

AbstractID: 11547 Title: The effect of daily cone beam CT imaging dose on the secondary cancer risk for patients receiving prostate IMRT treatments

Purpose: The impact of daily kilovoltage cone beam CT (CBCT) imaging dose on the radiation induced cancer risk (RICR) was evaluated for patients receiving prostate IMRT treatments. **Materials and Methods:** Increased secondary cancer risk was modeled by employing effective dose concept described in ICRP report 103 as basis. A prostate IMRT plan was generated in the treatment planning software to calculate dose to organs within the treatment volume. Scattered and leakage dose to organs outside the treatment volume, and CBCT imaging dose were obtained from data in published literature. Both linear and nonlinear risk-dose response models were considered to establish a relationship between RICR and absorbed dose in the therapeutic dose range. ICRP 103 tissue weighting factors were assumed to stay the constant as a function of absorbed dose. **Results:** We calculated the relative increase in RICR for various RICR-dose response models. If the secondary cancer risk was assumed to be proportional to absorbed dose, the increase in RICR due to daily CBCT imaging was in the order of 5 %. If the secondary cancer risk was assumed to fall off exponentially at therapeutic doses (beyond 4 Gy), RICR increased by 21%. If RICR was assumed to be constant at therapeutic doses, the increase in RICR was 13%. Finally, if only out-of-treatment field organs are considered for risk estimations, RICR increased only 2%. **Conclusion:** Based on the risk-dose response models that we evaluated, increased secondary cancer risk due to daily CBCT imaging during prostate IMRT treatments was in the 2% to 21% range. Although such models were known to contain inherently large uncertainties, our study might be a plausible starting point to evaluate the effect of CBCT imaging dose on the secondary cancer risk for radiation therapy patients.