UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Farmacologia

2425-2-I0302D034-I0302D039M

Aims

The course aims to provide students with a basic understanding of drug action in the context of biomedical laboratory techniques.
In particular, students will acquire basic knowledge of drug pharmacokinetics (Absorption, Distribution, Metabolism, and Excretion, ADME), an understanding of drug-receptor interactions and the relationship between drug dose and biological response, as well as knowledge of individual variation in drug response and the classification of adverse reactions.

Contents

During the course, students will acquire skills in the fundamental concepts of pharmacokinetics (the fate of drugs in the body) and pharmacodynamics (the molecular targets of drugs), as well as explore specific classes of drugs agreed upon at the beginning of the course. Topics such as drug interactions, variability in drug response, and classification of adverse reactions will also be addressed.

Detailed program

The course provides students with an overview of pharmacology, focusing on key aspects of general pharmacology and some mentions of specific classes of drugs agreed upon at the beginning of the course.

The first part of the course, after brief historical references on the development of pharmacology, will illustrate the **drug development** phases: students will learn to distinguish between preclinical and clinical phases, and understand the importance of pharmacovigilance.

In the section dedicated to **pharmacokinetics**, fundamental concepts of the discipline will be illustrated, with particular emphasis on the 4 phases of Absorption, Distribution, Metabolism, and Excretion (ADME). Topics such as different administration routes, absorption through cellular membranes, bioavailability, and first-pass effect will be covered. Drug distribution in the body will also be examined, considering influencing factors such as binding to plasma proteins and other factors that may affect it. Drug metabolism will be explored, including biotransformation processes (Phase I and Phase II) with mention of the action of major liver enzymes, cytochromes P450. Finally, drug excretion will be analyzed, focusing on renal elimination mechanisms and the phenomenon of enterohepatic circulation, with brief mentions of secondary excretion routes.

In the **pharmacodynamics** section, focus will be on the effects of drugs on the body and the mechanisms through which these effects are mediated. Receptors and their classification will be introduced, distinguishing between membrane receptors (channel receptors, G protein-coupled receptors, enzymatic receptors) and intracellular receptors (hormone receptors), and drug-receptor interactions will be explored. Dose-response curves will be analyzed to understand the relationship between drug dose and biological effect. Regarding drug safety, therapeutic index and therapeutic window will be mentioned.

Variability in pharmacological response will also be touched upon, including factors influencing individual drug response. Finally, **drug adverse reactions** and their classification will be examined: hypersensitivity, idiosyncrasy, allergy.

Prerequisites

Teaching form

All lessons are conducted in person.

Fourteen lessons of 2 hours each will be delivered, partly in a lecture format and partly interactive.
The Wooclap platform will be used for interactive sessions. This tool offers various functionalities such as surveys, quizzes, and real-time discussions to make lessons more engaging and participative for students, promoting active interaction during teaching sessions and allowing students to receive immediate feedback on their learning.

In addition, audiovisual materials will be used to facilitate understanding and memorization of the concepts covered. The integration of these tools aims to make the learning process more dynamic and accessible for students.

Lessons will be delivered in Italian, but some classroom videos will be in English.

Furthermore, we will examine how gender differences can influence drug response and side effects, increasing awareness of these differences in biomedical laboratory practice.

Textbook and teaching resource

Regarding the teaching material, the following textbooks are recommended:

"Farmacologia generale e speciale per le lauree sanitarie triennali" by Cella, Di Giulio, Gorio, and Scaglione (Published by Piccin).
"Farmacologia generale" by Collino, Cicala, and Ialenti (Published by UTET).

Additionally, the teacher will provide supplementary material, including lecture slides.

Semester

second semester.

Assessment method

The exam will include multiple-choice quizzes along with open-ended questions requiring a brief elaboration on the topics covered during the lectures.

Office hours

The teacher will be available for meetings by appointment, both in person and through online modalities.

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION | GENDER EQUALITY