AbstractID: 2054 Title: VMDOSE : A multi-purpose dose calculation software for electron and photon emitters based on the MIRD formalism with S values evaluated at the voxel level

A computer package (VMDOSE) for calculating the 3-D dose distribution from a radionuclide distributed non-uniformly in a source volume has been developed. The core calculation engine is based on S values that are evaluated at the voxel level for any voxel size (cubic or non-cubic) and array dimensions. The voxelized S values are evaluated using a fast Monte Carlo integration technique of dose-point-kernels (DPK) for more than 838 isotopes from the ICRP38 and MIRD databases (Auger, CE, β, X and γ emitters). The calculated β and electron DPKs are based on EGSnrc Monte Carlo results, and reproduce accurately the earlier compilation made by Cross (AECL-10521, 1992) while expanding it to many other isotopes. The X and γ DPKs are calculated using the formalism developed by Berger (MIRD-2). The 3-D dose distribution is obtained from the convolution D(r) = S(r-r')*A(r) using Fast Fourier Transforms (FFT) techniques. The software has been developed in MATLAB™, and can be tailored easily to any specific problem. For example, complete internal organ dosimetry (average dose, DVH and 3D contours) can be assessed using phantom or patient specific data defining the source terms A(r) for every organ in the voxel space. VMDOSE has been used also to calculate the dose from a P-32 radiolabeled drug eluting stent with voxel sizes of ~50 microns describing the arterial wall. Other examples illustrating the flexibility and wide range of applicability of the software will be presented (I-125/I-131 mIBG for neuroblastomas, Y-90 MRI based synovium dosimetry, P-32 radioactive coils for aneurysm).