AbstractID: 12566 Title: Comparison of tumor and normal tissue dose for accelerated partial breast irradiation using an electronic brachytherapy eBx source and Iridium-192 source

Purpose: To compare treatment plans for patients treated with electronic brachytherapy (eBx) using the Axxent® System as adjuvant therapy for early stage breast cancer with treatment plans prepared from the same CT image sets using an Iridium-192 (Ir-192) source.

Materials and Methods: Patients were implanted with an appropriately sized Axxent® balloon applicator based on tumor cavity size and shape. A CT image of the implanted balloon was utilized for developing both eBx and Ir-192 brachytherapy treatment plans. The prescription dose was 3.4 Gy per fraction for 10 fractions to be delivered to 1 cm beyond the balloon surface. Ir-192 plans were provided by the sites on 35 of the 44 patients enrolled in the study.

Results: The planning target volume (PTV) coverage was very similar when comparing sources for each patient as well as between patients. There were no statistical differences in mean %V100. The percent of the PTV in the high dose region was increased with the eBx source as compared to Ir-192 ($p<0.001$). The mean maximum calculated skin and rib doses did not vary greatly between eBx and Ir-192. By contrast, the doses to the ipsilateral lung and the heart were significantly lower with eBx as compared with Ir-192 ($p<0.011$ and <0.0001, respectively). The total nominal dwell times required for treatment can be predicted by using a combination of the balloon fill volume and planned treatment volume.

Conclusions: This dosimetric comparison of eBx and Ir-192 sources demonstrates that both forms of balloon-based brachytherapy provide comparable dose to the PTV. Electronic brachytherapy is associated with a considerably increased dose within the PTV near the surface of the balloon and decreased dose outside the PTV, resulting in significantly increased sparing of the heart and ipsilateral lung. This research study was sponsored and funded by Xoft, Inc.