AbstractID: 9739 Title: Scatter control techniques and new x-ray sources

Title: X-ray image acquisition- two long standing problems and a nearly realized wish

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In the last two decades, there have been rapid advances in projection x-ray imaging in the areas of x-ray detector and infrastructures for image management, processing and display. Following the development and commercialization of flat panel detectors, there have also been rapid advances in using the large area detectors to implement reconstructive 3-D imaging techniques, including the cone beam CT and digital tomosynthesis imaging techniques. In contrast to these advances, the issues of x-ray scatter and heavy patient attenuation remain the two biggest challenges in our effort to improve the image quality while keeping the patient dose in check. The presence of the x-ray scatter component in the image signals biases the transmitted x-ray intensity and results in erroneous x-ray attenuation measurements which degrades the image quality and prevents accurate quantitative analysis in both projection and reconstructed images. Heavy patient attenuation could result in excessively low photon flux in certain anatomical regions, such as abdomen or retrocardium. This can combine with the lowered detective quantum efficiencies (DQEs) to lead to excessively low and unusable image signal-to-noise ratios (SNRs) Along with these two long standing issues is the long awaiting wish to develop a “weightless” x-ray source that can be digitally controlled to shift without having to move a bulky and heavy housing. The development of a CT or digital tomosynthesis imaging system with no moving parts has become the holy grail of x-ray imaging research. In this paper, efforts to address the scatter and exposure issues and to develop a “weightless” x-ray source in the past two decades are reviewed with an educated guess on where we might head to in the future.

Educational Objectives:

1. To review the issues of and solutions to the scatter problem in x-ray image acquisition
2. To review the issues of and solutions to the problem of excessive patient attenuation
3. To review the efforts and potential use of digitally addressable “weightless” x-ray source