

AbstractID: 3328 Title: Correlation of target movement, diaphragm motion and external sensor signals for respiratory-gated hepatoma radiotherapy using TACE as a target indicator

**Purpose:**

To assess the correlation among target movement, diaphragm motion and external sensor signals to predict the internal safe margin required for respiratory-gated radiotherapy for hepatoma patients. Impact of gating window size on internal safe margin selection was also evaluated.

**Method and Materials:**

5 hepatoma patients who previously received trans-arterial chemoembolization (TACE) treatments were enrolled in this study. The patients were imaged fluoroscopically for 60 seconds to record the internal motion patterns of the diaphragm and of the TACE through an image-capture device. The skin motion pattern was obtained by an in-house developed sensor. Locations of the diaphragm and the TACE on the fluoroscopic images were identified manually frame-by-frame. Means and standard deviations of the differences between the displacements of the sensor signal and the diaphragm (SD), of the sensor signal and the TACE (TS) and of the diaphragm and the TACE (TD) were calculated for various gating window settings. Internal safe margins as defined by  $\text{mean} \pm 1.5 * \text{standard deviation}$  were calculated.

**Results:**

Displacement differences of patient #1-5 for 50% gating window size were determined to be  $1.3 \pm 1.3$ ,  $1.2 \pm 1.1$ ,  $2.9 \pm 2.1$ ,  $3.0 \pm 1.9$  and  $2.4 \pm 1.7$  mm for SD;  $2.2 \pm 1.5$ ,  $1.1 \pm 0.7$ ,  $1.3 \pm 1.1$ ,  $4.8 \pm 1.5$  and  $2.1 \pm 1.5$  mm for TS; and  $0.8 \pm 0.4$ ,  $1.4 \pm 0.2$ ,  $1.2 \pm 0.1$ ,  $2.9 \pm 1.0$  and  $1.1 \pm 0.2$  mm for TD. The results also showed that selection of different gating window sizes had limited effect on the size of the internal safe margin.

**Conclusion:**

Inconsistent motion patterns among target, diaphragm and external skin sensor must be taken into consideration when determining internal safe margin for hepatoma patients.

**Conflict of Interest (only if applicable):**