

**AbstractID: 2080 Title: A comparison of spirometry and abdominal height as 4DCT metrics.**

We are developing a 4-dimensional computed tomography process for the quantitative measurements of tumor, and normal organ motion during breathing. An important consideration is the selection of a metric to use in retrospectively gating the CT data, model internal motion, and use during gated radiotherapy. Abdominal height is available commercially as a metric for lung tumor motion; however, little data exists as to the accuracy of the correlation. This study evaluates and compares two non-invasive metrics to quantify breathing motion, spirometry and abdomen height. Free-breathing spirometry was acquired simultaneously with the abdomen height through digital-video recording of a surface grid attached to the patient's abdomen. Time synchronization for the CT scanner, spirometer and video processor was performed using an optical signal hardwired to the CT scanner. The video was imported and a custom algorithm was written to automatically determine the abdominal height versus time. Abdominal height and spirometry were compared against internal air content, defined as the amount of air within a 12-slice (1.8 cm) thick region. The air content had been previously shown to be well correlated with internal motion, and so was used as a surrogate for internal motion. Both the abdomen height and spirometry were shown to be accurate metrics, but the spirometry was more precise than abdomen height by a factor of 3. Our current plans are to use a drift-free metric, such as abdomen height, along with spirometry to improve the overall metric precision and provide a normalization of the drift-free metric to tidal volume.