AbstractID: 3702 Title: Implementation Of EPID Based Quality Assurance Procedures For Radiation And Optical Fields.

PURPOSE: Enhanced radiation and light field quality assurance (QA) procedures have been developed and implemented utilizing amorphous silicon electronic portal imaging devices (EPID). This effort was motivated by the fact that film exposure coupled with hand measurements are extremely time consuming and prone to many sources of error.

METHOD AND MATERIALS: The EPID based QA procedure uses specially designed acrylic test templates, containing radio-opaque led bars to register the position of the optical field. Images of these templates were acquired with the EPID on both Varian and Elekta linear accelerators. A MATLab based computer application was used to automatically assess light/radiation field congruence, radiation field sizes and optical field size and positioning. A three-month pilot study using two Varian accelerators to assess both 6 MV and 18 MV photon energies was performed to validate the EPID QA procedure's efficacy and quantify its efficiency relative to film QA procedures.

RESULTS: The pilot study verified that the EPID QA system results are congruent with the hand measurements obtained from a detailed analysis of film QA measurements. Light/radiation congruence measurement performed using an EPID exhibited an absolute mean deviation of 0.37 ± 0.37 mm (1σ), relative to the film measurements. EPID based radiation field size assessments produced an absolute discrepancy of 0.57 ± 0.44mm (1σ), while film measurements yielded an absolute discrepancy of 0.61 ± 0.55mm (1σ), relative to measurements acquired using RIT software. EPID based measurements were found to be more efficiently performed, reducing the set-up and analysis time by 55% compared to film.

CONCLUSIONS: The enhanced EPID QA system can effectively replace film in routine quality assurance tasks for radiation and optical fields. This procedure saves Princess Margaret Hospital 4 man-hours per week, and provides a user-independent analysis procedure for objectively assessing routine QA results.