

**Purpose:** To measure the setup uncertainty for curative head and neck cancer patients undergoing intensity modulated radiation therapy (IMRT), to assess the degree of daily intra-fraction motion, and to determine whether our 5-mm CTV-PTV expansion margins can be reduced.

**Method and Materials:** Nine patients receiving post-operative bilateral IMRT to the head and neck were fitted with dental molds containing gold fiducial markers. Daily orthogonal kV images were used for treatment positioning, and the patient position was corrected along the three Cartesian directions by matching bony anatomy near isocenter. Imaging was repeated at the completion of each treatment fraction to assess intrafraction motion. Images were compared off-line to the digitally reconstructed radiographs used for treatment and two sets of proposed shifts were recorded by separately matching bony anatomy near isocenter and the gold fiducial markers.

**Results:** The required margins, as calculated by the van Herk margin recipe, for aligning bony anatomy near isocenter were 1.3 mm SI, 2.3 mm LR, and 2.5 mm AP. Based on aligning the fiducial markers the calculated margins were 7.4 mm SI, 6.9 mm LR, 8.5 mm AP. The average measured intrafraction displacement was 2.3 mm and 2.1 mm for bony anatomy and fiducial markers, respectively.

**Conclusion:** The reported measurements indicate that the current 5-mm margin is adequate near isocenter. The larger margins calculated based on fiducial markers are attributed to angular setup uncertainties. Based on this data, we are currently investigating an alternative immobilization technique to reduce angular setup uncertainties and intrafraction rotations.