Radiolabelling and *in vivo* imaging to assess regional drug distribution after lung administration

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Nanoparticles (NPs) have been under extensive investigation because of their high potential as nanocarriers (NCs) for a broad range of chemical entities, including drugs and chemotherapeutic agents. Most of the studies reported so far rely on intravenous administration. However, lung administration has recently gained attention, especially when the lung is the target organ, e.g. to treat lung cancer or airway diseases such as asthma, cystic fibrosis and chronic obstructive pulmonary disease [1]. Pulmonary administration offers numerous advantages as a delivery route compared to oral or intravenous administration, as it can prevent rapid metabolism while decreasing unwanted off-target side effects. However, pulmonary administration poses several challenges, especially in the pre-clinical setting. Regional distribution of the nanomedicine, residence time in the lungs and translocation to remote organs are essential parameters to predict therapeutic efficacy and to define the most appropriate administration pattern.

In this talk, different alternatives for the pulmonary administration of aerosolized nanomedicines in rodents will be discussed. The application of nuclear imaging techniques (Figure 1) to the assessment of the fraction of the aerosol deposited in the lungs, the regional lung distribution, the residence time in the lungs, drug release rate and clearance to remote organs will be discussed.

References

[1] C. Loira-Pastoriza, J. Todoroff, R. Vanbever, Adv. Drug Deliv. Rev., 75 (2014), 81-91.

Figures

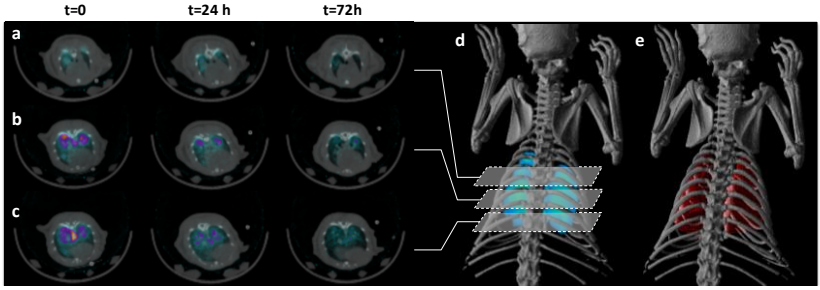

Figure 1: Example of Positron Emission Tomography (PET) images obtained at different times after lung administration of labelled nanoparticles in rats; (a-c) selected coronal slices from images obtained at different time points after administration. PET images are co-registered with Computerised Tomography (CT, grey scale) for appropriate localization of the radioactive signal; (d) volume 3D-rendered image showing distribution of the radioactive signal; (e) surface 3D-rendered image corresponding to the segmented lungs.