AbstractID: 10856 Title: Experimental verification of dosimetric parameters for a new 125-I interstitial brachytherapy source

Purpose: This investigation experimentally determined the dosimetric parameters of a new brachytherapy source from GE Healthcare, henceforth referred to as model 9011. This new source is designed to be used with smaller gauge needles and may reduce trauma to the patient during the implant procedure. The results of the experiments performed in this work were compared to published values for the model 9011 and the model 6711.

Methods and Materials: The AAPM TG-43U1 document details the dosimetric parameters that must be determined for any new low-energy interstitial brachytherapy source. Thermoluminescent microcube dosimeters were used to experimentally determine the radial dose function, dose rate constant and anisotropy functions. Two PMMA phantoms were machined in-house with tolerances of 0.001". The atomic composition of the acrylic was verified by Colombia Analytical Laboratories (Tucson, AZ). Two 9011 seeds were studied as well as the standard 6711 conventional model. Each parameter was also determined computationally using MCNP5 for both the 9011 and 6711. These and other published values were compared to the experimental results.

Results: Initial measurements of the 9011 indicate good agreement in the dose rate constant and radial dose function as compared to the Monte Carlo calculated values and to the published values. Additionally, as expected, the 9011 dose rate constant and radial dose function values are similar to those of the 6711. Initial measurements of the 2D anisotropy function show good agreement with published values as well.

Conclusions: The 9011 seed may provide an advantage to the patient without compromising the dosimetric qualities of the seed. Although the model 6711 and model 9011 are quite similar, their TG-43 parameters are not identical and should be entered into a treatment planning system separately.

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