

**AbstractID: 11798 Title: Quantifying the reproducibility of heart position with respect to bony anatomy in daily set up and the corresponding delivered heart dose in voluntary deep inhalation breath hold for left breast cancer patients via external beam radiotherapy**

**Purpose:** Voluntary deep inhalation breath hold (DIBH) technique help reduce the heart toxicity during radiation treatment of the left breast. We present the results of the first study performed to quantify the reproducibility of heart position and the heart dose in daily setup for voluntary DIBH patients.

**Method and Materials:** Ten left breast patients undergoing treatment with voluntary DIBH were studied. Each patient had two CT scans, one with free breathing and one with voluntary DIBH, to evaluate the dose under these two conditions to the Heart, anterior most point of left anterior descending (LAD) coronary artery, and left Lung. At the treatment machine, daily and weekly KV orthogonal images were acquired using onboard imaging for each patient. Mosaiq™ software was used to register the full bony anatomy of thorax (including the spine, ribs, anterior chest wall and heart) with KV images to the planning DRRs. Once the patient is aligned on the treatment machine using bony anatomy registration, the difference between the bony anatomy registration and the heart registration is the daily heart position. These differences were transferred into treatment planning system to obtain the delivered dose.

**Results:** The dosimetric evaluation shows clinically significant reduced dose to heart, lung, and LAD in the DIBH case compared to the free breathing case, as previous studies have shown. The weekly heart position shifts are in the order of few mm. Dosimetric evaluations for these shifts indicate that dose to the heart in the daily treatment with DIBH remains low.

**Conclusion:** The setup and breath hold accuracy and the daily delivered dose to the heart was evaluated for voluntary DIBH breast patients. Results indicate a clear reduction of dose delivered to the heart throughout the treatment when voluntary DIBH technique is employed.