VNIVERSITAT DE VALÈNCIA

Course Guide
43029 Drug-receptor interaction

COURSE DATA

DATA SUBJECT

Code: 43029
Name: Drug-receptor interaction
Cycle: Master's Degree / Doctorate
ECTS Credits: 4
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
2138 - Master's Degree in Research in and Rational Use of Medicines	Facultat de Farmàcia i Ciències de L'alimentació	1	Annual

SUBJECT-MATTER

Degree	Subject-matter	Character
2138 - Master's Degree in Research in and Rational Use of Medicines	Drug-receptor interaction	ELECTIVES

COORDINATION

NOGUERA ROMERO MARIA ANTONIA

IVORRA INSA MARIA DOLORES

SUMMARY

Subject in which, from the basics of drug-receptor interaction, are developed the molecular, biochemical and physiological and mathematical models that allow us to study and to understand the concept of receptor and its pharmacological modulation. Provides a basis for understanding much part of the basic pharmacological mechanisms involving pharmacology research so it is of interest to students to guide their training to research the mechanism of action of drugs, but also for those who need a solid grounding in the molecular mechanisms of signal transduction.

It is noteworthy that the skills and learning outcomes to be acquired in this subject, as well as the teaching methodology used, integrate the sustainable development goals (SDG) promoted by the United Nations (Agenda 2030).

s (Agenda 2030).

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

Previous knowledge of Pharmacology and English is required.

COMPETENCES / LEARNING OUTCOMES

2138 - Master's Degree in Research in and Rational Use of Medicines

Be able to access the information required (databases, scientific articles, etc.) and to interpret and use it sensibly.

Be able to access to information tools in other areas of knowledge and use them properly.

Be able to apply the research experience acquired to professional practice both in private companies and in public organisations.

Be able to make quick and effective decisions in professional or research practice.

Dominar el método científico, el planteamiento de protocolos experimentales y la interpretación de resultados en la búsqueda, desarrollo y evaluación de nuevos fármacos.

Know how to write and prepare presentations to present and defend them later.

Select and manage available resources (instrumental and human) to optimise research outcomes.

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 possess and understand foundational knowledge that enables original thinking and research in the field.

To acquire basic skills to develop laboratory work in biomedical research.

Utilizar adecuadamente las herramientas informáticas, métodos estadísticos y de simulación de datos, aplicando los programas informáticos y la estadística a los problemas biomédicos

DESCRIPTION OF CONTENTS

Development of the concept of signaling through receptors as a primary mechanism for the physiological

1. THEORETICAL ASPECTS OF DRUG-RECEPTOR INTERACTION

or pharmacological modulation of cellular processes.

Specification of the contents of the unit:
Receptor concept and its impact on biomedical sciences.
Theory of drug-receptor interaction. Receptor activation models.
Constitutive activity: agonism, inverse agonism, antagonism.
Systems of signal transduction.
Mechanisms of physiological and pharmacological regulation of receptors.

2. STUDY TECHNIQUES OF RECEPTORS

Management of the molecular mechanisms of signal transduction, both conceptually and methodologically, including laboratory tests and analysis of the results.

Specification of the contents of the unit:
Specific radioligand binding and fluorescent ligands.
Western blotting, immunoprecipitation, immunofluorescence.
Analysis of receptor expression by RT-PCR quantitative real-time.
Analysis of the functionality of receptors: isolated organ techniques.
Other study techniques: confocal laser microscopy .

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	6,00
Seminar	6,00
Laboratory	13,00
Group work	3,00
Total hours	**28,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	35,00
Independent study and work	20,00
Preparation of lessons	10,00
Preparation for assessment activities	20,00
Resolution of case studies	0,00
Total hours	**85,00**

TEACHING METHODOLOGY

During the activities, both theoretical and practical, the applications of the subject contents in relation to the Sustainable Development Goals (SDG) will be indicated. This is intended to provide knowledge, skills and motivation to understand and address these SDGs, while promoting reflection and criticism.

