**Summary: The influence of reconstruction parameters on PET image quality**

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**Introduction :**

The PET image quality is directly related to the reconstruction algorithm. The statistical reconstruction methods can improve the image quality by improving the spatial resolution. This may change the image contrast and the quantitative measurement of SUV (standardized uptake value) in small structures. The aim of this study is to determine the changes in SUV, image contrast, recovery coefficient and spatial resolution within the reconstruction parameters such as iterations and subsets number and also the applied corrections.

**Material and method :**

The measurements of SUV (average and maximum), contrast, recovery coefficient and spatial resolution were obtained through a Jaszczak Deluxe phantom image, acquired on a PET-CT GE scanner Discovery 710 ®. The phantom was filled with a 18F-FDG solution of 22 MBq. These parameters were studied based on the corrections applied during the reconstruction, including the Point Spread Function (PSF) and the Time-Of-Flight (TOF) option. Comparisons have also been made in terms of number of iterations and subsets: OSEM (2.4 and 10 iterations, 1.12 and 24 subsets).

**Results :**

Reconstruction results for 4 iterations and 24 subsets showed that the average SUV value, with TOF function is reduced by 5.2%, 2.1% and 4.2% compared to non-TOF, PSF and TOF-PSF reconstructions respectively.

With PSF, the average SUV value is reduced by 3% and 2% compared to the non-PSF and TOF-PSF reconstructions respectively. However the average SUV value is increased by 2% compared to the reconstruction integrating the TOF function.

The contrast measurement is reduced by 80%, 75% and 45% compared to the expected absolute value for the reconstructions with TOF, PSF and TOF-PSF respectively.

The recovery coefficient is improved with the correction of TOF and PSF however improvements become less important when the diameter of the sphere is large.

The spatial resolution with the full width at half maximum (FWHM) measured on the largest sphere is underestimated by 5.5%, 0.6% and 5.6% for TOF, PSF and TOF-PSF reconstructions respectively.

**Conclusion:**

The reconstruction parameters can improve image quality, however any image reconstruction protocol should be validated before clinical routine or research use.