AbstractID: 5648 Title: Electron arc therapy with an Elekta SL-25 10 MeV beam using a dedicated short applicator

Purpose: To implement the electron arc therapy with an Elekta SL-25 10 Mev beam using a dedicated short applicator.

Method and Materials: . All measurements were done on an Elekta SL-25 with a 10 MeV electron beam. Radial PDD were characterized for 4 different cylindrical acrylic phantoms using TLDs and Kodak X-Omat-V radiographic films The phantom radius (d_i) ranged between 5.1 and 15.2 cm, the total arc angles (α) varied between 60° and 160° and the number of monitor units (MU) per degree between 0.5 and 7. The field with at isocenter (w) was varied between 3.7 and 9.8 cm. Based on this data bank, an analytical model was developed for monitor unit (MU) calculation. This model estimates arc beam output at the depth of maximum dose (d_{max}) as a function of d_i and α for a given w. A verification of the model precision was done with a new cylindrical phantom.

Results: Curve fitting of the complete set of beam output data with w fixed at 7.3 cm was done with an asymptotic relationship between the dose rate at d_{max} and the inverse square of d_i. The dependence of the beam output on α was introduced by assuming an explicit function of α for each parameter of the model. Results show that the calculated beam output data is a good approximation for all measured data for all phantoms and arc angles: 89% of the calculated values are within ± 3% of the measured ones and all points are within a ± 5% error range.

Conclusion: From our results, clinical implementation of the electron arc therapy technique is possible and should be facilitated by the use of our predictive model in the treatment planning process.

Conflict of Interest (only if applicable):