AbstractID: 13624 Title: Evaluating Source Constancy from the Xoft Electronic Brachytherapy System

Purpose: The Xoft Axxent 50 kVp electronic brachytherapy source is currently used to treat a variety of clinical sites including endometrial carcinoma (single-channel HDR cylinder), accelerated partial breast irradiation (single-channel HDR balloon), and surface lesions (external cone applicator). Unlike conventional linac-based dosimetry control systems, the 50 kVp x-ray source is not monitored during treatment, raising the question of source output stability as a function of absolute dose rate and the spatial constancy of the x-ray emission. This study evaluates the constancy of the Xoft Axxent 50 kVp electronic brachytherapy source using a pinpoint ion chamber and EBT2 GafChromic film. **Materials and Methods**: A 0.015 cm^3 pinpoint ion chamber was used to verify the constancy of source output during pre-treatment quality assurance checks using a lucite phantom. The phantom is designed to accept a single channel Xoft applicator and a chamber verification plug. A standard treatment plan was developed to verify source output from a single 50 second dwell position. EBT2 GafChromic film was also used to verify the spatial constancy of a coronal dose plane anterior to the source channel. **Results:** A total of 37 independent quality assurance measurements were performed using 7 different Xoft sources. The mean pinpoint chamber reading was 10.34 nC with a relative standard error of 2.5%. The ratio of the maximum and minimum chamber reading versus the mean was 1.06 and 0.96, respectively. In comparison, the Xoft on-board well chamber measures a relative standard error of <1% for the pre-treatment air-kerma strength. **Conclusions:** The output from the Xoft electronic brachytherapy source was monitored using a pinpoint ion chamber during pre-treatment quality assurance checks. The relative standard error of 37 independent ion chamber readings was 2.5% indicating a relatively stable output across multiple x-ray tubes in a clinical setting. Research sponsored by the Xoft Corporation.