AbstractID: 1491 Title: Dosimetric properties of magnetically collimated electron beams for radiation therapy

We present the first time measurement results of magnetically collimated electron beams. Magnetically collimated electron beams are produced by steering electrons through a fixed in-air magnetic collimator that is attached to the end of the electron cone. An axial magnetic field of approximately 0.6 Tesla is produced inside the collimator. Phantom measurements were performed to characterize the dosimetric properties of magnetically collimated electron beams. An empirical dose model was tested via comparing dose calculations with the measurement for both fixed-beam and rotational beam deliveries. We found that magnetic collimation improve the skin sparing by 15-20% as compared with the conventional electron beam. In particular, magnetically collimated electron arc beam reduce the skin dose to < 30% of the maximum dose inside the target. The isocenter dose per monitor unit was measured to be 40-150% higher for magnetically collimated electron beams as compared with conventional electron beams of the same field size. In conclusion, the dosimetric properties of magnetically collimated electron beams promise new treatment techniques that can reduce normal tissue toxicities such as telangiecstasias in radiation therapy of early breast cancers.

Supported in part by a research grant from the Department of Defense