Correlation Between Two Methods of Florbetapir SUVr Analysis

Christopher Breault[1], Jonathan Piper[2], Abhinay D. Joshi[1], Sara Pirozzi[2], Aaron Nelson[2]

[1]Avid Radiopharmaceuticals, a wholly owned subsidiary of Eli Lilly and Company, Philadelphia, PA, USA; [2]MIM Software, Cleveland, OH, USA

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.
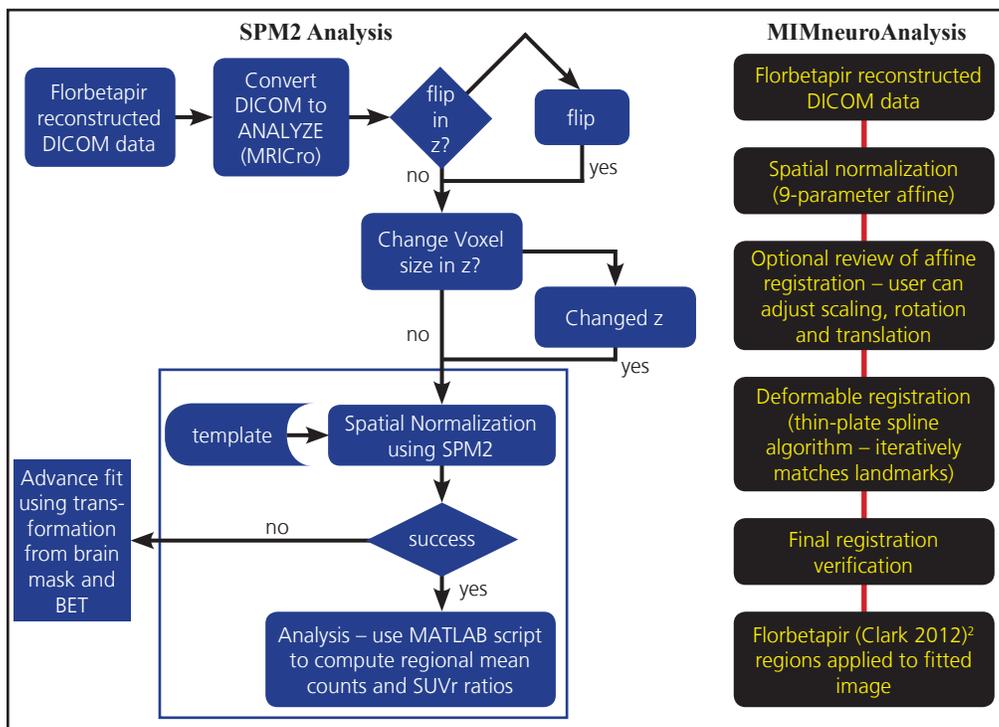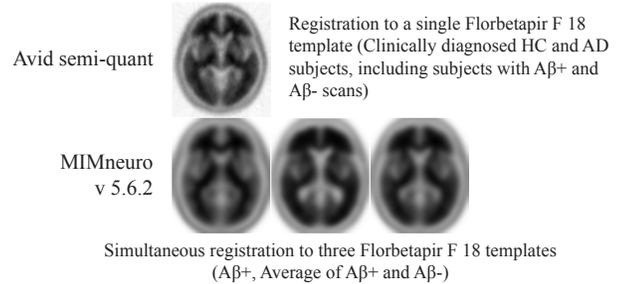
Methods

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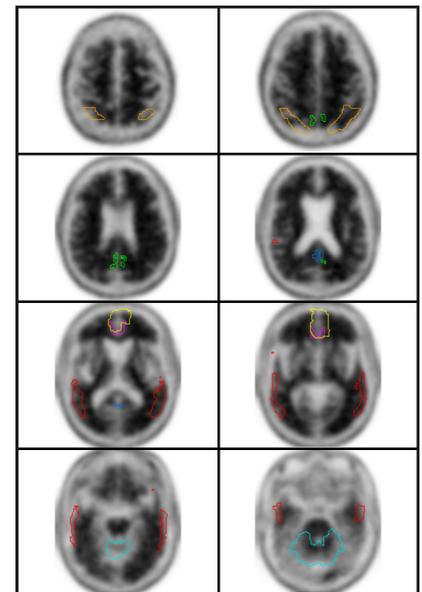
Imaging: 10-min dynamic scans (2 x 5 minute frames) at 50-min post injection

**Image Reconstruction:** 4 iterations, 16 subsets, 128 x 128 matrix, 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 Aβ+ and Aβ- scans)

MIMneuro v 5.6.2

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

SPM2 Analysis

MIMneuroAnalysis

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

R = 0.991
MIMneuro_SUVr = 0.9965*SPM2_SUVr + 0.0045
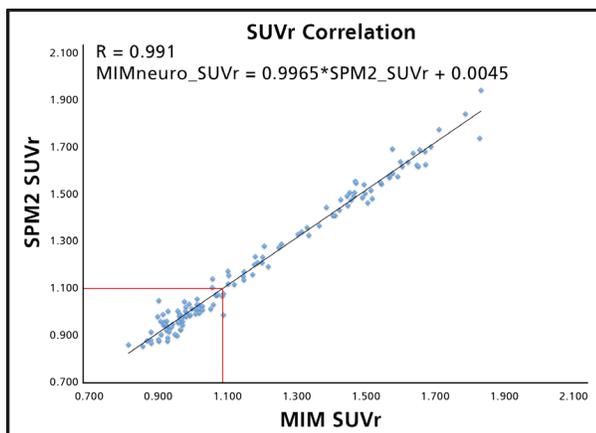
Conclusions

- 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 Avid[2] 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.