



Course Title: Intercellular communication mechanisms in Vascular Physiology  
Course number: 18581  
Center: Faculty of Medicine  
Degree: Medicine Degree  
Course level: Degree  
Course type: Optative  
Credit allotment: 3 ECTS  
Academic year: 2017-18

## 1. ASIGNATURA / **COURSE TITLE**

Intercellular communication mechanisms in Vascular Physiology

### 1.1. Código / **Course number**

18581

### 1.2. Materia / **Content area**

Human Physiology

### 1.3. Tipo / **Course type**

Optative

### 1.4. Nivel / **Course level**

Medicine Degree

### 1.5. Curso / **Year**

2<sup>nd</sup> and 3<sup>th</sup>

### 1.6. Semestre / **Semester**

1<sup>st</sup>

### 1.7. Idioma de impartición / **Imparting language**

English

### 1.8. Requisitos previos / **Prerequisites**

To have passed General Physiology, subject belonging to the 1<sup>st</sup> year of Medicine Degree.

### 1.9. Requisitos mínimos de asistencia a las sesiones presenciales / **Minimum attendance requirement**

Attendance to theoretical classes, seminars and oriented work is recommended. Attendance to the practical classes is mandatory, being essential the attendance, at least, in 75% of the activities of seminars and oral presentations to be evaluated.



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## 1.10. Datos del equipo docente / Faculty data

Profa. Mercedes Ferrer Parra  
Departamento de Fisiología. Lab C-29  
Facultad de Medicina  
Teléfono: +34 91 497 3112  
E-mail: [mercedes.ferrer@uam.es](mailto:mercedes.ferrer@uam.es)

Student tutoring: By previous appointment

## 1.11. Objetivos del curso / Course objectives

The subject aims to offer an integrated view of the different types of intercellular communication through which vascular function is regulated, showing the relevance of signaling mechanisms. This will be the basis for understanding the changes that occur by the appearance of different vascular pathologies. The knowledge of these signaling pathways is essential to establish possible therapeutic treatments.

### *-Knowledge acquisition:*

It is intended that the student understands the basic communication mechanisms involved in the optimal maintenance of vascular function, and how they are modified in some pathologies of great incidence in the current society.

### *-Acquisition of skills and competences:*

To be able to search for and find information regarding various aspects of intercellular communication related to vascular function. To value and to discuss different scientific texts related to the objective of the subject, demonstrating effective oral and written communication.



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## 1.12. Contenidos del programa / Course contents

### *-Theoretical classes:*

1. Structure and function of the vascular system
2. Intercellular communication systems
3. Cells receptors
4. Ion channels
5. Signaling pathways
6. Extracellular Matrix
7. Contact Communication: Adhesion Molecules
8. Paracrine regulation of vascular function:
9. Gaseous molecules: nitric oxide, carbon monoxide and hydrogen sulfide
10. Arachidonic acid derived products
11. Peptides
12. Reactive oxygen species
13. Cytokines and adipokines
14. Growth factors
15. Nervous regulation of vascular function
16. Nervous regulation of vascular function (cont).
17. Endocrine regulation of vascular function
18. Endocrine regulation of vascular function (cont.)
19. Intracellular mechanisms of cell proliferation
20. Cytoskeleton and cellular behavior
21. Angiogenesis
22. Vascular inflammation in diabetes
23. Glycosylation of cell membrane receptors
24. Vascular remodeling in hypertension
25. Origin and development of atherosclerotic plaque

### *-Seminars:*

1. Evaluation of vasomotor function. Paracrine and neuroendocrine regulation (2 hours)
2. Use of fluorescent probes in the evaluation of different produced substances in the vascular wall (1 hour)
3. Evaluation of expression and activity of different proteins (2 hours)
4. Confocal microscopy to study the structure of the vessel wall (1 hour)



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### 1.13. Referencias de consulta / Course bibliography

- Alberts, B. *et al.* Molecular Biology of the Cell; 4<sup>o</sup> Edición; New York: Garland Science (2002).
- Alon R, Shulman Z. Chemokine triggered integrin activation and actin remodeling events guiding lymphocyte migration across vascular barriers. *Exp Cell Res.* 2011;317(5):632-41.
- Crimi M, Esposti MD Apoptosis-induced changes in mitochondrial lipids. *Biochim Biophys Acta.* 2011; 1813(4):551-7
- Dora KA. Coordination of vasomotor responses by the endothelium. *Circ J.* 2010;74(2):226-32.
- Harburger DS, Calderwood DA Integrin signaling at a glance. *J Cell Sci.* 2009;122(Pt 2):159-63.
- Marceau F. *et al.* Vascular smooth muscle contractility assays for inflammatory and immunological mediators. *Int Immunopharmacol.* 2010 (11):1344-53.
- Maedler K. *et al.* Interleukin-targeted therapy for metabolic syndrome and type 2 diabetes. *Handb Exp Pharmacol.* 2011;(203):257-78.
- Majesky MW *et al.* Vascular smooth muscle progenitor cells: building and repairing blood vessels. *Circ Res.* 2011;108:365-77.
- Rudolph V, Freeman BA Cardiovascular consequences when nitric oxide and lipid signaling converge. *Circ Res.* 2009;105:511-22.
- Savoia C. *et al.* Angiotensin II and the vascular phenotype in hypertension. *Expert Rev Mol Med.* 2011;13:e11.

In addition, specific articles will be used.

## 2. Métodos docentes / Teaching methodology

**1. Theoretical classes:** The teacher, expert in the specific field, will expose the theoretical fundamentals of each topic. Audiovisual material will be used in each session.

**2. Seminars:** Demonstrations of techniques used in the study of Vascular Physiology. They will include measures of physiological parameters of interest and computer simulations of biological processes.

**3. Oriented works (Teamwork):** Groups will be formed for different topics to work throughout the duration of the subject. Each group will present an oral presentation



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with the main results, which will be discussed at a joint session. Attendance to these sessions is mandatory for all students.

**4. Tutorials:** The teacher will give directions on how to prepare the oral presentation session. Students' doubts will be solved by reviewing the most important concepts of each block

**5. Personal work of students:** Several questions proposed by the professor will be solved individually by the students.

### 3. Tiempo de trabajo del estudiante / **Student workload**

TOTAL WORK LOAD			
		Hours	Percentage
Classroom Activities	Theoretical classes	12	32%
	Seminars	6	
	Oriented works	3	
	Tutorials	2	
	Continuous evaluation	1	
Personal work	Resolution of proposed issues. Personal preparation of oriented works	51	68%
TOTAL		75	100%



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#### 4. Métodos de evaluación y porcentaje en la calificación final / Evaluation procedures and weight of components in the final grade

The corresponding contents of the theoretical classes, practices and seminars will be evaluated continuously throughout the course by continuous objective tests and evaluation of the exposed works.

The final grade of the course -both in ordinary and extraordinary calls- will be obtained by adding 50% of the continuous assessment mark and 50% of the exposed works mark. To be considered fit, the final mark must be equal to or higher than 5 points out of 10.

The student who has not participated in at least 75% of seminars and oriented activities will be considered non-evaluable in any of the calls.

#### 5. Cronograma\* / Course calendar

Semana Week	Contenido Contents	Horas presenciales Contact hours	Horas no presenciales Independent study time
1-2	Topics 1-7	2	6
3-4	Topics 8-14	3	6
5-6	Topics 15-19	3	6
6-7	Topics 20-25	4	6
8-9	Seminars	6	5
10	Oriented works	3	14
11-12	Tutorials	2	5
	Evaluation	1	3

\*This course calendar is orientative