

AbstractID: 9301 Title: Feasibility study of treating multiple tumors simultaneously with a 4-bank mMLC stereotactic radiosurgery system

**Purpose:**

A novel 4-bank micro-multileaf collimator (mMLC) has been commissioned for stereotactic radiosurgery (SRS). Leafs of each bank of mMLC can be individually controlled, which allows to form more complex field than conventional 2-bank MLC or circular cone. For cases with multiple brain masses, pre-treatment QA and treatment are always time consuming. In this study we investigate if multiple tumor sites can share one isocenter and if they can be treated simultaneously without sacrificing the quality of dosimetry.

**Method and Materials:**

The microMLC (Alayna Enterprise Corp) consists of 96 tungsten leaves aligned in four banks. Three treated patients, each with two adjacent brain masses, were selected retrospectively in this study. Three plans were made on each patient. Plan 1 used conventional method that was to create two beam sets each with its own isocenter. Treatment was to be delivered in a sequential way. In Plan 2, tumors shared single isocenter but were treated by its respective beam set. In Plan 3, single isocenter was chosen and two masses were to be irradiated simultaneously by one set of beam. For comparisons, the treatment and setup time were measured or estimated. The isodose curves and dose volume histograms (DVH) were analyzed.

**Results:**

Plan 2 and Plan 3 save significant time in QA and treatment (~30mins). Plan 1 and Plan 2 have equally satisfying dosimetric outcome, while the DVHs of Plan 3 degrade significantly. Plan 1 and Plan 2 have individual control of the dose of each target, while Plan 3 doesn't have.

**Conclusion:**

We have studied three scenarios of treating multiple isocenter SRS using 4-bank microMLC. The best method found is to share a common isocenter, but treat the targets individually. This method can reduce the QA and treatment time significantly, and achieve the similar dose coverage as the conventional technique.