AbstractID: 7301 Title: Image-Guided Stereotactic Body Radiotherapy Using Cone-Beam Computer Tomography for Treatment of Spinal Tumors

Purpose: To report the technique and result of image-guided stereotactic body radiotherapy (IG-SBRT) for treatment of spinal tumors using a cone-beam computer tomography (CT) for daily pretreatment imaging.

Method and Materials: A spine phantom was first used to study the feasibility and accuracy of image-guided stereotactic body radiotherapy using cone-beam CT before one patient was treated with a prescription of 2700 cGy to the lesion at the level of L5 in three fractions. Planning CTs were taken using regular CT machines, and pretreatment daily CT scans were taken using the cone-beam CT equipped on a Varian Trilogy Linac treatment machine. Pretreatment daily CT images were first registered with the planning CT images to find out the difference of the daily isocenter from its planning position, then shifts were made by moving the treatment couch to align the patient's daily isocenter to that of the treatment machine. A set of three reference points was used in each case to add accuracy to the localization and alignment of the daily isocenter. As final verification, the KV on-board imaging (OBI) device was used to take orthogonal portal images to be registered with planning digitally reconstructed radiographs (DRR) before treatments were delivered.

Results: Image registration found shifts of the spine phantom to be 16.4 mm laterally, 25.1 mm vertically, and 16.8 mm longitudinally. After shifting the couch accordingly, portal images showed perfect match in vertical and longitudinal directions, only 0.5 mm shift was detected in the lateral direction. For all the three treatments of the patient, daily shifts in any direction were found to be between 2-28 mm. Portal images demonstrated positioning accuracy within 1 mm.

Conclusion: Phantom study and real patient treatment for IG-SBRT of spinal tumor were successfully performed using cone-beam CT. Satisfactory accuracy of patient positioning was achieved.