

AbstractID: 4670 Title: Diagnostic Medical Physics Performance Evaluation of a Portable Digital Flat Detector system.

Purpose: To outline a set of tests to evaluate clinical flat detector performance in terms of image quality, artifact evaluation, detector radiation exposure response and system refresh rate/throughput.

Method and Materials: The tests were performed on a Canon CXDI-50G detector associated with Siemens Axiom Sireskop SD Radiography/Fluoroscopy (R/F) system. For most tests, all image processing filters were turned off and look up table was selected to get unprocessed image data. Detector Dark noise, uniformity and distortion measurements were performed. Relationship between detector exposure, pixel value and detector exposure index was established using three different exposure levels (0.15, 1.13 & 5.7 mR) and R^2 calculated. Spatial resolution was determined in four quadrants of the detector. Percent contrast was obtained at three exposure levels with 1 mm Copper filtration. The detector was evaluated for possible ghosting related artifacts between exposures. Detector exposure index (EXI) reproducibility was tested. Refresh rate was measured for the flat detector while used in table top, table bucky and wall bucky mode using all clinical organ program settings.

Results: Dark noise EXI was 0 with a pixel value of 0.5. Maximum non uniformity relative to global average was 4.4%. Relationship between detectors exposure, pixel value and exposure index was linear with R^2 of 0.9999 and 1 respectively. Spatial resolution was approximately 3.1 lp/mm. Percent contrast was obtained to be 1.22 corresponding to detector exposures of 0.15 mR and 1.13 mR and 0.61 for detector exposure corresponding to 5.7 mR. No ghosting was observed. EXI reproducibility was found to be within 2% of average. No artifacts or distortions were observed. Maximum time to refresh was 20 seconds for Table Top and 19 seconds for Table and Wall Bucky respectively.

Conclusion: Detailed performance evaluation of digital flat detectors is an important part of a comprehensive quality assurance program.