

The Visual Short-term Memory Binding Test to predict cognitive decline in cognitively unimpaired individuals

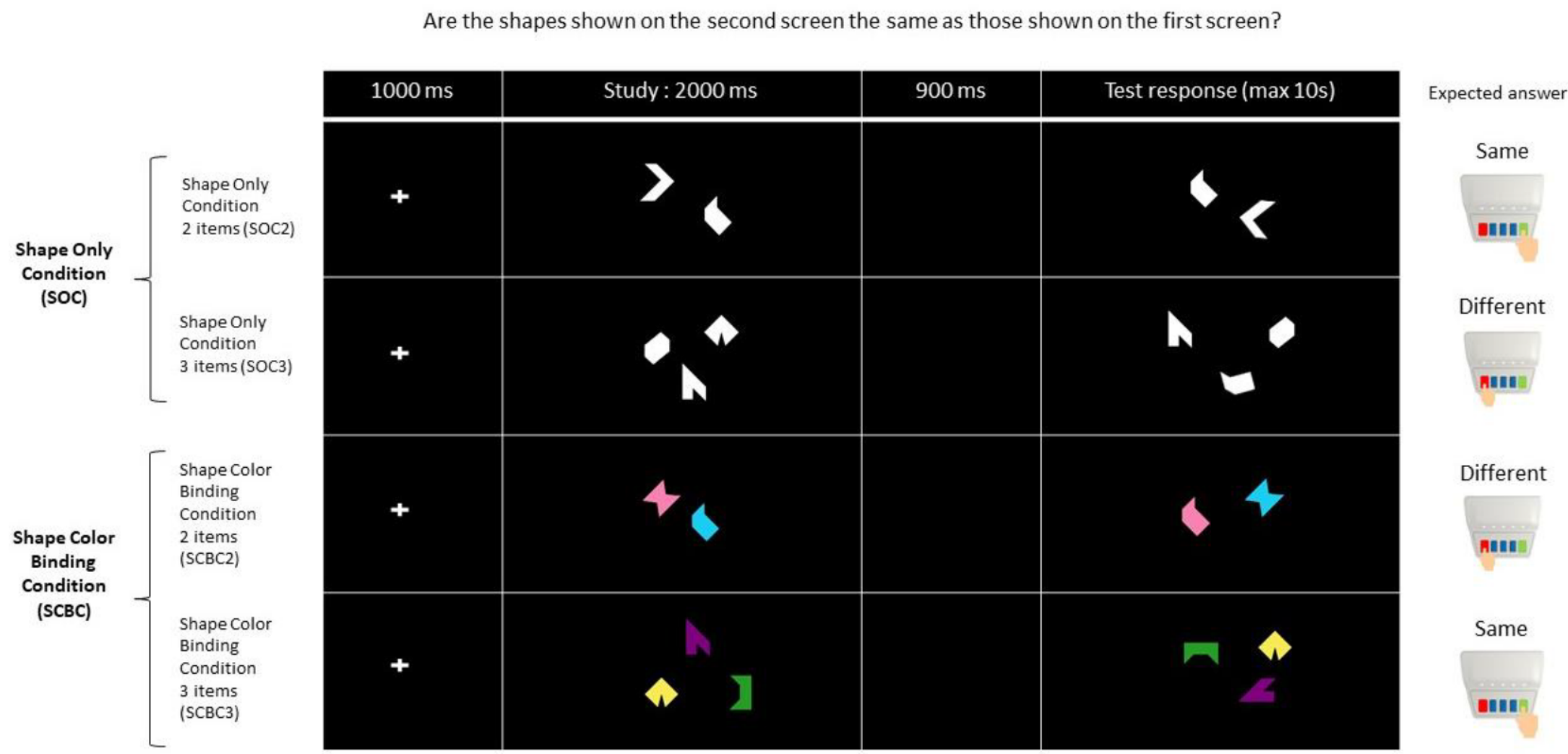
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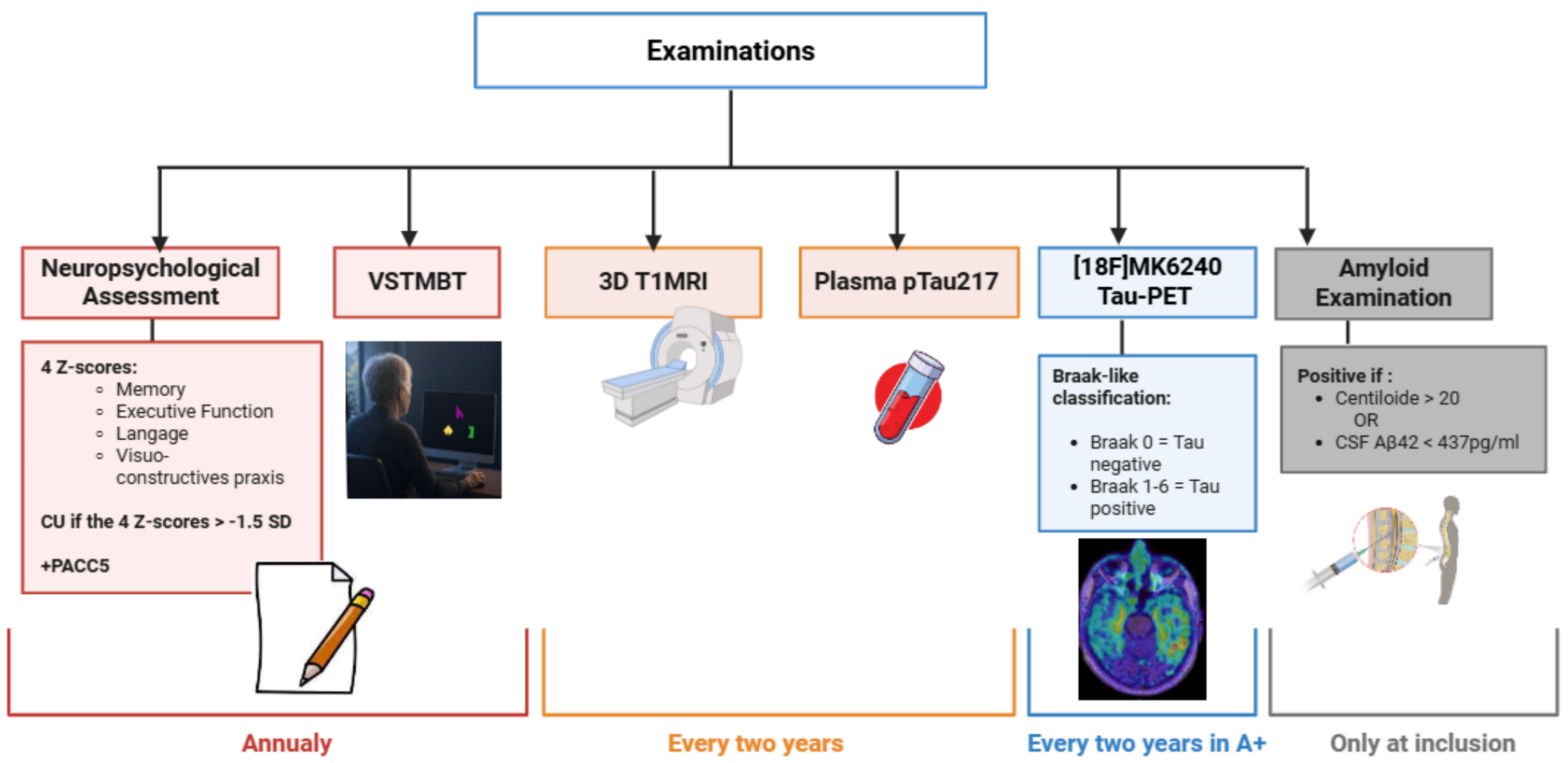
Introduction

