AbstractID: 6877 Title: Monte Carlo Calculations of a P-32 and Three Ir-192 Sources for Intravascular Brachytherapy

Two ^{192}Ir HDR sources (VariSource and microSelectron) are used recently for peripheral intrvascular brachytherapy (IVBT). Dose calculations in near-source region for these two sources should be re-examined, as the previously reported data are usually generated for conventional brachytherapy. In this work, we have calculated the 2-D dose distribution for the two ^{192}Ir HDR sources using the EGSnrc and EGS4 Monte Carlo codes taking into account electron transport. Two other commonly used IVBT wire sources, a ^{32}P (Guidant) and a ^{192}Ir, are also studied. The dose parameters required by the AAPM TG-60 formalism are discussed and calculated. Comparisons between the EGSnrc and EGS4 calculations show that no significant difference was found between the two codes for the gamma sources, although upto 10% difference was found for the beta source. For the ^{32}P wire, the anisotropy function proposed by TG-60 is not appropriate due to the source length (27 mm long). To overcome the problem, an alternative expression based on cylindrical coordinate system with radial and axial coordinates ρ and z is proposed. For this source, the dose distribution is uniform along the axial direction z for a given radial position ρ for -10 mm $\leq z \leq 10$ mm and $\rho \leq 7$ mm. Dose rate at the reference point (r_0=2 mm) was found to be 0.1311± 0.0001 Gy min^{-1} mCi^{-1}. For the ^{192}Ir source wire (30 mm long), there was no problem found on the TG-60 anisotropy function. More detailed results will be presented.