

AbstractID: 10347 Title: Risk Estimation of Radiation Induced Second Cancers in Prostate Cancer Patient Treated by Intensity Modulated Radiotherapy (IMRT) and Three Dimensional Conformal Radiotherapy (3D-CRT)

**Purpose:** The main purpose of this study was to determine the organ equivalent dose (OED) from primary beam and scatter components reflecting the second cancer risk in prostate cancer patients treated with 10 MV photon by the intensity modulated radiotherapy (IMRT) compared to the three dimensional conformal radiotherapy (3D-CRT).

**Method and materials:** Both IMRT and 3D-CRT plans were optimized for each of the 10 patients using Eclipse Radiation Therapy Planning System (RTPS), from which the differential dose volume histograms (dDVHs) for organs of interest were extracted. The three-dimensional dose distribution data were used for calculation of the primary beam OED. The scatter dose was measured by thermoluminescence dosimeters 700 (TLD-700 rods) using an Alderson Rando phantom to simulate the treatment condition according to IMRT and 3D-CRT plans.

**Results:** IMRT plan induced a significant 2-fold increase in scatter component of OED compared with 3D-CRT ( $p = 0.0092$ ) and a 1.13 fold reduction in primary beam component ( $p = 0.0001$ ). When the primary and scatter components were combined, the total OEDs for IMRT and 3D-CRT were 0.41 and 0.43 Gy, respectively. No significant difference could be observed ( $p = 0.1845$ ). On average, risk of the second cancer from IMRT and 3D-CRT plans was 12.47 risks/10,000 patients/year.

**Conclusions:** IMRT plan does not induce greater second cancer risk than 3D-CRT. The average OED for both techniques was 0.42 Gy.