AbstractID: 9094 Title: A Fast and Simple Software-Based Method for X-Ray Scatter Reduction in Portable X-Ray Systems

Purpose: To develop a processing method to reduce the effects of x-ray scatter in images acquired with portable x-ray systems without an anti-scatter grid.

Method and Materials: Due to the varying geometry inherent in portable x-ray systems, the use of anti-scatter grids with a high ratio is challenging. For clinical applicability, the algorithm must be fast and preserve the image texture. First an adequate understanding of the x-ray scatter signal present in different radiography applications was obtained using Monte Carlo (MC) simulations of several clinical applications. From the simulations it was confirmed that the x-ray scatter fields consisted of a low-frequency offset, with very different shapes and magnitudes depending on the image being acquired. The developed algorithm, a modified version of unsharp masking, involves masking the open field area and the thin sections of the body, replacing these areas with the mean signal from the edges of the body, applying a low pass filter, and then subtracting a weighted version of the latter from the original image. The masking is performed to avoid the inclusion of the very high signal areas from the low pass image, which would result in an overestimation of the signal to be removed.

Results: The algorithm reduced the x-ray scatter signal in simulated MC images by 50-80%, depending on the image and the location analyzed. When applied to images of a thorax phantom obtained with a portable x-ray system without a grid, the quality of the images were improved enough to be comparable to those obtained with a clinical fixed system with a grid.

Conclusion: The use of the developed scatter reduction algorithm seems to compensate for the inability to use a high ratio grid in portable systems. Further testing will be performed.

Conflict of Interest: Research sponsored by GE Global Research.