

Urinary Allantoin levels in cognitively normal individuals with low and high neocortical amyloid load



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Background

- Alzheimer’s disease (AD), is a progressive neurodegenerative disorder marked by accumulation of amyloid beta and neurofibrillary tangles in the brain.¹
- Oxidative stress increases with ageing, contributing to cognitive impairment.²
- Blood based biomarkers pTau181, GFAP and NFL are associated with pre-clinical AD.³
- Allantoin, an oxidative product of urate in humans, is commonly used as a marker of oxidative stress.⁴

AIM

- Examine urinary allantoin and blood-based AD biomarkers in cognitively unimpaired individuals with and without amyloid accumulation.

METHODS

- Analysis of 100 plasma samples from the Kerr Anglican Retirement Village Initiative in Ageing Health (KARVIAH) cohort.
- Cognitively normal (MMSE > 26) men and women aged 65-90 yrs.
- Urinary allantoin measured via Liquid chromatography-mass spectrometry.
- Plasma AD biomarkers AB42/40, GFAP, NFL and pTau181 (pg/mL) measured via SIMOA; pTau181 and pTau231 via ELISA
- Data analysed (n=100) by partial correlation adjusted for age, sex and APOE status. Multiple correction applied using Benjamini-Hochberg false discovery rate (FDR) procedure.

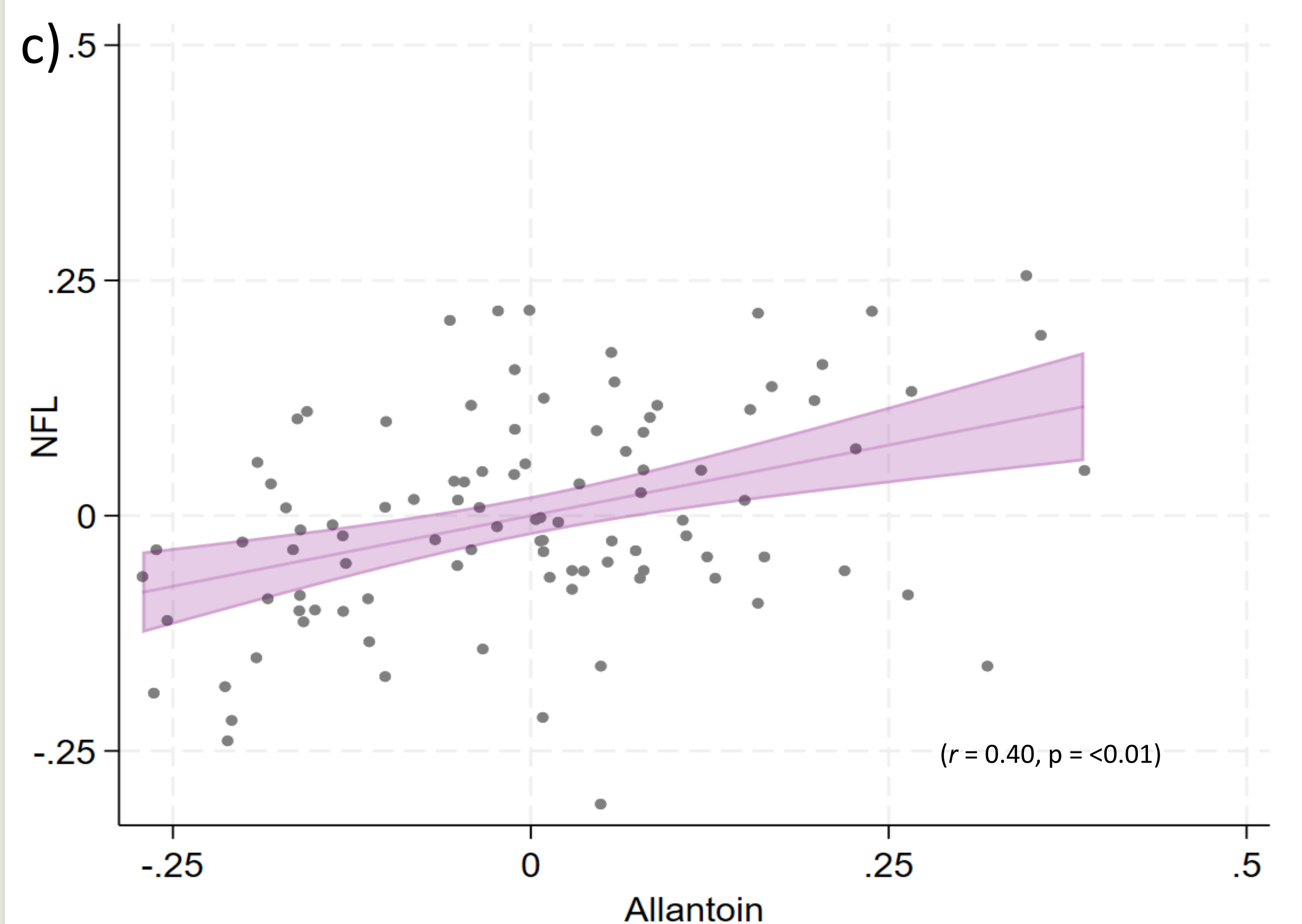
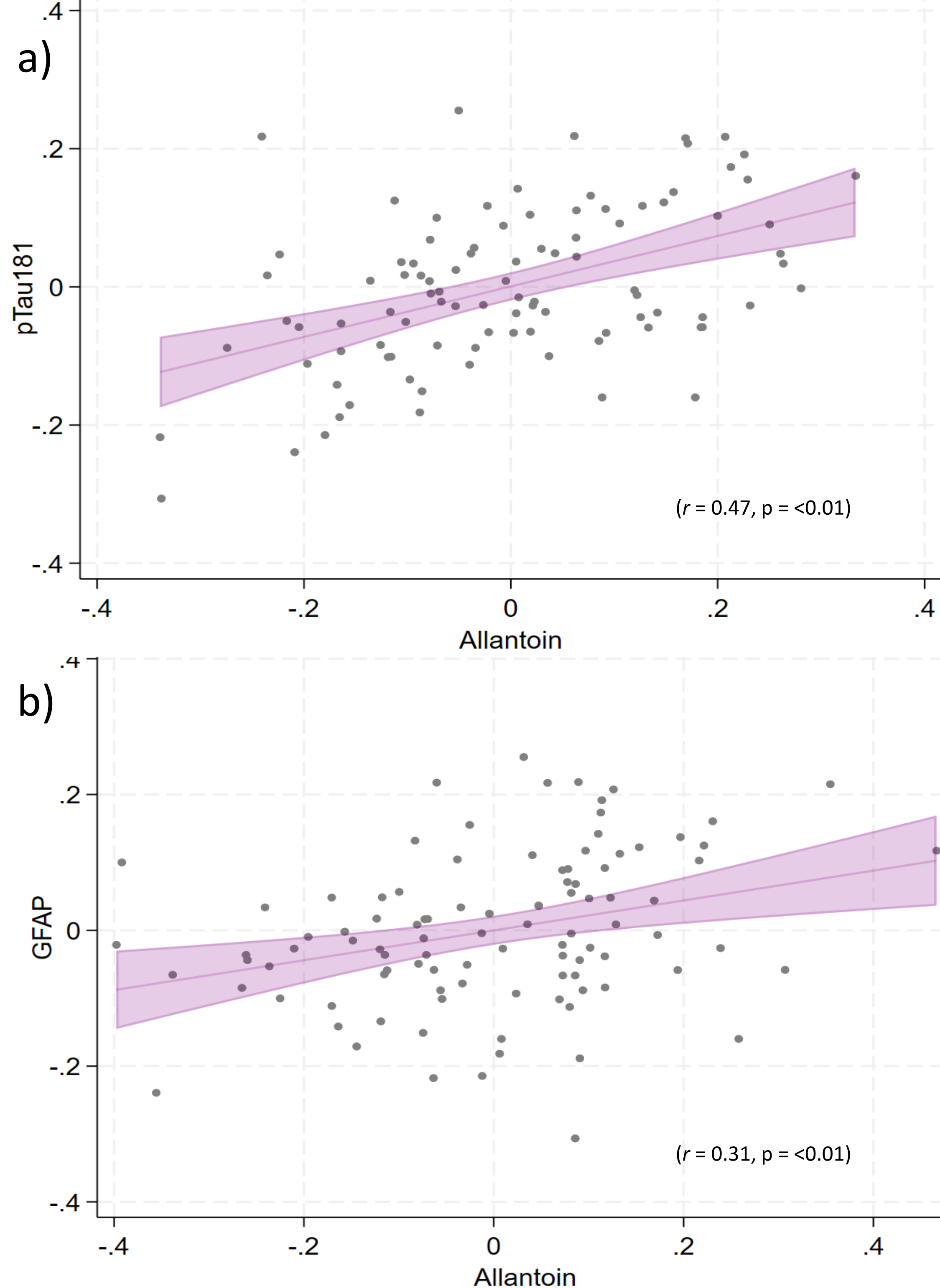
RESULTS

