AbstractID: 6731 Title: Image-guided Radiation Therapy for Large Soft Tissue Sarcoma: tumor volume changes and dosimetric impacts

Purpose: To report our initial experience with image-guided radiation therapy for large soft tissue sarcoma with emphases on inter-fractional tumor volume changes and their dosimetric impacts during the course of treatment.

Methods and Materials: Twelve patients with large soft tissue sarcoma were treated with a Helical Tomotherapy unit. Daily MVCT images were acquired to guide patient positioning as well as monitoring the anatomical changes in clinical target volumes (CTVs) and other structures. The CTVs and normal structures were contoured on a series of daily MVCT sets, and were compared with the planning CTV and the planning target volume (PTV) obtained from planning KVCT. The 3D dose distributions and dose volume histograms (DVHs) the patient actually received were computed retrospectively based on the MVCT images using the Planned Adaptive software in the Tomotherapy planning system. These daily verification dose distributions and DVHs were compared to those from the original plan.

Results: Daily pre-treatment MVCT images demonstrated significant daily target shifts and allowed accurate localization of target volumes prior to each treatment. The significant tumor volume changes, both increases and decreases, were observed during the course of treatment. For a sample patient, the CTV (in the middle of the treatment) was found to be approximately doubled from the planning CTV, resulting in the original PTV smaller than the enlarged daily CTVs. The daily CTV coverage by the prescription dose varied from 30-95% during the course of treatment, which suggested significant underdosing in the CTVs.

Conclusion: Dramatic inter-fractional changes (increases and decreases) in gross tumor volume were observed during the radiation therapy of these large soft tissue sarcomas. Such changes can result in significant underdosing for tumor target(s) and/or overdosing for adjacent normal tissues, indicating that the image-guided adaptive treatment with re-planning can potentially improve tumor control and/or normal tissue sparing.