

AbstractID: 3918 Title: Performance of Xoft FlexiShield<sup>TM</sup> Flexible X-ray Shielding in Laboratory Tests and in a Goat Mammary Model

**Purpose:** These studies measured the low energy x-ray shielding effectiveness of Xoft FlexiShield<sup>TM</sup> flexible tungsten-silicone sheets. The ability of the shielding material to lower the ambient radiation level in a treatment room was then evaluated during dose delivery to goats in the course of simulated accelerated partial breast irradiation (APBI).

**Method and Materials:** X-ray attenuation of 1 mm thick tungsten-silicone flexible sheeting was measured using a collimated beam from a Xoft AXXENT<sup>TM</sup> X-ray Source operated at 30 to 50 kV. X-ray attenuation was calculated as the ratio of air kerma rate from the Source measured using an Exradin A600 Ionization Chamber with and without the shield in the beam path. To evaluate shielding effectiveness in a clinical setting, exposure rate was measured during simulated APBI of four Nubian milk goats with balloon applicators inserted percutaneously into simulated lumpectomy cavities in their udders. A Victoreen 451B Ion Chamber Survey Meter was used to measure exposure rates at twelve locations with nominal distances of 1 meter from the udder being treated.

**Results:** X-ray attenuation measured using the collimated beam was  $10^4$  to  $10^6$  at 30 to 50 kV operating voltage. A calculated lead-equivalence of 0.45 mm at 50 kVp was based on the equivalent of 0.35 mm thick tungsten in the 1.0 mm thick composite sheet. During dose delivery to goat udders draped with FlexiShield<sup>TM</sup> the average ambient exposure rates at 1 m were 1.3 and 13 mR per hour at 40 and 50 kV operating voltages, respectively. The exposure rate at 50 kV was 170x lower than without shielding.

**Conclusion:** Xoft FlexiShield<sup>TM</sup> flexible tungsten-silicone sheet is a conformable low energy x-ray shield that very effectively reduces the ambient exposure rate while performing APBI.

**Conflict of Interest:** Research was supported by Xoft, Inc.