33204 - THERAPEUTIC TARGETS IN CARDIOVASCULAR PHARMACOLOGY

This is a non-sworn translation intended to provide students with information about the course

Information of the subject

Code - Course title: 33204 - THERAPEUTIC TARGETS IN CARDIOVASCULAR PHARMACOLOGY

Degree: 721 - Máster en Investigación Farmacológica (2018)

Faculty: 106 - Facultad de Medicina

Academic year: 2023/24

1. Course details

1.1. Content area

In this course, pathogenic mechanisms of cardiac diseases will be studied, including cardiac failure, arrhythmias, and ischemic heart disease, as well as the experimental approaches used at present in research and the new therapeutic targets for treatment. Then, a critical analysis will be developed concerning the new therapeutic approaches for cardiac disease, focused on its biological bases and the involved cellular and molecular mechanisms.

Moreover, the molecular, cellular, and pathophysiological aspects related to the structure and function of the vascular wall will be revisited. The specific characteristics of blood flow regulation in the different organs and systems will be described, as well as the pathogenic cellular and molecular mechanisms involved in the damage and regeneration of the vascular wall. In addition, the mechanisms related to the development of hypertension and atherosclerosis will be analyzed, describing the experimental methods used in research and the possible present and future therapeutic targets for treatment.

Finally, vascular damage associated to ageing and cardiometabolic diseases, such as diabetes mellitus and metabolic syndrome, will be studied.

1.2. Course nature

Optional

1.3. Course level

Máster (EQF/MECU 7)

1.4. Year of study

1

1.5. Semester

Second semester

1.6. ECTS Credit allotment

5.0

1.7. Language of instruction

English

1.8. Prerequisites

Previous attendance to the General Module of the Master. Level B2 in English is required since the subject will be taught in that language.

1.9. Recommendations

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1.10. Minimum attendance requirement

Minimum attendance 80% (theoretical and seminars/presentations of bibliography).

1.11. Subject coordinator

Maria Concepcion Peiro Vallejo, Oscar Lorenzo Gonzalez
https://autoservicio.uam.es/paginas-blancas/

1.12. Competences and learning outcomes

1.12.1. Competences

BASIC AND GENERAL
GE1 - Acquire the knowledge, skills and abilities necessary to carry out an innovative quality research in Pharmacology

CB6 - Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context

CB7 - Know how to apply the acquired knowledge and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of interest

CB8 - That students are able to integrate knowledge and face the complexity of formulating judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments

CB9 - That the students know how to communicate their conclusions and their knowledge to specialized and non-specialized publics in a clear and unambiguous way

CB10 - That students possess the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.

TRANSVERSAL
T2 - Ability to carry out effective scientific and technical communication, both in a specialized environment and in more general environments, including the educational

T1 - Ability to carry out a self-learning plan, perform an autonomous consultation of the bibliography and databases at the scientific, technical or regulatory level.

SPECIFIC
ES-4 - Know the most common therapeutic targets in cardiovascular disease or diseases of the nervous system and assess their physiological significance and their therapeutic projection.

ES-5 - Be able to identify potential new therapeutic targets in cardiovascular and central nervous system diseases, assess their biological significance and their therapeutic potential

ES-6 - Know and apply the most common experimental techniques and models, both in research in Cardiovascular Pharmacology or in research in Psychoneuropharmacology

ES-10 - Design and develop research plans in Pharmacology

1.12.2. Learning outcomes

In this course, the student will enhance the knowledge in a more specific topic of pharmacological research, such the Cardiovascular Pharmacology. Advanced aspects of pathophysiology, cellular and molecular biology, and pharmacology will be analyzed, discussing with the students the latest pharmacological discoveries and therapeutic approaches.

1.12.3. Course objectives

1.13. Course contents

1. Introduction to cardiovascular diseases

    1.1.   Cardiovascular diseases: definition, risk factors, and classification
    1.2.   Epidemiology, morbidity, mortality and prevention of cardiovascular diseases
    1.3   Associated pathologies; Diabetes, Obesity

2. Structure of the vascular wall

    2.1. Cell types and structure of the vascular wall
    2.2. Vascular remodelling

3. Regulation of the vascular tone

    3.1. Acoplamiento excitación-contracción del músculo liso vascular / Excitation-contraction coupling in vascular smooth muscle
    3.2. Hormone regulation of vascular tone
    3.3. Endotelial function and vascular disease
    3.4. Prostanoids and vascular function
    3.5. Endothelins

4. Mecanismos de daño y regeneración vascular

    4.1. Vascular ageing. Mechanisms of vascular senescence
    4.2. Stem cells and vascular disease
    4.3. Vascular function in congenital diseases
    4.4. Vascular alterations in children
    4.5. of the ischemia-reperfusion processes
    4.6. Mechanisms of vascular fibrosis
    4.7 Anaphylaxis

