

AbstractID: 1327 Title: Comparison of TCP and NTCP for Hypo-fractionated Breast Treatment

Comparisons of Tumor Control Probability (TCP) and Normal Tissue Complication Probability (NTCP) have been made using different treatment planning techniques for breast cancer treatment. The treatment techniques under investigation include conventional tangential photon radiotherapy that delivers 46Gy to the breast in 23 fractions, intensity-modulated radiation therapy (IMRT) that also delivers 46Gy to the breast in 23 fractions and hypo-fractionated IMRT that delivers 45Gy to the breast in 20 fractions. The conventional plans are generated using a commercial treatment planning system, the IMRT and hypo-fractionated IMRT plans are generated using a home-grown treatment optimization system. All final dose calculations are performed using the Monte Carlo method. A Linear-Quadratic (LQ) model has been applied for the TCP calculation. A modified parallel quantal model has been applied for the NTCP calculation. The results show that all techniques cover the target very well, IMRT and hypo-fractionated IMRT techniques give more homogeneous dose to the target volume than the tangential technique. The differences in TCP for the 3 different treatment techniques are small; the average difference in TCP among 19 patients is less than 2.5% (TCP>90%). The highest lung dose using the IMRT technique is about 2% more than that using hypo-fractionated IMRT while the tangential technique gives the highest lung dose. The differences in NTCP between IMRT and hypo-fractionated IMRT are within 2% for different α and α/β values. For most patients, NTCP values for lung using the conventional technique are 20% higher than those using IMRT and hypo-fractionated IMRT.