AbstractID: 3727 Title: Phantom study of radiation dose reduction to the contralateral breast using lead shielding when treating with the MammoSite applicator.

Purpose: Accelerated intracavitary partial breast irradiation can be delivered using an Ir-192 HDR afterloader with a MammoSite™ applicator. Over the course of a 3400 cGy treatment the contralateral breast can receive total radiation doses exceeding 200 cGy. Placing shielding between the breasts might reduce the dose to the contralateral breast. Phantom measurements were performed to investigate the feasibility and benefit of this shielding.

Method and Materials: Treatments were simulated using doses of 340 cGy. Dose measurements were performed using an ion chamber in a homogeneous solid water phantom. The ion chamber was calibrated is solid water 5 cm from a known Ir-192 source. The phantom was simulating a geometrically simple patient with 5 cm tissue from the center of the MammoSite balloon to the medial breast surface, 10 cm of air between the breasts, and 1 cm to the measurement point in the contralateral breast. 1.6 mm lead sheets were used in single or double layers. The simulations were repeated in a Rando™ anthropomorphic phantom with simulated breasts created from BolxII™.

Results: Contralateral breast shielding is strongly dependant upon the position of the Ir-192 source and the lead shield. Using 1.6 mm and 3.2 mm of lead reduced the contralateral breast dose behind the shield by approximately 45% and 65% respectively. In our Rando™ experiments, using 3.2 mm of lead, the dose 1 cm below the skin would decrease from 190 cGy to 57 cGy and the dose at the center of the breast from 101 cGy to 39 cGy

Conclusions: A 3.2 mm lead shield decreases the dose to the contralateral breast by more than 60%. This may be clinically significant for a reduction in the risk of radiation-induced second malignancies. Shielding may be of best use if treating the patient in a prone or sitting position.