

AbstractID: 6492 Title: Simultaneous Irradiation of Prone Breast and Regional Lymph Nodes Using Helical Tomotherapy

**Purpose:** We investigate the capability of helical tomotherapy to simultaneously irradiate the involved breast and regional lymph-node groups for breast-cancer patients simulated in prone position.

**Method and Materials:** We generated helical tomotherapy treatment plans for ten patients (five left breast, five right), each simulated with the involved breast suspended downward. Our target structures were the ipsilateral breast and the supraclavicular, axillary, and internal mammary chain nodes. Each target was to receive  $45 \text{ Gy} \pm 5\%$ . The region-at-risk (RAR) structures considered were the ipsilateral and contralateral lungs, contralateral breast, heart, spinal cord, esophagus, and thyroid.

**Results:** The requirement for  $V_{45} \geq 95\%$  was met for all target structures. The minimum point dose objective of 42.8 Gy was achieved for all lymph-node structures, but for the ipsilateral breast the minimum dose on average was slightly less. The maximum point dose objective of 47.3 Gy was not achieved for any target structure; on average, it was 49.5 Gy. Among the RAR structures, contralateral breast  $V_5$  was kept below 2%. For left-breast patients, the DVH goals for the heart were met; however, for right-breast patients, although the aim was for the heart to receive zero dose,  $V_{10}$  was typically 0.4%. The other RAR DVH objectives that were not met were those for the ipsilateral lung  $V_5$  (the goal was 60% or less; 67% was achieved on average) and the esophagus  $V_5$  (the goal was 30% or less; the average was 41%).

**Conclusions:** Helical tomotherapy can simultaneously cover the breast and regional lymph nodes with uniformity comparable to that achieved conventionally. The high ipsilateral-lung  $V_5$  may be the primary limitation for clinical application, since there are reports that respiratory complications may correlate with the volume of lung irradiated to relatively low doses. All other RAR doses can be kept to clinically acceptable levels.