

Purpose: Since amorphous-silicon electronic portal imaging devices (EPIDs) availability the interest for radiation dosimetry use increases. In clinical quality assurance (QA) program, EPIDs has the potential to be used to verify IMRT plans in radiation therapy. The present study purpose is to test the use of an EPID phantom-less method in clinical applications for IMRT.

Methods: EPID images were acquired using a aS1000 EPID in the integrated mode, 6 MV beam, 600 MU/min dose rate (IMRT) . Signal intensity of EPID images were converted to dose map using a calibrated linear signal-dose relationship. An EPID-based QA system was designed, which includes IMRT Quality Assurance (QA). For IMRT and VMAT QA, a phantom-less method was proposed, which used fluence maps reconstructed from EPID-measured fluences as input to treatment plan system for dose calculation and comparison

Results: Comparison of the calculated dose using EPID-measured fluence to the plan dose for IMRT to a point and plane dose calculated by the TPS and measured by Ion Chamber were made for 16 patient specific QA plans. The EPID-based IMRT method was able to verify the treatment plan and capture the reasonable plan-versus-QA comparison with a gamma analysis (3% maximum dose, 3mm) resulting in >99 % of points with a gamma <1 . EPID-based QA dose matches well to the plan dose with similar contours. Point dose between EPID and Ion chamber measurements for IMRT plans were in average 2.24% for 16 plans including brain and Head/Neck cases.

Conclusions: The results show that EPID may be properly used as a tool for clinical QA tasks and the developed EPID-based QA system may be used for IMRT patient specific QA. Our method for EPID IMRT QA indicates the feasibility to use EPID measurements for daily patient QA verification.