

AbstractID: 10264 Title: Delivery Angle Dependency on Treatment Plan Quality for Whole Breast Radiotherapy Using Helical Tomotherapy

Purpose: To characterize the effect of delivery angle (DA) on target dose homogeneity and coverage as well as normal tissue sparing for whole breast treatments using helical tomotherapy.

Method and materials: Tomotherapy treatment plans (TomoTherapy Inc, Madison WI) were generated for three sets of patients with varying breast sizes: small (<975cc), medium (<1600cc), and large (>1601cc). All patients presented with left-sided breast cancer. For each patient, three tomotherapy plans were created with different DAs. Pinnacle³ (Philips Medical, Fitchburg WI) treatment planning system was used to segment the PTV, critical structures, and blocking structures. Blocking structures were created to allow radiation delivery from 180°, 210°, and 240° relative to conventional tangent beam geometry. Treatment plans were prescribed 50.0Gy to 95% of the PTV for 25 fractions. A directional block was used for the blocking structures. Plans were compared based on target homogeneity (HI) and conformity (CN) and dose to critical structures.

Results: Percent differences between the average CN of each DA was less than 0.5%. The 180-degree DA produced the least homogenous dose distributions with an average HI of 0.0654 while the 240-degree DA produced the most homogenous with an average HI of 0.0531. Regarding contra lateral breast dose, the 180-degree DA limited the D_{2%} and V_{10Gy}. The 240-degree DA reduced the dose to the heart and ipsilateral lung. Treatment time decreased as the DA increased.

Conclusion: By using a 210-degree DA, the sparing of the contra lateral breast increases dramatically while not substantially impacting the dosimetric quality of the PTV and dose sparing of the heart, and lung for all of the patients studied. This study indicates that the 210-degree DA may be an optimal DA when considering all treatment planning goals and may serve to be beneficial during the beam angle selection process of tomotherapy.