



Radiology Diagnosing Imaging and Radiotherapy Techniques

INSEGNAMENTO INTEGRATO: PHARMACOLGY

SSD: BIOS -11/A (ex BIO/14), MEDS-22/A (Ex MED/36)

CFU: 6

Course Coordinator: Prof. Marzia Del Re

TEACHING: Radiopharmaceuticals

SSD: BIOS -11/A (ex BIO/14)

Number of CFU: 2

Professor : [Marzia Del Re](#)

E-mail: marzia.delre@unicamillus.org

TEACHING: Radiopharmaceuticals

SSD: BIOS -11/A (ex BIO/14)

Number of CFU: 1

Professor : [Giuseppe Caruso](#)

E-mail: giuseppe.caruso@unicamillus.org

TEACHING: Safe handling of radiopharmaceuticals

SSD: MEDS-22/A (Ex MED/36)

Number of CFU: 3

Professor : [Miriam Conte](#)

E-mail: miriam.conte@unicamillus.org

PREREQUISITES

The student must have knowledge of biochemistry, microbiology, general pathology and basic physiology that allows him to understand the contents of the program related to pharmacokinetics and pharmacodynamics, as well as the basis of the adverse events of the studied drugs. Basic knowledge of medical physics and chemistry.

LEARNING OBJECTIVES

The course will deal with the general principles of pharmacology that apply to all drugs and therefore the classes of drugs directly and indirectly correlated with radiological practice. In particular, in the general part, students will have to learn the principles of pharmacokinetics, pharmacodynamics, pharmacogenetics that apply to all classes of drugs, including radiopharmaceuticals and contrast media. In the special part, particular emphasis will be placed on radiopharmaceuticals (used for both diagnostic and therapeutic purposes), and specific classes of drugs. After completing the course, students should know and understand the mechanism of action, pharmacokinetics, side effects, toxicological aspects, contraindications of the main radionuclides used in SPECT and PET nuclear medicine and must be able to control, when perform an instrumental examination using a radiopharmaceutical, the patient's physical safety.

LEARNING OUTCOMES

Knowledge and understanding

At the end of the course the student will know the pharmacokinetics and pharmacodynamics of the drugs, both directly and indirectly connected with radiological preclinical practice and will know the principles and consequences of drug interactions. He will also know the main radiopharmaceuticals used for both diagnostic and therapeutic purposes and contrast media, in addition to the drugs used in inflammation, those used in the main neurological disorders, anticancer drugs, antibacterial chemotherapy and drugs used

in the respiratory emergency. Students will also be able to implement their pharmacological knowledge of the physical and chemical principles of radiopharmaceuticals. Describe the chemical and physical principles of radiopharmaceuticals. Know the principles for proper management of radiopharmaceuticals in nuclear medicine. Explain the correct use of a radiopharmaceutical control system.

Applying knowledge and understanding

At the end of the course, the student will be able to use the knowledge acquired for the independent study of the aspects relating to the specific field to which the student will devote himself in the professional activity. Use and handle radiopharmaceuticals consciously.

Communication skills

At the end of the course, the student will have to know how to use scientific terminology adequately specifies.

Making judgements

At the end of the course, the student must be able to make general assessments relating to the topics covered.

SYLLABUS

Radiopharmaceuticals

- Principles of general pharmacology
- New drug development and study phases
- Preclinical and clinical trials of drugs
- Pharmacodynamics: mechanism of action of agonist and antagonist drugs, receptors and signaling pathways
- Pharmacokinetics: factors influencing it, elimination and biotransformation of drugs
- Pharmacogenomics
- Antineoplastic chemotherapy, general principles of Target Therapy.
- Radiopharmaceuticals in nuclear medicine
- Generalities on radiopharmaceuticals in Nuclear Medicine
- Structure of the atom and the nucleus
- Generalities on type of radiation used in medicine and decay
- Generalities on radioprotection's principles
- Criteria for choosing a radiopharmaceutical
- Production and quality control of radiopharmaceuticals
- General information on PET, general information on SPECT
- PET and SPECT radiopharmaceuticals
- Scintigraphic exams (renal scintigraphy, myocardial scintigraphy etc.)
- Radiolabelled Nanoparticles : new pharmacological perspectives for nuclear medicine imaging and therapy

Safe handling of radiopharmaceuticals Generalità sui radiofarmaci in Medicina Nucleare

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COURSE STRUCTURE

Lectures: each new lesson will be preceded by a summary of the previous lesson with the help of the students, who will often be asked to intervene during the lesson, with the aim of reaching the maximum understanding and learning of the topic treaty, directly in the classroom.

COURSE GRADE DETERMINATION

Written test: written test with 33 questions. 1 point will be given for each correct answer and no penalty will be assigned to wrong or null answers. Compilation time 35 minutes.

Oral test: The oral exam will be optional and may be taken by students who wish to obtain the honours or improve their score.

The exam will be graded overall according to the following criteria:

Unsuitable: major deficiencies and/or inaccuracies in knowledge and understanding of topics; limited ability to analyze and synthesize; frequent generalizations.

18-20: barely sufficient knowledge and understanding of topics with possible imperfections; sufficient skills of analysis synthesis and autonomy of judgment.

21-23: routine knowledge and understanding of topics; correct analysis and synthesis skills with coherent logical argumentation.

24-26: fair knowledge and understanding of topics; good analysis and synthesis skills with rigorously expressed arguments.

27-29: Comprehensive knowledge and understanding of topics; remarkable skills of analysis, synthesis. Good autonomy of judgment.

30-30L: excellent level of knowledge and understanding of topics. Remarkable analytical and synthesis skills and autonomy of judgment. Arguments expressed in an original way

OPTIONAL ACTIVITIES

Students will have the opportunity to carry out theoretical / practical exercises and participate in seminars. The teachers will provide constant support during and after the lessons

READING MATERIALS

Radiopharmaceuticals

- Laurence Brunton; Bjorn Knollmann. Goodman and Gilman. The Pharmacological Basis of Therapeutics, 14° Edizione McGraw Hill, 2023.
- Bertram G. Katzung, Todd W. Vanderah. "Basic and clinical pharmacology". 16° Edizione, McGraw Hill Education, 2024.
- Nuclear Medicine Textbook, Methodology and Clinical Applications- Duccio Volterrani, Paola Anna Erba, Ignasi Carrió, H. William Strauss, Giuliano Mariani; ISBN 978-3-319-95563-6 ISBN 978-3-319-95564-3 (eBook) <https://doi.org/10.1007/978-3-319-95564-3>; © Springer Nature Switzerland AG 2019
- EANM Guidelines; © European Association of Nuclear Medicine.

Safe handling of radiopharmaceuticals Radiopharmaceutical



- **Professor's slides:** All the slides shown during the lessons will be sent to the students by e-mail.
- **Nuclear Medicine Textbook, Methodology and Clinical Applications-** Duccio Volterrani, Paola Anna Erba, Ignasi Carrió, H. William Strauss, Giuliano Mariani; ISBN 978-3-319-95563-6 ISBN 978-3-319-95564-3 (eBook) <https://doi.org/10.1007/978-3-319-95564-3>; © Springer Nature Switzerland AG 2019
- **EANM Guidelines;** © European Association of Nuclear Medicine