Theoretical classes and participatory lectures
Discussion of items (readings)
Seminars
Laboratory practices and practices in computer room
Project development
Debate or guided discussion
Conference of experts

The course is structured in a series of lectures, which will introduce students to the theoretical concepts of drug-receptor interaction, for, from them, ask the student an experimental problem to be solved. With the knowledge gained and additional literature available in the Virtual Classroom, students must develop an appropriate experimental protocol to solve the problem, run in the laboratory, to obtain experimental results, analyze and develop a written report of all these activities following the outline of a research paper. The course will finish with an oral presentation of the work performed.

To complete face-to-face teaching, students will be able to take online questionnaires, practical exercises or comments on research articles...

As a communication support is used:
Virtual Classroom platform of the University of Valencia that allows teacher-student communication and storage of slides

Other teaching resources that is available to students.

Other teaching resources that is available to students.

EVALUATION

La información está en un formato que no se puede convertir

REFERENCES

- HALL and LANGMEAD. Matching models to data: a receptor pharmacologists guide. British Journal of Pharmacology DOI:10.1111/j.1476-5381.2010.00879.x
- Articulos en revistas especializadas
- WHALEN E.J., RAJAGOPAL S., LEFKOWITZ R.J. Therapeutic potential of b-arrestin- and G protein-biased agonists. Trends in Molecular Medicine (17): 2011.

- RAJAGOPAL S., RAJAGOPAL K., LEFKOWITZ R.J. Teaching old receptors new tricks:biasing seven-transmembrane receptors. Nature Reviews, 9, 2010.

- SCHEERER P., SOMMER M.E. Structural mechanism of arrestin activation. Current Opinion in Structural Biology. 45: 160-169, 2017

- ZHOU X.E., MELCHER K., XU H.E. Understanding the GPCR biased signaling through G protein and arrestin complex structures. Current Opinion in Structural Biology. 45: 150-159, 2017.

- KENAKIN T. International Union of Basic and Clinical Pharmacology Review. New concepts in pharmacological efficacy at 7TM receptors: IUPHAR. Br. J. Pharmacol. 168: 554-575, 2013.

- SCHARGE R., DE MIN A, HOCHHEISER K, KOSTENIS E., MOHR K. Superagonism at G protein-coupled receptors and beyond. Br.J.Pharmacol. 173: 3018-3027, 2016.

- KENAKIN T. Signaling bias in drug discovery, Expert Opinion on Drug Discovery, 12:4, 321-333, 2017.

- STODDART L.A., WHITE C.W., NGUYEN K., HILL S.J., PFLEGER K.D.J. Fluorescence- and bioluminescence-based approaches to study GPCR ligand binding. Br. J. Pharmacol. 173: 3028-3037, 2016.https://webges.uv.es/uvGuiaDocenteWeb/guia#

- JEAN-ALPHONSE F., HANYALOGLU A.C. Regulation of GPCR signal networks via membrane trafficking. Molecular and Cellular Endocrinology 331, 205214, 2011.

- ALEXANDER S.P., MATHIE A., PETERS J.A. Guide to Receptor and Channels, Br J. Pharmacol, 5th edition,(164):S1-S324, 2011.

- SEGURA V, PÉREZ-ASO M, MONTO F, CARCELLER E, NOGUERA MA, PEDIANI J, MILLIGAN G, MC GRATH J, D¿OCON MP. "Differences in the Signaling Pathways of a1A- and a1B Adrenoceptors Are Related to Different Endosomal Targeting" PlosOne 8(5): e64996, 2013.

- MC GRATH J. "Localization of α-adrenoceptors: JR Vane Medal Lecture" Br. J. Pharmacol. 172: 1179-1194, 2015

- Rankovica Z,*, Tarsis F. Brustb, and Laura M. Bohnb,*"Biased agonism: An emerging paradigm in GPCR drug discovery"

- Von Moo E, van Senten JR, Bräuner-Osborne H, Møller TC. Arrestin-dependent and -independent

internalization of GPCRs methods, mechanisms and implications on cell signaling. Mol Pharmacol. 2021; 99(4):242-255 DOI: 10.1124/molpharm.120.000192