

PARTICLES-MATTER INTERACTIONS: Nuclear medicine

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2. External Beam Radiotherapy optimisation with lung perfusion SPECT/CT

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The aim of radiotherapy is to treat tumoral targets while avoiding normal tissue surrounding it called organs at risk (OAR) to maintain its functionality.

The organ functionality of a healthy patient is usually assumed as uniform. The volume delineation of an organ is then enough to study that functionality. Nevertheless, illness or previous treatment could alter that uniformity. For the lung, that loss of uniformity could be defined with the lung perfusion SPECT/CT.

Single-photon emission computed tomography (SPECT) is a nuclear medicine tomographic imaging technique using gamma rays. The technique requires delivery of a gamma-emitting radiopharmaceutical into the patient, normally through injection into the bloodstream. The pharmacokinetic of the radiopharmaceutical in an organ allows studying the biology or the functionality of the considered organ. The pharmacokinetic is obtained by image quantification of the administered radiopharmaceutical. The perfusion and the functionality of the lung are evaluated through the administration of ^{99m}Tc -MAA.

The aim of the master thesis is to study the optimisation of the dose delivered to the organs and the lesions with the help of the lung perfusion SPECT/CT.