AbstractID: 10601 Title: Does Intrafraction Motion Increase Dose to the Inframammary Fold Areas in Whole Breast Treatment using Direct Machine Parameter Optimization IMRT?

Purpose: Dosimetric uncertainties in the inframmamary fold due to intrafraction breast motion are major clinical concerns for treating large or irregularly shaped breast patients as skin break-downs commonly occurred near the regions during the course of the treatment. Direct Machine Parameter Optimization (DMPO) IMRT has been well reported for whole breast treatments. The purpose of this study is to investigate whether intrafraction motion affects skin sparing for patients treated with this technique.

Method and Materials: A pair of open tangential beams (6 MV) combined with a maximum of 20 DMPO segments of mixed photon energies (6 or 18 MV) was used to create DMPO IMRT plan for a large shaped breast case which was then benchmarked against a standard wedge-pair plan. In order to constrain the dose to the inframamary fold, a region-of-interest starting near the inferior border and extending 3-4 cm superiorly was contoured. Using recorded intrafraction breast movements obtained from an image-tracked CyberKnife system, transformed treatment plans were created while scaling the average time patterns from the CyberKnife treatment to simulate DMPO IMRT delivery.

Results: Transformed DMPO plans received lower dose (90.6±3.1)% to the inframammary region compared to the original DMPO plan (96.0%). $V_{100\%}$ for the PTV was slightly reduced from the original 97.5% to 95.0±1.5%. The treatment planning effort and delivery efficiency of DMPO IMRT were found to be similar to the wedge-pair technique. However, the DMPO method significantly reduced the maximum dose and improved the overall dose uniformity to the inframmamary region.

Conclusions: DMPO is an effective and efficient planning technique in skin sparing particularly in the inframammary fold areas for the whole breast IMRT treatments. Our study found no negative impact on such advantage due to intrafraction patient's breathing motion. In addition, the PTV dose coverage was also found to be insensitive to such motion.