

AbstractID: 8222 Title: Comparisons of a Monte Carlo IMRT plan recalculation results with the Pinnacle treatment planning system

**Purpose:** We developed a Monte Carlo based IMRT recalculation tool and determined its parameters for Varian Clinac 2100C 6 MV and 18 MV photon beams. We report our comparisons with prostate and head and neck IMRT Pinnacle treatment plans.

**Method and Materials:** Our source model components include: a primary photon point source, an extended extra-focal source, and contamination electrons. One unique feature of the system is that it is fluence-based, not a segment based calculation. A modified composite fluence map for each beam is built by summing the MLC segments and modifying for the effects of leakage, and rounded leaf edges. Model parameters are automatically determined by fitting to measurements. We re-computed two 6 MV head & neck, and three 18 MV prostate, IMRT plans created by Pinnacle. For head & neck plans, we compared the DVHs of PTV, brainstem and parotid glands, as well as the mean dose to parotid glands. For the prostate plans, the DVHs for PTV, rectum, and bladder, as well as the D50, D98, and minimum doses for PTV are compared. **Results:** We found that our dose calculation

system is comparable with Pinnacle for prostate IMRT plans, with small differences. For the prostate tests, the D50 for the PTV agrees within 0.7% with Pinnacle. DVHs for rectum and bladder all agree closely. The model predicts more pronounced dose inhomogeneity inside PTV in head and neck cases: the average reduction in the D98 value for the primary PTV was 5.5%.

**Conclusion:** As expected, prostate IMRT recalculations agree well with the Pinnacle results. However, differences in head and neck results may be due to improved physics in the Monte Carlo system. The results support the use of the Monte Carlo tool as a treatment planning QA tool. **Conflict of Interest:** Work partially supported by grant PHS CA010953.