AbstractID: 7318 Title: Reduction of cardiac and lung complication probabilities after breast irradiation using conformal radiotherapy with and without intensity modulation

The purpose of this work is to assess cardiac and lung doses and corresponding normal tissue complication probabilities (NTCPs) for breast cancer patients receiving irradiation of the left breast. Furthermore, the application of a single global objective function to generate beam segments and beam weights using inverse treatment planning of these techniques is investigated.

Three tangential beam techniques were compared: 1) optimized wedges without blocks, 2) optimized wedges with conformal blocks and 3) intensity modulation. Plans were evaluated using dose-volume histograms (DVHs) for the planning target volume (PTV), the heart and the lungs. NTCP values for radiation pneumonitis were calculated using the mean lung dose. NTCP values for late excess cardiac mortality were calculated using the relative seriality model with parameter values γ=1.28, s=1 and D_{50}=52.3 Gy. The prescribed dose was 50 Gy delivered in 25 fractions, normalized to the mean PTV dose. Fluence profiles and beam segments were generated using Konrad, while beam weights were optimized using the University of Michigan planning system U-Mplan.

The patient averaged dose homogeneity in the PTV was not significantly different between the three techniques. The average NTCP for radiation pneumonitis was below 0.5% for all techniques. The average NTCP for late cardiac mortality was 5.9% for the rectangular technique. This value was reduced about to 4.0% and 2.0% with the conformal and IMRT technique, respectively. One single objective function could be used to generate these results.