



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Gastroenterology and Hepatology I

2627-5-H4102D060-H4102D156M

Aims

This module aims to provide students with theoretical and practical knowledge and applicable skills concerning the use of nuclear medicine and radiotherapy techniques in gastroenterological and hepatic diseases, integrating and deepening the clinical foundations acquired during the course and Clerkship 9.

Educational Objectives:

Theoretical Knowledge:

1. Understand the fundamental principles of diagnostic nuclear medicine, including the main radiopharmaceuticals used in diagnostic investigations of the gastrointestinal tract, liver, and related diseases.
2. Learn about the most common nuclear imaging techniques (scintigraphy, PET/CT, PET/MR) and their use in diagnosis, staging, and follow-up of gastroenterological and hepatic diseases.
3. Become familiar with therapeutic applications of nuclear medicine, particularly with transarterial radioembolization therapy (TARE) for the treatment of hepatic tumors.
4. Understand the principles of radiotherapy, with particular focus on advanced modalities (IMRT, IGRT, proton therapy) and their role in managing gastroenterological and hepatic neoplasms.
5. Deepen knowledge of regulatory, safety, and pharmacological aspects related to the use of radiopharmaceuticals and radiotherapy technologies.

Practical and Interpretative Skills:

6. Be able to correctly interpret nuclear medicine imaging reports related to gastroenterological and hepatic diseases (e.g., liver function assessment, tumor localization, therapeutic monitoring).
7. Understand clinical indications, protocols, and management of patients undergoing TARE.
8. Apply appropriate criteria for ordering and interpreting diagnostic nuclear medicine investigations and radiotherapy according to clinical guidelines.
9. Effectively collaborate with professionals from involved disciplines (gastroenterologists, radiologists, nuclear medicine physicians, radiotherapists) within a multidisciplinary approach to patient care.

Transversal Competences:

- Integrate clinical, semiological, and instrumental knowledge for a comprehensive and multidimensional patient evaluation.
- Communicate clearly and comprehensibly with patients regarding diagnostic and therapeutic procedures, including risks and benefits.
- Maintain professional and collaborative behavior within multidisciplinary teams, ensuring compliance with safety regulations.

Ability to assist and collaborate in nuclear medicine diagnostic and therapeutic procedures with increasing autonomy.

Practical Learning Objectives for Students at the End of Clerkship:

Capability to critically interpret diagnostic reports and apply acquired knowledge to clinical patient assessment.

Effective communication skills with patients and multidisciplinary teams.

Safe application of operational protocols and good practices in managing radionuclide treatments.

Learning outcomes according to the Dublin Descriptors

1. Knowledge and understanding

At the end of the module, students will have acquired theoretical and practical knowledge of the principles and clinical applications of nuclear medicine and radiotherapy in gastroenterological and hepatic diseases.

Students will understand the main diagnostic nuclear medicine techniques, including scintigraphy, PET/CT and PET/MR, and their role in diagnosis, staging, follow-up and treatment monitoring of gastrointestinal and liver diseases.

They will also acquire knowledge of the therapeutic applications of nuclear medicine, with particular reference to transarterial radioembolization therapy, and of the principles of radiotherapy, including advanced techniques such as IMRT, IGRT and proton therapy.

Students will understand the regulatory, safety, pharmacological and clinical aspects related to the use of radiopharmaceuticals, radionuclide therapies and radiotherapy technologies.

2. Applying knowledge and understanding

Students will be able to apply the acquired knowledge to the interpretation of nuclear medicine imaging reports and radiotherapy-related clinical documentation in patients with gastroenterological and hepatic diseases.

They will be able to correlate imaging findings, clinical history, laboratory data and therapeutic indications in order to support patient assessment and multidisciplinary clinical decision-making.

Students will also be able to understand clinical indications, protocols and management pathways for patients undergoing TARE, nuclear medicine procedures and radiotherapy treatments.

Through supervised clinical activities, learning by doing, case-based discussions and clinical mentorship, students will progressively apply diagnostic, interpretative and procedural knowledge in real clinical settings.

3. Making judgements

Students will develop the ability to critically evaluate the appropriateness of nuclear medicine investigations, radiotherapy indications and radionuclide treatments in relation to the clinical condition of the patient.

They will be able to assess diagnostic and therapeutic options by considering expected benefits, possible risks, safety requirements, patient selection criteria and available clinical guidelines.

Students will also be encouraged to integrate clinical, semiological, imaging and instrumental data in order to contribute to a comprehensive and multidimensional evaluation of patients with gastrointestinal and hepatic diseases.

Participation in multidisciplinary meetings, team briefings and debriefings will support the development of autonomous clinical judgement within a supervised professional environment.

4. Communication skills

Students will be able to communicate clearly and appropriately with patients regarding nuclear medicine and radiotherapy procedures, including their aims, practical aspects, risks and benefits.

They will develop the ability to interact professionally with gastroenterologists, hepatologists, radiologists, nuclear medicine physicians, radiation oncologists and other healthcare professionals involved in patient care.

Students will also be able to discuss clinical cases, imaging findings and therapeutic strategies using appropriate

medical terminology and a multidisciplinary perspective.

