



UNIVERSITA' DEGLI STUDI DI MESSINA
*Dipartimento di Scienze Biomediche, Odontoiatriche e delle Immagini
Morfologiche e Funzionali*

Corso di Laurea in Biotecnologie Mediche (Classe LM-9)

NUCLEAR MEDICINE & MOLECULAR IMAGING

Docente: Prof. Minutoli Fabio

COURSE PROGRAM

- Imaging methods and technology elements of traditional radiological equipment, TC, US, RM. Formation of Nuclear Medicine images and elements of technology of nuclear medicine equipment. Overview of radioguided surgery. Multimodal imaging. Elements of Radiotherapy equipment technology.
- Characteristics of imaging techniques relevant to the study of molecular targets (sensitivity, spatial resolution, temporal resolution, penetration ability, etc.).
- Characteristics of contrast media for CT, MRI and Ultrasound. Characteristics of radiopharmaceuticals of medical interest. Contrast media and radiopharmaceuticals for molecular imaging.
- Dynamic contrast-enhanced CT and MRI. Chemical shift imaging. Diffusion-weighted imaging. *In vivo* MRI spectroscopy. Delayed-enhancement technique.
- Direct and indirect molecular imaging.
Signal amplification mechanisms.
Molecular targets (receptors, enzymes, membrane transporters, ...) and biomarkers for imaging.
- Metabolism and cell proliferation imaging.
Perfusion and tissue vitality imaging.
Imaging of receptors, neoangiogenesis, apoptosis, chemoresistance, hypoxia.
Molecular imaging using "labeled" antibodies.
Gene therapy: "gene delivery" and imaging.
Non-invasive imaging of "labeled" cells.
- Elements of Radiobiology. Damage from ionizing radiation. Principles of Radiation Protection.

- Principles of nuclear medicine therapy. Radiometabolic, radioreceptor, radioimmunological therapy strategies. Pretargeting in nuclear medicine therapy. Principles of external beam radiotherapy. Dose-enhancement.

Teaching methods: lectures.

Didactic means used: PC, video projector.

Learning assessment procedures: oral exam.

Recommended texts: lecture notes