GENERAL PHARMACOLOGY AND PHARMACOTHERAPY I (FV000017)

1. language

Italian

2. course contents

Coordinator: Prof. MARTIRE MARIA

Anno di corso: 3

Semestre: 1

CFU: 10

Modules and lecturers:

- General PHARMACOLOGY and Pharmacotherapy I (FV000017) – 10 UCF – SSD BIO/14-

Profs. Lucia Lisi, Cesare Mancuso, Maria Martire, Giacomo Pozzoli, Giuseppe Tringali

3. BIBLIOGRAPHY

Reccomended texts:

Laurence L. Brunton, Randa Hilal-Dandan. Goodman & Gilman. The pharmacological basis of therapy. 13th edition, 2018 (2019 Italian translation, Zanichelli publisher).

Bertram G. Katzung. Farmacologia generale e clinica. 14th edition, 2018 (2021 Italian translation, Piccin Nuova Libraria publisher).

4. LEARNING OBJECTIVES

Knowledge and understanding - The objective of the course in General Pharmacology and Pharmacotherapy is to provide the student with knowledge of the general principles governing the interaction between drugs and living organisms, as well as knowledge of the

different classes of drugs, the molecular and cellular mechanisms of their actions, the therapeutic uses of drugs in various diseases, the side effects and toxicity of drugs, the variability of the pharmacological response related to sex, genetic, and pathophysiological factors. Upon completion of the course, the students should understand the pharmacodynamics, pharmacokinetics, and metabolism of drugs; factors affecting intra- and inter-individual variability in drug responses; the general principles underlying the use of drugs to treat a given disease condition; the therapeutic indications for the drug classes covered in this course year (i.e., drugs affecting the autonomic nervous system, drugs that act on histaminergic and serotonergic receptors, anti-inflammatory drugs and glucocorticoids, antimicrobial chemotherapeutics and ophthalmic drugs).

Applying knowledge and understanding - At the end of the course the student must know how to apply the skills acquired, relating to the general and specific pharmacological actions of drugs, in the context of the performance of the professions to which the graduate in Pharmacy can access. In particular, to provide pharmacy users with the necessary information on the correct use of a self-medication agent or prescription drug; to respond correctly and thoroughly to a pharmacy user's request for information about a drug; to understand drug monographs; to be able to identify drug interactions; to know how to report adverse drug reactions.

Making judgements - At the end of the course, the student must be able to independently deepen and re-elaborate the acquired knowledge, in order to predict the consequences of the appropriate and inappropriate use of drugs. To know how to elaborate and/or apply the acquired knowledge for the purposes of scientific research or for the exercise of other professional activities involved in the entire *process* followed by the drugs, from their production to their use by the patient.

Communication skills - The student must acquire a clear and coherent technical-scientific language, in order to be able to communicate the notions learned in all public and private health care areas in which the Pharmacy graduate is called to work.

Learning skills - The student must have acquired the ability to refine and deepen their knowledge, through ongoing study and the updating of the essential skills of their profession based on consultation of specialized texts and journals (scientific and popular).

5. prerequisites

For optimal understanding of the course content, students registering for this course should have a valid knowledge of chemistry, biochemistry, and the physiology of the various organs and systems. They should also have knowledge of the basic concepts of pathophysiology, general pathology, microbiology, and virology.

6. TEACHING METHODS

The course will consist of face-to-face lectures, and the aim will be to promote direct interaction between the students and lecturer in order to stimulate the students' interest in the topics covered. The primary source of the information provided will be the lectures (including any accompanying visual material) and, of course, to reference text cited above. Teaching will involve the integrated articulation of the concepts of general pharmacology, cellular pharmacology, molecular pharmacology, and special pharmacology. Therefore, class attendance is strongly recommended (and students are required to be present for at least 67% of the lectures that are delivered).

7. OTHER INFORMATIONS

The professors will receive students, by appointment (to be set up via e-mail), in their offices in the Institute of Pharmacology (third floor of the Biological Institutes). Alternatively, meetings can be held electronically on the Microsoft Teams platform. The e-mail addresses of the lecturers are as follows: lucia.lisi@unicatt.it; cesare.mancuso@unicatt.it; maria.martire@unicatt.it; giacomo.pozzoli@unicatt.it; giuseppe.tringali@unicatt.it.

8. METHODS FOR VERIFYING LEARNING AND FOR EVALUATION

The goal of the exam is to verify the extent to which the educational objectives have been met (in terms of the knowledge acquired by students, their ability to apply what they have learned, the judgement and communication skills they have developed). Students will be asked to demonstrate their understanding of the therapeutic uses of drugs, possible drug combinations, the contraindications for the use of the drugs covered during the lessons, and precautions/warnings issued regarding their use.

The students' preparation will be evaluated by means of an oral examination during which they will be asked to respond to one or more questions formulated by the teaching members responsible for the individual topics covered in the course. The oral exam is graded on a scale of 0 to 30, with the highest grade (30) assigned to students who demonstrate a thorough understanding of the course contents and a good command of the topic-specific vocabulary.

