AbstractID: 9450 Title: Scatter Rejection properties and Low-Contrast Performance of a Scan Equalization Digital Radiography (SEDR) System: Initial Experiences with Chest Phantom Images

**Purpose:** To investigate scatter rejection properties and low-contrast performance of a flat-panel based SEDR system for chest imaging.

**Method and Materials:** A prototype SEDR system was developed to improve the image quality especially in heavily attenuated regions. Slot scan imaging geometry was used to reduce x-ray scatter without attenuating primary x-rays. Regional beam width modulation was used to equalize the x-ray exposures at the detector input for more uniform image signal-to-noise ratios. A low-dose chest phantom (pre-scan) image was acquired with the slot-scan technique to determine the equalization factors for SEDR imaging. A steel bar was placed in front of the chest phantom to measure the scatter component and scatter-to-primary ratios (SPRs) across the phantom image. Two images acquired with the same techniques were subtracted from each other for measuring the noise levels. SPRs, SNRs, and contrast-to-noise ratios (CNRs) of the SEDR images were measured and compared with those of the slot-scan images and full-field images acquired with and without anti-scatter grid.

**Results:** The SEDR technique resulted in lower SPRs in heavily attenuated regions like retrocardum and mediastinum than the slot-scan and full-field techniques. They resulted in similar SPRs in lungs as the slot-scan technique. Both the SEDR and slot-scan methods produced better SNRs than the anti-scatter grid method in full-field imaging. The SEDR technique resulted in the best CNRs, followed in order by the slot-scan and anti-scatter grid techniques. The improvement of CNR was more pronounced in heavily attenuated regions.

**Conclusion:** The SEDR technique can effectively reject scatter without having to attenuate the primary x-rays. Furthermore, it can improve image SNRs and CNRs by regionally compensating for x-ray attenuation by patient's anatomy.

**Acknowledgement:** This work was supported in part by grants CA104759 and CA124585 from NIH-NCI, a grant EB00117 from NIH-NIBIB, and a subcontract from NIST-ATP.