

AbstractID: 4380 Title: A novel method for image-guided verification of SBRT with an EPID in cine mode

Purpose: The adoption of stereotactic radiosurgical techniques for extra-cranial treatment sites is predicated on a high accuracy and precision of tumor localization before *and during* each treatment. We introduce a novel method for monitoring the tumor location while the treatment beam is on by using a conventional electronic portal-imaging device (EPID).

Method and Materials: In our clinic, we are currently treating some liver patients under a Phase-I IRB-approved extra-cranial radiosurgery protocol. Prior to treatment planning, multiple ($n > 2$) gold fiducial markers are implanted on the periphery of the tumor. At the time of treatment, the patient is placed in a stereotactic body frame with abdominal compression. After the set-up orthogonal portal images are taken, the EPID is left in its acquisition position. When employed during treatment, the EPID, in *cine* mode, collects the exit radiation and produces a sequence of images for each field. By the end of treatment, a collection of images will be available in PortalVision for review. For advanced analysis and quantification, the images are exported and evaluated off-line.

Results: Given the length of hypofractionated treatments (due to the high dose delivered), we are able to acquire as many as 78 images for each field. The implanted gold markers are visible in the images even before processing. We use an in-house program for calculating the location of the seeds and their relative distance to the planned location (as defined by the DRRs).

Conclusion: We have developed an algorithm for quickly assessing target localization using implanted gold markers as surrogates. Not only is this information used to verify the treatment, but it may also be used in the future to adapt the treatment either for subsequent fields or remaining fractions.

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