Imaging based dosimetry for 177Lu treatments in internal radiotherapy

In nuclear medicine, the cancer treatment by targeted radionuclide therapy (TRT) has been growing strongly for 10 years. Among the current TRTs, the peptide receptor radionuclide therapy (PRRT) has been shown to be an alternative treatment for neuroendocrine tumors (NETs) when surgery is not indicated. The PRRT consists in intravenous administration of somatostatin analog labeled with a β-emitting radionuclide which is Lutetium-177 (^{177}Lu) in the most cases. The ^{177}Lu radionuclide is also a γ-emitting it allows to quantify the radionuclide concentration in the tumors and healthy organs from SPECT/CT scintigraphic acquisitions repeated at different point-times after treatment injection. Image-based quantification leads to personalized patient 3D-dosimetry that optimizes tumor control by administering the highest possible activity in target volume while limiting complications irradiation to organs at risk. At the LUMEN nuclear medicine department of the Léon-Bérard Center, some patients benefit from such treatment for which planning based on 3D dosimetry must be implemented.

The aim of the proposed study is two-fold: first, implement, then optimize the patient dosimetry in clinical practice for ^{177}Lu treatments; second, compare dosimetric methodologies with those of two associated French hospitals (Cancer Institute of Montpellier and Neurologic hospital of Lyon) in order to harmonize practices.

In a work's clinical part, the student will participate to treatment steps in particularly to SPECT/CT acquisition steps. In the scientific part, the student will study the ^{177}Lu dosimetry using an use commercial 3D dosimetry software, which allows to multi-modality fusion, volume segmentation and absorbed dose calculation.

The student will work in a multidisciplinary team composed of nuclear physicians, medical physicists, radiopharmacists, researchers, and computer scientists of Leon-Bérard Center. He/she will also exchange with the teams of associated hospitals.

This study will give the student the opportunity to work in both imaging and dosimetry in the field of nuclear medicine.

Responsables du stage :

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Rémunération : 450 – 500 euros

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Perspectives - Possibilité de poursuivre en thèse : Possible selon l'avancement du projet.