

Florbetapir

reconstructed

DICOM data

Advance fit using transformation

from brain

mask and BET

Correlation Between Two Methods of Florbetapir SUVr Analysis

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Introduction

Quantitative analysis has been demonstrated to be an important aid in interpreting functional neuroimaging exams. The purpose of this study was to evaluate a newly released commercial software in comparison with an established (Avid semi-quant) method for standard uptake values ratio (SUVr) calculation in a cohort of Florbetapir PET images.

Methods

Subjects: 130 subjects (a sub-group of cases listed in Fleisher et. al. 2011)¹
49 OHC – no cognitive complaints, >55 years of age, MMSE ≥ 29
45 AD – met National Institute of Neurological and Communicative
Disorders and Stroke and the Alzheimer's Disease and Related Disorders
Association criteria for probable AD, MMSE 10 – 24 at screening
36 MCI – cognitive impairment not more than 1 year from screening
visit, CDR 0.5, MMSE > 24

Change Voxel

size in z?

Spatial Normalization

using SPM2

SUCCESS

Analysis – use MATLAB script

to compute regional mean

counts and SUVr ratios

no

qilf

Changed z

ves

Imaging: 10-min dynamic scans (2 x 5 minute frames) at 50-min post injection

Image Reconstruction: 4 iterations, 16 subsets, 128 x 128 matrix,

SPM2 Analysis

Convert

DICOM to

ANALYZE

(MRICro)

template

no

Gaussian 5mm FWHM

Image Analysis

Avid semi-quant

Registration to a single Florbetapir F 18 template (Clinically diagnosed HC and AD subjects, including subjects with $A\beta$ + and $A\beta$ - scans)

MIMneuro v 5.6.2

MIMneuroAnalysis

Florbetapir reconstructed

DICOM data

Spatial normalization (9-parameter affine)

Optional review of affine

registration – user can adjust scaling, rotation

and translation

Deformable registration

(thin-plate spline

algorithm – iteratively matches landmarks)

Final registration

verification

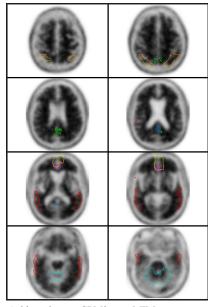
Florbetapir (Clark 2012)² regions applied to fitted

image



Simultaneous registration to three Florbetapir F 18 templates (A β +, Average of A β + and A β -)

Fitted florbetapir F 18 image with regional overlays



Avid semi-quant SPM2 SUVr = 1.357

MIMneuro SUVr = 1.345

SUVr = 6 region average (medial orbital frontal, lateral temporal, posterior cingulate, anterior cingulate, lateral parietal, precuneus) / whole cerebellum

SUVr Correlation 2.100 R = 0.991 MIMneuro_SUVr = 0.9965*SPM2_SUVr + 0.0045 1.500 1.500 1.100 0.700 0.700 0.700 0.700 0.900 1.100 1.300 1.500 1.700 1.700 1.900 2.100 MIM SUVr

Conclusions

- The two methods are well correlated across the entire range of SUVr values.
- The slope and intercept of the regression line converting the literature method results to MIMneuro results approaches 1 and 0 respectively.
- The SUVr threshold defining an amyloid positive PET scan using both Avid semi-automated and MIMneuro is 1.10.
- This study suggests that MIMneuro is comparable to published Avid² semi-automated SUVr analysis of Florbetapir images.

References

- 1. Fleisher AS, Chen K, Liu X, et al. Using Positron Emission Tomography and Florbetapir F 18 to Image Cortical Amyloid in Patients With Mild Cognitive Impairment or Dementia Due to Alzheimer Disease. Arch Neurol. 2011;68(11):1404-1411.
- 2. Clark CM, Pontecorvo MJ, Beach TG, et al. Cerebral PET with florbetapir compared with neuropathology at autopsy for detection of neuritic amyloid-β plaques: a prospective cohort study. *Lancet Neurol.* 2012;11(8): 669-678.