AbstractID: 8893 Title: Intra-fractional motion of bony targets in the spine and pelvis during extra-cranial SRS treatment

Purpose: to quantify intra-fractional motion of bony targets with respect to the immobilization cradle during extra-cranial SRS treatments. **Methods and materials:** Pre and post treatment cone beam scans were acquired of 64 patients undergoing either single fraction or hypo-fractionated therapy to tumors in the torso. The median dose delivered in a treatment session was 24 Gy. In the cone beam scans, both the target and the immobilization cradle are visible. Target shifts were determined by computing the difference in the target to target 3D registration, and the cradle to cradle 3D registration. Cradle to cradle registration was done manually. The registration target was either the involved vertebra, or the vertebra at the level of the actual target. Target registration was done automatically using a region of interest encompassing the target vertebra and extending midway into the adjacent vertebrae. Patients were monitored throughout treatment using a stereoscopic infra-red tracking system. **Results:** The mean and standard deviation of the shift in target position in the left–right, posterior–anterior, and superior–inferior directions were 0.0±1.4, 0.0±1.0, and 0.2±1.2 mm respectively. The rotations about the corresponding axes, determined from a separate 6D fit, were 0.0±0.7, 0.0±0.5, and 0.0±0.7 degrees, respectively. The length of time between the pre and post treatment scans was 48±15 minutes (mean±std.dev). No correlation was seen between the magnitude of the target shift and the length of time between scans, or between the magnitude of shift and the vertebral level. No indications of radiation induced myelopathy have been seen. Outliers (shifts > 3mm in at least one direction) were seen in 8 patients. **Conclusions:** Although this form of immobilization works well for most patients, the existence of outliers indicates the importance of infra-red surveillance.