Comparation of blood residues effects in body tissues considering dose estimation ICRP models

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New pharmaceuticals based on peptides labeled with lanthanides have been proposed recently. The most part of the lanthanides biokinetic models for the estimative of the patients doses are described in the ICRP 30 and ICRP 78 reports. The methodology to obtain the biodistribution and kinetics data uses the planar gamma-cam, SPECT and PET. However, none of those equipments is able to subtract the blood contained in the organ. Alternatively, the biokinetics data can be obtained by 'post-mortis' measurements of the radioactivity in the organs. However, this kind of sample is appropriated only for studies in animals; is not possible get rid of the problem by removing all the blood on the organs. The present work is based on the generic Lanthanide model (ICRP 30) and the Cerium model (ICRP 78) and it uses the software ANACOMP and the MIRD protocol to describe the transport of the element Lutetium from fluids to other tissues and its elimination constant rate. Some considerations are introduced using the compartmental analysis theory to elucidate the dose due to the overlapping of organs or tissues images based in scintilographic studies. Hypothetical values of 0%, 5% and 10% of blood in the liver, bone and kidneys were choosen to generate the dose response curves. Afterwards, these curves are used for the dose calculationin the tissues applying the reference values from the ICRP 89 for blood contents in the bone (4%), liver (10%) and kidney (2%). These results form the basis of a discussion about the contribution of the amount of blood in each tissue in the processing of the scintillographic image samples. The two models result in absorbed doses completely different. The ICRP 78 model gives results 52% upper than ICRP 30 model to whole body doses, while the organs absorbed doses grow in liver and kidneys and decrease in the bone. The absorbed dose will be overestimated by ICRP 30 model in 0.08% ($27.87 \longrightarrow 27.99$mGy/MBq); 17.2% ($0.36 \longrightarrow 0.43$mGy/MBq) and 117.91% ($0.23 \longrightarrow 0.50$mGy/MBq) to the bone, liver and kidneys, respectively. By ICRP 78 model the doses will be overestimated only to the kidneys in 41,82% ($13.71 \longrightarrow 19.43$mGy/MBq) and will be underestimated in 9.99% ($13.38 \longrightarrow 12.04$mGy/MBq) and 9.88% ($8.30 \longrightarrow 7.48$mGy/MBq) to the bone and liver, respectively. These values may be higher in the case of samples containing larger amount of blood from the adjacent circulation in the neighborhood of the organ of interest.