



## MODULE 4: CARDIOVASCULAR AND KIDNEY DISEASES

**Code:** 43644

**Type:** Elective

**Credits:** 6 ECTS

**Language:** English/Spanish

**Module's Coordinator:** Antonia Sambola, MD PhD

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**Schedule for mentoring:** Thursday, 3-5 pm

*Although having this timetable proposal, the **students have to arrange an appointment with the teacher by e-mail.***

## OBJECTIVES

This module aims to introduce the major cardiovascular and renal diseases from clinical and epidemiological point of view, as well as, molecular approaches used for understanding the pathophysiological processes underlying these diseases. The module is also addressed to identify diagnostic and/or prognostic markers and potential therapeutic targets.

## SKILLS

E01. Identify and use the tools, techniques and methodologies of translational clinical research to solve problems in human health.

E01.8. Learn morphological, imaging, biochemical, genetic, molecular and cellular techniques used in cardiovascular and kidney diseases research.

E01.9. Identify research methodologies to understand the pathophysiological mechanisms that underly cardiovascular and renal diseases.

E02. Use of modification techniques in living organisms (or part of them) to improve pharmaceutical and biotech processes or to develop new products.

E02.4. Apply cell and molecular biology techniques to produce therapeutic and diagnostic products for cardiovascular and kidney diseases.

E03. Analyze the pathophysiology at the molecular level using the scientific method and identify its relationship with the clinical process of different diseases.

E03.4. Know the processes that trigger cardiovascular and kidney diseases and its progression.

## CONTENTS

### SECTION I: CARDIOVASCULAR DISEASES

#### Lesson 1. Introduction to cardiovascular function

- 1.1. Basic anatomy and physiology of heart
- 1.2. Translational research in cardiology: from the research question to the clinical bedside

#### Lesson 2. Heart failure

- 2.1. Pathophysiology of heart failure
- 2.2. Therapeutic strategies in heart failure
- 2.3. Left ventricular remodeling. Experimental models in heart failure

#### Lesson 3. Advances in the study of coronary disease

- 3.1. Onset, progression and destabilization of Atherosclerotic vascular disease. Role of risk factors in atherogenesis and thrombosis
- 3.2. Experimental models in atherosclerosis, coagulation and platelets
- 3.3. The new era of coronary stents

#### Lesson 4. Translational research on myocardial reperfusion injury

- 4.1. Molecular mechanisms of cell injury caused by ischemia-reperfusion of the myocardium
- 4.2. Experimental models for the study of ischemia-reperfusion
- 4.3. Therapeutic approaches to limit infarct size
- 4.4. Biomarkers in cardiovascular research

#### Lesson 5. Molecular basis of ischemic myocardial damage and cardiovascular

- 5.1. Role of the sarcoplasmic reticulum and mitochondria in cardiomyocyte functionalism
- 5.2. Myocardial ischemia-reperfusion injury and aging
- 5.3. Angiogenesis and Microvasculature Remodeling in myocardium. Microarray technology for therapeutic uses in cardiology

#### Lesson 6. Valvular disease and aortic pathology

- 6.1. Pathogenetic and therapeutic aspects of valvular disease
- 6.2. Genetics of connective tissue disorders: overview and new insights
- 6.3. Pathophysiology of aortic diseases
- 6.4. Bioengineering of diseases of the aorta

#### Lesson 7. Advances in family and congenital diseases

- 7.1. Molecular mechanisms in cardiac family diseases
- 7.2. Pathophysiology of congenital heart diseases

#### Lesson 8. The molecular basis of arrhythmias

- 8.1. Cellular and molecular pathophysiology of arrhythmias
- 8.2. The Molecular Basis of Atrial Fibrillation
- 8.3. Ventricular arrhythmias and channelopathies. Scar

## SECTION II: KIDNEY DISEASES

### Lesson 1. Introduction to renal function and acute kidney injury and repair

- 1.1. Structure and functional characteristics of the mammalian kidney. Overview on most common kidney pathologies
- 1.2. Acute kidney injury: Definition, symptoms, causes, risk factors, early diagnostic markers
- 1.3. Mechanisms of renal cell repair and regeneration

### Lesson 2. Hypertension, diabetic nephropathy and CKD progression

- 2.1. Arterial hypertension
- 2.2. Diabetic nephropathy
- 2.3. Lessons from experimental models of diabetic nephropathy
- 2.4. The metabolic syndrome. Animal models and androgen action

### Lesson 3. Kidney diseases in infants and children. Glomerulopathies

- 3.1. Genetic causes of early-onset chronic kidney disease
- 3.2. Collagen IV nephropaties
- 3.3. Genetic and congenital abnormalities of the kidney (CAKUT). Renal function maturation.
- 3.4. Impact of basic research on primary tubulopathies

### Lesson 4. Management of chronic kidney disease end stage renal disease. Biomarkers.

- 4.1. Dialysis
- 4.2. Transplantation
- 4.3. Classic and novel biomarkers of renal dysfunction. Proteomic techniques

## METHODOLOGY

Theoretical classes  
 Making reports/works  
 Autonomous study  
 Reading articles/reports of scientific interest  
 Presentation/ oral defense of works  
 Tutorials

## EVALUATION

Theoretical partial exam	40-50%
Theoretical partial exam	20-40%
Submission of reports/works	20-30%

**Attending a minimum of 80% of the classes is required for taking the exam and passing the course.**

## TEACHING STAFF

**Anna Meseguer Navarro, PhD** – ana.meseguer@vhir.org

Head of Kidney Physiopathology Research Group. CIBBIM-Nanomedicine. VHIR.

**Antonia Sambola Ayala, MD PhD** - asambola@vhebron.net

Specialist physician in Cardiology Departament. HUVH.

Principal Investigator in Cardiovascular Diseases Research Group. VHIR.

### Invited lecturers:

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<i>Ramon Vilalta, MD PhD</i>	<i>rvilalta@vhebron.net</i>

## ACADEMIC SCHEDULE

**Timetable:** From 26 September to 11 October 2018, from 16 to 20h.

**Exam dates:** 29 October 2018 from 9 to 11h.

[See the Master's Degree Schedule for academic year 2018-2019](#)

**Classroom:** 112. Teaching Pavilion UAB-HUVH.

Please, check the information board at the Academic Office of the Teaching Pavilion in order to confirm the classroom before the class starts.