- Preclinical AD** can be diagnosed using A β and tau-PET imaging but these methods are costly and invasive
 - Need for more suitable methods for large-scale screening in the general population
- Cognitive tools offer scalable alternatives
- Impaired performance in the Visual-Short-Term Memory Binding Test (VSTMBT, Parra et al., 2010) **has been evidenced in preclinical AD** (Huyghe et al., 2025) and was associated with early tau burden in the entorhinal cortex (EC) in cognitively unimpaired individuals (CU)
- The temporal trajectory of VSTMBT performance and the prognostic value of this test have never been studied
- Goals: examining longitudinal changes in VSTMBT performance according to the baseline biomarker status in well-characterized CU individuals, and assessing whether baseline VSTMBT performance differed between converters to MCI and stable CU individuals

Figure 1: Illustration of the conditions of the Visual-Short-Term Memory Binding Test (VSTMBT)



Methods



	Year 0	Year 1	Year 2
A- CU	n=54	n=54	n=44
A+ CU	n=30	n=30	n=21
Total	n=84	n=84	n=65

100% stable CU status

76.7% stable CU status

23.3% conversion to MCI

Results

Table 1: Amyloid group comparisons on demographics, cognitive data and biomarkers

	A-CU (n=54)	A+CU (n=30)	p-value
Age	69.07 (9.21)	73.27 (6.99)	.181
Sex (% women)	57.8%	48.5%	.388
Education (years)	17.35 (2.93)	16.52 (3.78)	.096
Centiloid	6.37 (7.88)	55.44 (25.86)	<.001
Plasma pTau217 (pg/mL)	.121 (.06)	.305 (.169)	<.001
Number of T+ individuals (%)	0 (0%)	17 (56.6%)	<.001
Braak-like stage (n 0/1-2/3-4/5-6)	57/0/0/0	13/5/3/9	<.001
Entorhinal (EC) tau burden (SUVR)	.88 (.12)	1.53 (.69)	<.001
MMSE	28.98 (.85)	28.42 (1.03)	.048
PACC5	-.03 (.56)	-.60 (.56)	<.001

Figure 3: Boxplots of VSTMBT and PACC5 performance at baseline according to conversion status

