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Conclusions

- **AI-derived MRI markers — especially GM volume and microhaemorrhage burden — predict cognitive response and ARIA risk in lecanemab-treated early AD.**
- Lower baseline neurodegeneration favors benefit; higher MH burden raises ARIA risk (~ 3.5× per MH).
- Human-equivalent AI microhaemorrhage quantification supports scalable, standardized safety assessment.
- Imaging-based biological staging can identify who is most likely to benefit and who is most at risk — supporting personalized amyloid-targeting therapy decisions.

82

patients, biomarker-confirmed early AD

20.7%

developed ARIA (17 / 82)

$\beta = 0.64$

baseline GM volume → less MMSE decline
(FDR p < 0.003)

OR 3.48

ARIA odds per baseline microhaemorrhage
(p = 0.015)

ICC 0.89

AI vs expert agreement on
microhaemorrhage count



Background

- Lecanemab (Anti-A β protofibril mAb) showed meaningful clinical benefit in early Alzheimer's disease in CLARITY-AD; now approved in the US, Israel, Japan, Europe and beyond.
- Real-world data needed to refine patient selection and safety monitoring — above all for ARIA: ARIA-E (vasogenic oedema) and ARIA-H (microhaemorrhage, siderosis).
- Baseline MRI is central to eligibility, yet how quantitative imaging relates to outcomes and ARIA in routine care remains unclear.
- AI-derived MRI biomarkers may standardize assessment and sharpen risk stratification. TASMIC is among the earliest centers outside the US to use lecanemab in routine practice.



Objective

In a real-world cohort, test whether baseline AI-derived MRI markers predict 12-month cognitive trajectory and ARIA risk in lecanemab-treated early AD.



Methods

- Design — retrospective real-world observational study, Cognitive Neurology Unit, TASMIC (Nov 2023 – Jun 2025).
- Treatment — lecanemab 10 mg/kg IV every 2 weeks; ARIA MRI surveillance at 1, 2, 4 and 6 months. APOE ϵ 4 homozygotes and > 4 microbleeds excluded per guidance.
- Imaging — 3T Siemens Prisma; volumetric 3D-T1 + SWI. Whole-brain, regional cortical and hippocampal volumes with age/sex percentiles via FDA-cleared icobrain (icometrix). MH burden by expert read and AI-assisted read.
- Outcomes & statistics — primary endpoint Δ MMSE at 12 months. Linear regression (GM, WM, hippocampal ROIs; Benjamini-Hochberg FDR). Multivariable logistic regression for ARIA predictors. ICC for human–AI MH agreement.

1

Cohort

82 biomarker-confirmed early AD on lecanemab (99 screened, 17 excluded for MRI quality; 44 with 12-mo MMSE)

2

Baseline MRI

3T Siemens Prisma · volumetric 3D-T1 + SWI

3

AI quantification

icobrain (icometrix): volumes, age/sex percentiles, microhaemorrhage detection

4

Outcomes

Δ MMSE at 12 months & ARIA risk



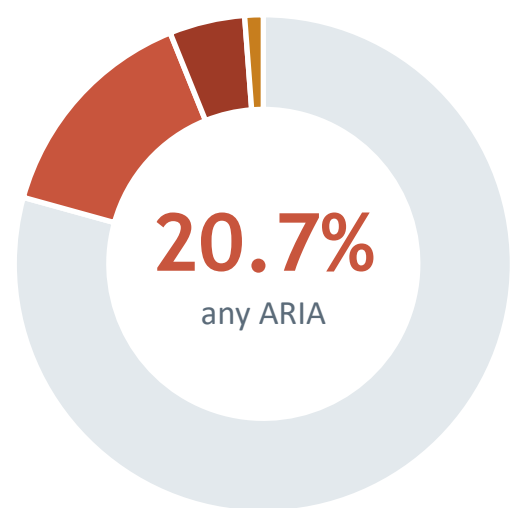
Cohort & imaging characteristics

Baseline (N = 82)	
Age, years	72.6 $\pm$ 8.0
Female	51.2%
APOE ϵ 4 carrier	58.5%
Hypertension / Antiplatelet	47.5% / 35.4%
MCI / mild dementia	82.9% / 17.1%
MMSE (baseline)	24.1 $\pm$ 2.8
12 months · Δ MMSE = 2.5 $\pm$ 5.1 (N= 44)	
AI-derived MRI percentiles (icometrix)	
Whole-brain volume	11.5%
Gray matter	8.6%
White matter	38.8%
Hippocampus	15.9%
ILV / hippocampus ratio	86.3 $\uparrow$
Microhaemorrhage count (human / AI)	0.26 / 0.30 (0–3)

Percentiles vs an age/sex-matched normative population. High ILV/hippocampus ratio indicates marked hippocampal atrophy.



ARIA outcomes



Mostly isolated microhaemorrhages. One symptomatic ARIA-E (hospitalized, IV steroids, full recovery, lecanemab discontinued); all others asymptomatic. SWI sensitivity likely increased ARIA-H detection.



