DAT定量評価のSUVへの応用のための基礎的検討

Utilization of SUV (Standardized Uptake Value) to Quantitative evaluation of DAT(Dopamine transporter)
-Consideration about optimum system conditions-

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【Introduction】

SBR by the Bolt method is not a high accuracy by various causes. Because, SBR includes ranges other than a striatum and the value influenced by the physique.[1)]

SUV(Standardized Uptake Value)＝ [Radioactive of VOI (kBq)/VOI (ml)]/[injection dose (MBq)/wight(kg)]

・not influenced by the physique.

・VOI: flexible change the size and set up to multiple image.

not includes ranges other than a striatum.

【Purpose】

The optimal Gamma Camera system conditions for SUV
The optimal reconstruction condition ： 3D OSEM : SI (Subset×Iteration)

【Analysis】

Striatum Phantom
radioactive ratio＝left:right:BG=8:4:1
SUVmean=8 (left)
SUVmean=4(right)
Important clinical factor (Phantom) =DAT uniformity distribution =SUVmean
Optimum system condition {collimator system (LHHR or ME),SC(+or−),AC(+or−) and reconstruction(3OSEM SI?)} = min CV (Coefficient of variation) of SUVmean of theoretical values (SVUmean=4:right tends to be subject to the influence of a statistical fluctuation.)

【Results】

Table 1 Comparison of SUVmean approximate value between difference of the system.

System	Subset× Iteration	SUVmean	ERR(%)
LHER SC− CTAC+	30	3.59	−10.25
LHER SC+ CTAC+	42	3.56	−11.0
ME SC− CTAC+	90	4.4	+10.0
ME SC+ CTAC+	90	3.69	−7.75

Table 2 Linearity of acquisition time and SUVmean.

system condition	Coefficient of determination (R^2)
LEHR SC- CTAC+ SI=30	0.988
LEHR SC+ CTAC+ SI=42	0.989
ME SC- CTAC+ SI=90	0.916
ME SC+ CTAC+ SI=90	0.999

【Discussion】

System of scatter correction tends to be subject to the influence of a statistical fluctuation.

However, there were no significant difference in SUVmean between system.

This phantom system keep up sufficient quantity radioactive counts and highly level of uniformity. Rational system conditions should be used for the clinical test. Because there are many patients with the low accumulation of DAT to the striatum. Therefore, we selected the LEHR collimator system without scatter collection. Clinical study is required in order to use this system.

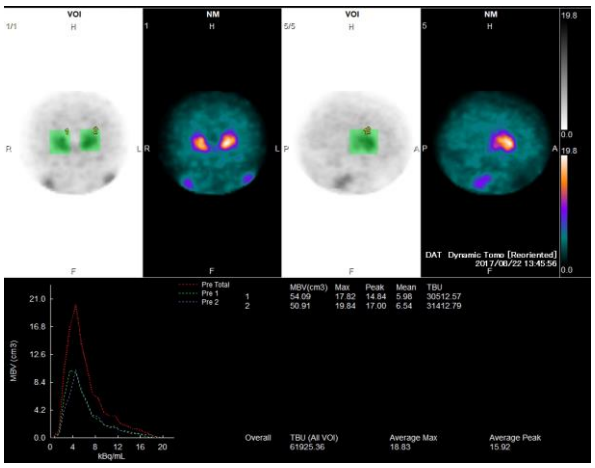

Fig.1 Case 1. Alzheimer disease

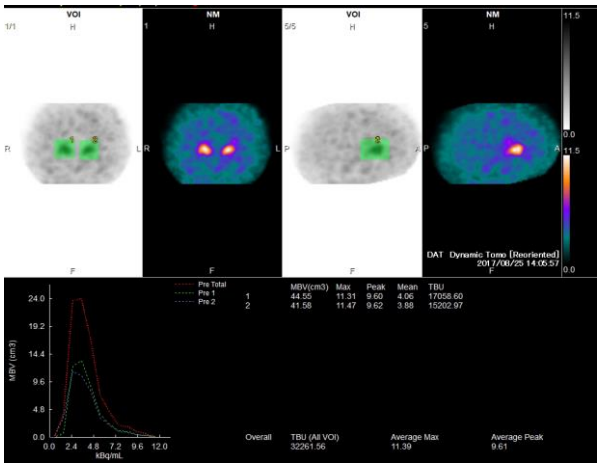

Fig.2 Case2. Parkinson disease

【Conclusion】

Optimum system condition for SVU of DAT

LEHR Collimator SC- CTAC+ : Subset×Iteration=30 Gaussian filter 3.3

LHHR Collimator SC+ CTAC+ :Subset×Iteration=42 Gaussian filter 3.3

ME Collimator SC- CTAC+:Subset×Iteration=90 Gaussian filter 3.3

ME Collimator SC+ CTAC+ :Subset×Iteration=90 Gaussian filter 3.3

【references】

1) Makoto Ohba , Akio Okada, etal: Physical Influence on SBR in ^{123}I-FP-CIT SPECT and Its Correction. Japanese JNMT Vol.38 No.2(April 2018)