

**Purpose:**To evaluate the need for adjusting the respiratory gating window on a daily basis due to variability of intrafraction motion of abdominal tumors treated with stereotactic and conventional fractionated radiotherapy.

**Methods:**Thirteen patients (8 with liver cancer and 5 with pancreatic cancer) were implanted with visicoil fiducials and treated with amplitude based respiratory gated (RPM) radiation therapy on a Varian Trilogy linear accelerator (Varian Medical, Inc.). A total of 225 fluoroscopic movies were recorded using an Intrafraction Motion Review Software (Varian Medical, Inc.) over 106 fractions with an average length of ~15s each. Intrafraction tumor motion was represented by the amplitude (peak-to-trough) of the fiducial motion trace extracted from each fluoroscopic movie. The superior-inferior motion over the course of radiotherapy was compared to the maximum motion from 4D-Computed Tomography (4DCT).

**Results:**All patients showed predominant motion in superior-inferior direction ranging from 1mm to 29 mm. The motion varied on a day to day basis, with changes of amplitude up to  $6.7\pm 5.4$  mm for liver-SBRT patients and  $7.8\pm 2.0$  mm for pancreas-fractionated patients. The maximum motion from 4DCT was compared to individual fractions for all patients. For liver-SBRT patients, 4DCT overestimated the motion on 5/ 27 fractions (average 6.4 mm); and underestimated motion on 11/27 fractions (average 6.8 mm). For pancreas-fractionated patients, 4DCT overestimated the motion on 60/79 fractions (average 13.6mm); and underestimated the motion on 16/79 fractions (average 7.9 mm).

**Conclusions:**Observed intrafraction motion range varied from fraction to fraction and majority of treatment fractions (88%) were either overestimated or underestimated by 4DCT. These results suggest the need for daily respiratory gating window adjustment for a more accurate and efficient delivery.