UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

In Vivo Molecular Imaging

2122-1-F0901D027

Aims

a) Fundamentals of in vivo imaging techniques; b) design and preclinical and clinical development of a potential novel diagnostic agent; c) general use in clinical practice and application in clinical and preclinical research

Contents

Basic knowledge on fundamental in vivo clinical and preclinical imaging techniques. Main topics: radiobiology, radiochemistry, fluorescent probes, physical principles of in vivo imaging instrumentation devices, fundamentals of image quantification in clinical practice and research and introduction to regulatory affair for radiopharmaceuticals, contrast media and in vivo Imaging medical device.

Detailed program

-General introduction to basic principles, instrumentation and techniques for in vivo imaging; sensitivity, spatial resolution, temporal resolution; translational and preclinical imaging

-Fundamental of digital images: matrix, pixel or voxel, color scale, image analysis.

-Basic principles and application of Radiography and CT and contrast media

-Basic principles and application of Ultrasound and microbubble

-Basic principles and application of Magnetic Resonance and contrast media

-Basic principles and application of Emission tomography (PET and SPECT) and radiopharmaceuticals; radioactive decay and radiochemistry, radiobiology and radioprotection; tracer definition and compartmental models.

-Optical Imaging: Bioluminescence and fluorescence; fluorescent probe for clinical and preclinical use.

-Preclinical and clinical application of in vivo imaging in oncology, neurosciences, inflammation and drug development; introduction to theranostic

-Introduction to Regulatory affair for Diagnostic Imaging: diagnostic medicinal drugs, medical devices, preclinical research with radiopharmaceuticals.

Prerequisites

Basic knowledge on biochemistry, pharmacology, chemistry, physic and physiology that will be introduced during the course if relevant

Teaching form

Lectures, presentation and critical discussion on scientific papers, case study involving the use of in vivo diagnostic imaging; self-assessment test with images and questions

Textbook and teaching resource

Slides, Scientific papers and self evaluation tests

Semester

second semester

Assessment method

Evaluation with oral or written self-assessment test performed during the course; (closed questions or multiple choice); to test the ongoing learning skills, students will receive a list of question on the various lessons presented

and images case study; in addition, to verify the exact understanding of the methods presented to answer a specific scientific question, papers will be to be provided and discussed in class; problem solving activities on specific diagnostic issue will be carried out in class. Final test: Oral examination.
Evaluation criteria: theoretical knowledge, synthesis skills, ability in the application of diagnostic methods to a specific clinical or experimental contest.

Office hours

On appointment with the teacher by mail or telephone