AbstractID: 7246 Title: Accurate Targeting Breast Cancer in Real-Time Stereovision-Guided Radiotherapy

Purpose: A recent study by Korreman et al (IJROBP, vol 65, 1375-1380, 2006) demonstrates possible >85% relative reduction of cardiac-pulmonary complications for tangential breast irradiation by using deep inspiration breath-hold or gating techniques. The aim of this work is to minimize the risks by correcting the breast displacements using real-time stereovision guidance.

Materials/Methods: Twenty breast-cancer patients were accrued over the last seventeen months on an IRB-approved study. Planning target volume (PTV) was encompassed by the prescribed isodose in tangential beams with intensity modulation. The surgical bed was boosted using an electron field or conformal photon beams. The planning information (include CT images) were transferred to an in-house stereovision-guided program which automatically created the reference surface images from the CT-based plans. The reference surfaces were matched with the real-time surface images, captured with 3D cameras mounted in the CT simulation room and treatment vault, to determine the displacements of CT setup markers, daily initial setup isocenter, final target position, and target motion during treatment. Large and significant position error were corrected based the image-guidance. Images and on-line adjustments were automatically stored for the analysis. Portal images were taken weekly for the position verification.

Results: The 3D isocenter displacements improved from ~10 mm to ~ 4 mm after the application of IGRT. Isocenter setup error and simulation-marking error were detected and corrected. All major changes were confirmed with portal images. The intrafractional motion caused only ~2.0 mm target displacement. The entire procedure (including the table shifts) took < 5 minutes per day.

Conclusions: The clinical results demonstrate improvement for breast target positioning using stereovision guidance. This in-house IGRT for BC is clinically feasible, efficient, and accurate.