UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Diagnostica per Immagini e Radioterapia

2627-4-H4101D020-H4101D078M

Aims

The module provides students with theoretical/practical knowledge for the correct use of diagnostic imaging, and for the fundamental radiation treatment of the most frequent malignant diseases. It also provides tools for evaluating the appropriateness of the main diagnostic procedure based on the clinical question, and for correct completion of requests for first-level diagnostic imaging . Finally, the module illustrates radiotherapy applications in clinical oncology, exclusively or integrated with other therapeutic modalities.

1. Knowledge and understanding
   The student shall:

- know the basic physical principles of the main imaging techniques
- understand the clinical indications of radiological, nuclear medicine, and radiotherapy methods
- acquire general knowledge of the main clinical applications

2. Applying knowledge and understanding
   The student will be able to:

- identify the most appropriate imaging method
- provide a general interpretation of imaging findings
- understand the role of diagnostic imaging in clinical pathways

3. Making judgements
   The student shall:

- assess the benefits and risks of the different methods
- consider aspects of appropriateness and radiation protection
- develop a critical approach to requesting diagnostic examinations

4. Communication skills

The student will be able to:

- use appropriate medical terminology in the field of radiology
- correctly communicate basic indications and results
- interact with diagnostic imaging specialists

5. Learning skills
   The student shall:

- develop the ability to update knowledge independently
- consult and understand review articles
- integrate theoretical and clinical knowledge

Contents

DIAGNOSTIC IMAGING: Reference to anatomy and physiology of major organs. Conventional and digital radiology, digital and conventional angiography, CT, MRI, Ultrasonography. Nuclear Medicine techniques with radioactive tracers: SPECT, PET, CT/PET. Integrated role of Nuclear Medicine and Radiological techniques. Interventional Radiology.

RADIOTHERAPY AND RADIOMETABOLIC THERAPY: Biological and clinical rationale for the use of radiation in oncology, integration of radiotherapy with other cancer therapies. Stages of radiation treatment and conditions of delivery of radiation dose: external beam radiotherapy, brachytherapy, radiometabolic therapy. Staging of tumors and defining volumes of interest in radiation therapy: target volume and organs of respect. Efficacy, acute and late toxicity of radiotherapy. Principles of radioimmunotherapy. Principles of Clinical Methodology.

RADIOBIOLOGY AND RADIATION PROTECTION: Biological effects of radiation. Principles of radio pathology. Principles of radiation protection: the patients, the workers, the population as a whole, the environment. The current Italian legislation and international recommendations.

Detailed program

° IMAGE DIAGNOSTICS

- Review of anatomy and physiology of the main organ
- Human application of radiological techniques with and without contrast media: conventional and digital radiography, conventional and digital angiography, computed tomography, magnetic resonance, ultrasound
- Application to man of nuclear-medical techniques with radioactive tracers: Static and dynamic scintigraphy, Single photon emission tomography - SPECT, Positron emission tomography - PET
- Integrated role of radiological and medical-nuclear techniques in the diagnosis of the main pathologies of the apparatuses: cardiovascular, respiratory, gastroenteric, urogenital, locomotor, of the Central Nervous System, of endocrinological pathologies and of pediatric and haematological diseases
- Interventional Radiology: Methods and clinical applications with particular regard to diagnosis (biopsies) and treatment (drainage, percutaneous ablation, alcoholization) of neoplasia and angiography (embolization, angioplasty)

RADIOTHERAPY and RADIOMETABOLIC THERAPY

- Biological and clinical rationalization of the use of radiation in oncology

- Assumptions of the integration of radiotherapy with other cancer treatments
- Technical aspects: the phases of radiant treatment from the prescription to the execution
- Method of delivery of the radiant dose: external beam radiotherapy, brachytherapy, metabolic radiotherapy
- Criteria for staging of neoplasms and definition of volumes of radiotherapy interest: concept of target volume and organs of respect
- Efficacy, acute toxicity and late toxicity of radiotherapy
- Main techniques and clinical use of radiometabolic therapy
- Principles of radioimmunotherapy
- Principles of clinical methodology.

RADIOBIOLOGY AND RADIOPROTECTION

- Biological effects of radiation at the molecular, cellular, tissue, and complex biological systems
- Physical and biological factors that influence the effectiveness of radiation
- Concept of dose of exposure and absorbed dose
- Principles of radiopathology: acute, chronic and late effects, at low and high doses
- Deterministic and stochastic effects
- Somatic and hereditary effects
- Protection of the patient, of the workers, of the population as a whole, of the environment
- Regulations in force in Italy and international recommendations with particular reference to the criteria of justification and optimization

Prerequisites

basic knowledge of anatomy, physiology, patology

Teaching form

The module includes a total of 48 hours divided into 20 lessons, in which topics relating to radiodiagnostic imaging and nuclear medicine and radiotherapy are covered; the lessons are proposed by individually teacher for mage modality and/or tratment, and, with an integrated approach, jointly by two teachers focussing on the radiologica and nuclear medicine aspects for specific pathologies (2 lessons).

Textbook and teaching resource

Suggested textbooks

1. R. Passariello - G. Simonetti: “Compendio di Radiologia: con 2172 figure a colori e b/n e 41 tabelle” Ed. Idelson-Gnocchi 2010.

2. P. Torricelli e M. Zompatori: "Manuale di Diagnostica per Immagini: per il corso di laurea in Medicina e Chirurgia" Ed. Esculapio 2016.

3. G. Cittadini: "Diagnostica per immagini e Radioterapia" Ed. Edra 2015

4. Perez & Brady: "Principles and Practice of Radiation Oncology" 2013

5. Lecture notes of Nuclear Medicine lessons

Semester

II Semester

Assessment method

see the general Syllabus of the Course

Office hours

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Sustainable Development Goals

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