AbstractID: 13115 Title: A dosimetric study of the microSelectron HDR Ir-192 brachytherapy source

Purpose: Recently the manufacturer of the mHDR-v2 HDR Ir-192 brachytherapy source clarified design changes that may alter the existing dosimetric data for this source. The object of this study was to obtain new dose rate tables following the TG-43 formalism and to provide these data in close proximity to the source with high spatial resolution including the electron dosimetric contributions from Ir-192 disintegration.

Methods and Material: To study the source we used three different Monte Carlo codes: MCNP5, GEANT4, and Penelope. The source was located inside a 40 cm radius water phantom. Dose and kerma were obtained using 0.1 mm thick voxels to provide high-resolution dosimetry near the source.

Results: Dose rate distributions obtained with the three Monte Carlo codes were compared, and agreed within the statistical uncertainty. Dosimetric contribution of electrons was important for $r < 2$ mm. The TG-43 dose-rate constant and radial dose function were similar to prior Monte Carlo studies for the old design. The 2D anisotropy function also coincided with the old design for $r > 0.25$ cm.

Conclusions: Monte Carlo simulations of the mHDR-v2 HDR ^{192}Ir source have been performed with three radiation transport codes showed excellent agreement. Comparison of these results to prior Monte Carlo studies showed good agreement for $r > 0.25$ cm. If knowledge of dose for $r < 0.25$ cm is not needed, dosimetric results from the prior Monte Carlo studies will be adequate.