

AbstractID: 5458 Title: Pre-Clinical Evaluation of the new Xoft-AxxentTM Electronic Brachytherapy System

Purpose: To evaluate the preclinical functionality of the new Xoft-AxxentTM Electronic Brachytherapy System intended for partial breast irradiation treatment.

Methods and Materials: The EB system consisting of: controller, X-ray source catheter, and the balloon applicator was tested for: graphical user interface functionality, X-ray generator parameters stability, beam output constancy, source position accuracy, timer accuracy, end effects, and dose distribution versus Ir-192 source. The safety features and the adequacy of the proposed shielding also have been tested. The system's log files which record the kVp, beam and filament currents were used to make inferences about the stability of the X-ray generator. Output constancy, timer accuracy, and end effects were measured using a PTW-34013 ion chamber and phantom. The dosimetric characteristics of the source obtained in a manner consistent with TG-43U protocol were entered into PlatoTM-TPS to compute the dose distributions. Source position verification was performed using manufacturer supplied procedures. Source step size accuracy was independently verified using external markers. The effect of transit time on dose distributions was simulated using low steps and dwell times for the transit positions.

Results: The GUI was found to be functional for its intended purposes. The parameters of the X-ray generator were found to have variations of $<0.5\%(1\sigma)$. Output for single source was constant within 0.7% and for multiple sources 1.6% over the duration of the testing. Source position accuracy was $<1.0\text{mm}$. The timer error and linearity were -2.0s and 0.32%, respectively. Dose distributions show higher inhomogeneities towards the proximal end compared with Ir-192 distribution. All safety features were found to be operational.

Conclusion: During preclinical evaluation the system was found to perform as expected. Minor revisions were proposed and should be integrated in the clinical system.