Table 1. Participant Characteristics

	All Participants	Aβ-	Aβ+	p
Variables	n=100	n=65	n=35	-
Age (years)	78.18 ± 5.52	77.62 ± 5.56	79.23 ± 5.38	0.17
Females	68 (68%)	46 (71%)	22 (63%)	0.42
BMI (kg/m ²)	27.62 ± 4.56	27.39 ± 4.48	28.06 ± 4.74	0.47
Education (years)	14.43 ± 3.26	14.85 ± 3.37	13.64 ± 2.92	0.78
APOE ε4 carriers	21 (21%)	5 (7.69%)	16 (45.71%)	<0.01
MMSE	28.61 ± 1.15	28.51 ± 1.16	28.80 ± 1.11	0.23
Global Composite score	0.00 ± 0.55	0.07 ± 0.49	-0.13 ± 0.63	0.08
Brain Aβ Load (SUVR)	1.35 ± 0.32	1.16 ± 0.09	1.71 ± 0.26	<0.01

BMI: Body mass index, MMSE: Mini-Mental State Examination. Data presented as mean±SD and counts and (percentages) for categorical variables. Continuous data was compared using Mann-Whitney U test and categorical by Chi-square tests in Aβ- and Aβ+ subgroups. Significance was determined at p<0.05.

Figure 1. Partial correlations of urinary allantoin with blood-based AD biomarkers controlled for age, sex and APOE status



Results

- Plasma pTau181 (r = 0.47, p < 0.01)(fig. 1a), GFAP (r = 0.31, p < 0.01)(fig. 1b) and NFL (r = 0.40, p < 0.01)(fig. 1c) were positively correlated with urinary allantoin, adjusted for age, gender and APOE status, following FDR correction.

Conclusion

- Findings indicate that higher urinary allantoin levels were associated with some plasma AD biomarkers
- Increased allantoin levels which reflect higher reactive oxygen species activity, may be linked to increased levels of some AD-related biomarkers.

References

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