Basic Advanced Pharmacology

Code: 42359
ECTS Credits: 9

2024/2025

Degree	Type	Year
4311309 Pharmacology	OB	0

Contact

Name: Francesc Jimenez Altayo
Email: francesc.jimenez@uab.cat

Teachers

Antoni Barbadilla Prados
Magi Farre Albaladejo
Jesus Giraldo Arjonilla
Marcel Jimenez Farrerons
Armand Sanchez Bonastre
Antonio Francisco Vallano Ferraz
Ignacio José Gich Saladich
Caridad Pontes Garcia
Montserrat Solé Piñol
Joan Seoane Suárez
Alheli Rodriguez Cortes
Francesc Jimenez Altayo
(External) B. Belosillo
(External) H. Verdaguer
(External) J. Abian
(External) L. Izquierdo
(External) P. DOcon
(External) T. Macarulla

Teaching groups languages

You can view this information at the end of this document.

Prerequisites

Basic knowledge of physiology, biochemistry and cell biology taught in degrees belonging to Health Sciences, Biosciences and Sciences.

Objectives and Contextualisation

Acquire the basic scientific knowledge of pharmacology and deepen into the knowledge of the physiological, biochemical and genetic concepts that support them. Introduction to the criteria for clinical use of drugs.

Competences

- Capacitat d'anàlisi i síntesi.
- Definir les diferents etapes del recorregut dels fàrmacs pel organisme, descriure les seves característiques i interpretar la seva relació amb l'efecte farmacològic.
- Desenvolupar habilitats d'autoaprenentatge.
- Desenvolupar un pensament crític i autocrític.
- Recognise the criteria for the clinical use of drugs.
- Recognise the scientific bases of pharmacology and the physiological, biochemical and genetic concepts that underpin it.

Learning Outcomes

1. Analyse the drug-pharmacological effect relationship.
2. Analyse the origin of variation in response to drugs.
3. Capacitat d'anàlisi i síntesi.
4. Define the different stages of drugs' transit through the organism.
5. Describe the characteristics of drugs.
6. Desenvolupar habilitats d'autoaprenentatge.
7. Desenvolupar un pensament crític i autocrític.
8. Explain the mechanism of action of drugs as modifiers of biological activity.
9. Identify the principles of genetics, molecular biology and cell biology that underlie the structure, action and effects of drugs.
10. Interpret the clinical implications of the basic concepts in pharmacology: clinical response and adverse effects.

Content

a) Pharmacokinetics: concepts, definitions, objectives and LADME processes. Release: concept and importance of galenic formulation, definitions (pharmaceutical form, formulation, etc.), impact of the pharmaceutical form on therapeutic efficacy, drug stability. Pharmaceutical forms: dissolution / suspension, topical administrations (emulsions, transdermal patches, solid formulations, new technologies). Absorption. Distribution. Metabolism. Excretion. Compartmental Models. Non-compartmental Models and independent model methods. Kinetics dose / dependent time. Kinetics of metabolites. Relation between kinetics and dynamics: PK-PD modeling. Clinical impact of pharmacokinetic parameters. Design of the posology guidelines: pharmacokinetic and pharmacodynamic factors.

b) Pharmacodynamics: definition and basic principles. Action and pharmacological effect.

Concept of pharmacological selectivity and reversibility. Concentration curve / effect: description of the main parameters that describe this relationship. Pharmacological targets: receptors, enzymes, ion channels, carriers and cellular structures. Receptor-mediated actions: receptor concept, drug-receptor interaction (kinetic and occupational theories), agonism and pharmacological antagonism, structural characteristics of the main types of receptors. Receptor regulation: sensitization and desensitization, constitutive state of a receptor, reserve receptors. Pharmacological actions mediated by ion channels: types of ion channels. Enzyme-mediated pharmacological actions: different mechanisms of drug-enzyme interaction, types of enzymes as pharmacological targets. Pharmacological actions mediated by carriers. New pharmacological targets: genes, exogenous receptors. Temporary aspects of the pharmacological response: tolerance, sensitization.

c) Definitions and historical evolution. Basic elements of molecular biology, the human genome, protein biosynthesis. Pharmacogenetics: expression of polymorphisms with pharmacokinetic or pharmacodynamic implications. Impact of pharmacogenetics on therapeutic efficacy and adverse effects. Pharmacogenomics. Pharmacoproteomics: protein configuration and therapeutic efficacy. Systems biology: metabolomics and cytomics. Personalized pharmacology. Bioethical aspects.

d) Clinical response to drugs and their measurement. Treatment of symptoms, modification of the evolution of the disease, healing and prevention. Clinical events versus subrogated variables. Adverse effects and their identification: toxic effects, classification of adverse effects according to different dimensions (mechanisms of production, frequency, severity, etc.), causality. The benefit / risk relationship in the administration of drugs. Overdose and poisoning: basic principles of intervention.

