

AbstractID: 13044 Title: Cobalt-60 based 3-D conformal radiotherapy using an MLC and Corvus treatment planning system

Purpose: To investigate modeling a multi-leaf collimator (MLC) in conjunction with the Equinox™ Cobalt-60 teletherapy unit by measuring the accuracy of a 3d conformal prostate plan based on AAPM TG119.

Method and Materials: A prototype of the CORVUS® treatment planning system was developed to support this MLC/Co-60 combination incorporating source decay. The geometric kernel of CORVUS® was modified to properly account for the 2 cm Co-60 source diameter. Specifically, a two-dimensional circ function (radially symmetric Heaviside step function) was used to represent the isotropic radiation distribution from the cylindrical cobalt source. The diameter of the source used in modeling was computed based on the physical source size, the distance the MLC is mounted from the source, and the SAD. A sliding window technique was used to deliver the plan, which provides the advantage of avoiding the impact which source travel time could have on step and shoot delivery. Regarding mounting, a custom adapter was designed to mount the 54 leaf MLC to the usual location of shielding block tray, and two electrical connections provided interlock and timing signals. A prostate plan was generated based on the AAPM TG119 sample prostate contour utilizing a four-field box beam configuration. The calculation was compared with QA measurements using radiochromic (GafChromic EBT2) film and an ion chamber.

Results: In relative film measurements, 97.9 % of points passed a χ^2 test using 3 %, 3 mm criteria. The absolute point dose measurement using an ionization chamber agreed within 0.5% to prediction. Visual inspection of the χ^2 value map suggests that most disagreement can be attributed to uniformity issues with the EBT2 film.

Conclusion: Promising dosimetric agreement was obtained for Co-60 based conformal radiotherapy using a MLC and a prototype version of CORVUS.

Conflict of Interest: Research sponsored by Best@ Medical International, Inc.