AbstractID: 5698 Title: Using magnetically collimated electrons and narrow intensity modulated tangential photons for accelerated partial breast irradiation

Purpose: Previous studies have shown that enface magnetic collimation lowers entrance dose and reduces lateral scattering for electron beams. However, dose uniformity is limited at depth for single beam delivery. This study investigates whether adding narrow intensity modulated tangential photon beams would solve the problem and create a new technique for accelerated partial breast irradiation.

Method and Materials: Magnetically collimated electron beams were measured and modeled empirically for treatment planning and combined with photon beams on a commercial treatment planning system (Pinnacle 7.6, Philips Medical System). Treatment plans were generated for conformal irradiation of the partial breast using a pair of intensity modulated tangential photon beams plus enface magnetically collimated electron beams. The photon beams were planned via inverse planning with the beam weights of the electron beam adjusted simultaneously. The first MLC segment of the photon beams was fixed to cover the entire planning target volume in the beam's eye view to minimize the effect of target motion. Final treatment plans were analyzed for dose uniformity, for the conformity of the target volume and also for the dose to normal tissues including the skin.

Results: The combined beam approach significantly improved dose conformity, e.g., narrower separation between peripheral isodose lines, as compared with using either electron beams or a pair of tangential fields alone. The use of enface electron beams significantly improved the target dose uniformity to better than 10%. Due to magnetic collimation, the skin dose was on average lowered by 18% over the use of conventional electron beam for the technique.

Conclusion: Intensity modulated tangential photon beams combined with magnetically collimated electron beams offers a new technique for accelerated partial breast irradiation.