e) Patient's own factors (sex, age, race, etc.): examples. Factors characteristic of the patient's pathology (alterations of the organs and systems responsible for the absorption, distribution and elimination processes): examples. Pharmacological interactions with drugs and other substances: examples.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Clinical cases seminars	5	0.2	2, 1, 3, 4, 5, 7, 8, 9, 10
Practical seminars	14	0.56	2, 1, 3, 4, 7, 8, 9, 10
Theory lessons	49.5	1.98	2, 1, 3, 4, 5, 7, 8, 9, 10
Type: Supervised			
Non-scheduled tutorials	3	0.12	2, 1, 3, 4, 5, 7, 8, 9, 10
Paper revisions	16	0.64	2, 1, 3, 4, 5, 7, 8, 9, 10
Scheduled tutorials	4	0.16	2, 1, 3, 4, 5, 7, 8, 9, 10
Type: Autonomous			
Study, papers,..	130	5.2	1, 3, 4, 5, 6, 7, 8, 9

The module's global mark is the arithmetic mean of all subjects' marks within the module.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Attendance and active participation	40 %	0	0	2, 1, 3, 4, 5, 6, 7, 8, 9, 10
Exams	24 %	1.5	0.06	2, 1, 3, 4, 5, 7, 8, 9, 10
Oral paper presentations	18 %	1	0.04	2, 1, 3, 4, 5, 7, 8, 9, 10
Paper writing	18 %	1	0.04	2, 1, 3, 4, 5, 7, 8, 9, 10

Each subject that composes the module is evaluated independently, and the module's global mark is the arithmetic mean of all subjects' marks within the module. You must have attended at least 80% of the sessions.

Students who do not take both the theoretical and practical assessment tests will be considered "Not Evaluable", exhausting their rights to enroll in the subject.

This subject/module does not provide for the single assessment system.

Bibliography

- Malcolm Rowland , Thomas N. Tozer. Introduction to Pharmacokinetics and Pharmacodynamics: The Quantitative Basis of Drug Therapy. 2010.
- José Domenech; José Martínez Lanao; Concepción Peraire. Tratado general de biofarmacia y farmacocinética. 2013.
- BRUNTON, L.L. Goodman and Gilman: Las Bases Farmacológicas de la Terapéutica. Buenos Aires: Mc-Graw-Hill Interamericana, 13ª ed., 2018.
- FLOREZ, J.; ARMIJO, J. A.; MEDIAVILLA, A. Farmacología Humana. Barcelona: Ediciones Científicas y Técnicas (Masson i Salvat), 6a ed., 2014.
- RANG, H. P.; DALE, M. M.; RITTER, J.M.; FLOWER, R.J.; HENDERSON, G. Pharmacology, Edinburgh, Elsevier. Churchill-Livingstone, 9th ed., 2020.
- Leff P The two-state model of receptor activationTrends Pharmacol Sci. 1995 Mar;16(3):89-97.
- Giraldo J, Vivas NM, Vila E, Badia A Assessing the (a)symmetry of concentration-effect curves: empirical versus mechanistic models. Pharmacol Ther. 2002;95(1):21-45.
- Rovira X, Roche D, Serra J, Kniazeff J, Pin JP, Giraldo J Modeling the binding and function of metabotropic glutamate receptors. J Pharmacol Exp Ther. 2008;325(2):443-56.
- Rovira X, Pin JP, Giraldo J The asymmetric/symmetric activation of GPCR dimers as a possible mechanistic rationale for multiple signalling pathways. Trends Pharmacol Sci. 2010;31(1):15-21.
- Roche D, Gil D, Giraldo J Mechanistic analysis of the function of agonists and allosteric modulators: reconciling two-state and operational models. Br J Pharmacol. 2013;169(6):1189-202.
- Roche D1, Gil D, Giraldo J Multiple active receptor conformation, agonist efficacy and maximum effect of the system: the conformation-based operational model of agonism. Drug Discov Today. 2013;18(7-8):365-71.
- Giraldo J Modeling cooperativity effects in dimeric G protein-coupled receptors. Prog Mol Biol Transl Sci. 2013;115:349-73.

- JR Laporte, D Capellà. Mecanismos de producción y diagnóstico clínico de los efectos indeseables producidos por medicamentos. (http://www.icf.uab.es/ca/pdf/publicacions/pem/cap5.pdf). En JR Laporte, G Tognoni. Principios de epidemiología del medicamento, 2ª Ed. Accés gratuït a http://www.icf.uab.es/ca/pdf/publicacions/pem

Software

no need of specific software

Language list

Name	Group	Language	Semester	Turn
(PAULm) Classroom practices (master)	101	Catalan/Spanish	first semester	afternoon
(PLABm) Practical laboratories (master)	101	Catalan/Spanish	first semester	afternoon
(SCCm) Clinical case seminars (master)	101	Catalan/Spanish	first semester	afternoon
(TEm) Theory (master)	101	Catalan/Spanish	first semester	afternoon