SEMINAR

CIC biomaGUNE
MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

Biomedical imaging strategies for measuring the kinetics of therapeutic nanoparticles in vitro and in vivo

Prof. Marc-André Fortin
Département de Génie des M.M.Matériaux,
Université Laval, Québec, Canada

Tuesday, 20th February
12.00 p.m.

CIC biomaGUNE - Seminar Room

In the past 25 years, the development of nanotechnology has followed the same growth curve as biomedical imaging. Magnetic resonance imaging (MRI), X-ray computed tomography (CT), and positron emission tomography (PET) figure among the most widely used imaging techniques in hospitals and clinics, mainly because of their capacity to acquire in-depth images of tissues and organs. On the other hand, many theranostic products – i.e. compounds acting both as diagnostic probes and as therapeutic agents – are based on nanoparticles that can be tracked by one of the other imaging modalities. PET in particular, is the imaging modality of choice when comes time to measure in a quantitative manner and in near-real time, the biodistibution of systemically administered nanoparticles finding their way through the different organs. This presentation will describe how gold-based nanoparticles used for their radiotherapeutic potential in medical physics and in oncology, are radiolabeled with radioisotopes of intermediate half-lives (e.g. 89Zr; 3.3 days), allowing thereby their precise and very quantitative tracking with PET over a period of time extending up to one week. Applications to prostate, cervix and eye cancer therapies will be described, with a specific emphasis on 3D-printed combinatorial device technologies. Finally, the presentation also draws on the latest results of the laboratory on the development of PET-operated Franz diffusion cells. These new technologies precious to the pharmaceutical industry (skin, gastrointestinal, genitourinary, ocular treatments), allow to measure in real-time, and in a sensitive and visual manner, several kinetic parameters such as lag time, flux, and diffusion coefficients.