AbstractID: 11081 Title: Metal artifact reduction algorithm for x-ray CT using a three-pass approach

Purpose: To investigate a three-pass reconstruction approach for metal artifact reduction in x-ray CT. **Method and Materials:** The algorithm consists of: 1) Initial reconstruction from the original sinogram data; 2) Simple thresholding to identify high-density regions (e.g. metal) that can cause artifacts; 3) Delineation of corresponding regions in the original sinogram that are replaced using linear interpolation; 4) Second reconstruction after the interpolation; 5) All pixels in the second image that lie between -500 and +500 HU are replaced with the mean of these pixels; 6) Rays in the sinogram through the metal are estimated a second time through forward projection of the segmented second image; 7) Third and final reconstruction. To avoid the need for forward projection across the entire native field-of-view (FOV) during step 6 above, a double-wedge filter is applied in the 2DFT space of the sinogram so that objects outside of the reconstruction FOV are filtered out of the original sinogram. If k and p are the view-angle and fan-angle frequency variables, respectively, the double-wedge filter consists of setting to zero all frequencies in the 2DFT of the sinogram for which $|k/(k+p)|>R/L$, where R is the reconstruction FOV and L is the source-to-isocenter distance. **Results:** The algorithm substantially reduces streak and blooming artifacts that are present in the original reconstruction for three scans with dental fillings, and performs better than linear interpolation across missing regions in the sinogram. The double-wedge filter is effective in removing contributions to the sinogram from objects outside of the reconstruction FOV. **Conclusion:** The algorithm is effective for reducing metal artifacts as well as computationally practical. **Conflicts of Interest:** Funding was provided by GE Healthcare.