

AbstractID: 7528 Title: Correlating Lung Tumor Motion Patterns with its Geometrical Location

**Purpose:** Precise and accurate delivery of radiation treatment for moving tumors is of great contemporary interest to the clinical and scientific community. Respiratory induced inter- and intra-fraction tumor motion in the thorax and abdomen degrades the effectiveness of radiation treatment. Tumors at different geometric locations, as seen in the lung, kidney, liver or prostate, have distinct motion properties. Furthermore, tumors at different sites of an organ reflect characteristic motion based on location; for example, lung tumor motion is dependent upon which lobe the tumor resides. The objective of this work is to identify the correlation between respiratory-induced tumor motion and lung tumor location, size and shape.

**Method and Materials:** Based on a finite state model, which captures the natural breathing actions, tumor motion properties (amplitude and duration) have been characterized. Lung motion characteristics are classified based on broncho-pulmonary segments, which define tumor location, and used in clinical treatments. The association rules between motion patterns and lung tumor location have been identified and parameterized through extensive statistical analysis.

**Results:** There is a correlation between tumor motion and position in the lung. For example, tumors with smaller motion (amplitude < 5mm) are observed most frequently in the upper lung or attached to fixed structures. Tumors with relatively large motion are associated with the lower portion or periphery of the lungs.

**Conclusion:** Establishing reliable correlations between respiratory motion and tumor location, size and shape, enhance the predictive power of these models of tumor motion in the lung. This is particularly important for new patients, on whom little data has been accumulated related to the tumor motion, to confidently predict the tumor's behavior during the course of treatment.

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