AbstractID: 9081 Title: Evaluation of the use of 18 MV photons from a Siemens linear accelerator for IMRT

Due to the increased dose rate and subsequent faster delivery time, the use of an 18 MV Siemens linear accelerator (500 MU/min vs. 300 MU/min for 6 MV) is evaluated for IMRT delivery with respect to neutron production and the effects on individual patients. A modified modulation scaling factor (MSFmod) is derived, being the ratio between the total number of MU for a daily IMRT vs. conventional 3D CRT treatment. We have calculated the average values of the $MSF_{mod}$ for treatments delivered on the Primus units at this institution. The relative risk of the incurrence of fatal secondary malignancies is estimated using a previously published formalism. The difference in neutron production between 18 MV Varian and Siemens accelerators is estimated using Monte Carlo results. The neutron production from the Siemens accelerator is found to be approximately 4 times less than that of the Varian accelerator resulting in a risk of fatal secondary malignancy incurrence of approximately 1.6% when using the SMLC delivery technique and our measured modulation scaling factors for treatment of the prostate to 76 Gy. This compares with a previously published value of 1.6% for routine 3D CRT delivery to 70 Gy on an 18 MV Varian accelerator. The difference in neutron production between the two accelerator manufacturers results from the fact that the input energy for the Varian unit (18.6 MeV) was higher than the nominal photon energy while significantly lower than the nominal photon energy for the Siemens unit (14.8 MeV).