AbstractID: 2085 Title: Measurement of Patient Compliance during Breath-Hold Imaging for ITV Determination

To account for respiratory-induced intrafraction motion of thoracic tumors we determine Internal Target Volumes (ITVs) from Clinical Target Volumes (CTV)s obtained via Feedback-Guided Breath-Hold (FGBH) inspiration, expiration, and free breathing (FB) studies. Ideally, the inspiration and expiration-derived CTVs accurately depict the limits of the FB CTV motion.

To assess this, FGBH respiratory traces were retrospective analyzed to study patient compliance. A commercial respiratory gating system (Varian RPM$^{TM}$) was used to generate the traces based upon the tracked motion of a thoracic surface marker. Traces were analyzed for position and stability of breath-hold (BH) relative to maximum marker excursions during FB imaging.

Inspiration BH stability varied between 3.5 - 40% of the FB trace amplitudes (0.05 – 0.30 cm marker displacement during imaging). Expiration BH stability varied between 0 – 25% (0.00 – 0.20 cm excursion). FB respiratory trace amplitude ranged from 0.50 - 1.50 cm. Inspiration BH positions ranged from 0.50 – 2.00 cm vertical displacement, corresponding to 12.5 – 120 % of FB vertical displacement. Expiration BH positions ranged from -0.15 – 0.35 cm, corresponding 20 – 31.8 % of FB vertical displacement. Three patients were unable to comply with the protocol.

Accurate expiration BH position was easier to achieve and sustain than inspiration BH. This method of analysis allowed us to exclude 3 non-compliant patients and create ITVs based upon more traditional approaches. A patient training and screening program may help to increase precision, accuracy and stability of FGBH studies for ITV generation, as well as to exclude patients who cannot comply with the protocol.