

AbstractID: 6863 Title: Region-of-Interest (ROI) Cone-Beam Computed Tomography (CBCT) using Rotational Digital Subtraction Angiography (DSA) Acquisition

Purpose: Region-of-interest (ROI) cone-beam computed tomography (CBCT) can reduce dose to the patient. To provide data outside the ROI and overcome the truncation artifacts due to lack of data, we propose a new technique in which a material filter attenuates the beam except in a central ROI. DSA is used to subtract background bone and tissue as well as much of the ROI filter.

Method and Materials: A ROI filter was made by making a 1 cm diameter aperture in 0.21 g/cm² gadolinium screens. The ROI filter was fixed to the x-ray tube assembly of a standard C-arm gantry. Mask and contrast acquisitions were performed. Misregistration between the mask and contrast projections were corrected to reduce artifacts at the edge of the ROI. The intensities inside and outside the ROI were further equalized to adjust for the beam hardening effects of the filter outside the ROI. After corrections, reconstruction was performed with the acquisition system's software.

Results: DSA-ROI-CBCT data were comparable to those obtained with standard DSA-CBCT with registration and equalization each resulting in artifact reduction at the edge of the ROI. Data outside the ROI was noisier due to fewer photons. Since the x-ray intensity in the periphery was reduced, the contrast-to-noise ratio of the iodinated vessels in the projections inside the ROI was approximately 40% higher than outside. The calculated integral dose reduction for the 12" acquisition mode with the ROI filter was approximately 85% compared to a full-field acquisition.

Conclusion: By providing data outside the ROI, the new DSA-ROI-CBCT technique provides reconstructions inside the ROI comparable to standard DSA-CBCT with minimal artifacts and significantly reduced integral dose compared to full-field acquisition. This technique may be easily implemented in the clinical environment for DSA-ROI-CBCT reconstruction during ROI image-guided interventions.

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