

## AbstractID: 5214 Title: Comparison of various respiration measurement methods for 4D radiotherapy

**Purpose:** To find the best method corresponding with respiratory target motion, ten patients' respiratory patterns were measured by various methods simultaneously. Respective respiration monitoring methods were compared with fluoroscopic target motion during simulation.

**Method and Materials:** A respiration monitoring system using thermocouple was developed to measure patient's respiration. Conventional spirometer and home made thermocouple were connected to a mouse piece to measure the patient's respiration simultaneously. A respiration acquisition program was built by using Labview 7.0 (National Instruments, Austin, TX), which acquire respiration signals and display its patterns. A fluoroscopic target tracking program was built by using IDL 6.1 (Research Systems, Inc, Boulder, CO). Ten patients with lung or liver cancer participated in this study. Fluoroscopic movies were captured during acquisition of their respiration patterns. At the same time their skin motion was measured by using Real-time Position Management<sup>®</sup> (RPM<sup>®</sup>, Varian, Palo Alto, CA) system. Respiratory patterns from spirometer, thermocouple, and RPM<sup>®</sup> system were compared with fluoroscopic target motion respectively. Its relationships were evaluated as correlation coefficient.

**Results:** Comparing each correlation coefficient for spirometer, thermocouple, and RPM<sup>®</sup>, skin motion detection is the most correspondent with fluoroscopic target motion. However, respiration monitoring methods with spirometer or thermocouple also correlate well (more than 0.9).

**Conclusion:** Respiratory pattern depends on a patient and his/her conditions. The relationship between thermocouple and fluoroscopic target motion could be enhanced by correlating respiratory signal with target motion. Respiration monitoring methods with spirometer or thermocouple, and skin motion detection are feasible to monitor the target motion for applying 4D radiotherapy.