Predictors of ARIA

Multivariable logistic regression · odds ratio (human-rated MH model)

Microhaemorrhage count ★	OR 3.48 · p = 0.015
APOE ϵ 4 carrier	OR 3.37 · p = 0.07
Antiplatelet use	OR 2.02 · p = 0.26
Hypertension	OR 1.07 · p = 0.91

★ **Significant predictor.** Each additional baseline microhaemorrhage raised ARIA odds ~ 3.5× (AI-rated MH model: OR 3.25, p = 0.01). APOE ϵ 4 trended higher; hypertension and antiplatelet use were not associated.



AI - expert agreement

ICC 0.89

(95% CI 0.83–0.93) for microhaemorrhage count — excellent. AI-assisted MH quantification matches expert reads and is equally informative for ARIA risk.



Baseline GM volume predicts cognition

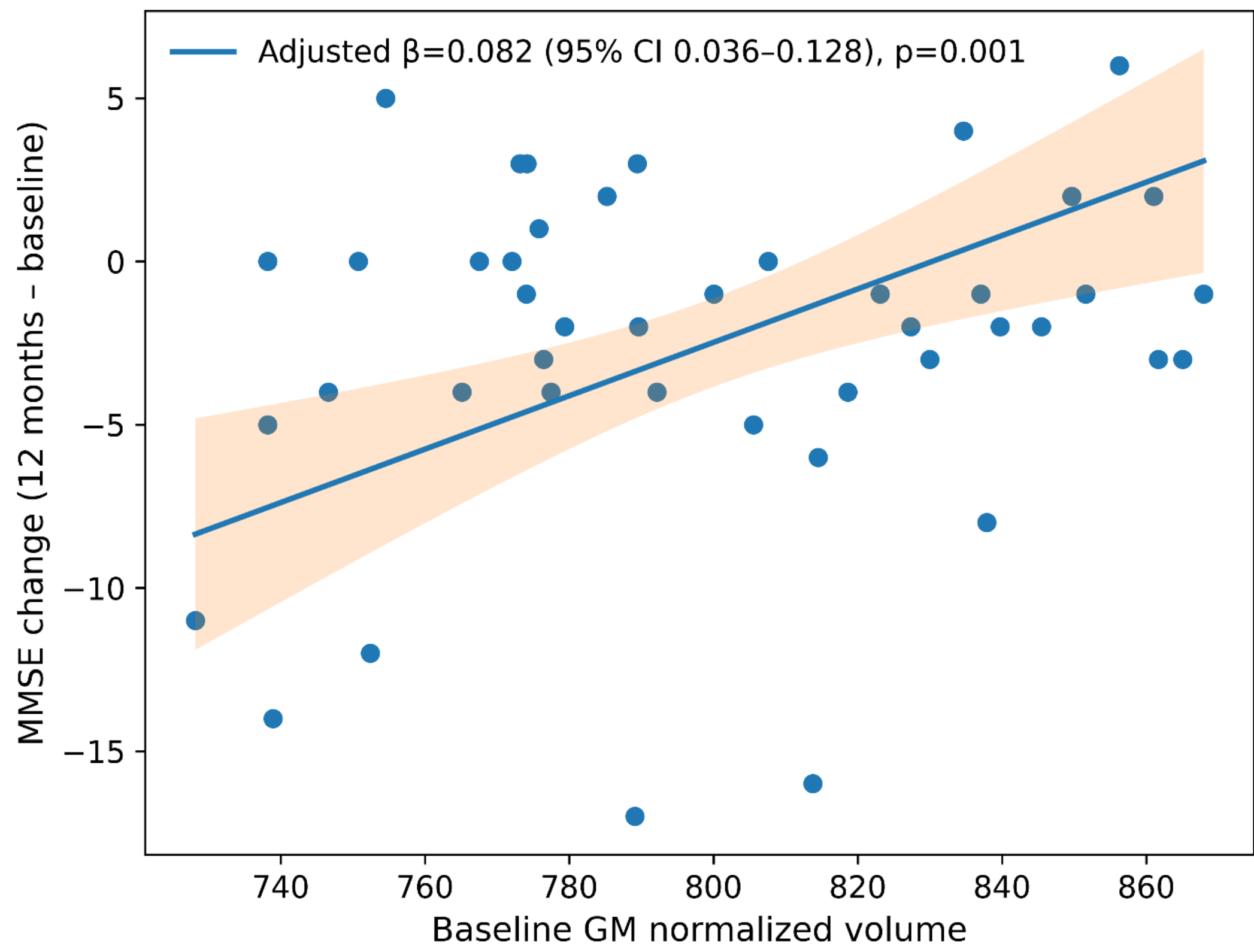


Figure 1. Association between baseline global gray matter (GM) normalized volume and change in MMSE over 12 months. The regression line represents estimates from a linear model adjusted for age at baseline MRI, sex, and baseline MMSE. Higher baseline GM volume was independently associated with less MMSE decline ($\beta = 0.082$, 95% CI 0.036–0.128, $p = 0.001$).



Cognitive outcomes

- Mean Δ MMSE was – 2.5 over 12 months (n = 44).
- **Higher baseline GM volume → less decline ($\beta = 0.082$, $\beta = 0.64$, $p < 0.001$; FDR p < 0.003). Older age also predicted less decline.**
- White-matter (p = 0.16) and hippocampal (p = 0.90) volumes showed no association with cognitive change.
- Most MCI patients sat in the lowest GM percentiles — advanced neurodegeneration despite early clinical stage (consistent with cognitive reserve / high education).