

AbstractID: 10853 Title: Amplitude Gated Deep-Inspiration-Breath-Hold Treatment for Heart Dose Reduction in Left Breast Cancer Patients: Residual Motion and Breath-Hold Threshold

Purpose: Amplitude gated deep-inspiration-breath-hold (DIBH) treatment technique may greatly reduce cardiac dose for left-breast cancer patients compared to irradiation under free-breathing. This study investigates the correlation between inter/intrafractional motion and the amplitude gated breath-hold threshold. The outcome of this study can be used to guide setting the thresholds and margin determination for patients to be treated with this technique. **Method and Materials:** 12 left-sided breast cancer patients were studied in this investigation. EPID device was used for cine image acquisition. Real-time position management[®] (RPM) was used in accordance with amplitude gated DIBH technique for motion management. Megavoltage cine images taken during the treatments were used to determine chestwall motions. Image analysis of the DICOM cine images were performed using MATLAB[®] and Image J[®]. Threshold sizes were compared with maximum intrafractional chestwall motions in 282 sessions, separated into superior, middle, and inferior regions. Interfraction motion was measured by picking cine images acquired during different sessions at the top and bottom of the threshold for each patient. **Results:** Breath-hold level was found to have large variations among various patients. The mean intrafractional motion as measured with cine EPID images was 0.68 mm, with a standard deviation of 0.54 mm. For each given mm increase in intrafraction chestwall motion, the threshold increased an average of 0.38, 0.39, and 0.14 mm for superior, middle, and inferior regions, respectively, for the 12 patients. Interfraction chestwall motion increased with increasing threshold size. Mean interfractional motion was 3.34 mm, with a standard deviation of 2.31 mm. A 1 mm increase in threshold size led to an average 0.88 mm increase in mean interfraction motion. **Conclusions:** A correlation exists between the breath-hold level and intrafractional chestwall motion. Threshold correlations with intra/interfraction motion were also found. Increasing the threshold leads to both increased inter and intrafractional motion.