

THE IMPACT OF NEUROIMAGING MARKERS OF CEREBROVASCULAR DISEASE ON PLASMA BIOMARKER LEVELS IN ALZHEIMER'S DISEASE PATIENTS

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Background

- Plasma biomarkers have emerged as important tools for diagnosing Alzheimer's disease (AD) and for monitoring treatment response and disease progression.
- Cerebral vessel disease (CVD) frequently coexists with AD and may influence the interpretation of plasma AD biomarkers.
- The impact of CVD neuroimaging markers on the levels of plasma AD biomarker remains unclear.

Methods

- **Study population:** Patients with AD confirmed by CSF biomarkers or amyloid PET imaging.
- **Imaging:** 3.0 T MRI for Fazekas score assessment; SWI sequence for cerebral microbleeds quantification.
- **Biomarker detection:** Electrochemiluminescence assays to measure plasma A β 40, A β 42, p-tau181, p-tau217, GFAP and NfL.
- **Statistical analysis:**
 - **Spearman correlation:** associations between imaging markers and plasma biomarkers;
 - **Multivariable linear regression:** independent effects of CVD-related imaging markers on plasma biomarker levels.

Results

- **Baseline characteristics:** 80 AD patients were enrolled (mean age: 67.0 ± 8.7 years; female: 66.3%). 27.5% of participants had a Fazekas score ≥ 2 .
- **Group comparison by Fazekas score:** Compared to patients with Fazekas score ≥ 2 , those with Fazekas score < 2 had elevated plasma p-tau181 ($P=0.037$) and p-tau217 ($P=0.014$) and decreased A β 40 ($P=0.010$).
- **Spearman correlation:** **Fazekas score** was negatively correlated with p-tau181 ($r=-0.235$, $P=0.036$) and p-tau217 ($r=-0.281$, $P=0.013$), and positively correlated with A β 42 ($r=0.293$, $P=0.009$). **Cerebral microbleed count** was positively correlated with A β 40 ($r=0.255$, $P=0.022$) and A β 42 ($r=0.228$, $P=0.043$).

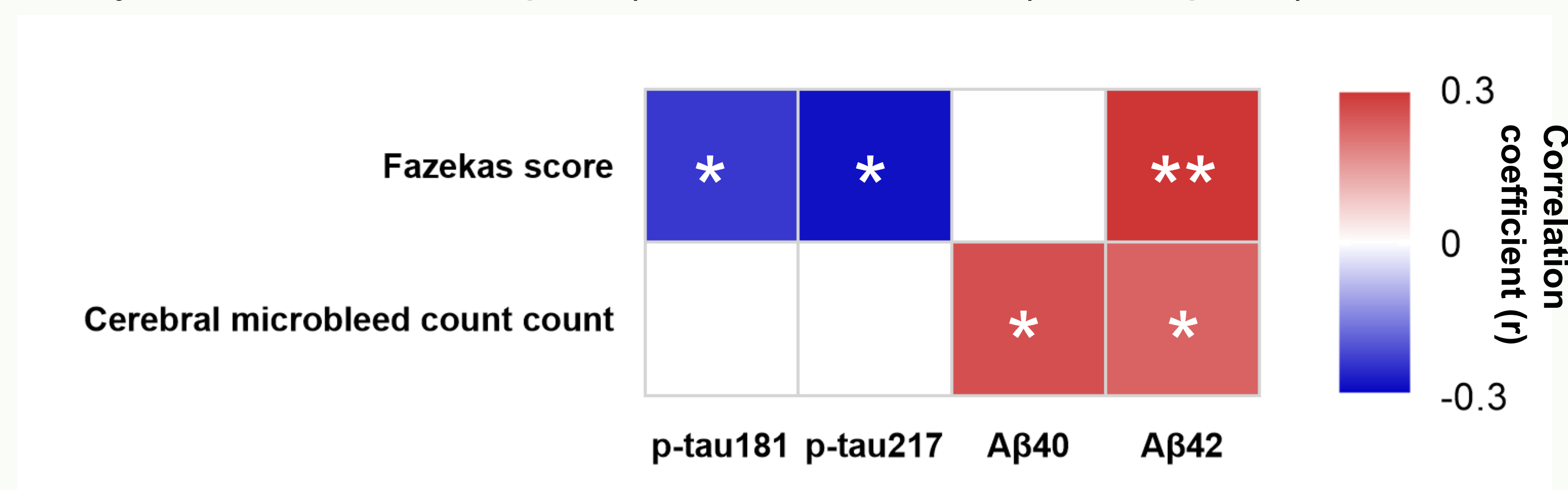


Figure 1 Heatmap of Spearman correlations. * $P < 0.05$, ** $P < 0.01$.

- Fazekas score showed a borderline association with plasma A β 42 ($\beta = 0.680$, $P = 0.070$), with no significant associations with p-tau181 or p-tau217.

Conclusion

- CVD-related imaging markers exerted limited independent effects on core AD plasma biomarkers, especially p-tau181 and p-tau217.
- These findings supported the high disease specificity of plasma p-tau biomarkers and suggested that plasma p-tau levels were minimally influenced by concomitant cerebrovascular pathology.