

Purpose: To investigate the use of Electronic Portal Imaging Devices (EPIDs) for the routine quality assurance (QA) of linear accelerator (Linac) electron beams.

Method and Materials: Routine electron beam QA is typically performed using radiographic film. The use of film for beam QA is time consuming and prone to many sources of error. EPIDs have become standard equipment on modern linacs, and their suitability for photon beam QA has been previously established. We have investigated the use of EPIDs for routine electron beam QA, including radiation field size, penumbra, flatness and symmetry. A Varian 2100iX with aSi imager was used. Service mode was used, as the linac does not support imaging with electron beams in clinical mode. Dark and flood field calibration of the EPID was obtained using the electron beams. EPID pixel response linearity with dose was verified for energies 6, 12, and 20 MeV with a 10x10 cm cone by exposing the imager to various MU. For radiation field size and beam flatness/symmetry QA, images were acquired using the 6x6 cm and 20x20 cm cones at energies of 6, 12 and 20 MeV. For comparison, Kodak XV films at a depth of 2 cm were exposed using the same configurations. The SDD for both film and EPID measurements was 105 cm. All films and images were analyzed using MATLAB code.

Results: The EPID pixel response is linear with delivered dose. The radiation field size as measured by the EPID agreed with film to within 1.6 mm. Penumbra agreed to within 1.5 mm. It was not possible to obtain accurate flatness and symmetry results, but the EPID can be used for flatness and symmetry constancy.

Conclusion: EPIDs can be used for the routine QA of electron beams. Radiation field size results are similar to those obtained with film.