

Purpose: AcurosXB and AAA dose calculation algorithms are assessed for accuracy in RapidArc stereotactic (small field) treatments.

Methods: AcurosXB (engineering pre-release 11.0.03) and AAA (release 10.0.28) as implemented in Varian Eclipse planning system were configured and analyzed. To assess the baseline accuracy, small open fields were considered first. Spot size setting was varied for to 0.5, 1, and 2mm. Calculation grid was 1mm. Field settings were 3x3, 2x2, 1x1 and 0.8x0.8 cm², 6MV beam from a Clinac2100iX. Profiles, PDD, and output factors were measured with PTW diamond detector (detector size: 4mm², thickness 0.4mm) and compared to calculations. Additionally, four RapidArc cases were optimized, calculated and delivered with jaw settings 3x3, 2x2 and 1x1 cm², the last having two plans, one with high (H) and one with low (L) modulation. Each plan contained one partial arc (gantry 110° to 250°), and collimator 45°. Dose to isocenter was measured in a PTW Octavius phantom and compared to calculations.

Results: Open square fields: penumbræ from open field profiles were in very good agreement with diamond for 1mm spot size setting for Acuros, and between 0.5 and 1mm for AAA. Maximum MU difference between calculations and measurements was 1.7% for Acuros XB (0.2% for fields greater than 1x1cm²) with 0.5 or 1mm spot size. Agreement for AAA was within 0.7%, 2.8% for 0.5, 1mm spot size, respectively. RapidArc cases: computed doses evaluated in an isocentric 6mm diameter sphere differ from measurements of -0.1, -1.1, 4.1, -1.0% for AcurosXB calculations and 1mm spot size, and of -0.6, -0.5, 1.8, -2.7% for AAA, respectively for 3x3, 2x2, 1x1H, 1x1L Rapidarc plans.

Conclusions: RapidArc dose calculations with AAA or AcurosXB algorithms can be considered a safe solution for stereotactic treatments.

Funding Support, Disclosures, and Conflict of Interest:

The present work was partially supported by a Grant from Varian Medical Systems, Palo Alto, CA, USA.

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