

Intensity Modulated Radiation Therapy [IMRT] requires that current models for dosimetric calculations be re-examined and perhaps re-engineered in order to meet the demanding needs of small-area, high-gradient dose delivery techniques. In order to validate such a dose model, commissioning measurements were done for several different accelerators. Following data collection, measurements were made for a representative set of field shapes that included simple static geometries, step wedges, and complex field shapes delivered as multi-segment multileaf collimator (MLC) fields. These measurements were then compared to calculations made using the CORVUS Planning system (NOMOS Corporation), and an evaluation was made of the accuracy of the dose model for MLC field delivery.

Calculated dose distributions were evaluated with and without a leakage correction for MLC leaf transmission. Static field calculations showed good agreement between both models and measurements. Multi-segment fields, however, showed differences ranging on the order of 2% - 7% for non-leakage-corrected calculations. Significant improvement was seen with the leakage term included, with differences between measured and calculated dose averaging less than 3%. Penumbral measurements showed good agreement, even for complex delivery fields. Tongue-and-groove effects, not included in the model, showed significant variations between calculated and measured dose.

The finite size pencil beam dose model used in CORVUS provides acceptable dose accuracy for IMRT delivery. Work is continuing to further improve dose modeling and delivery techniques to reduce the differences caused by tongue-and groove effects.

This work was supported by NOMOS Corporation.