AbstractID: 3174 Title: A Treatment Planning Study Comparing Whole Breast Radiotherapy Against Conformal, IMRT and Tomotherapy For Accelerated Partial Breast Irradiation

Purpose: Conventional early breast cancer treatment consists of a lumpectomy followed by whole breast radiation therapy (WBRT). Accelerated partial breast irradiation (APBI) is a method to reduce the irradiation volume to the lumpectomy site plus appropriate margins and reduce treatment time from 5 weeks to 1 week. A radiotherapy treatment planning study was done using postoperative treatment planning CT scans of 15 patients with early breast cancer (T1, T2, N0) to compare four techniques for APBI.

Methods and Materials: Patients were placed in the supine positions and CT images were taken at three to four weeks after definitive breast surgery and patients were treated with WBRT. The CT data for these patients was used to compare four external beam techniques for APBI (small-field tangents, conformal radiotherapy, intensity-modulated radiation therapy and helical tomotherapy) with WBRT. Critical structures (heart, contra-lateral breast, uninvolved breast, lungs and skin) were contoured on the CT simulator software. The GTV was defined as the union of seroma volume and the volume bounded by the surgical clips. The CTV was defined with a 1.5-cm margin around the GTV, constrained to within 5 mm to the skin surface and within the ipsilateral breast volume. A 1cm expansion of the CTV used to create the PTV. Two types of dose homogeneity indices and a Conformity Index were used to evaluate the dose to the target.

Results: All proposed APBI techniques delivered a significant increase in conformity index while maintaining homogeneity and not allowing for a significant increase in dose to critical structures compared with whole breast tangents.

Conclusion: With increasing amounts of sophistication in the delivery of radiotherapy to the lumpectomy site an increase in the conformity index is observed with doses to critical structures that never exceed the whole breast case.