AbstractID: 4850 Title: Investigation of Superficial Dose from a Static TomoTherapy Beam

Purpose: To determine the magnitude of superficial doses produced from a static TomoTherapy beam directed at varying SSDs and angles of incidence.

Method and Materials: Measurements of superficial doses have been made along the central axis of a static TomoTherapy beam at normal incidence for SSDs of 55, 70, and 85 cm for typical TomoTherapy jaw sizes (40x2.5 cm^2 and 40x5 cm^2). Measurements have also been made along the central axis of a TomoTherapy beam at oblique angles of 30˚, 45˚, 60˚, 75˚, and 85˚. Data were collected with a Gammex Model 449 parallel-plate chamber embedded in a solid water phantom and LiF TLD powder. For comparison, measurements have been made on a 6X Varian 2100C accelerator with the same jaw width (5 cm at 85 SSD) and at the same SSDs. Percentage depth dose (PDD) profiles for depths $\leq$ 2 cm have been obtained from the data.

Results: TomoTherapy surface dose measurements vary weakly with SSD, ranging from 16%-18% for the 40x5 cm^2 field, and from 12%-14% for the 40x2.5 cm^2 field. The measured doses increase rapidly with depth, with PDD>90% obtained at depths < 0.6 cm. Surface dose ranges from 17%-26% on the Varian 2100C for the same SSDs and 5cm jaw width. TomoTherapy surface dose increases from 16% to 43% as the angle of incidence increases from 0˚ to 85˚ for the 40x5 cm^2 field and increases from 12% to 40% for the 40x2.5 cm^2 field.

Conclusion: TomoTherapy surface doses do not vary significantly with SSD but increase dramatically with increasing angle of incidence. Generally, the magnitude is less than that measured from a conventional, flattening filter-based linac. These data should assist in assessing the accuracy of the TomoTherapy planning system in the calculation of superficial doses.

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