

AbstractID: 7031 Title: Pediatric Sarcoma Radiotherapy: Target Coverage and Normal Tissue Sparing in 66 Patients Treated with External-Beam Photon Techniques

**Purpose:** To investigate the variation in target coverage, normal tissue dosimetry, and treatment planning statistics for pediatric sarcoma patients treated with external-beam radiation therapy (EBRT) and develop a baseline for future comparison of new methods and modalities such as proton and intensity-modulated arc therapy.

**Methods:** From January 2003 to July 2005, 66 pediatric patients (1.4-21.6 years old, median 11.6) with soft-tissue and bone sarcomas were prospectively treated on an institutional phase II protocol using EBRT that included forward planned multi-segment 3-dimensional conformal (FPMS-RT) or inverse-planned intensity-modulated radiation therapy (IMRT) with or without low-dose-rate brachytherapy.

**Results:** Beam arrangement consisted of 2-field (11%), multifield coplanar (49%), and noncoplanar (40%). Fields per fraction averaged 7 (2-19) utilizing 6MV (88%) and 6/15MV (12%) photons. MU per fraction averaged 333 (252 for FPMS-RT and 478 for IMRT). PTV ranged from 35 cm<sup>3</sup> to 4657 cm<sup>3</sup>. Total delivered radiation doses ranged from 41.4Gy to 70.2Gy (median, 50.4Gy). Beam delivery time for each fraction (including inter-field beam-off) averaged 9 minutes (5.2 minutes non-IMRT, 17 minutes IMRT with a range of 7-45 minutes). Median PTV D<sub>95</sub> and V<sub>95</sub> were, respectively, 93.4% of the prescribed dose and 94.6% of the target volume for the initial phase and 97.8% and 99.2% for a reduced volume phase. The spinal cord dose exceeded 45 Gy and was limited to 52 Gy (<1 c.c.) in 13 out of 36 patients due to tumor involvement or target volume proximity (spinal cord tumors).

**Conclusions:** Improvements in conformity and dose gradient with current methods are still required for challenging paraspinal and head and neck cases. In general, critical organ constraints compromise the delivery of intended high dose to the planned target; however, the inability to achieve CTV coverage (V<sub>95</sub>>95%) for some patients does not appear to result in significant risk of early local recurrence.