The module will promote clear, empathetic and effective communication with patients, colleagues and healthcare staff during diagnostic and therapeutic pathways.

5. Learning skills

Students will acquire the learning skills necessary to further develop their knowledge of nuclear medicine, radiotherapy and multidisciplinary management of gastroenterological and hepatic diseases.

They will be able to use clinical cases, imaging data, specialist reports, guidelines, scientific literature and feedback from tutors to improve their diagnostic reasoning and clinical competence.

The module will promote autonomous and continuous learning through supervised clinical practice, direct observation, clinical mentorship, debriefing sessions, guided case studies and participation in multidisciplinary activities.

Students will progressively develop the ability to reflect on clinical experiences, identify learning needs and integrate specialist knowledge into future clinical practice.

Contents

1. Practical Introduction to Diagnostic Nuclear Medicine
2. Hands-On Learning in Radionuclide Therapy: TARE
3. Introduction to Radiotherapy Techniques
4. Practical Safety and Regulatory Aspects
5. Communication and Professional Interaction

Detailed program

1. Practical Introduction to Diagnostic Nuclear Medicine
Observation and active participation in the administration of diagnostic radiopharmaceuticals and image acquisition (scintigraphy, PET/CT, PET/MRI).
Shadowing nuclear medicine physicians during patient preparation and exam execution, with focus on protocols, safety, and patient communication.
Guided interpretation of imaging reports in the clinical setting, correlating with clinical history and data.
Clinical case discussions based on real patient scenarios and multidisciplinary team interaction.
2. Hands-On Learning in Radionuclide Therapy: TARE
Direct involvement in transarterial radioembolization (TARE) sessions: observing the entire procedure including preparation, monitoring, and post-procedure care.
Support in clinical monitoring of patients undergoing radionuclide therapy, under supervision.
Participation in team briefings and debriefings for therapeutic planning and outcome analysis.
Real-time discussions on patient selection criteria and therapeutic protocols applied.
3. Introduction to Radiotherapy Techniques
Shadowing in the radiotherapy department during simulation, planning, and treatment delivery phases (IMRT, IGRT, proton therapy).
Observation of how integrated imaging supports therapy planning and monitoring.
Interaction with radiation oncologists to understand clinical indications and evaluate risk-benefit profiles in specific cases.
Participation in day-to-day management of patients undergoing radiotherapy.
4. Practical Aspects of Safety and Regulations
Direct exposure to safety procedures in handling radiopharmaceuticals and radioactive waste.
Observing and applying safety protocols during all nuclear medicine and radiotherapy procedures.
Briefings on regulatory issues, documentation, and professional responsibilities, integrated with practical

clinical examples.

5. Communication and Professional Interaction Activities

Direct involvement in physician-patient interactions during nuclear medicine and radiotherapy procedures, focusing on clear and empathetic communication.

Observation and participation in multidisciplinary meetings, with opportunities to contribute reflections based on clinical experiences.

Exercises to improve communication and information management with colleagues and healthcare staff.

Prerequisites

Propaedeutic skills & Advanced knowledge in anatomy, semeiology, biology and molecular biology.

Teaching form

Learning by doing: supervised, progressive participation in diagnostic and therapeutic activities.

Clinical mentorship: guidance through one-on-one or small group tutoring by specialist physicians.

Debriefing sessions: reflective discussions on clinical experiences.

Guided clinical case studies: support via patient reports and imaging data gathered during clinical practice.

Textbook and teaching resource

- Harrison's Principles of Internal Medicine: The 20th edition of the book, edited by Dennis Kasper, Anthony Fauci, Stephen Hauser, Dan Longo, J. Larry Jameson and Joseph Loscalzo, (17 August 2018). The 21st edition of the book to be released on 28 March 2022
- Zakim and Boyer's Hepatology. A Textbook of Liver Disease. Seventh Edition (2018) (Edited by: Arun J. Sanyal, Thomas D. Boyer, Norah A. Terrault, and Keith D. Lindor)
- Sleisenger and Fordtran's Gastrointestinal and Liver Disease- 2 Volume Set Pathophysiology, Diagnosis, Management. 11th Edition - June 9, 2020. Authors: Mark Feldman, Lawrence Friedman, Lawrence Brandt
- Clinical Gastrointestinal Endoscopy: A Comprehensive Atlas. (2018) Ed. Hoon Jai Chun, Suk-Kyun Yang, Myung-Gyu Choi
- Malattie Dell'apparato Digerente 2019-2022: Unigastro (Editrice Gastroenterologica Italiana)
- Reviews

Semester

Second semester

Assessment method

1. Clinical Competence in Diagnostic and Therapeutic Procedures

Assessment Method:

Direct observation by supervising physician during clinical rotations.

Use of a checklist covering procedural skills, safety compliance, and patient interaction.

2. Interpretation and Clinical Integration Skills

Assessment Method:

Written or oral case-based examination presenting imaging studies and clinical scenarios.

Evaluation by faculty using standardized scoring rubrics.

Office hours

The professor receives by appointment upon agreement by e-mail

Sustainable Development Goals

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