

AbstractID: 13454 Title: Equivalent doses and secondary malignancy risk estimates for gynecological patients undergoing CBCT and IMRT

Purpose: To assess risk of secondary malignancy associated with peripheral doses from kV CBCT for gynecological patients undergoing IMRT and to compare doses to organs peripheral to the treated volume from kV Cone Beam with scatter and leakage doses from MV IMRT. **Method and Materials:** In field and peripheral doses for kV CBCT gynecologic studies were simulated by Monte Carlo code BEAMnrc and DOSXYZnrc. Dose-mean lineal energy based quality factor for kV beam was calculated to account for the difference of relative biological effectiveness between kV CBCT beams and MV beams. Life time attributable risk of cancer incidence (LAR) and relative risk (RR) for bladder and colon for patients undergoing IMRT and daily CBCT were estimated based on the Monte Carlo simulated equivalent doses. Peripheral dose from image-guided radiation therapy (IGRT) using kV CBCT was evaluated relative to the scatter and leakage doses from the Linac delivering the IMRT treatment. **Results:** The estimated quality factor for CBCT is about 1.3 times that of MV beams. With daily imaging over a 25 fraction IMRT treatment regimen with prescribed dose of 4500 cGy, RRs of cancer incidence for bladder and colon are 21.2 and 3.4, of which the contribution from CBCT is 1.83 and 1.20. In the peripheral region, the average CBCT dose is of the same order of magnitude as the leakage dose. Scatter doses from the IMRT treatment are however, a factor of 5 higher than the CBCT peripheral doses and leakage doses. **Conclusion:** Even with daily kV CBCT, the relative risk caused by CBCT is much lower than the risk from IMRT scattering in both in field and peripheral regions. Understanding the relative risks associated with the doses from these procedures is important for designing appropriate CBCT protocols. **Conflict of Interest:** Research supported by Varian Medical Systems.