AbstractID: 3942 Title: Contralateral Breast Dose in Conventional and Intensity Modulated Radiotherapy

Purpose:
Induction of secondary malignancies in the contralateral breast can be considered a significant risk of breast radiotherapy due to the excellent prognosis for breast cancer patients and the relative radiosensitivity of the breast. The magnitude of the absorbed dose to the contralateral breast is a primary risk factor for such secondary malignancies. This dose may be reduced by eliminating beam modifiers such as wedges and compensators or by shielding the contralateral breast.

Method and Materials:
We added wax breasts to an anthropomorphic phantom and prepared CT-based treatment plans for five techniques: paired wedges, lateral wedge only, individually-fabricated physical compensators, and both forward-planned and inverse-planned segmental multileaf collimator delivered IMRT. These techniques were administered both without shielding and using lead shields of two different thicknesses (1/8" and 1/4") covering the entire contralateral breast. TLD and ionization chamber measurements were performed at four points inside the contralateral breast, and TLD measurements were performed at five points on the surface of the contralateral breast for each technique.

Results:
With or without the use of shielding, forward-planned IMRT resulted in the lowest dose, followed by inverse-planned IMRT, lateral wedge only, paired wedges, and compensators. The use of forward-planned IMRT resulted in reductions of approximately 45% and 70% in the average surface and internal doses, respectively, in comparison to paired wedges. The use of a ¼" lead shield resulted in additional reductions of 70% and 13% in average surface and internal doses, respectively, for forward-planned IMRT delivery.

Conclusion:
While the clinical superiority of IMRT over conventional radiotherapy for breast cancer is still debatable, the ability of IMRT to reduce the absorbed dose to the contralateral breast is unequivocal. Furthermore, combined use of IMRT and relatively thin lead shielding can reduce the dose to the surface of the contralateral breast by roughly 85%.