

AbstractID: 9387 Title: Evaluation of the accuracy of TomoTherapy dose calculations for shallow-depth PTVs

Purpose: To investigate the accuracy of TomoTherapy dose calculations for shallow-depth PTVs, and to examine the sensitivity of the resulting plans to positional variations.

Method and Materials: TomoTherapy treatment plans were created and delivered for a cylindrical phantom with surface-to-PTV margins of 0 to 10 mm in 2 mm increments. Dose in the coronal plane was measured using EDR2 film and compared to the dose predicted by the TomoTherapy software. Treatment was also delivered with the phantom intentionally misaligned to investigate the sensitivity of each plan to imperfect patient alignment.

Results: A margin of 0mm resulted in an excess dose on the order 15% to the region just below the surface of the phantom. This was consistent with the dose predicted by the planning software. Using a PTV to skin margin of 2mm or more resulted in only a negligible overdose to the phantom. With a margin of 0mm, the dose delivered was very sensitive to misalignment of the phantom. Moving the phantom by 4mm in one direction resulted in a peak dose slightly higher than predicted; moving it 4mm in the other direction substantially reduced the peak dose, nearly eliminating the overdosing altogether. With a margin of 4mm, misalignment had only negligible impact on the maximum dose.

Conclusion: The results suggest that when treating breast cancer using tomotherapy, the PTV should be kept at least 2mm back from the surface of the skin to avoid severe dose dumping just below the skin and a maximum dose that changes significantly with only small misalignment of the patient.