UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Diagnostica per Immagini e Radioterapia

2021-4-H4101D020

Aims

The course provides students with theoretical and 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 diagnostic imaging of first level. Finally, the course illustrates radiotherapy applications in clinical oncology, exclusively or integrated with other therapeutic modalities

Contents

BIOMEDICAL TECHNOLOGIES: Physical principles of ionizing radiations; General principles of formation, display and processing of biomedical images. Technological basics of the main radiological methods: conventional and digital radiology and angiography, Computed Tomography, Magnetic Resonance, Ultrasonography. Technological basics of the main Nuclear Medicine methods: Scintigraphy, Single Photon Emission Computed Tomography, Positron Emission Tomography.

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.

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.

RADIOTHERAPY AND RADIOMETABOLIC THERAPY: Rationale of the use of biological and clinical radiation oncology and non-neoplastic diseases, integration of radiotherapy with other cancer therapies. Stages of radiation treatment and conditions of delivery of radiation dose: external beam radiotherapy, brachytherapy, metabolic

radiotherapy. Staging of tumors and defining volumes of interest in radiation therapy: target volume and organs of respect. Efficacy, acute and late toxicity of radiotherapy.

Detailed program

BIOMEDICAL TECHNOLOGIES Physical principles of ionizing radiation General principles of formation, representation and elaboration of biomedical images Technological bases of the main radiological methods: radiography and conventional and digital radioscopy, conventional and digital angiography, Computerized Tomography - CT, Magnetic Resonance - MRI, Ultrasound Technological bases of the main nuclear medical methods (scintigraphy, Single photon emission tomography -SPECT, Positron emission tomography - PET)

° IMAGE DIAGNOSTICS Recalls of anatomy and physiology of the main organs 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)

RADIOBIOLOGY AND RADIOPROTECTION Biological effects of radiation at the molecular, cellular, tissue, and complex biological deisystems 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

RADIOTHERAPY and RADIOMETABOLIC THERAPY Biological and clinical rationalization of the use of radiation in oncology and in non-neoplastic diseases 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

Prerequisites

None

Teaching form

Lectures and exercise

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

Final examination, intended to test students’ knowledge acquired in the different modules of the course, includes a written test of 30 multiple choice questions of which only one correct (1 point for each correct answer) and a subsequent oral interview on the topics covered in the lessons to which the student can access only if the written test is passed (minimum score = 18/30). There are no ongoing test.

Office hours

By appointment