

AbstractID: 2017 Title: Imaging Performance of a Commercial aSi Flat Panel Kilovoltage X-ray imager for Organ Motion Study and Respiration Gating

The purpose of this study is to evaluate the imaging performance of a commercial digital aSi flat panel kilovoltage x-ray imager for organ motion and respiration gating studies. The imager has an image area of 397 x 298 mm<sup>2</sup> and a pixel size of 0.388 mm (1024 x 768 pixels) and acquires images up to 15 frames/s. We evaluated the image quality of this digital x-ray system with a series of test phantoms including high and low contrast resolution and Leeds phantoms. The phantom was placed on an acrylic plate on top of the imager. The acrylic plate could be driven in sinusoidal motion to simulate respiration motion. A motion amplitude of 0.75 cm (motion range of 1.5 cm) and frequency of 15 cycles/min were used in this study. For comparison, x-ray images were acquired with and without motion. Without motion, the images of Leeds N3, T0-10 and GS2 phantom displayed all objects in the phantoms. These objects were also clearly identified on the images acquired with the phantoms in motion, except that a slight motion blur was observed on the T0-10 phantom image. Low contrast resolution phantom images also exhibited mild motion induced image degradation. High contrast resolution was not affected in the direction perpendicular to the motion but was slightly reduced along the motion direction (from 1.4 lp/mm to 1.25 lp/mm). However, the overall motion induced image degradation is minimal and the impact on its application to organ motion and respiration gating related studies is insignificant.