AbstractID: 6712 Title: Evaluation of rapid dose map acquisition of a SLIC (scanning liquid-filled ionization chamber) electronic portal imaging device (EPID)

We evaluate the accuracy and performance of the new dosimetry module in the Varian LC250 SLIC EPID for IMRT verification, in both standard (~2.7s/frame) and fast (~1s/frame) synchronous acquisition modes (S- and F-mode). This module permits one to integrate EPID snapshots of IMRT dose rate in real time, and returns a profile of accumulated dose for treatment verification. The EPID was calibrated using an iterative procedure, from which a lookup table was generated and transferred to the image-acquisition hardware. We evaluate the dose linearity, the relative profiles compared with film measurements, and the accuracy in predicting absolute dose. We also verify IMRT fields using a linear-regression model and compare the results with off-line integration. The results indicate that dose linearity for static and IMRT fields is within 2.0% for monitor unit >100 (S-mode) or >50 (F-mode.) The EPID measured profiles of open and wedged fields agree well (within 3.0%) with film measurements. The measured dose in the S-mode is within 3% of the ion-chamber-measured dose. However, the dose measured in the F-mode is off significantly (>4%). Verification of IMRT fields using real-time integration shows comparable accuracy (mean=3%, standard deviation<1%) to off-line integration. For the same given dose, the F-mode is more accurate than the S-mode in all cases. However, the improvement is not proportional to the difference in imaging speed. Possible explanations which we are investigating include detector "memory" of prior images, momentary beam hold-off during DMLC delivery, and smaller signal-to-noise ratio due to shorter acquisition time, when F-mode is used.