AbstractID: 3897 Title: Complex IMRT plan verification using a commercial MU calculation package

Purpose: The general availability of IMRT treatments is constrained by the need to perform dosimetry measurements as part of the patient plan verification. While secondary IMRT MU calculators have been successfully used to validate some plans for a restricted number of sites, these calculators have suffered from unacceptably large uncertainties when applied to sites confined to the head and neck region. A strategy to reduce these calculational uncertainties has been developed which permits a greater use of IMRT MU calculators and reduces the need for dosimetric measurements, enabling a larger patient population to receive the benefits offered by IMRT treatments.

Methods and Materials: Segmental IMRT head and neck treatments were developed using the Pinnacle 6.2b inverse planning module. The IMRT treatment plans where then calculated on a CT image set of PMH IMRT phantom, and validation points corresponding to key target and avoidance regions where identified. The dosimetric data corresponding to these points was exported to RadCalc, a commercial IMRT MU calculator, and the calculations were compared to Pinnacle calculations and in-phantom measurements.

Results: A total of 10 clinical patient cases, each containing 7 to 9 gantry angles, were assessed. Agreement was assessed on basis of total dose delivered to the point of calculation. The measured and RadCalc calculated doses were found to agree within 3% at the high dose point and 5% at the low dose point in all cases, while the Pinnacle calculated dose was found to agree with the measured dose within 2.5% at the high dose point, with deviations as large as 13.5% observed at the low dose point.

Conclusions: In-phantom IMRT verification calculations of the total dose yields similar results as in-phantom measurements. Consequently, a secondary MU calculator can be used to verify IMRT treatment plans and reduce the frequency of validation measurements.