

AbstractID: 3431 Title: The evaluation of several commercial IMRT treatment planning systems heterogeneity dose calculation algorithms using an anthropomorphic thorax phantom

Purpose:

To measure the accuracy of heterogeneity dose calculation algorithms from several commercial IMRT treatment planning systems using an anthropomorphic thorax phantom.

Methods and Materials: Four planning trials were designed to characterize heterogeneity dose calculation algorithms. The four trials were 1) evaluation of ADAC Pinnacle's conventional 3D algorithm as a baseline, 2) evaluation of Pinnacle IMRT, 3) evaluation of Corvus IMRT and 4) evaluation of a hybrid plan consisting of the Pinnacle dose calculation optimized by Corvus. The accuracy of the algorithms was determined by delivering the clinically relevant treatment plans to the Radiological Physics Center's anthropomorphic thorax phantom. The phantom contained radiochromic film in the three major planes and TLDs in the center of the tumor target. The film data were normalized to the TLD readings. Point doses and planar dose distributions were extracted from the treatment planning system and compared to TLD and film measurements. Dose profiles and planar dose distributions were compared point by point using criteria of $\pm 5\%$ and 3mm distance to agreement.

Results:

Preliminary results for Pinnacle reveal TLD-to-calculation dose ratios of 0.994 and 0.990 for 3D and IMRT, respectively. Points on dose profiles through the target and adjacent lung met the agreement criteria 96% and 84% of the time for the respective treatment techniques. The 3D TPS planar dose distribution agreed with measurements to within the criteria at 74% of the points, while the IMRT TPS agreed at 73% of the points.

Conclusion:

The Pinnacle conventional and IMRT heterogeneous dose calculation algorithms agree well with measured data in an anthropomorphic thorax phantom.