COURSE DATA

Data Subject	
Code	43090
Name	Cerebral circulation. Physiological, pathophysiological and therapeutic aspects
Cycle	Master's degree
ECTS Credits	4.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
2141 - M.U. en Fisiología 12-V.2	Faculty of Medicine and Odontology	1	Second term

Subject-matter

Degree	Subject-matter	Character
2141 - M.U. en Fisiología 12-V.2	5 - Optional subject	Optional

Coordination

Name	Department
ALBORCH DOMINGUEZ, ENRIQUE	190 - Physiology
JOVER MENGUAL, TERESA	190 - Physiology
MIRANDA ALONSO, FRANCISCO JAVIER	190 - Physiology

SUMMARY

In this course it is intended that the student knows the methods of studying cerebral circulation, its regulatory mechanisms under physiological conditions, the processes involved in the pathophysiology of cerebral circulation, as well as the foundations of therapeutic approaches to pathological processes related to cerebral circulation, such as cerebral ischemia.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

No enrollment restrictions have been specified with other subjects in the curriculum.

OUTCOMES

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- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Know how to write and prepare presentations to present and defend them later.
- To acquire a critical attitude that allows you to make reasoned judgments and defend them with rigor and tolerance.
- Search, order, analyze and synthesize scientific information (databases, scientific articles, bibliographic repertoires), selecting the pertinent to focus current knowledge on a topic of scientific interest in Physiology.
- Assess the need to complete the scientific training, in languages, computer science, ethics, etc., attending conferences or courses and/or carrying out complementary activities, self-evaluating the contribution that the performance of these activities implies for their comprehensive training.
- Understand and differentiate the physiological, pathophysiological and therapeutic aspects in the cardiovascular system and in the cerebral circulation.

LEARNING OUTCOMES

Know the anatomy of the cerebral circulation.Know the methods of measuring cerebral blood flow.Know the physiological characteristics of the cerebral circulation.Know the mechanisms that underlie the origin of the pathophysiological processes of the cerebral circulation.Know the foundations of the therapeutic approaches of various disorders of cerebral circulation.

DESCRIPTION OF CONTENTS

1. Physiological aspects

This Thematic Unit will include:
- Morphological and physiological considerations of the cerebral circulation.
- Methodological approaches referring to experimental techniques for the study of cerebral circulation, as well as clinical diagnostic methodology.

2. Pathophysiological aspects

In this Thematic Unit the study of the pathophysiology of cerebral ischemia will be addressed, especially the mechanisms of neuronal and glial death, the signaling pathways, the ischemic cascade, etc ...

3. Therapeutic aspects

This Thematic Unit will explain the experimental approaches to the treatment of cerebral ischemia, especially neuroprotection (therapeutic targets, neuroprotectors, hypothermia, pre and post conditioning) and neuroregeneration (plasticity, angiogenesis, stem cells ...).

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	24,00	100
Tutorials	3,00	100
Development of individual work	20,00	0
Study and independent work	15,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	8,00	0
Resolution of case studies	10,00	0
TOTAL	**100,00**	

TEACHING METHODOLOGY

- Theoretical classes of participatory master class. Subject matter expert conferences.

- Audiovisual session.

- Debate and directed discussion on the work done.

EVALUATION

Evaluation system:

- Written exam consisting of multiple choice questions: assessment of 5 points.

- Preparation of a work related to the subject: assessment on 5 points.

Minimum passing grade: 5 points

REFERENCES

Basic

- CIPOLLA MJ (Ed.). The Cerebral Circulation. San Rafael (CA): Morgan & Claypol Life Sciences, 2009.
- CHEN et al. (Eds). Non-Neuronal Mechanisms of Brain Damage and Repair After Stroke. Springer, 2016.
- GROTTA et al. (eds). STROKE: Pathophysiology, Diagnosis and Management. Foreword by JP Mohr. Sixth Edition. Elsevier, 2016.
- MONTANER J (ed.). Fisiopatología de la Isquemia Cerebral. Barcelona: ICG Marge, SL. 2007.
- PATEL RAG, McMullen PW. Neuroprotection in the Treatment of Acute Ischemic Stroke. Prog Cardiovasc Dis. 2017 May - Jun;59(6):542-548.

Additional

- CAPLAN et al. (EDS) Primer on cerebrovascular disease. 2nd Edition. Elsevier, 2017.
- CHAMORRO Á, DIRNALGL U, URRA X, PLANAS AM. Neuroprotection in acute stroke: targeting excitotoxicity, oxidative and nitrosative stress, and inflammation. Lancet Neurol. 2016 Jul;15(8):869-881.
- FILOSA et al. Beyond neurovascular coupling, role of astrocytes in the regulation of vascular tone. Neuroscience 323 (2016) 96109.
- LAI TW, ZHANG S, WANG YT. Excitotoxicity and stroke: identifying novel targets for neuroprotection. Prog Neurobiol. 2014 Apr;115:157-88.

- MAYOR D, TYMIANSKI M. Neurotransmitters in the mediation of cerebral ischemic injury. Neuropharmacology. 2017 Dec 2. pii: S0028-3908(17)30589-0.
- McCABE C, ARROJA MM, REID E, MACRAE IM. Animal models of ischaemic stroke and characterisation of the ischaemic penumbra. Neuropharmacology. 2017 Sep 18. pii: S0028-3908(17)30439-2.
- KANDEL ER, KOESTER JD, MACK SH, SIEGELBAUM SA (eds.). Principles of Neural Science. Sixth Edition. McGraw Hill, 2021.