

AbstractID: 6485 Title: Evaluation of Quality Assurance Phantom for Electronic Portal Imaging Device (EPID)

Electronic portal imaging device (EPID) has become an essential and integral tool in setup and treatment field verification for precision radiation therapy. Along with geometric verification, EPID is also being used for dosimetric verification. Consistent image quality and stable radiation response is necessary for proper utilization that requires routine quality assurance (QA). A commercial 'EPID QC' phantom from PTW is evaluated for EPID QA. The device is a solid $25 \times 25 \times 4.8 \text{ cm}^3$ phantom and weighs 3.8kg. It consists of 5 essential tools to measure the geometric accuracy, signal to noise ratio (SNR), dose linearity, the low and the high contrast resolutions and are aligned with divergence to measure the imaging and geometric parameters in both x, and y directions. The low contrast tool consists of a series of holes with various diameters and depths in aluminum slab, very similar to the Las Vegas phantom. The high resolution contrast tool provides the modulation transfer function (MTF) in both the x- and y-dimensions to measure the focal spot of linear accelerator. The EPID QC device is tested on the latest and modern amorphous silicon imagers on Elekta, Siemens and Varian linear accelerators. Images were acquired in the anterior and lateral orientations for a $26 \times 26 \text{ cm}^2$ field for 1-15 MU at 95.2 cm. The analysis of the images was performed with the EPIDsoft software for automated analysis. The results indicates that all imagers have very good low contrast resolution and MTF(0.5) in the range of 0.3-0.4 lp/mm. All imagers also exhibit satisfactory geometric accuracy, dose linearity and SNR. Our analysis indicated that the imaging parameters are independent of MU and spatial orientations. The software maintains a record for the QA and verifies the parameters for temporal variation. The EPID QA device is easy to use, and allows readily assessment of the performance of any imager.