

AbstractID: 2033 Title: Acceptance Protocol and Quality Assurance Program for a Radiographic Image-Guidance System

The introduction of image-guided radiotherapy systems allows improved management of geometric variations in patient setup and internal organ motion. As IG systems become a routine clinical modality, we propose an acceptance protocol and a quality program (QA) for portal imaging and cone-beam computed tomography integrated with a linear accelerator.

The image-guided system used in this work combines a linear accelerator with conventional x-ray tube and an amorphous silicon flat-panel detector mounted orthogonally from the accelerator central beam axis. In the spirit of the AAPM TG-40 report, our QA program addresses safety of patients and staff, geometric calibration, image performance, database and software integrity. The accuracy of the clinical process is also assessed periodically. We propose a comprehensive schedule and tolerances for QA tasks. As all components of the image-guided system are widely available, clinical users can rely on established publications for several aspects of acceptance and QA. Therefore, we focus on the aspects of the acceptance and QA protocol germane to the image-guided system, including: the flex of the image-guided system components as a function of gantry angle; the pixel size at isocentre; the coincidence of the kV and MV beam axes; and, flat-panel image quality using a plastic Las Vegas phantom. The accuracy of kV and MV localization was assessed by comparing images of unambiguous objects displaced by known shifts from a reference image.

Our tests demonstrate the long-term stability of the flex movements, and that the accuracy of the image-guided process can be within 0.5 mm.