# AbstractID: 12802 Title: Development of an EPID-based Machine and IMRT QA System

**Purpose:** Interests in electronic portal imaging devices (EPIDs) for radiation dosimetry increase over the past decade, particularly with recent technique advances in amorphous-silicon EPID. For a clinical quality assurance (QA) program, EPIDs may provide a useful tool with benefits of reduced cost and added convenience, e.g., shortening setup time. This study is to investigate the clinical application of EPID in routine machine and IMRT QA and develop an EPID-based QA system. **Materials and Methods:** EPID images were acquired using Varian aS1000 EPID (integrated mode; 6 MV beam; 600 MU/min dose rate). Signal intensity of EPID images were converted to dose maps using a calibrated linear signal-dose relationship. An integrated EPID-based QA system was designed, which include functions for machine QA and IMRT QA. For routine machine QA, recommendations by TG-40 and TG-45 reports were used. Specific EPID-based QA procedures and image analysis algorithms were designed and developed for basic QA tasks, e.g., beam flatness/symmetry test and Winston-Lutz isocenter test. For IMRT QA, a phantom-less method was proposed, which used fluence maps reconstructed from EPID-measured fluence as input to treatment plan system for dose calculation and comparison. **Results:** EPID-measured machine QA results were comparable to those measured monthly using films in our institute. For example, EPID-measured parameters were: flatness = 0.9-1.45%; symmetry = 0.48-1.31%; penumbra = 3.2-4 mm at SSD = 150 cm. Star-shot images were well reconstructed for isocenter check from EPID images acquired at different gantry or collimator angles. The EPID-based IMRT QA method was able to verify the treatment plan and capture the reasonable plan-versus-QA dose difference. **Conclusion:** 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 machine and IMRT QA. (Research sponsored by Oncology Data Systems, Inc, Oklahoma City, OK)