5. Atherosclerosis

    5.1. Development of atherosclerotic plaque and clinical consequences: coronary and cerebrovascular disease
    5.2. Therapeutic strategies in atherosclerosis
    5.3. Postprandial metabolism in atherosclerosis
    5.4. Biomarkers for vascular risk
    5.5. Macrophages and atherosclerosis
    5.6. Anti-inflammatory therapies in atherosclerosis
    5.7. Alternatives to pharmacological treatment in atherosclerosis
    5.8. New experimental approaches for atherosclerotic research
    5.9. New proteomic techniques in atherosclerosis

6. **Metabolismo y enfermedad vascular**
    6.1. Glucose and inflammation in diabetic vasculopathy
    6.2. Cardiac steatosis and apoptosis in diabetes
    6.3. Diabetic retinopathy
    6.4. Pathophysiology of obesity
    6.5. Adipokines and vascular disease
    6.6. Influence of perivascular fat in the vascular wall
7. **Hypertensive vasculopathy**
    7.1. Pathophysiology of high blood pressure (HBP)
    7.2. Kidney and HBP
    7.3. New aspects of the renin-angiotensin system
    7.4. Therapeutic strategies for HBP
    7.5. Reactive oxygen species and HBP
8. **Alterations in specific vascular beds**
    8.1. Mechanisms of aneurysm formation and development
    8.2. Lung hypertension
    8.3. Septic shock
    8.4. Therapeutic approaches of erectile dysfunction.
9. **Cardiac arrhythmias**
    9.1. Cardiac ionic channels
    9.2. Mechanism responsible for the genesis of cardiac arrhythmias
    9.3. New atrial selective antiarrhythmic agents

10. **Ischaemic heart disease**

    10.1. Treatment of acute coronary syndromes

    10.2.*I* New anti-angina drugs

11. **Heart failure**

    11.1 Cardiac Remodelling: dilatation, hypertrophy, fibrosis, steatosis and inflammation. Underlying mechanisms

    11.2 New inotropic drugs

    11.3 New drugs for heart failure: erythropoietin, iron, statins, nitric oxide, sildenafil, endothelin receptor antagonists, cytokine inhibitors, modulation of ventricular remodelling, relaxin

12. **New therapeutic approaches in cardiovascular pharmacology**

    12.1 Cardiovascular chrono-pharmacology

    12.2 New strategies in heart failure: stem cells

    12.3 Microbiota regulation

    12.4 Bariatric surgery

This program can experience variations when new professors are invited.

1.14. Course bibliography

Bibliographic references will be original research works or recent reviews, distributed by the teachers or obtained by the students after the corresponding search in PubMed

2. Teaching-and-learning methodologies and student workload

2.1. Contact hours

TOTAL HOURS OF THERAPEUTIC TARGETS IN CARDIOVASCULAR PHARMACOLOGY			
	Nº of Hours	%	
Research topics	40		
Test about the contents	2	40	
Poster presentations	3		
Oral presentations	5		
Weekly study **(5 hours x 3 weeks)**	20		
Reading and analysis of scientific papers **(10 hours x 3 weeks)**	30	60	
Preparation of presentations	25		
Total student workload: 25 hours x 5 ECTS 125			

2.2. List of training activities

LECTURES
Lectures will provide organized and structured information elaborated by the teacher. The lecture content will include an initial review of the topic followed by the exposition of the teacher's own research work. The content will be research in course and will include original papers and relevant reviews. Lectures will take 50 minutes, with an additional time for discussion with the students. Different teaching methodologies will be used, such as visual presentations that can be available in the teaching web page.

GROUP PRESENTATIONS: Presentation and defence of a scientific manuscript related to cardiovascular pharmacology presented by a group of 2 to 3 students

INDIVIDUAL PRESENTATIONS: Oral presentation and defence of a scientific manuscript related to cardiovascular pharmacology

3. Evaluation procedures and weight of components in the final grade

3.1. Regular assessment

The evaluation will include two main components.

Continuous evaluation will attend assistance and the active participation in the academic activities.

Presentations:
(1) **Group Presentation:** evaluation of the preparation, presentation and defense of a scientific manuscript related to cardiovascular pharmacology
(2) **Individual Presentation:** evaluation of the preparation, presentation and defense of a scientific manuscript related to cardiovascular pharmacology

3.1.1. List of evaluation activities

- **Attendance and Continuous assessment** 20 %

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- Evaluation of the **Group presentation**: 30 %
- Evaluation of the **Individual presentation**: 50 %

The mark for attendance and continuous evaluation will be maintained in the extraordinary evaluation.

3.2. Resit

The same requirements as for the Regular assessment apply in this case.

3.2.1. List of evaluation activities

The same list of evaluation activities as for the regular assessment apply in this case.

4. Proposed workplan

Timetable will be indicated in the website:
https://www.uam.es/ss/Satellite/Medicina/es/1242667165286/subhome/Master_Universitario_en_Investi
and in Moodle:https://moodle.uam.es/