UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Radiotherapy Techniques

2627-3-I0303D015

Aims

1. Knowledge and Understanding

Upon completion of the course, students will be able to:

demonstrate knowledge of the physical, biological, and technological principles underlying radiation therapy;
understand the clinical indications for radiation therapy in the management of the major oncological diseases;
describe the different radiation therapy techniques, including three-dimensional conformal radiotherapy (3D-CRT), intensity-modulated radiation therapy (IMRT), volumetric modulated arc therapy (VMAT), stereotactic body radiotherapy (SBRT/SABR), stereotactic radiosurgery (SRS), brachytherapy, image-guided radiotherapy (IGRT), and adaptive radiotherapy;
understand the entire radiation therapy workflow, from patient selection and treatment prescription to treatment planning, delivery, and follow-up;
recognize the main acute and late toxicities associated with radiation therapy and the principles of their prevention and management.

2. Applying Knowledge and Understanding

Upon completion of the course, students will be able to:

apply the principles of radiation oncology within the multidisciplinary management of cancer patients;
identify the main indications and contraindications for radiation therapy in different clinical settings;
interpret the essential components of a radiation treatment plan and understand the rationale for selecting the most appropriate treatment technique;
evaluate the risk-benefit profile of radiation therapy according to patient- and disease-specific characteristics;
integrate anatomical, pathological, and biological information into radiation treatment decision-making.

3. Making Judgements

Upon completion of the course, students will be able to:

critically evaluate the indications for radiation therapy based on current scientific evidence and clinical guidelines;
appreciate the importance of individualized treatment planning according to patient, tumour, and technological factors;
interpret and critically appraise the scientific literature concerning treatment efficacy, toxicity, and technological innovations in radiation oncology;
formulate evidence-based clinical judgments regarding the role of radiation therapy in cancer care.

4. Communication Skills

Upon completion of the course, students will be able to:

use appropriate scientific and clinical terminology in the field of radiation oncology;
communicate the rationale, benefits, limitations, and potential adverse effects of radiation therapy effectively to patients, caregivers, and healthcare professionals;
present and discuss radiation treatment strategies within a multidisciplinary clinical team;
communicate complex technical concepts clearly and appropriately according to the audience.

5. Learning Skills

Upon completion of the course, students will be able to:

independently update their knowledge through the critical appraisal of scientific literature, clinical practice guidelines, and evidence-based resources;
recognize and evaluate emerging techniques and innovations in radiation oncology;
develop lifelong learning skills essential for continuous professional development in oncology;
integrate radiation oncology knowledge with other medical disciplines to promote a comprehensive, multidisciplinary approach to cancer care

Contents

The teaching aims: to provide the student with knowledge of the different irradiation techniques both in the field of external beam radiotherapy and in that of brachytherapy; to provide the student with knowledge on the methods of calculating the dose distribution and on the principles of dose optimization; to provide the student with knowledge relating to the patient's path in Radiotherapy; to provide the student with knowledge on irradiation methods according to the main tumor diseases.

Detailed program

The various phases of the radiotherapy procedure: prescription, setting, centering, simulation, acquisition of anatomical data, development of the treatment plan, evaluation of the plan, execution, verification, monitoring during treatment, monitoring over time.
The choice of beams: photons, electrons. The choice of energy.
Performance in depth.
The beam modifiers.
The conformation.
Intensity modulation.
The irradiation geometry.

Dose fractionation methods.
The volumes of interest.
ICRU reports.
Patient set-up: positioning and immobilization methods.
Imaging in Radiotherapy.
Quality controls.
Recording of processing data.
Brachytherapy: indications; devices for endocavitary treatments and interstitial treatments; the different radioisotopes; loading modes: pre-loading, after-loading, -remote-loading.

Prerequisites

Health Care and Disease Prevention

Teaching form

Teaching takes place in attendance, with frontal and interactive lessons

Textbook and teaching resource

Teachers will provide educational materials

Semester

First semester

Assessment method

Monza
Oral examination to assess preparation for the examination programme, ability to organise knowledge and ability to properly use the technical language.
Bergamo
Written exam with compulsory oral to assess preparation on the syllabus, ability to organise knowledge and communicative ability in the subject area.
The written test will consist of multiple-choice questions for each module. The oral examination will consist of a more in-depth assessment of the knowledge of the topics covered in the course modules through open questions, with questions possibly relating to errors made during the written examination. The final assessment will take into account the results obtained in both the written and oral examinations.

Office hours

By appointment required by mail

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION