AbstractID: 11652 Title: Dosimetric Accuracy of the Varian HD120 MLC and Eclipse & iPlan Algorithms for Radiosurgery

The dosimetric accuracy of radiosurgery treatments is limited by the treatment planning algorithm as well as dosimeter performance for small field sizes. In this work we focus on the small field dosimetry for both the single square fields (2.5mm to 30mm side length) and the composite arcs (5mm to 23mm diameter lesions) delivered using the HD120 2.5mm MLC and the 1000MU/min 6MV beam. The isocenter dose for the square MLC fields were measured at depths of 7cm and 15cm using EDR film, a radiosurgery diode (IBA) and a 0.01cc ion chamber (IBA). The measurements for all detectors agreed to within 3.4% down to a field size of 7.5x7.5mm². Previous Monte Carlo studies have shown good agreement with film and the over response of diodes for sub-1cm fields. Therefore, the dose calculated by the Eclipse AAA and iPlan PBC algorithms was compared to that measured using film. The doses for both algorithms agree to within 5% of the film measurements for field sizes of 7.5mm or greater. For the 5mm field, Eclipse has a -11% and -25% discrepancy for the depths of 7cm and 15cm, respectively, whereas iPlan has 6% discrepancy for both depths. This lower discrepancy may be a result of iPlan being commissioned down to a $5x5mm^2$ field size whereas Eclipse was commissioned down to 10x10mm². Six composite HD120 arc planar dose distributions were measured in a Solid Water phantom using EDR film. Eclipse and iPlan show good spatial agreement for all lesion sizes (within 1mm). Central axis dose agreement is within 3% for PTV widths of 7.5mm or greater reflecting the single field results. However, for a PTV width of 5mm, Eclipse results improve compared to the single field results (2.5-12.5% agreement) whereas the iPlan results worsen (12.5% agreement).