

## Monte Carlo simulation for personalized dosimetry in radionuclide therapy

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**Background:** the aim of this work is to use MC simulations in GATE to study the dose distribution at voxel level. GATE is used for the calculation of dose voxel kernels (DVK) for the radionuclides of interest. Later the DVK will be used in dose estimation by voxel dosimetry. The results obtained will be compared with those obtained by MIRD method used at clinical level. **Material and Methods:** first, we find out the DVK of Lu-177 and Y-90 for soft and bone tissue simulating a source in a box of uniform material (water or bone) and sampling the dose deposition using chosen voxel sizes. The kernels have been compared with those obtained by other authors [1,2]. Then, we check the dose deposited in phantoms calculated by convolution with those obtained with full MC simulation in order to validate the voxel dosimetry method.

**Preliminary results:** the DVKs obtained with MC simulations show a good agreement with the DVKs of other authors as shown in figure 1. The result of dosimetric evaluation will be presented.

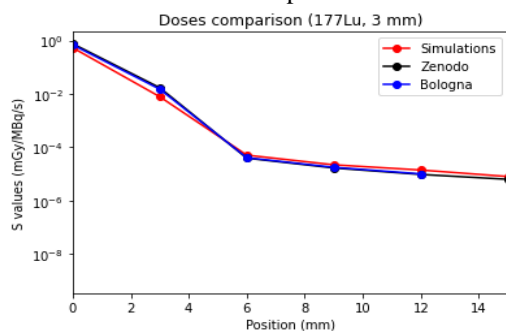


Figure 1: comparison between the results obtained with our simulations, Graves et al. [1] (labelled with "Zenodo") and from a University of Bologna website

1. S.A. Graves et al., "Dose point kernel for 2174 radionuclides", Med. Phys. vol. 46,(2019), 5284-5293.
2. N. Lanconelli, et al. "A free database of radionuclide voxel S values for the dosimetry of nonuniform activity distributions", Phys.Med. Biol., Vol. 57, (2012), 517-533.