

**AbstractID: 13201 Title: Statistical analysis of the correlation between breathing characteristics with patient parameters**

**Purpose:**

Breathing curve of lung patient is an important feature for tumor tracking and 4D delivery. The correlation of external breathing curve characteristics with internal tumor location and with the biological features of the patient is of large interest. In this study, we are aiming to propose a method for analyzing the parameters of breathing curves and study the correlation of breathing characteristics with features of patients.

**Method and Materials:**

Piecewise cosine functions were used to fit breathing curves and determine the amplitude, period and baseline of each breathing cycle. Mean value and standard deviation of amplitude, period and baseline over the breathing curves were determined as the "characteristics" of a breathing curve. Statistical analysis was performed to correlate these characteristics with patient parameters including age, gender and tumor site base on a total of 305 breathing curves from 158 patients acquired from Real-time Position Management (RPM) system. Pearson correlation method was used to determine the correlation of age with breathing parameters. Two-sided unpaired t-test was used to study whether gender or presence of tumor in lung affect the breathing characteristics significantly.

**Results:**

Age has no correlation with breathing characteristics studied. Gender affects both the mean ( $p = 0.971$ ) and standard deviation ( $p = 0.425$ ) of breathing period. The effect of gender on breathing amplitude or baseline variation was insignificant. Presence of lung tumor affects the mean amplitude ( $p = 0.317$ ) and period ( $p = 0.384$ ). The baseline variation was also affected slightly ( $p = 0.860$ ). But the irregularity of amplitude and period was irrelevant to the tumor locations.

**Conclusion:**

Statistical analysis of large number of breathing curves revealed that parameters of patient may affect the breathing curve statistics thus affecting the management of tumor motion in radiation therapy.

**Conflict of interest:**

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