Evaluation impact count recovery model on standardized uptake value used in PET-CT

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Evaluation of effect of lesion size and sphere to background ratio (SBR) on the threshold used for PET tumor volume delineation.

Evaluation effect and accuracy of recovery coefficient (RC) model on standards uptake value (SUV) of different inner size diameters filled with different activity concentration and apply this model on small cohort of patients and construct Look Up Table (LUT) for different lesions with different sizes. A cylindrical phantom equipped with different volume hollow spheres was used. Two different reconstruction algorithms were applied in this study; one of them modified with Point Spread Function (the other did not base on PSF).

Partial volume effect (PVE) was highly dominant in low uptake spheres although it had large size, i.e., not only small size object affecting by PVE but also low activity concentration object. For true volume measurements, practically TrueX algorithm was more accurate when activity measurements dal with true measured volumes.

Also, the results showed using that phantom study had successfully provided "Look Up Table" for the partial volume correction of spherical lesions at maximum measured activity ratios that were typically noted in human PET-CT imaging. The present study demonstrated that SBR have not significant effect on the estimation of volumes from PET images in the different SBRs. The only determining factor for the threshold for PET volume estimation was the size of the sphere. Superior percent accuracy was shown for OSEM algorithm when applying RC model to corrected SUV values and OSEM was more efficient and less error variation with respect to sphere volume, but in case of uncorrected data, no remarkable difference between TrueX and OSEM algorithm had been observed.

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