

AbstractID: 11267 Title: Establishing an Efficient EPID-based IMRT QA Protocol Using Gamma Analysis Coupled with DVH

Purpose: This study is to establish an efficient EPID-based IMRT QA protocol using gamma analysis coupled with DVH. **Method and Materials:** An EPID is configured for 6- and 10 MV X-ray beams for the IMRT portal dosimetry. The EPID system is assessed for dosimetric accuracy using several open fields spanning 3cm x 3cm to 38cm x 10cm with dMLC patterns. To build a QA decision tree, retrospective analysis of over 100 dMLC fields is undertaken to examine correlation between passing rates and field sizes. The fields are divided into 2 categories according to their field sizes. A statistical analysis is done using Statistical Process Control to determine passing criteria. For the failed fields from the gamma analysis, fractional dose contribution to PTV or critical structures is considered for the second criteria. The dose difference between the planned and the acquired images and DVHs from initial and a modified plan excluding the failed field is utilized. **Results:** From the system accuracy study, the dose profile matches within 2.7% up to 30cm x 10cm and the gamma score varies with field size. In the retrospective analysis, to make 2% pass rate, gamma score of 0.992 and 0.944 are chosen for the small, $r_m < 18.3$ cm, and large field groups. For 10MV beam, 7% pass rate is chosen with gamma scores, 0.969 and 0.872 for $r_m < 15$ cm and the larger field group, respectively. For failed fields, calculated dose difference is less than 5%, which is the second criteria. A field which fails both criteria needs IMRT re-optimization. **Conclusion:** The gamma thresholds chosen are based on our statistical findings. The proposed IMRT QA decision tree utilizes gamma scores and overall dose distribution of the individual fields to plan. This is a useful tool to standardize the patient-specific QA.