

AbstractID: 4633 Title: A Comparison Between the New Stereotactic-Mode 6 MV Beam and the Standard 6 MV Beam of Varian Trilogy Accelerators

Purpose: Recently, a new high dose-rate radiation beam has been offered by Varian to reduce radiosurgery treatment times. The stereotactic-mode 6 MV beam (SRS-6X) operates at a dose rate of 1000 MU/min. To achieve this dose rate, the flattening filter of the standard 6 MV beam (STD-6X) was redesigned to be significantly thinner. Comparisons between the SRS-6X and STD-6X beams has been performed.

Method and Materials: Profiles and Percentage Depth Doses (PDDs) were measured for a 3×3, 10×10, and 15×15 cm (maximum) field size. The profiles were acquired at depths: 1.6, 10 and 20 cm. Total Scatter Factors (Scp) were measured for various field sizes. All measurements were repeated for the SRS-6X and STD-6X beams on three Varian linacs. The PDD and Scp measurements were averaged over the linacs. The profile data was not averaged.

Results: At a given depth, SRS-6X PDD curves exhibit a greater slope than that of STD-6X PDD curves. The depth 20 cm to 10 cm ionization ratio of the SRS-6X beam was 1.0% ±0.4% lower than that of the STD-6X beam. These results show that the SRS-6X beam has a lower mean energy. Excluding the tail region, the 1.6 cm depth profiles agreed to within 0.8% or 0.4 mm or better for all field sizes and the 15×15 cm profiles agreed to within 1.4% or 0.2 mm at each depth. In the tail region, the SRS-6X profiles exhibited a higher dose, indicating that the SRS-6X beam has a larger component of scattered radiation. The SRS-6X beam Scp values were 1% to 2% larger than those of the STD-6X beam. The difference increased with decreasing field size.

Conclusion: Clinically significant differences exist between the Trilogy SRS-6X and STD-6X beams. The beam data should not be interchanged.

Conflict of Interest (only if applicable): Research sponsored by Varian.