

## Degree in Radiology diagnosing imaging and radiotherapy techniques

**Integrated Teaching: PHARMACOLGY**

**SSD: BIO/14, MED/36**

**CFU: 6**

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MODULE: Radiopharmaceuticals

SSD: BIO/14

CFU: 3

Professor: Ornella Franzese

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MODULE: Safe handling of radiopharmaceuticals

SSD: MED/36

CFU: 3

Professor: Agostino Chiaravalloti

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### 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 physiological basis of the adverse effects of the drugs studied. 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), contrast media and drugs used for the control of inflammation, pain, anxious states, the main neurological disorders, anticancer drugs, monoclonal antibodies, antibacterial chemotherapy and drugs used in the respiratory emergency. 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 especially regarding new drugs in use through the use of IT tools. Know 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.

## **COURSE SYLLABUS**

### **MODULE: Radiopharmaceuticals**

- General pharmacology
- Development of new drugs and study phases. Clinical trial of drugs.
- Testing and marketing of radiopharmaceuticals. Standards of Good Preparation of Radiopharmaceuticals in Nuclear Medicine. Gender pharmacology. Pharmacokinetics and factors that influence it. Drug interactions.
- Pharmacodynamics.
- Special Pharmacology
- Treatment of pain inflammation.
- Fans, glucocorticoids, opioid analgesics.
- General principles of cardiovascular therapy.
- Medicines used in the treatment of anxiety.
- Medicines for the treatment of asthma and the treatment of anaphylactic shock.
- Antibacterial chemotherapy.
- General principles of antineoplastic chemotherapy. General principles of Target Therapy.
- Monoclonal antibodies.
- General principles of pharmacology of neurodegenerative diseases.
- Pharmacology of contrast media (gastrointestinal tests, intravascular tests, blood tests)
- magnetic resonance).
- Radiopharmaceuticals in nuclear medicine: general information. Radiopharmaceuticals in use for diagnostic practice
- and therapeutic.

- Radiotherapy: modalities, radiopharmaceuticals for metabolic radiotherapy.

### **MODULE: Safe handling of radiopharmaceuticals**

- General information on radiopharmaceuticals in Nuclear Medicine
- Structure of the atom and nucleus
- Radioisotopes: decay mode
- Radioisotope production: cyclotron
- Criteria for choosing a radiopharmaceutical
- Production and quality control of radiopharmaceuticals
- PET radiopharmaceuticals
- SPECT radiopharmaceuticals
- General information on PET, general information on SPECT
- production and quality control of PET radiopharmaceuticals
- production and quality control of SPECT radiopharmaceuticals
- Organization of a PET and SPECT radiopharmacy.

### **COURSE STRUCTURE**

The PHARMACOLOGY module is organized in lectures (60 hours) and theoretical-practical exercises. The lessons are held by projecting illustrative images (Power-Point) and through the use of paper material provided by the teacher.

### **COURSE GRADE DETERMINATION**

#### **MODULE: Radiopharmaceuticals**

The verification of learning takes place through a final exam, which ensures the acquisition of the knowledge and skills expected by conducting a written test that includes three open-ended questions without the help of notes or books. The evaluation parameters used will be the specific knowledge of the topic, together with the ability to discursively organize knowledge, the critical approach and the competence in the use of specialized language. The unit of measurement used will be a mark expressed in thirtieths. The exam will be deemed passed with a minimum mark of 18/30.

#### **MODULE: Safe handling of radiopharmaceuticals**

The preparation of the students will be verified with a written exam followed by an oral test. The written test will consist of 30 questions with multiple choice answers, for each correct answer a point will be awarded. The final score of the written test will be given by the sum of the partial scores assigned to each question correctly answered. To access the oral exam, the student must have completed at least a minimum of 18 points.

### **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



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## READING MATERIALS

### **MODULE: Radiopharmaceuticals**

- Bertram G. Katzung. Basic and Clinical Pharmacology. 14th edition, 24 apr 2018

### **MODULE: Safe handling of radiopharmaceuticals**

- Radiopharmaceutical Chemistry ; Editors: Lewis, Jason S., Windhorst, Albert D., Zeglis, Brian M. (Eds.) eBook ISBN 978-3-319-98947-1 ; Springer International Publishing