AbstractID: 1162 Title: Investigation of an Electron Specific Multileaf Collimator for Modulated Electron Radiation Therapy

Because of the rapid dose fall off at depths, energy- and intensity modulated electron beams have generated growing interest for treating superficial targets. In modulated electron radiation therapy (MERT), small electron beams (beamlets) of different angles, energies and intensities are optimized to achieve dose conformity both laterally and in the depth direction. In this work we investigated an electron specific multileaf collimator (eMLC) for MERT beam delivery. A prototype eMLC was developed to replace the bottom scraper of a 25 cm x 25 cm electron applicator on a Seimens PRIMUS accelerator. The 84 straight copper leaves are 0.5 cm wide and 1.8cm thick, mounted on an aluminum frame at 90 cm source to surface distance (SSD). Extensive film measurements have been performed for energies 6-21 MeV with different shapes and patterns defined by eMLC at 100 cm SSD. An EGS4 user code MCSIM was used to perform Monte Carlo simulations with the eMLC included in dose calculations. Monte Carlo calculated isodose curves were compared with film measurements for a L shaped opening and an irregular pattern. The Monte Carlo results agreed well with the measurements. We also compared dose profiles simulated by Monte Carlo and measured by film for 18 MeV beams for a 5.5 cm x 5.5 cm field defined at a 100cm SSD. The results agreed within 2%/2 mm. Our results show that calculated treatment plans can be faithfully delivered using a manual eMLC.