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Dose Evaluation of the AAA for small, Large and Asymmetric fields with a 6MV Photon Energy

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Purpose: Before a new calculation algorithm can be utilized clinically, a comprehensive evaluation is necessary. The accuracy of the dose calculated is very important for the quality and reliability of radiotherapy planning and delivery. The aim of this study was to achieve an accurate calculation of dose for small fields (2x2, 3x3) large field (7x7, 10x10, 20x20, 25x25, 30x30) and three asymmetric field dimensions Asymmetric 1 field ($X1=-2, X2=5, Y1=-2, Y2=5$) Asymmetric 2 field ($X1=-2, X2=5, Y1=1.5, Y2=1.5$) Asymmetric 3 field ($X1=1.5, X2=1.5, Y1=-2, Y2=5$) by evaluating the accuracy of AAA calculations in the Eclipse Treatment Planning System with measurement.

Material and Method: All the tested fields were calculated in the Eclipse treatment planning system (version 8.9.08) with AAA algorithms. A Varian Clinac 2100C/D accelerator delivering 6MV photons was used for all measurements in a blue Phantom 2 water tank. The CC13 detector was used for large field measurement while the A14SL detector was used for small and asymmetric field measurement. Determination of the physical factors required for dose estimation measured by the two ionization chambers and calculated by treatment planning system (TPS) were based on the latest technical report series (IAEA TRS-398). The acceptability criteria used for the comparison of the calculated and measured data acquired were based on the report of the AAPM Task Group 53.

Results: Good agreement between the measured and calculated dose was found, with the maximum difference not exceeding 1% for all fields. The highest difference between the calculated and measured data was seen in the large fields. The deviation in small fields, asymmetric fields and large fields were in the range of 0.0%-0.1%, 0.0%-0.3% and 0.1%-0.5% respectively.

Conclusion: Since the accuracy desired in radiotherapy chain should mostly be less than 5% in dose delivery, the results from this study are well within tolerance and that the accuracy of AAA of Eclipse is adequate for clinical applications

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