

AbstractID: 6623 Title: The application of a simplified framework for the treatment of left breast cancer using deep inspiration breath-hold (DIBH) for reduced heart dose

**Purpose:** A simplified framework for deep inspiration breath-hold (DIBH) was developed and used for patient simulation. This report presents the details of using the framework for left breast patient treatment.

**Materials and methods:** For each patient, two plans were made, one with the free breathing CT and the other with the DIBH CT. Organ structures (left breast, heart and left lung) were contoured separately on each set of CT. Dose volume histograms (DVH) and dose statistics were used for comparison. Before treatment, the framework was set to patient in the same way as for simulation. Patient setup was made at DIBH such that P point's SSD (anterior) matches that from the simulation DIBH CT. Portal images were taken at DIBH and compared to DRRs generated from the DIBH CT for setup. Because the RPM inside the treatment room and that inside the simulation room had different setups, in case the DIBH amplitudes were different, the two gating threshold lines can be shifted and overlaid to the captured DIBH signal before treatment. The RPM system can guide the linac to turn on or off the radiation automatically.

**Results:** Comparing the two plans based on two CT sets, it was found that the left breast dose coverage was similar. While the absolute DVH for left lung was higher with DIBH, the relative DVH was similar or even lower because of the much enlarged lung volume. The heart volume did not change much but the dose was appreciably reduced. One breath hold was generally enough for the treatment of each beam. We did find that the DIBH portal images matched better to DRRs generated from DIBH CT than with free breathing CT.

**Conclusion:** The framework was successfully applied for the treatment of three left breast patients with reduced heart dose.