

AbstractID: 6626 Title: Evaluation of Dose from TomoTherapy Irradiation of Superficial PTVs

Purpose: To evaluate the accuracy of dose calculated by the TomoTherapy HI-ART treatment planning system for superficial planning target volumes (PTVs).

Methods and Materials: TomoTherapy treatment plans were developed for three superficial PTVs (2-, 4-, and 6-cm deep radially by 90° azimuthally by 4-cm longitudinally) contoured on a 27-cm diameter cylindrical white opaque, high-impact polystyrene phantom. The phantom included removable transverse and sagittal film cassettes. Kodak EDR2 films were cut using templates to match the phantom surface (± 0.5 mm). The phantom was aligned to the machine's isocenter (± 0.5 mm), and films were irradiated according to the treatment plans. Films were then scanned with a Vidar film digitizer and converted to dose using a calibration determined from a 6 MV perpendicular film exposure. Hence, axial film doses were scaled by 1.027 so that mid-arc depth doses matched those measured in the sagittal plane. All film readings were scaled by 0.934 to correct for over response due to phantom Cerenkov light. Measured dose distributions were registered to calculated ones and compared.

Results: For all PTVs, at depths less than 10mm calculated overestimated measured doses by as much as 8%. At depths greater than 10mm, the calculated and measured doses agreed to within 5%. In the dose falloff region, measured and calculated dose distributions agreed to within ± 2 mm. The calculated dose in the low dose region distal to the PTV was lower by as much as 2%. Each of these differences is related to an assumption in the dose model.

Conclusion: Calculated dose distributions showed good agreement with measurement for depths greater than 10mm. For more superficial depths, the dose model should be carefully evaluated or one should use bolus of at least 10mm to ensure accurate calculated dose to superficial PTVs.

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