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Characteristics of Human Breathing Motion

On initial inspection breathing patterns appeared to be fairly straightforward to describe. They are periodic, finite in amplitude and can be controlled voluntarily. Early descriptions of the breathing cycles assumed that irregularities and breathing were relatively minor and the breathing cycle could be described as a purely periodic function. Upon closer inspection, the breathing cycle was found to be highly complex, include significant variations in amplitude, frequency, and baseline, and the path that tissues took during inhalation often different from the path they took at exhalation. Multiple approaches have been attempted to describe breathing characteristics for purposes of radiation therapy treatment planning, treatment delivery, and treatment gating. This presentation will show the history of previous breathing motion tour positions as well as new methods to describe breathing motion, and use that description for predictive purposes. The objective are as follows:

1) Have attendee understand complexities of breathing cycle

2) Have attendee understand methods for measuring the breathing cycle

3) Have attendee understand methods for modeling breathing motion