AbstractID: 7572 Title: Clinical Evaluation Using Digital Tomosynthesis for Positioning Verification of Breath-hold Liver Treatment

Purpose: To demonstrate clinical feasibility of generating digital tomosynthesis (DTS) in a single breath-hold (BH) period compared to multiple BH periods for CBCT acquisition and to examine on-board BH-DTS as an efficient alternative to BH-CBCT for target localization of breath-hold liver treatment.

Methods & materials: 3 patients receiving 3D conformal or IMRT treatments to the liver were retrospectively studied. Reference DTS images (RDTS) were generated using the BH planning CT and BH-DTS images were reconstructed using the projection images acquired with BH-CBCT. Matching between on-board image set and reference image set was performed by (1) aligning bony anatomy near isocenter and (2) aligning target soft tissue using all image sets. Localization variations were calculated as the relative couch shifts in the vertical, longitudinal and lateral directions, as well as the relative couch rotations in pitch, yaw, and roll directions.

Results: 10 – 40 degrees DTS images can be acquired within 1 single BH. Localization accuracy is in the range of 0.2 cm and 1.0 degree using the coronal-view DTSs and is in the range of 0.35 cm and 1.6 degree using the for sagittal view DTS. The localization accuracy is comparable either using bony anatomy or using soft tissue.

Conclusion: Rapid (< 10 sec.) BH-DTS is more efficient than BH-CBCT (> 5 min.) for daily 3D on-board image guidance and localization of liver under breath-hold radiation therapy.