AbstractID: 2005 Title: A Comparison of Risk Estimates from Conventional and IMRT Treatments Delivered with Siemens and Varian Accelerators

Background and Purpose: A side effect of external beam radiation is out of field radiation doses to normal tissues. This out of field radiation has been associated with an increased risk of secondary malignancies, particularly in long-term survivors. The risk of secondary malignancies must be known in order to thoroughly evaluate a potential treatment plan, particularly for step-and-shoot IMRT, which yields higher out of field doses than conventional treatments.

Methods: This study estimates the risk of fatal secondary malignancies for 6 IMRT and one conventional treatment approach for prostate cancer. The whole-body absolute risk of fatal secondary malignancy for each treatment approach was calculated based on dose equivalents to sensitive organs and risk coefficients of the NCRP (Report 116).

Results: The lowest risk of secondary fatal malignancy was found with the 18MV conventional treatment with a Varian accelerator (1.7%). Of the IMRT treatments with a Varian accelerator, the lowest risk was found at 10MV (2.1%). Higher risks were found at 6MV (2.9%), 15MV (3.4%), and 18MV (5.1%). Intermediate risks were found with IMRT treatments with a Siemens accelerator at 6MV (3.7%) and 15MV (4.0%). There did not appear to be a significant difference in risk between treatments done with Varian or Siemens accelerators.

Conclusion: A substantial difference in risk of secondary fatal malignancy was seen between different IMRT and conventional prostate treatments. The risk of secondary malignancies should be taken into account when deciding clinically what is the optimum treatment for patients.