

AbstractID: 10376 Title: Utilization of Conebeam CT to Accurately Assess TLD Placement for In-Vivo Dosimetry

Purpose: Assessing the predicted dose at the thermoluminescent dosimeter (TLD) location is one of difficulties when utilizing in-vivo TLD dosimetry. Accurate dose prediction at the exact TLD location increases confidence in the measured TLD results.

Method and Materials: Prior to localization and treatment, TLDs are placed according to physician's direction. A conebeam CT (CBCT) image set, in treatment position and encompassing all TLD locations, is obtained. The patient's treatment is delivered and the TLDs are sent for analysis (University of Wisconsin, Radiation Calibration Laboratory). The acquired CBCT image set is imported into the Eclipse treatment planning computer and the data set is rigidly fused with the initial treatment planning simulation CT data set. The TLDs are visible on the CBCT data set, allowing for visualization of the TLD location on initial planning CT which contains the calculated dose distribution. The calculated dose at the exact location of the TLD is obtained for comparison to the measured TLDs. Thus, the calculated dose at the exact TLD position is obtained for comparison to the measured TLD results. From 2008 – 2009, three patients underwent treatment for scalp lesions, resulting in twelve TLD measurements from the above described technique.

Results: All TLD results were corrected for contribution from the CBCT acquisition. The percentage agreement of measured vs. predicted TLD doses was 0.2 ± 7.5 %.

Conclusion: These results indicate that CBCT can be used to predict the dose at the exact TLD location during treatment within 10%. Additionally, CBCT removes uncertainty in TLD location on the patient at the time of exposure.