

AbstractID: 7038 Title: Patterns of Failure for Ion Chamber based IMRT QA

Purpose: To examine the effect of detector size in the dosimetry of IMRT delivery. In addition we studied the effect of tongue and groove effect (TGE) and steep dose gradient regions (SDGR) at the point of measurement and their implication in the measured dose.

Method and Materials: The advantage of intensity-modulated radiation therapy (IMRT) over conventional treatment methods is the limited damage to normal tissue, while delivering high doses to target volumes. Because of the complexity associated with the application of IMRT, patient plan quality assurance (QA) is very important. In our department QA measurements can reveal discrepancies larger than 3% of the expected values. Those discrepancies cannot be easily explained by common errors (phantom setup, output variation etc.). Absolute dose measurements of intensity modulated fields were performed in a water tank phantom using ion chambers of three different volumes (0.015cc, 0.056cc and 0.3cc). All measurements were compared to the corresponding calculated doses from the treatment planning system. Film measurements were also taken for every IMRT field in our study in order to examine if the point of measurement was on a SDGR and/or affected by TGE.

Results: According to our results a better agreement with the calculated values was shown using the 0.3cc ionization chamber. Discrepancies of more than 3% existed in cases where the point of measurement fell into a SDGR or on areas where TGE was more pronounced, as demonstrated by the film measurements.

Conclusions: Preliminary results indicate that using a larger ionization chamber for clinical QA purposes is a possible solution to overcome the positional uncertainty, especially in cases of SDGR or if synchronization is not used for limiting the TGE.