated cytotoxicity. Natural Killer (NK) cells, cytotoxic T-lymphocytes (CTL) and their weapons of mass destruction. Dr. Julián Pardo

9- Immunological features of a novel tuberculosis vaccine. Dr. Juan Ignacio Aguiló

10- Workshop on Granzymes Dr. Julián Pardo.

11- Redox activity of Apoptosis-Inducing Factor (AIF): molecular basis and biological function implications.

Dr. Patricia Ferreira

12- Unravelling causes of multifactorial diseases: OXPHOS differences among mitochondrial haplogroups. Dr. Eduardo Ruiz Pesini

13- Identification of nuclear factors involved in mitochondrial diseases. Dr. Patricio Fernández

14-1) Innate immune response: mechanisms of inflammation.

2) Acute-phase proteins. Dr. María Angeles Alava

15- 1) Acute-phase proteins as pathological markers and of animal welfare.

2) Protein glycosylation: principles, study methods and clinical applications. Dr. Fermín Lampreave

16- Introduction to the study of Reactive Oxygen Species (ROS) and Reactive Nitrogen Species (NOS). Antioxidant defences and oxidative stress. Dr. Pedro Iñarrea

17- Last course week: Student evaluation seminars: Presentation and discussion of papers related to syllabus topics.

Dr. Alberto Anel, Isabel Marzo and Javier Naval

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### 5.4.Planning and scheduling

Schedule, venue, timetable etc. will be announced in the Science School web page, in the moodle platform and in the Department information boards.

Indicative sessions, (may vary depending on the availability of guest lecturers)

session 1

Gaucher Disease. clinical, genetic and epidemiological characteristics

Dr. Pilar Giraldo.

session 2

1) Inborn errors of metabolism of chylomicrons, remnant lipoproteins and high density.

2) regional Hypercholesterolemia dominant.

Dr. Miguel Pocoví.

session 3

1) Importance of programmed cell death or apoptosis. Apoptosis in *C. elegans*.

2) Apoptosis in *Drosophila melanogaster*.

Dr. Javier Naval

session 4

1) Via extrinsic apoptosis. MORTALS RECEPTORS.

2) Caspases. Caspase inhibitors.

Dr. Javier Naval

session 5

1) Role of mitochondria in apoptosis. Cytochrome c, AIF, Smac / Diablo.

2) Regulation of apoptosis by proteins of Bcl-2 superfamily

Dr. Isabel Marzo

session 6

Apoptosis in the immune system I. Central Tolerance. Maintenance mechanisms of peripheral tolerance.

Dr. Alberto Anel

session 7

Apoptosis in the immune system II. Cell mediated cytotoxicity. Cytotoxic lymphocytes and their deadly weapons

Dr. Julian Pardo

session 8

Lessons from vector-borne infectious disease "Lyme borreliosis"

Novel vaccination strategy outwits pathogens' versatility.

Dr. Markus Simon, Max-Planck Institut

session 9

Workshop on granzymes

Dr. Markus Simon, Max-Planck Institut

session 10

1) Introduction to reactive oxygen species. The chemistry of free radicals.

2) The antioxidant defenses and oxidative stress.

Dr. Pedro Iñarra

session 11

1) Physiological basis of intake. Orexigenic and anorectic neuropeptides and other regulatory molecules. related genetic alterations

2) accumulation of fat in the adipose tissue. Physiological basis and genetic alterations.

Dr. Maria Iturralde

session 12

1) Unraveling the causes of multifactorial diseases: OXPHOS differences between mitochondrial haplogroups.

Dr. Eduardo Ruiz Pesini

session 13

1) Identification of nuclear factors involved in mitochondrial diseases

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Dr. Patricio Fernández

session 14

1) innate immune response: mechanisms of inflammation

Dr. Fermin Lampreave

2) Acute Phase Proteins.

Dr. M. Angeles Alava

session 15

1) acute phase proteins as pathological markers and animal welfare.

2) Changes in protein glycosylation: principles, methods of study and possible clinical applications.

Dr. Fermin Lampreave

session 16

Seminars student assessment: presentation and discussion of related agenda items.

Drs. Alberto Anel, Isabel Marzo and Javier Naval

### 5.5. Bibliography and recommended resources

The corresponding teachers will indicate the specific bibliography for each topic, updated every year.