

AbstractID: 12430 Title: Physics commissioning in Xofter Axxent® Electronic Brachytherapy (eBx) for the primary treatment of non-melanoma skin cancer

**Purpose:** The Xofter Axxent® X-ray source has been used for treating non-melanoma skin cancer since the surface applicators became clinically available in the summer of 2009. We report a comprehensive quality assurance (QA) procedure for the commissioning of the Electronic Brachytherapy (eBx) system with the Xofter surface applicators.

**Materials and methods:** The Xofter miniature tube (model S700) generates 50kVp low-energy x-rays. The new surface applicators used with this device have four available sizes of 10mm, 20mm, 35mm, and 50mm in diameter. Our tests include dose-rate measurement, air-gap factor, output stability, energy verification, beam flatness and symmetry, timer linearity and treatment planning with patientspecific cutout factors. TG-61 in-air method was used as a guideline for acquiring nominal dose rate output at the skin surface. Soft x-ray parallel plate chamber (PTW T34013) and electrometer was used for the output commissioning. Gafchromic(R) EBT films were used for testing the properties of the treatment fields with the skin applicators. Solid water slabs were used to verify the source energy and measure cutout factors.

**Results:** The average nominal dose-rate output at the skin surface for the 35mm applicator is 1.35 Gy/min with  $\pm 5\%$  variation for fifteen sources. For the same source, the output variation is within 2%. The effective SSD was also calculated based on the air-gap measurements for four applicator sizes. The field flatness and symmetry are well within 5%. Treatment duration is calculated based on the nominal dose-rate, the prescription fraction size, the depth dose percentage, and the cutout factor.

**Conclusion:** Together with TG-61, our methodology provides a comprehensive commissioning procedure for medical physicists in using the Xofter eBx system and skin applicators for the treatment of non-melanoma skin cancer.