

Role of Prototype Amorphous Silicon Array Electronic Portal Imaging Device (EPID) in Breathing Synchronized Radiotherapy

Current electronic portal imaging devices (EPID) are limited in their ability to provide direct and quick verification and monitoring of patients during both setup and treatment of breathing synchronized radiotherapy (BSRT). These limitations are largely due to their slow image capture rate and poor image quality. An amorphous silicon array flat panel electronic portal imaging device (si-EPID) is emerging to meet the challenge. The purpose of this study is: 1) to characterize the performance of a prototype si-EPID; 2) to compare si-EPID and digitized film image quality; and 3) to evaluate the device in terms of verification of patient setup and monitoring during BSRT. Three quality assurance phantoms: a Lutz PVC, “Las Vegas” and RMI model 1151 phantom were used to characterize the imaging system. To investigate the clinical application five EPID images each were collected from a lung cancer patient during a 22-second breath-hold and normal breathing. The quality of images obtained with the “fast” and “standard” mode was found to be comparable to and better than that obtained with the digitized films, respectively. With this prototype si-EPID, it is possible to collect the images at the beginning, middle, and end of a 15 second breath-hold. The si-EPID images can provide quick verification of initial patient setup and subsequent treatment position throughout the daily fractionation.

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