AbstractID: 11587 Title: Accuracy of scatter and attenuation correction in PET imaging

Objectives: PET data is usually corrected for scatter and attenuation among other factors during image reconstruction. The aim of this abstract is to study the accuracy of scatter and attenuation correction using different tissue equivalent and object sizes in PET/CT imaging. **Methods:** A phantom containing three cylindrical inserts (Air, water and Teflon) each of 40mm diameter was scanned on a GE DRX PET/CT scanner. The inserts were used to simulate air, soft tissue, and bone at 511 keV. The activity concentration (AC) in the phantom background was set to 0.12uCi/cc to emulate background AC found in clinical studies. PET data was acquired in 3D mode for 6 minutes (2 FOVs, 3 min per FOV). The same experiment was then repeated twice while wrapping the phantom with one and two layers of saline bags to simulate patients with medium and large cross sections. Each layer of saline bags added 4cm to the phantom diameter. All PET images were reconstructed using OSEM (2 iterations 21 subsets). A 20mm diameter ROI was drawn on each of the three cylinders and background as well as ±6 slices and the mean AC was calculated. In addition, cold contrast defined as one minus the ratio of cylinder to background AC was calculated for each cylinder type and phantom size. **Results:** Contrast in the air cylinder was constant for all phantom sizes, but decreased for water and Teflon with increasing phantom sizes. The decrease was 17% and 15% for Teflon and water respectively between the small and large phantom sizes. The highest contrast was observed in the Teflon cylinder for all phantom sizes. **Conclusion:** Current scatter and attenuation correction techniques do not fully recover the true AC in tissue particularly in large objects which might impact the accuracy of quantification in PET imaging.