



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Nuclear Medicine Techniques

2627-3-I0303D036

Aims

Knowledge and Understanding

By the end of the course, students will understand the fundamental principles of diagnostic and therapeutic nuclear medicine, with particular emphasis on radiochemistry, radiopharmaceuticals, dedicated equipment (gamma cameras, SPECT/CT, PET/CT, and PET/MR), image acquisition and processing methods, and key clinical applications. Students will understand the radiochemical, pharmacokinetic, and biodistribution characteristics of radiopharmaceuticals, preparation and quality control procedures, methodological protocols for scintigraphic and PET investigations, and the general principles of radiopharmaceutical therapies.

Applying Knowledge and Understanding

By the end of the course, students will be able to apply their acquired knowledge to identify the most appropriate radiopharmaceutical and nuclear medicine method for various clinical questions. They will be able to describe and use the main scintigraphic and PET image acquisition protocols, and recognize the essential aspects of quality control for radiopharmaceuticals and equipment. They will also be able to interpret the key diagnostic and therapeutic applications of nuclear medicine in various clinical settings.

Making Judgements

By the end of the course, students will be able to critically evaluate the characteristics, indications, limitations, and safety aspects of radiopharmaceuticals and nuclear medicine procedures. They will be able to recognize the technical quality of diagnostic images and make reasoned judgments regarding the use of various diagnostic and therapeutic methods in relation to the clinical context, in compliance with the principles of appropriateness, quality, and safety.

Communication Skills

By the end of the course, students will be able to correctly use nuclear medicine specialized terminology and will be able to clearly and appropriately communicate knowledge, procedures, and results related to radiopharmaceuticals, equipment, diagnostic techniques, and therapeutic applications, interacting effectively with healthcare professionals.

Learning Skills

By the end of the course, students will have developed the skills necessary to independently deepen and update their knowledge in the field of nuclear medicine. They will be able to critically consult scientific sources, national and international guidelines, and technical and regulatory documentation relating to radiopharmaceuticals,

technologies, and emerging clinical applications.

Contents

Fundamental knowledge of radiopharmaceuticals for diagnostic and therapeutic purposes, equipment in conventional nuclear medicine (SPET gamma chambers and SPET/CT), PET tomographs, scintigraphic investigations and their clinical applications, PET investigations and their clinical applications, basic knowledge of radiometabolic therapy.

Detailed program

- Radiochemistry: laws and modalities of radioactive decay, preparation methods and selection criteria for radionuclides and main methods of radiopharmaceutical preparation; quality assurance management
- Radiopharmaceuticals: fundamental aspects of pharmacokinetics, mechanism of action and safety Radiopharmaceuticals used for diagnostic and therapeutic purposes and classification Radiopharmaceuticals with AIC and without. Reading and requirements for adherence to AIFA-approved Summary of Product Characteristics sheets.
- Equipment in conventional nuclear medicine and PET: basics of SPET, SPET/CT gamma chamber and PET tomography technologies
- Techniques and radiopharmaceuticals in conventional nuclear medicine (scintigraphy): radiopharmaceuticals, quality controls on gamma chambers, organisational aspects of an Operating Unit, methodological protocols, procedures for cell markings (leucocytes), acquisition techniques and main clinical applications of scintigraphic investigations
- Techniques and radiopharmaceuticals in positron emission tomography (PET): radiopharmaceuticals, methodological protocols, acquisition techniques and main clinical applications of PET investigations
- Diagnosis and Therapy in Nuclear Medicine: basic knowledge of the clinical applications of scintigraphic and PET investigations in cardiovascular, respiratory, gastroenteric, urogenital, osteoarticular, neurological, endocrinological, paediatric infectious disease and oncology. Basic knowledge of radiopharmaceutical therapies (radiometabolic therapy, radioligand therapy and selective radioembolisation treatment (SIRT) of liver tumours).

Prerequisites

Teaching form

Teaching takes place in attendance, with frontal and interactive lessons (see individual modules).

Textbook and teaching resource

Fondamenti di medicina nucleare: Tecniche e applicazioni, Duccio Volterrani, Giuliano Mariani, Paola Anna Erba, ed. Springer.

The Teachers will provide further educational materials

Semester

First semester

Assessment method

Monza

Learning will be assessed through a written and oral exam, designed to assess achievement of the course's learning objectives, knowledge and understanding of the content covered, the ability to integrate and organize acquired knowledge, and the appropriate use of the discipline's technical and scientific terminology. The written exam will consist of multiple-choice questions related to the modules on Radiochemistry, Radiopharmaceuticals, and Nuclear Medicine Equipment, with 5 questions for each module. The oral exam will cover the content of the modules on Diagnostics and Therapy in Nuclear Medicine, Techniques and Tracers in Scintigraphy, and Techniques and Tracers in PET, and will assess the student's ability to critically connect the topics covered and present them using appropriate disciplinary language.

The final grade will be expressed out of 30 and will be based on an integrated assessment of the results achieved in the written and oral exams.

Bergamo

Written and oral exam, to evaluate preparation on the exam programme, the ability to organize knowledge and communication skills in a disciplinary context.

The written test will consist of 5 multiple choice questions for each module. The oral exam consists of a more in-depth assessment of knowledge of the topics covered in the course modules through open questions, with questions possibly relating to errors made during the written exam. The final evaluation will take into account the results obtained in both the written test and the oral test.

Office hours

By appointment required by mail

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION