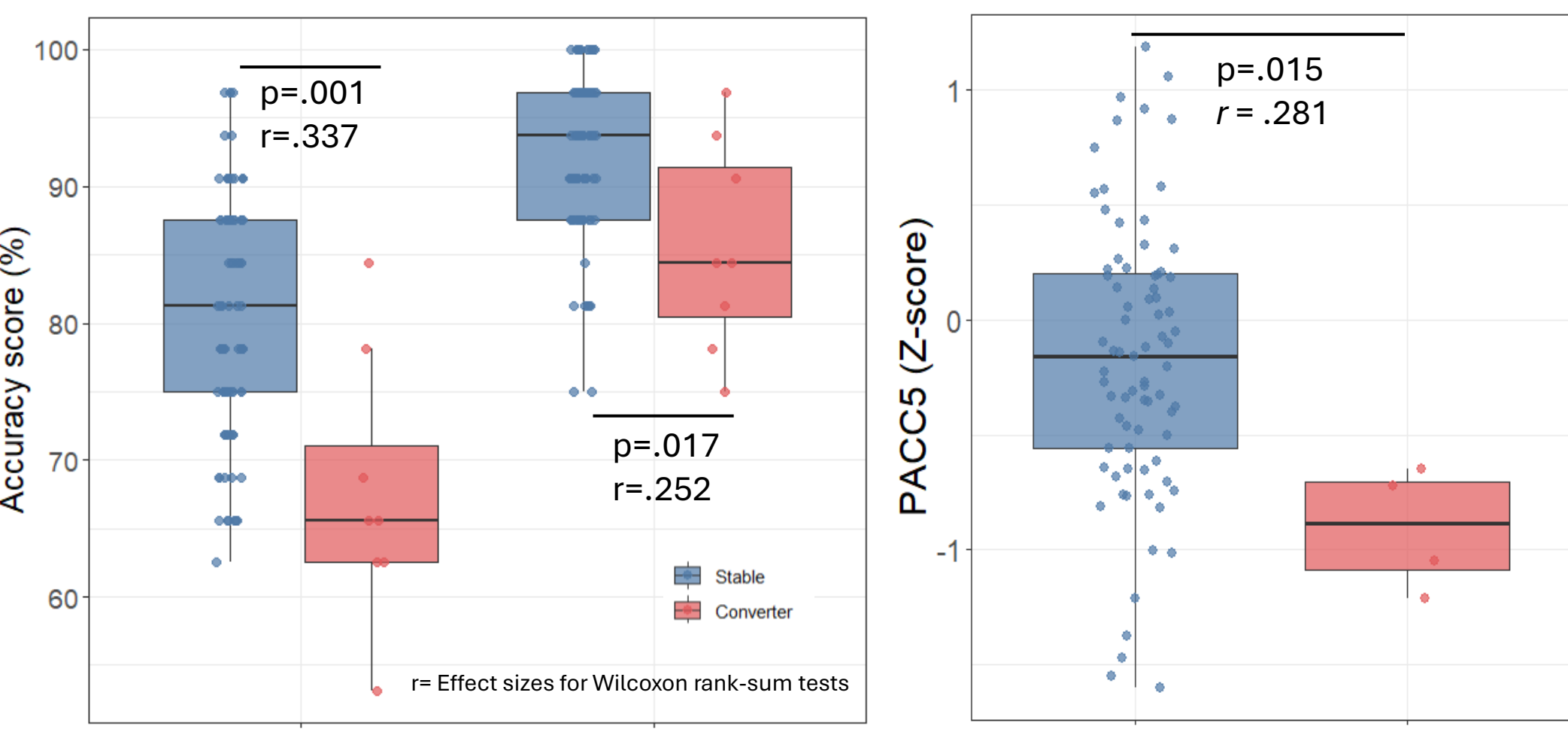
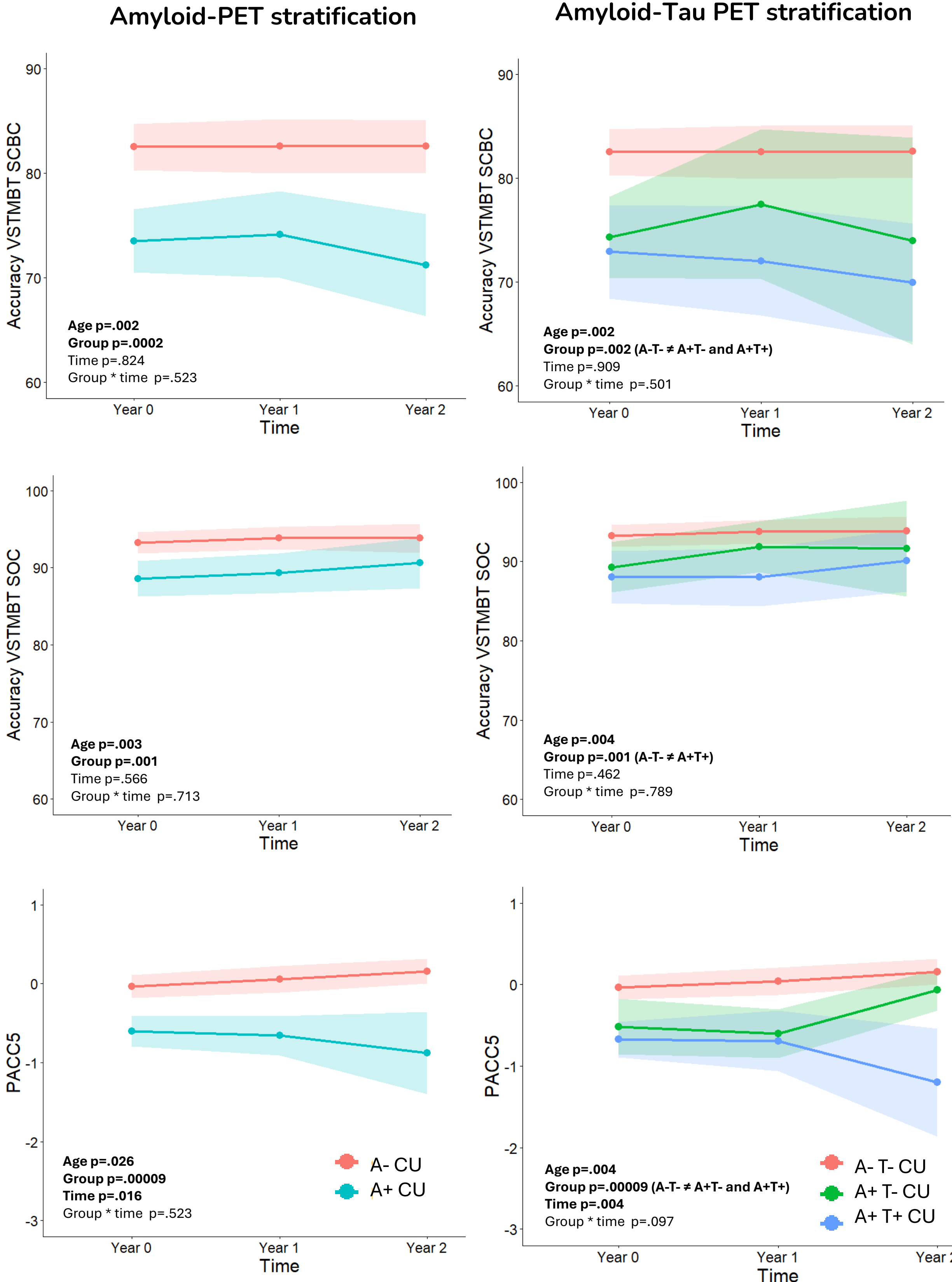


Table 2: Prediction of longitudinal decline in SCBC and PACC5 after two years

	SCBC decline		PACC5 decline	
	B (SE)	P-value	B (SE)	P-value
Age	-0.54 (0.18)	0.003	0.006 (0.009)	0.670
Sex	0.61 (2.69)	0.82	-0.144 (0.13)	0.372
Education	-0.06 (0.47)	0.888	0.007 (0.03)	0.765
Tau EC	-0.84 (2.490)	0.734	0.406 (0.145)	0.007

	SCBC decline		PACC5 decline	
	B (SE)	P-value	B (SE)	P-value
Age	-0.49 (0.17)	0.005	0.004 (0.01)	0.670
Sex	1.437 (2.52)	0.570	-0.12 (0.13)	0.372
Education	-0.204 (0.44)	0.644	0.008 (0.02)	0.765
Tau EC	3.841 (2.75)	0.168	0.11 (0.58)	0.852
Amyloid Status	-9.69 (3.06)	0.004	0.78 (0.59)	0.196
Amyloid Status * Tau EC	-6.51 (11.61)	0.576	-0.65 (0.61)	0.288

Figure 2: Longitudinal cognitive performance by biomarker stratification



- Main age and group effects for all cognitive measures (VSTMBT SCBC, SOC and PACC5; Fig.2)
- Main time effect on PACC5 only. No time x group interaction for any measure (Fig.2)
- Reduced baseline VSTMBT performance in converters to MCI vs stable CU individuals, with a higher effect size for SCBC (Fig.3)
- SCBC two-years decline is predicted by amyloid status at baseline whereas PACC5 two-years decline is better predicted by entorhinal tau burden at baseline but this effect did not survive after adjustment for amyloid status (Table 2)

Conclusions

- Reduced baseline VSTMBT binding performance in CU individuals who converted to MCI.
 - Two-years decline in binding performance was predicted by baseline amyloid status.
- The VSTMBT holds promise for cognitive screening and prognosis in CU individuals.

Limitations

- Short follow-up duration
- Small sample of converters to MCI

