AbstractID: 6660 Title: Slot scan imaging with a high frame rate flat panel detector-measurement and correction for in-slot scatter

Purpose:
To report on the use of a new scatter measurement technique to characterize the scatter rejection properties and to further correct for the in-slot scatter in slot scan imaging with a high frame rate flat panel detector.

Method and Materials:
A new slot scan imaging technique was developed with a high frame rate (7.5 fps) flat panel detector. 300 images were acquired as an x-ray fan beam, defined by a slot collimator placed in front of the tube, was scanned across an anthropomorphic chest phantom. Time-intensity curves were formed from the image sequence for all pixels. They were integrated over the fan beam passing frames to form the scatter rejected image signals and over all frames to form the open field image signals. By assuming the primary component to be constant during the fan beam exposure, the scatter components were extracted from the time-intensity curves to estimate the in-slot scatter using an iterative background estimation algorithm. The results were used to measure the scatter signals and to correct for in-slot scatter.

Results:
Slot scan images of an anthropomorphic chest phantom were acquired and formed for various projected fan beam widths. 2D maps of scatter-to-primary ratios and contrast-to-noise ratio (CNR) improvement factors were generated and plotted for the slot-scan images and compared with those for the full field, non-grided images . In the lungs, CNR was improved by 30 to 50%, and in the mediastinum, CNR was improved by 60 to 150%.

Conclusion:
We have described and demonstrated the use of a new scatter measurement technique to estimate and correct for the in-slot scatter on a pixel-by-pixel basis in slot scan imaging with a high frame rate flat panel detector.
This work was supported in part by research grants EB00117 from the NIH-NIBIB and CA51248 and CA104759 from the NIH-NCI.