9. PROGRAM

GENERAL PHARMACOLOGY AND PHARMACOTHERAPY I - Lectures by Prof. Maria Martire

The topics covered have been chosen to provide the student with knowledge of the general principles of pharmacokinetics and pharmacodynamics and their influence on the diversity of drug responses observed in the general population.

Pharmacodynamics

Introduction to pharmacology

Mechanisms of action of drugs

Quantitative analysis of the drug/receptor interaction

Concepts of affinity and intrinsic activity, efficacy, and potency.

Agonists, antagonists, partial agonists, and reverse agonists

Classes of receptors (nature of ligands, mechanism of transduction, main interacting drugs)

G protein-coupled receptors

Ion channels regulated by ligand, voltage, and other signals

Receptors associated with enzymatic activity

Intracellular receptors

Modulation of receptor responses

Enzymes, Transporters/Pumps

Factors involved in drug response variability

Adverse effects of drugs

Principles of toxicology (graded and quantal dose-response curves, the therapeutic index, toxicity mechanisms, descriptive toxicity tests in animals)

Pharmacokinetics

Drug absorption and routes of administration

Distribution

Excretion

Biotransformations of drugs: phase I and phase II enzymes

Metabolic variability, enzyme induction and inhibition

Pharmacokinetic parameters

PHARMACOTHERAPY

The topics listed have been chosen with the aim of introducing students to the mechanisms of action of the drugs covered in this course, the relations between their structures and activities, and the pharmacological properties that affect their use. The student will be required to know the names, mechanism of action, therapeutic indications, contraindications, adverse effects, and appropriate modes of administration of the principal drugs belonging to the following classes:

Pharmacology of the Autonomic Nervous System – Lecturer: Prof. Maria Martire

Anatomical and functional organization of the autonomic nervous system (ANS)

Neurotransmitters and co-transmitters in the ANS

Non-adrenergic non-cholinergic (NANC) neurons

The cholinergic system. The parasympathetic neuroeffector junction. Nicotinic receptors. Muscarinic receptors

The adrenergic system. The sympathetic neuroeffector junction. Synthesis and catabolism of catecholamines. Adrenergic receptors

Cholinomimetics: Direct and indirect

Antimuscarinic drugs

Sympathomimetic drugs: Direct-action, indirect-action, and mixed-action

Adrenergic antagonists. Alpha-adrenergic antagonists**.** Beta-adrenergic antagonists

Serotonin, histamine, and drugs; Anti-inflammatory drugs and glucocorticoids – Lectures by Prof. Lucia Lisi

Serotonin

Biosynthesis, catabolism, receptors, and the physiological actions of serotonin

Medications to treat migraines: triptans; ergot alkaloids. Drugs that promote weight loss (lorcaserin). Antiemetic drugs that are 5-HT3 receptor antagonists (ondansetron and congeners).

Histamine

Biosynthesis, catabolism, receptors, and the physiological actions of histamine

First- and second-generation histamine H1 receptor antagonist drugs.

Nonsteroidal anti-inflammatory drugs (NSAIDs), antipyretics and analgesics, pharmacotherapeutics for gout.

Pathophysiological aspects of the inflammatory process

Aspirin and salicylates, paracetamol, acetic acid derivatives, propionic acid derivatives, phenamates, enol acids, selective COX-2 inhibitors

Colchicine, allopurinol, febuxostat, lesinurad, uricase, and probenecid

Glucocorticoids

Mechanism of action and receptors, physiological functions, and pharmacological actions.

Drugs that act on glucocorticoid receptors: structure/activity studies, indications for use, and undesirable effects.

Chemotherapeutics for infectious diseases – Lectures by Prof. Cesare Mancuso

Basic principles of antibacterial chemotherapy

Ideal characteristics of an antibacterial drug

Bacteriostatic and bactericidal drugs

Mechanism of action of antibacterial drugs

Mechanisms of antibacterial drug resistance

WHO classification of different antibacterial classes based on the degree of resistance

Pharmacodynamic classification of antibacterial drugs

Post-antibiotic effect

Ability of antibacterial drugs to cross the blood-brain barrier

-lactam antibiotics

Penicillins

Cephalosporins

Monobactams

Carbapenems

Tetracyclines and Macrolides

Aminoglycosides

Antifungal drugs

Amphotericin B and its formulations

Flucytosine

Azoles

Echinocandins

Griseofulvin

Clotrimazole

Ciclopirox olamine

Chemotherapeutics for infectious diseases – Lectures by Prof. Giacomo Pozzoli

Sulfonamides
Quinolones and fluoroquinolones;
Antimycobacterials: antituberculars and antileptics;
Non-retroviral antivirals;
Antiretrovirals-anti-HIV;
Hepatitis medications.

Antiprotozoal and antimalarial drugs

Ocular Pharmacology – Lectures by Prof. Giuseppe Tringali

Pharmacokinetics and toxicology of ophthalmic drugs
Ophthalmic preparations and ophthalmic galenics
Cyclopegics, myotics
Humectant agents, artificial tears
Medications for the treatment of glaucoma
Medications for the treatment of maculopathies
Antiallergic agents, steroidal and nonsteroidal anti-inflammatory drugs (NSAIDs)
Topical ocular chemotherapeutics: antibiotics, antivirals