AbstractID: 7760 Title: Dosimetric characterization of model CS-1 ¹³¹Cs source by thermoluminescence dosimetry in liquid water

Purpose: To determine the dosimetric characteristics of a recently introduced ^{131}Cs brachytherapy source by performing measurements in liquid water employing thermo-luminescence dosimeters (TLD).

Method and Materials: Small capsules containing 14 mg of lithium fluoride were constructed from capillary tubes and were supported in a water phantom by two plastic jigs. The jigs allowed the capsules to be positioned around a source in circular and spiral patterns designed to permit measurement of dose rate constant, anisotropy function, and radial dose function. The radioactive source was mounted on the tip of a thin graphite rod with its long axis either parallel or perpendicular to the plane of the TLD pattern. To assure confidence in the results, thirteen different seeds were employed, and measurements were performed multiple times. The measured dosimetric parameters were based on the AAPM Task Group 43 formalism.

Results: The dose rate constant measured in liquid water was 1.08 cGy/U $\pm$ 5%, and was based on the air-kerma strength standard established by the National Institute of Standards and Technology. Measured values for the anisotropy function $F(r,\theta)$ and the radial dose function $g(r)$ also were determined. The results were compared with recently published values.

Conclusions: It appears that this is the first time a complete set of dosimetric parameters for a brachytherapy seed has been measured in liquid water. This method avoids the uncertainty introduced by the use of water-equivalent plastic.

Key words: Brachytherapy seed, Solid water, TLD, TG-43.