

AbstractID: 10917 Title: Assessing intrafraction motion for Cranial Tumor Patients Treated with hypofractionated radiation therapy using repeated imaging

**Purpose:** To assess intra-fraction motion of patients treated for brain cancer using hypofractionated treatment, to optimize the frequency of patient imaging, and to determine whether treatment margins are appropriate or not.

**Material and methods:** Intra-fraction patient displacement data for twenty brain cancer patients were analyzed retrospectively. Patient imaging for setup correction is done at three stages. The first set of images was taken before the patient treatment. The second set of images was taken after one third of the treatment is delivered, and the third imaging set was taken after two thirds of the treatment is delivered. During each imaging stage, two stereoscopic x-ray images are acquired using the ExacTrac imaging system. All images were automatically fused with digitally reconstructed radiographs (DRRs) determine patient displacement from the planning isocenter. Displacements were quantified in terms of position changes as a function of time between each two consecutive sets of stereotactic images.

**Results:** The average patient displacements were  $0.86 \pm .66$  mm,  $1.15 \pm 1.08$  mm, and  $0.86 \pm 0.79$  mm in the lateral, longitudinal and vertical directions respectively. During the first one third of the treatment, the average patient displacements were:  $0.68 \pm 0.62$  mm,  $0.83 \pm 0.66$  mm, and  $0.65 \pm 0.78$  mm. During the second third of the treatment, the average patient displacements were:  $0.57 \pm 0.64$  m,  $0.92 \pm 1.08$  mm, and  $0.69 \pm 0.79$  mm in the lateral, longitudinal, and vertical directions respectively.

**Conclusions:** The majority of positioning errors in this study are within the safety margin of 3 mm. Without patient displacement correction, higher margins may be necessary. Because the average patient displacement during the first one third of the treatment is comparable to the patient displacement during the second third of the treatment, it may not be necessary to increase the frequency of patient imaging.