a diagnostic confidence (1 to 3, low to high) and image quality (1 to 5, low to high) score. **Results:** The initial 20 cases included 8 cases for metastatic bone disease in known malignancy and 12 cases for pain generators. Inter-observer agreement for presence or absence of metastases and pain generators was 90% and 85% respectively. Average image quality score by both readers increased from 3.0 for F3D SPECT/CT to 4.7 for xSPECT/CT (p<0.0001). Diagnostic confidence for Reader 1 changed from 2.95 with F3D SPECT/CT to 2.98 with xSPECT/CT (p=0.6663), and from 2.77 to 2.95 for Reader 2 (p = 0.0165). Reader 2 identified an average of 2.3 more lesions on xSPECT/CT vs F3D SPECT/CT compared to Reader 1 with an average of 0.05 more lesions. xSPECT/CT helped identify low grade uptake within smaller joints compared to F3D SPECT/CT, although overall diagnosis was unchanged for the majority of cases. Only one discrepant metastasis case was identified demonstrating mottling of marrow uptake on xSPECT/CT due to tiny sclerotic metastases otherwise only visible on the CT component and not identifiable on F3D SPECT/CT images. **Conclusion:** The xSPECT/CT reconstruction provides potential scope to identify more subtle areas of radiopharmaceutical uptake with better anatomical localisation given the improved image quality. However, our findings demonstrate variable improvement of diagnostic confidence between readers and limited change in overall diagnosis. Further studies are needed to assess the improved clinical efficiency of xSPECT/CT reconstructions. **References:** None.

EP-0853

Optimized PET reconstructions: Can they be harmonized as well?

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Aim/Introduction: PET/CT images are extensively utilized for diagnosis, (re)staging and monitoring treatment response. Preferred protocols should have optimal image quality and detectability with accurate quantification, and as such reconstruction protocols should be optimized. There are significant variations in PET quantification due to differences in scanner hardware and reconstruction algorithms. To tackle the challenge of variability in quantitative values between PET images obtained using different scanners, determination of harmonized reconstruction is very important. **Materials and Methods:** Data acquisition of IQ-NEMA phantom with SBR 4:1, 6:1, 8:1 and 10:1 was performed on a SIEMENS Biograph6 TrueV PET/CT scanner. Raw PET data were reconstructed using 6 different iterations (x subsets) and Gaussian post-smoothing filters with FWHM 2, 4, 6, 8 and 10 mm. In addition, image reconstruction was performed with/without PSF modeling (HD and 3D mode). CNR, COV, percentage difference of CNR, RC_{max}, $RC_{A50\%}$ and RC_{peak} were evaluated for standardization, and were compared with EARL specification reference values. **Results:** CNR and COV improved using smoother filters and fewer iterations. COV was less than cutoff (15%) for all reconstructions of frames >3min. Percentage difference of CNR between FWHM 4 and 6mm for all reconstructions was more than other sequential filter pairs. Though in SBR4:1, the maximum value of CNR of the smallest sphere was 8, it was barely visible, but in SBR6:1, CNR increased to 15. Iterations 30-60 with suitable post-smoothing Gaussian filters harmonized quantitative PET data. There were no difference in RC curves between 3D and HD mode in SBR 4:1. In HD mode, RC_{max} and $RC_{A50\%}$ were overestimated in higher SBRs and higher iterations. Positive bias in RC_{max} and $RC_{A50\%}$ was observed for 13, 17, 22mm spheres caused by PSF-modeled reconstruction, creating edge artifact. However, applying 6mm Gaussian filter and/or using RC_{peak} reduced this bias. Furthermore using CNR as a surrogate for image quality demonstrated that 6 mm Gaussian filter can be appropriate towards optimized as well as harmonized imaging. **Conclusion:** Image quality and detectability in PET images strongly depends on activity to background ratios, reconstruction parameters and post-smoothing filter. The optimized post-reconstruction filter was found to minimize variations of RC in comparison to EARL references. In addition, accurate quantification is feasible utilizing PSF modeling when utilizing appropriate filters. **References:** None.

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Regularized Reconstruction Improves Signal-to-noise and Quantification for ^{18}F- PSMA PET/CT Imaging

