# AbstractID: 8530 Title: Evaluation of MLC Radiotherapy System Synchronized with Moving Target

**Purpose:** The aim of this study was to develop a dynamic tumor tracking radiation therapy (DTTRT) system in the consideration of tumor motion caused by moving body anatomy such as breathing and to evaluate its performance by realizing the simulation of radiation delivery.
**Method and Materials:** The DTTRT system was designed to estimate the tumor motion within a body during the treatment and to move a custom-built one-dimensional passive multileaf collimator (MLC) based on signals acquired through an abdominal shift sensor. The effectiveness of DTTRT system was evaluated by analyzing a beam penumbra with the dose distribution on films (Gafchromic EBT) within the phantom. Beam was delivered with 5 Gy at the SSD of 80 cm using Co-60 machine with the organ movement simulator and the passive MLC, and the irregular field particularly designated (displacement of +-1.25 cm, in x and y-axis) was used to be independent of penumbra effect at isocenter.
**Results:** Dose distribution was evaluated for the three exposure cases on the film delivered. Penumbra widths were measured to +3.1/–3.7 and +3.4/– 4.2, +14.5/-14.6 and +10.7/–14.5, +4.0/–4.4 and +4.0/–5.2 (mm) for x and y-axis in fixed phantom and fixed MLC, moving phantom and fixed MLC, moving phantom and moving MLC, respectively. The variation of penumbra widths for moving phantom and moving MLC was minimum 0.6, maximum 1.0, and minimum 7.3, maximum 11.4 (mm) in y-axis compared to that for fixed phantom and moving MLC, moving phantom and fixed MLC, respectively.
**Conclusion:** With the method to move MLC by passively synchronizing it with organ motion, the DTTRT system was developed and evaluated for its performance. For future research, various verification processes should be performed through the clinical experiments. Then one can expect that highly efficient precision radiation therapy shall be applied to moving target.