

SATURDAY, JULY 15, 2017  
ALZHEIMER'S IMAGING CONSORTIUM  
IC-01  
TAU PET

IC-01-01 AV1451-PET CORTICAL UPTAKE AND REGIONAL DISTRIBUTION PREDICTS LONGITUDINAL ATROPHY IN ALZHEIMER'S DISEASE



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**Background:** We aimed to assess whether  $\beta$ -amyloid (PIB) and tau (AV1451) PET predict longitudinal atrophy in patients with AD. **Methods:** A group of 10 patients fulfilling NIA-AA criteria for AD dementia likely due to AD were included (age =  $63 \pm 9$ , MMSE =  $24 \pm 4$  at baseline). All patients underwent i) a baseline visit with structural MRI and PET imaging with both AV1451 and PIB, ii) a follow-up structural MRI (time between MRIs =  $1.06 \pm 0.15$  years). Structural images were preprocessed using SPM12's longitudinal registration pipeline to obtain voxelwise maps of atrophy showing areas of local contractions and expansions (i.e. Jacobians, see figure 1A). Relationships between baseline PET data (Standardized Uptake Value Ratio (SUVR) images normalized to cerebellar gray matter) and subsequent atrophy were assessed in two complementary ways. First, a global cortical value was extracted for each patient and each modality (figure 1B) and correlations were computed at the group level. Second, we computed voxelwise correlations at the individual patient level to evaluate the similarity between baseline maps of PET uptake and the subsequent atrophy map (figure 1C). **Results:** Using global cortical measures (figure 2A), a significant association was observed between steeper cortical atrophy (lower Jacobians) and higher baseline AV1451 cortical SUVR ( $\rho = -0.76$ ,  $p = 0.02$ ) but not PIB-SUVR ( $\rho = 0.13$ ,  $p = 0.73$ ), see Fig 2a. Similarly, voxelwise correlation analyses revealed that maps of atrophy resembled baseline AV1451-PET images (median  $\rho = -0.57$ ), i.e. voxels of higher baseline AV1451-uptake showed

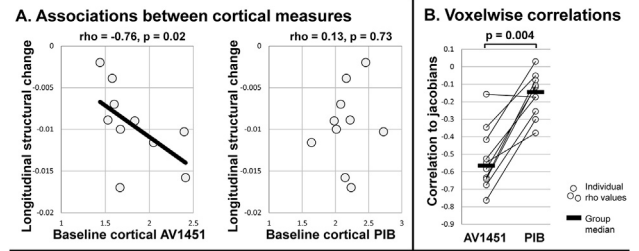


Figure 2. Results of the correlation analyses.

a steeper rate of atrophy. Correlation between PIB and atrophy maps were minimal (median  $\rho = -0.14$ ) and significantly different from the correlations with AV1451 (Wilcoxon signed-rank test:  $p = 0.004$ , Figure 2B). **Conclusions:** These results support the hypothesis that neurodegeneration is more closely related to tau than to  $\beta$ -amyloid pathology, and further suggests that tau pathology precedes and drives neurodegeneration locally. Our results further suggest a potential prognostic role for AV1451 in predicting individual patient longitudinal trajectories. From a clinical perspective, our results suggest that AV1451-PET could have a major clinical utility to predict short-term outcomes in patients.

IC-01-02 WHITE MATTER INTEGRITY REFLECTS TAU ACCUMULATION IN AD-DEFINED REGIONS



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**Background:** Axonal loss and demyelination are pathological changes that co-occur in Alzheimer disease (AD). Diffusion tensor imaging (DTI) is sensitive at detecting white matter degeneration in AD with changes more pronounced at later stages of the disease.

Table 1

B-amyloid Regions	Mean Diffusivity	Axial Diffusivity	Radial Diffusivity	Fractional Anisotropy
Gyrus Rectus (R-value)	0.0669	0.0378	0.0803	-0.1245
(P-Value)	0.5877	0.7598	0.5150	0.3118
Occipital	0.4029	0.4369	0.3773	-0.1574
	0.0014**	0.0004**	0.003**	0.2
Prefrontal	0.0892	0.0582	0.1011	-0.1113
	0.4692	0.6371	0.4119	0.3663
Temporal	0.4526	0.5356	0.3972	-0.0366
	0.0004**	0.00008**	0.003**	0.7672

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

The association for the  $\beta$ -amyloid regions between regional tau and DTI metrics in the  $\beta$ -amyloid positive subjects.

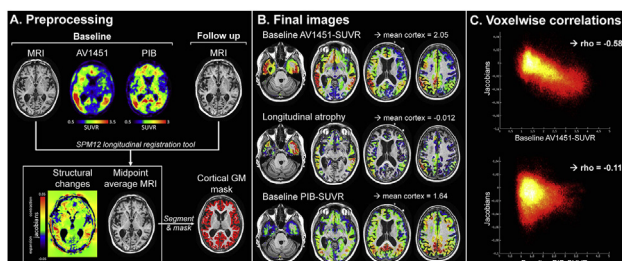


Figure 1. Study design, image preprocessing, and analyses (All images & values are from a representative patient with close to median values).