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Aim/Introduction: The popular ^{18}F-labeled PSMA-targeting PET tracer, ^{18}F-DCFPyL, has shown to be significantly superior in detecting metastatic prostate cancer than ^{18}F-FDG. Accurate quantification of ^{18}F-DCFPyL images can enable evaluation of therapeutic efficacy, comparison between centres, and the potential to build outcome predictive models. Ordered subsets expectation maximization (OSEM) is commonly used to generate PET images, but noise is amplified at high number of iterations. As such, limited iterations are used in practice to maintain adequate image quality; however, this may not be sufficient to achieve convergence and leads to lower standardized uptake values (SUV). The block sequential regularized expectation maximization (BSREM) algorithm, also called Q.Clear (GE Healthcare), allows convergence while avoiding noise amplification at higher number of iterations. In this study, we perform quantitative comparison of OSEM and BSREM-based ^{18}F-DCPFyL images on a cohort of prostate cancer patients. **Materials and Methods:** Whole-body ^{18}F-DCFPyL PET/CT imaging was performed on 30 patients with biochemical recurrence following curative-intent therapy for prostate cancer. Images were reconstructed using OSEM (32 subsets, 2 iterations) and BSREM (32 subsets, 25 iterations, gamma=2, beta=400) including attenuation and scatter correction. Images were interpreted by experienced nuclear medicine physicians. Regions of interest (ROIs) for the 3 most active lesions were drawn using MIM (MIM Software) and fixed 40% threshold. Each ROI was cloned and shifted to a region in the vicinity of the lesion to determine the maximum, mean, and standard deviation (s.d.) of the background (bg) activity. SUVmax, SUVmean, signal-to-noise ratio (SNR, calculated as lesion_SUVmean/bg_s.d.), and contrast (calculated for both SUVmax and SUVmean w.r.t. bg_SUVmean) were compared between the two algorithms. As distributions were skewed, a $\log_{10}$ transformation was applied and the Shapiro-Wilk normality test suggested that the transformed data was normally distributed. A paired t-test was used to determine statistically significant differences. Values are reported as (mean, [95% confidence interval]). **Results:** Mean BSREM SUVmax=(17.4, [13.0-23.2]), SUVmean=(9.6, [7.5-12.2]), SNR=(53.7, [41.0-70.3]), contrast_max=(19.5,[13.2-28.7]), and contrast_mean=(10.0,[7.0-14.4]) were 28.9%, 15.7%, 34.9%, 17.5%, and 2.0% higher, respectively, than OSEM SUVmax=(13.5, [10.5-17.3]), SUVmean=(8.3, [6.6,10.4]), SNR=(39.8,[31.8-49.9]), contrast_max=(16.6,[11.9-23.1]), and contrast_mean=(9.8,[7.1-13.5]). Statistically significant differences between algorithms were observed for SUVmax ($p=8.0\times10^{-8}$), SUVmean ($p=7.8\times10^{-8}$), SNR ($p=3.9\times10^{-7}$), and contrast_max ($p=1.8\times10^{-2}$), but not for contrast_mean (p=0.7). **Conclusion:** Use of regularized reconstruction can achieve significantly higher lesion SUVmax, SUVmean, SNR, and contrast_max for prostate cancer imaging using an ^{18}F-labeled PSMA PET radiotracer. This may lead to improved image quantification and clinical task performance in prostate cancer patients imaged with ^{18}F-DCFPyL. **References:** None.

EP-0855

Does Bayesian penalized likelihood reconstruction (Q.Clear) for FDG-PET always outperform image quality of OSEM-based reconstruction?

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Aim/Introduction: Bayesian penalized likelihood reconstruction for PET (e.g. GE Q.Clear) aims at improving convergence of lesion activity while ensuring sufficient signal-to-noise ratio (SNR). This study evaluated reconstructed spatial resolution, peak recovery (RCpeak) and SNR of Q.Clear compared to OSEM with time-of-flight (TOF) with and without point spread function (PSF). **Materials and Methods:** The NEMA IEC Body phantom was scanned for 3 min each (GE Discovery MI) for five times every 30 min (3.1, 2.6, 2.1, 1.8, and 1.5 kBq/ml F18) with spheres filled with 4- or 8-fold the background activity concentration (SBR 4:1, 8:1). Reconstruction with Q.Clear (beta, 150/300/450), "PSF+TOF 2.0" (in-plane filter, 2.0 mm; iterations, 2; subsets, 17), "OSEM+TOF 2.0" (identical), "PSF+TOF 6.4" (in-plane, 6.4 mm; 4/8) and "OSEM+TOF 6.4" (6.4 mm; 2/8) was performed. Spatial resolution was derived from 3D sphere activity profiles. RCpeak as ((sphere SUVpeak/background SUVmean) / true SBR). SNR as (background SUVmean/background SUVstddev). **Results:** Spatial resolution of Q.Clear 150/300/450 was each significantly higher than for all conventional algorithms (Wilcoxon, each $p<0.05$; except for Q.Clear 450 vs. OSEM+TOF 2.0 at SBR 4:1). Median spatial resolution at SBR 8:1 for Q.Clear 150, Q.Clear 300, PSF+TOF 2.0 and OSEM+TOF 2.0 was 3.6, 4.2, 5.0 and 5.1 mm compared to SBR 4:1 with 4.4, 4.9, 5.7 and 5.6 mm. SNR for Q.Clear 150 and OSEM+TOF 2.0 were similar at both SBR ($p>0.05$) but Q.Clear 150 showed higher RCpeak for the small spheres by +6.3 to 10.8% (diameter, 10 to 17 mm). SNR of Q.Clear 300 and PSF+TOF 2.0 were similar as were RCpeak (difference, +0.3 to 4.1%). Compared to PSF+TOF/OSEM+TOF 6.4, Q.Clear 150/300/450 each showed lower SNR (-79.7 to -35.9%) but higher RCpeak (+4.6 to 27.8%) at both SBR. **Conclusion:** Q.Clear improves reconstructed spatial resolution at high and low SBR compared to PSF+TOF and OSEM+TOF with both investigated iteration and filter settings. For specific conditions this resulted in higher RCpeak for small spheres at comparable SNR (Q.Clear 150 vs. OSEM+TOF 2.0). Highest RCpeak were achieved with PSF+TOF 2.0 and Q.Clear 150, but at the cost of lowest SNR. **References:** None.

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Impact of Radiation Dose Reduction of CT component in Whole-Body PET/CT Protocols on CT Image quality

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Aim/Introduction: We aim to reduce radiation dose of CT component in the whole-body PET/CT protocols, without compromising the image quality, aided by advanced iterative reconstruction technique.Regarding the issue of radiation dose, it is worth noting the recent progress and further advancements that can reduce the dose to the patient from CT exams. Important dose reductions have already been obtained through the development of optimized imaging protocols, smarter and more efficient x-ray beam collimation, advanced reconstruction algorithms, and by control of the x-ray flux illuminating the object. **Materials and Methods:** Forty eight patients underwent CT imaging with two different doses