

AbstractID: 9251 Title: Iterative Reconstruction of Slow Rotation CT Data with Projection Object Masks to Decrease Motion Effects

Purpose: To investigate masking portions of projection data to decrease motion-related artifacts using iterative image reconstruction techniques.

Method and Materials: A phantom was constructed from a water-filled plastic canister with two air-filled spheres fixed inside to simulate gas pockets. Inferior-superior motion was applied to the phantom to simulate breathing. A SPECT/CT scanner (Infinia^{VC} Hawkeye, GE Healthcare) with a 140 kVp, 2.5 mA tube, and slice thickness of 1 cm was used to acquire data. A single CT slice is acquired in 14 seconds. Projections identified to contain motion via data consistency conditions were combined with forward projected sinograms of the spheres to produce projection object masks (POMs). POMs were given various weights, smoothed using a Gaussian filter, and applied to the phantom sinogram and projection blank file. An OSTR iterative algorithm was used to reconstruct the POM sinogram. Contrast and uniformity data of the POM image were taken from different regions and compared to the filtered backprojected (FBP) image. Patient studies involving anatomical areas with little motion were also analyzed.

Results: Projection data with no motion could be reconstructed with minimal artifacts when 6.7% of the projection angles were removed prior to reconstruction. For the moving phantom, motion artifacts were greatly reduced in the POM images compared to FBP images. Contrast and uniformity data showed significant improvement with the applied POM.

Conclusion: CT images were successfully reconstructed with missing projection data, and motion can be detected in the projections. Initial work demonstrates that artifacts caused by moving gas pockets and a slow rotating CT such as this SPECT/CT scanner may be reduced through iterative image reconstruction with projections removed.

Conflict of Interest: Research sponsored by GE Healthcare corporation.