

AbstractID: 11367 Title: Evaluation of Fluoroscopically Aided Respiratory Gating

Purpose: A key issue in gated radiotherapy with external respiration monitors is the accuracy in predicting internal target position. We examine the positioning accuracy and residual motion of internal structures within the respiration gate at treatment, using in-room fluoroscopy and research software for image analysis. **Method and Materials:** We retrospectively analyze data from patients receiving gated radiotherapy (Varian Real-time Position Management) in abdominal disease sites and having implanted radiopaque markers near tumor. A physician-specified gate and within-gate motion extent of implanted markers are determined from a respiration-correlated CT (RCCT) at simulation. A short kV fluoroscopy session (~20s, 10fps) is recorded weekly at treatment to evaluate marker position and excursion within the gate. Commercial research software automatically tracks a marker in the images using a cross-correlation function, calculates its displacement from a user-specified intended position (end expiration) at the session start, and plots the internal signal vs time alongside the external signal from the respiratory monitor. Analysis compares the within-gate displacement from the fluoroscopy sessions to that determined at simulation. **Results:** Data from two patients (8 fluoroscopic sessions) have thus far been analyzed. The percent of within-gate time that the displacement at simulation was exceeded during treatment ranged from 10% to 50%. For patient 1, the mean in-gate displacement of the marker in the fluoroscopy sessions ranged from 3.1mm to 11.6mm, compared to 6mm at simulation. For patient 2, the range was 3.0mm to 5.8mm, compared to 4mm at simulation. Results from five patients will be presented. **Conclusion:** Residual internal motion in external-monitor gated treatment of abdominal sites may often exceed the prediction from RCCT at simulation. The preliminary findings suggest intra-fraction imaging is important to verifying gating accuracy.