AbstractID: 10669 Title: Accurate Surface Dose Determination for Electronic Brachytherapy Applicators

Purpose: To describe the use of experimental and numerical methods for the accurate determination of dose distributions along surface boundaries of applicators used to deliver electronic brachytherapy.

Method and Materials: Numerical models for several sizes of an electronic brachytherapy breast balloon applicator and a vaginal applicator were generated and dose distributions calculated using a general purpose multi particle transport code (FLUKA). The numerical data were compared to experimental measurements obtained with a parallel plate extrapolation ionization chamber and with dose distributions generated by a commercial treatment planning system

Results: Close agreement between the numerical model and measured doses were found. Comparison with doses computed using the treatment planning system showed good agreement at a prescription depth of 1.0 cm. Dose deviations as great as 150%, however, were observed at the surface-tissue interface of the applicators.

Conclusions: Using both experimental and numerical methods to determine dose distributions for electronic brachytherapy applicators offers a verifiable, comprehensive procedure in the determination of accurate surface doses. It has been demonstrated that treatment planning systems based on AAPM TG-43 guidelines, as currently configured do not estimate surface doses accurately when attenuating material is interposed between an electronic brachytherapy x-ray source and irradiated tissue.

Conflict of Interest (only if applicable):