

## AbstractID: 5504 Title: Uncertainty Analysis of Risk of Secondary Fatal Malignancies from Radiotherapy Treatments Including IMRT

**Purpose:** Radiation away from the treatment field may induce secondary cancers in long-term survivors. Risk estimates have received increased attention with the increase in out-of-field dose associated with IMRT. However, uncertainty in these risk estimates were not previously established, which has left unresolved the significance of these risk estimates. This work examines the uncertainty in the absolute risk estimates, as well as uncertainties in the ratio of risks between treatment modalities.

**Method and Materials:** Effective dose equivalents and estimated risks were taken from the literature for several treatment modalities including IMRT at 6, 10, 15, and 18 MV and conventional therapy. The most recent risk estimates (5.75%/Sv) along with uncertainties in this risk estimate and uncertainties in the dose-response model were considered in generating 90% confidence intervals for the absolute risk estimates and ratio of the risk estimates.

**Results:** The absolute risks of fatal secondary malignancy were associated with very large uncertainties, which precluded distinguishing between the risks for the different treatment modalities considered. However, a much smaller confidence interval existed for the ratio of the risk. Because of the confidence intervals generated, an effective dose equivalent difference of 50% resulted in a statistically different ratio of the risks. Such differences were observed between some of the treatment modalities considered including 6MV as compared to 18MV IMRT.

**Conclusion:** While no statistically significant difference existed in the absolute risk estimates of the treatment options examined in this study, the ratio of the risks was found to yield statistically significant differences between some treatment modalities considered.