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CIC biomaGUNE
CENTER FOR COOPERATIVE RESEARCH IN BIOMATERIALS

seminar

Friday, 30th November, 12.00 pm, Seminar Room

Host: Dr. Jordi Llop

Radiolabelling and preclinical evaluation of nanoparticles as drug delivery systems: Application to infectious pulmonary diseases

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The work performed in this thesis has been divided in three main parts. In the first part, the development of a new tool for the assessment of lung ventilation using Positron Emission Tomography (PET) and its evaluation in healthy (wild type) animals (rats) is described. The evaluation of the biodistribution or determination of pharmacokinetic properties of new chemical/biological entities after lung administration requires previous evidence of unaltered ventilation, which can be assessed efficiently and with high sensitivity with the newly developed tool. This tool is based on the use of two radiofluorinated gases, obtained after following a completely innovative methodology.

The second part of the PhD thesis focuses on the evaluation of three different pulmonary administration methods in rodents, using nuclear imaging techniques. With that purpose, the aerosol is labelled with 2-deoxy-2-(^{18}F)fluoro-D-glucose ([^{18}F]FDG), a radiotracer widely used in the clinical field for the early diagnose and evaluation of the response to treatment of different cancer types. For the three administration methods, the percentage of administered dose deposited in the lungs and the regional distribution of the aerosol within the lungs is evaluated using *in vivo* PET imaging and complementary *ex vivo* techniques such as dissection/gamma counting experiments, and eventually *ex vivo* PET imaging.

The last part of this PhD thesis pursues the determination of the residence time in the lungs of two novel antimicrobial peptides (AMPs) after lung administration, both as free peptides and in combination with nanocarriers (NCs). With that aim, radiolabelling strategies to incorporate either positron or gamma emitters into the different species have been developed. In addition, imaging studies have been conducted to determine the residence time in the lungs of the labelled AMPs and, eventually, of the nanocarriers. These studies provide evidence about the feasibility of nuclear imaging techniques to investigate innovative nanomedicines in the preclinical setting, where they can provide information about the advantages and limitations of using nanocarriers as drug delivery systems.