

AbstractID: 5318 Title: Is 0.5 cm leaf width of MLC beneficial in IMRT?

**Purpose:** Evaluate treatment plan quality and quantify dosimetric accuracy of IMRT for different disease sites with MLC of 0.5 and 1.0 cm leaf width.

**Method and Materials:** We tested a hypothesis, quality of IMRT treatment plans with smaller MLC leaf width is better, by developing treatment plans on Pinnacle treatment planning system (TPS) for multiple patients (total 60) with tumor sites located in Head and Neck (H&N), Vertebral Body and Prostate. For each patient, two plans are created using same objective functions and optimization parameters and algorithm (Direct Machine Parameter Optimization): one with 0.5 cm leaf width; the other with 1.0 cm leaf width. The TPS beam modeling of the two virtual machines was exactly the same except for the MLC leaf width. The dose volume histogram (DVH) is used in the evaluations of plan quality. All target coverage is normalized to the criteria of 95% of the target volume receiving prescribed dose. A diode array (Mapcheck) was used to quantify the dosimetric accuracy of all plans created with two MLC leaf width resolutions.

**Results:** DVHs of all the patient plans reveal very minor dosimetric differences between the IMRT plans of the two MLC systems for the same patient. There are almost identical target coverage and similar dose distributions among the critical structures in H&N patients and vertebra body patients. For prostate, plan of 1 cm MLC leaf width has slightly more hot spots in the target with the same dose coverage criteria. Planar doses comparisons with Mapcheck measurements indicate slightly larger uncertainty in 0.5 cm leaf plans.

**Conclusion:** There are negligible dosimetric differences in IMRT plans created with 0.5 cm and 1.0 cm leaf width resolution. However, the dosimetric accuracy of plans generated with 1.0 cm leaf width is better than the plans generated with 0.5 cm leaf width.