AbstractID: 9443 Title: Experimental Verification of Lung Tumor Dose with Radiochromic Film.

Purpose: To assess the absorbed doses in and around lung tumor by performing radiochromic film measurements.

Method: A phantom was made to have a water equivalent central core, a low-density middle layer and a water equivalent outer layer to simulate tumor in the lung, lung and chest wall, respectively. GafChromic™ EBT films were placed in the anterior and posterior surfaces and middle plane of the tumor. Three plans with a single anterior beam, opposed anterior-posterior beams and five-field-IMRT were delivered separately. A calibration curve was generated to convert the optical density to absorbed dose. The measured doses in the three planes were compared with the calculated doses from Eclipse™ system which uses a Pencil Beam convolution-superposition Algorithm with modified Batho inhomogeneity correction. The single-beam, opposed beams were delivered for both low (6 MV) and high (15MV) energy photon. The IMRT plan was delivered with 6 MV.

Results: For both single- and opposed-beam plans, the measured dose was very close to the calculated dose in the middle plane (<2 %). In the anterior and posterior surfaces of the tumor, the measured dose was substantially lower than the calculated one. For the single–beam plan, the difference was10.0% (6MV) and 13.6%(15MV) for the anterior surface and was 9.8% (6MV) and 6.8%(15MV) for the posterior surface. For opposed beams, the difference was about 8% (6MV) and 11%(15MV) for both surfaces. Similar dose differences were observed for the IMRT plan (~ 10 %).

Conclusion: EBT film measurements demonstrated that the dose calculation algorithm used by a typical treatment planning system is precise (<2%) for the deep locations inside the tumor, but may overestimate the surface dose about 10%.