

Home task 3 – Internal dosimetry

In the radioactive decay are emitted charged particles (beta, conversion and auger electrons) and photons (gamma, x-rays).

The volume resolution of PET is about 0.1 cm^3 that corresponds to a linear resolution of about 5 mm. Most of the charged particle has in the tissue ranges of a few mm. Thus, the energy of the charged particles can be regarded to be 100% absorbed within a resolution volume.

A substantial part of the emitted photon energy is leaving the body (otherwise the PET would not work). A fraction of the photon energy is absorbed in the target organ (self absorption) and a fraction is distributed within the body (cross fire).

For a typical positron emitter (^{11}C), try to estimate the relative size of the different fractions. You can assume that 100% of the radioactivity is placed in a 1.9 kg liver in a 73 kg patient. To your help you have the data base in the net

<http://www.doseinfo-radar.com/RADARphan.html>

Give a rough estimation of the

1. The absorbed beta energy fraction
2. The absorbed gamma radiation energy in the liver
3. The total absorbed gamma energy in the body