

Purpose: To quantify the magnitude of dose optimization in 2 opposed tangential-field IMRT for left whole breast irradiation.

Methods and Materials: 6 left breast IMRT cases were randomly selected from our recent IMRT group for analysis. Each had 3 plan trials using 2 opposed tangential fields of 6 MV photons with heterogeneity corrections comprise a wedge paired 3D plan, IMRT plan with lung and heart dose constraints, and IMRT plan without organ avoidance (IMRT₀). In all trials the prescribed 50.40 Gy conceals 96% of PTV with clinically acceptable dose homogeneities. PTV was defined as entire involved breast with 5 mm margins from skin surface, lung and heart. A smaller volume was used for IMRT optimization due to electron buildups. The global maximum doses, doses at the cardiac surrogate (1 cm cardiac peripheral ring of in the upper-left quadrant), and volume of the left lung receiving 25.00 Gy dose (V_{25Gy}) were compared.

Results: Although global maximum doses were improved from 60.99 ±1.62 Gy in 3D plans to 59.96 ±0.97 Gy in IMRT₀ plans, no statistical differences (p ≥ 0.10) were indicated between groups, including IMRT (60.68 ±1.63 Gy) group. Mean doses to cardiac surrogate (12.61 ±6.45 Gy for 3D, 10.77 ±3.68 Gy for IMRT, and 11.83 ±3.08 Gy for IMRT₀) were technically undistinguishable. Similar V_{25Gy} for left lung was seen in all 3D, IMRT, and IMRT₀ groups (12.8%, 12.5%, and 14.8% respectively).

Conclusion: Observed 1.02 Gy in prescribed 50.40 Gy or 1.5% reduction in global maximal dose by IMRT₀ from 3D plans did not reach statistical significance due to limited sample size. With 96% PTV dose coverage and acceptable dose homogeneities, IMRT or IMRT₀ plans did not show meaningful dose sparing for cardiac surrogate or left lung in this investigation.