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ity and the accuracy of activity quantification in the phantom background were measured at a sphere-to-background ratio of 5 and at lung-to-background activity ratios (LBR) of 0, 40, 120, 400, and 1200. Similar scans and subsequent analyses were performed with ^{68}Ga. All scans were repeated on the GE Discovery 710 (D710) PET/CT system and results compared to those obtained on the DMI. **Results:** With ^{68}Ga and ^{124}I, scatter appeared undercorrected on both the DMI and D710. A positive bias on activity quantification in the phantom background caused a contrast reduction between the spheres and the background at high LBRs. No spheres were visible at a LBR of 1200, the 3 (124I) to 4 (68Ga) largest spheres could be identified at a LBR of 400 whereas all spheres were visible with both ^{68}Ga and ^{124}I at lower LBRs. The image quality was superior, background variability lower, and activity quantification more accurate on the DMI compared to the D710. With ^{68}Ga there were no photopenic areas or any appreciable difference between results obtained with and without PGC-correction. PGC-correction on the DMI also had no noticeable impact on ^{124}I-images. Photopenic areas were localized around the hot lung insert at LBRs > 40. However, these artefacts only had a minor impact on sphere detectability. Without PGC-correction enabled on the D710, scatter was significantly overcorrected in the center of images which caused large photopenic areas around the hot lung insert. PGC correction acceptably solved the problem. **Conclusion:** The new GE Discovery MI PET/CT system provides acceptable activity quantification accuracy and image quality under challenging imaging conditions where high organ-to-background activity ratios stress the accuracy of scatter correction algorithms.

OP-690

Evaluation of respiratory motion correction in PET/CT using a 3D printed phantom

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Objective: Respiratory movement during PET/CT scan causes blurred images and misalignment between the two modalities. The aim of this study was to evaluate the performance of two motion correction algorithms, Q.Static (rejection of events during inhalation) and Q.Freeze (5 bin gated acquisition with subsequent alignment of PET and CT bins) in combination with an advanced PET reconstruction algorithm, Q.Clear. **Methods:** A 3D printed phantom was designed with six cylindrical holes of varying diameter (3mm, 6mm and 10mm) and filled with 18F-FDG. The phantom was fixed on a motor simulating breathing cycles of a patient during a PET/CT study. Data was acquired on a GE Discovery 710 PET/CT equipped with a Varian RPM respiratory gating system. PET acquisition was done in list-mode with motion tracking. CT was acquired as gated CT cine and conventional helical CT. PET data was reconstructed (using Q.Clear) with Q.Static and Q.Freeze for motion correction. As recommended for clinical studies, PET Q.Freeze bin 50% and bin 70% were combined with neighboring CT cine bins (40%/60% and 60%/80%, respectively). Q.Static PET was compared with the conventional helical CT. Using the known dimensions of the phantom, the extent and pixel values of the hot spots in the PET images and the misalignment (mean difference between center of hot spots) between PET and CT were evaluated. **Results:** The best alignment was found with PET Q.Freeze 50%/CT cine 40%, and PET Q.Freeze 70%/CT cine 60%. Compared to Q.Static/helical CT, misalignment dropped from 13.8mm to 2.7mm. A good match between bins in Q.Freeze PET and CT cine is crucial - misalignment for suboptimal matching was three times higher than for PET Q.Freeze 70%/CT cine 60%. The size of the hot spots in axial PET images was robust and more or less independent of reconstruction or slice location. Furthermore, intensity of the hot spots was reduced in Q.Freeze reconstructions, and the highest intensities were found in Q.Static reconstructions. **Conclusion:** These results show that motion correction with Q.Freeze reconstruction is effective and performs better than Q.Static, but the matching of bins and decrease in intensity is important to keep in mind.

OP-691

Evaluation of the Impact of Using TOF Technique on Metal Artifact Reduction in PET/CT Images

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Purpose: The potentials of new technique like time of flight (TOF) can positively affect metal induced artifact in PET/CT imaging. The aim of this study was to evaluate the impact of TOF reconstruction on reduction of metal artifact in PET/CT images. **Subjects and Methods:** NEMA IEC body phantom with 2:1 activity ratio was used in this study. In the first step, the phantom was adapted to hold an ICD on removable lung insert and in the second step, pacemaker generator was also fastened to the internal wall of phantom. Both ICD and battery generator were placed opposite to the sphere with 13 mm in diameter. The phantom was scanned by Discovery 690 GE PET/CT scanner, equipped with 64-slice CT. The PET images were retrospectively reconstructed using two reconstruction algorithms, including non-TOF (routine protocol in our department: OSEM+PSF with 3itrations, 18subsets, 6.4 mm post-smoothing filter) and TOF (TOF+OSEM+PSF: 2itrations, 18subsets, 6.4 mm post-smoothing filter). All images were quantitatively analyzed using the CT number, SUV_{max} and SUV_{mean}. **Results**: In analysis of hot spheres of phantom, spheres with 13 and 17 mm in diameter more than the other affected by streak artifact. The relative differences of maximum CT number in these two spheres between image with metal artifact and image without metal artifact were