

AbstractID: 8625 Title: Delivered dose assessment with beam's-eye-view imaging during radiotherapy

Purpose: During conventional radiotherapy the location of the patients' anatomy, particularly the tumor, while the treatment beam is on is of primary importance. This becomes especially relevant in treatment sites where large intra-fraction motion has been observed (upper abdomen and thorax). We have already demonstrated a method for monitoring the target during irradiation with beam's-eye-view (BEV) imaging. In this work we use the intra-fraction data to retrospectively calculate the delivered dose. This can be done in between each fraction and the cumulative treatment dose updated daily. If discrepancies are seen between planned and delivered, the treatment may be altered such that the delivered distribution converges with the plan.

Method and Materials: The radiotherapy target is visualized daily during radiotherapy by collecting the exit radiation with an electronic portal-imaging device (EPID). In between each fraction, the location of the target in the treatment images is compared with the reference position from simulation. The in-treatment target positions are introduced in the treatment planning software as sub-fields representing equal fractions of the original fields' monitor units. The dose distributions from each of the sub-fields are summed to calculate the dose delivered each day. This distribution is updated daily to provide the cumulative delivered dose distribution.

Results: The dose-volume histograms (DVH) for the planned and delivered distributions have been calculated for several patients. Delivered doses to target and critical structures are generated for each fraction and cumulatively.

Conclusion: The delivered dose can be calculated using the information contained in BEV images acquired during irradiation. By calculating the dose actually delivered to the target, we can assess our treatment procedures as well as more accurately report clinical results.

Conflict of Interest: This work was partially supported by Varian Medical Systems, Inc.