AbstractID: 11309 Title: Dose Delivery Effects In Electron Beams From Surgical Breast Clips

ABSTRACT

Titanium clips are commonly used to delineate the location of the tumor bed during breast cancer surgery. Following a course of radiation from x-ray beams, electrons are normally prescribed as a boost for cancer treatment. This research employs a technique to determine the effect on such boost treatments as a result of metallic clip interference potentially exhibited though attenuation and scatter processes. Both Generalized Gaussian Pencil Beam and Electron Monte Carlo algorithms were used for dose delivery simulation at therapeutic energies of 6 MeV and 9 MeV. The potential effect of clip interference with an incident electron beam is concluded as unidentifiable on computer simulation in planes 3 mm from clips for both algorithms. Film dosimetry with Gafchromic EBT media did detect dose perturbations caused by the titanium clips in a more proximal plane, 0.23 mm away, resulting in a finding of 3.0 % backscatter and 2.4 % attenuation at 6 MeV and 2.0 % backscatter and 6.7 % attenuation at 9 MeV. At 6 MeV the dose to the film reduced by only 2.4 % whereas the dose reduction from the 9 MeV electron beam was greater at 6.7 %. Between 75-300 cGy, the Vidar scanner has a dose resolution of 0.5 %.[5] The noise contribution of the scanner is further estimated to be about 0.4 %.[5] As a result of having to couple these uncertainties with the uncertainty of 2 % for film calibrations, we conclude the magnitude of difference between measurement and accuracy is significant. With an end error analysis totaling 3 %, the uncertainty in measurement and the magnitude of the experimental findings is a strong indicator that the results are not significant. Results here are consistent with computer modeled simulations conducted initially in this investigation and deemed negligible for clinical findings.