

Resting-State EEG Reveals Shared Spectral Slowing and Divergent Connectivity in AD and FTD

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Take-home: AD and FTD share spectral slowing; connectivity reveals syndrome-specific network organization.

QUESTION AND DESIGN

Clinical need:
AD and FTD can overlap clinically; EEG adds an accessible physiological marker.

N = 88 | CN 29 AD 36 FTD 23

OpenNeuro ds004504 | eyes-closed EEG |
19 channels | 12-14 min | 500 Hz

PIPELINE

Preprocess (EEGLAB/ASR/ICA) -> Spectral power
(Welch PSD) -> Connectivity (wPLI)

ANALYSIS

Measures:

- Global theta/alpha/beta power
- Global alpha wPLI
- Posterior/frontal alpha wPLI
- Broadband node strength (exploratory)

Stats:

- One-way ANOVA + Bonferroni pairwise tests
- Permutation ANOVA (10,000 shuffles)
- Age-adjusted checks showed same pattern

KEY HYPOTHESES

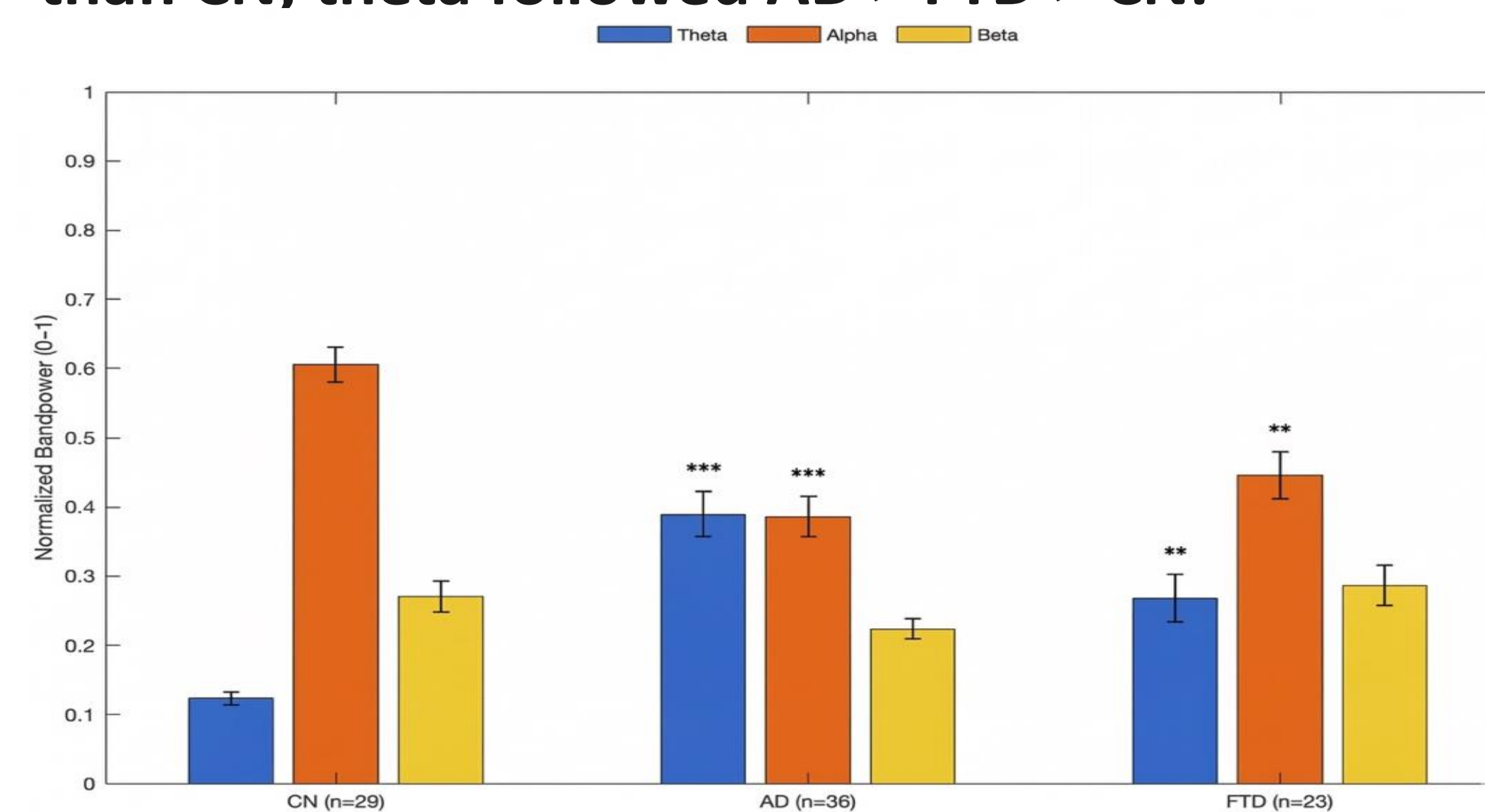
- AD/FTD show slowing (theta up, alpha down)
- Alpha connectivity is reduced in dementia
- Network topography differs between AD and FTD

PARTICIPANT SNAPSHOT

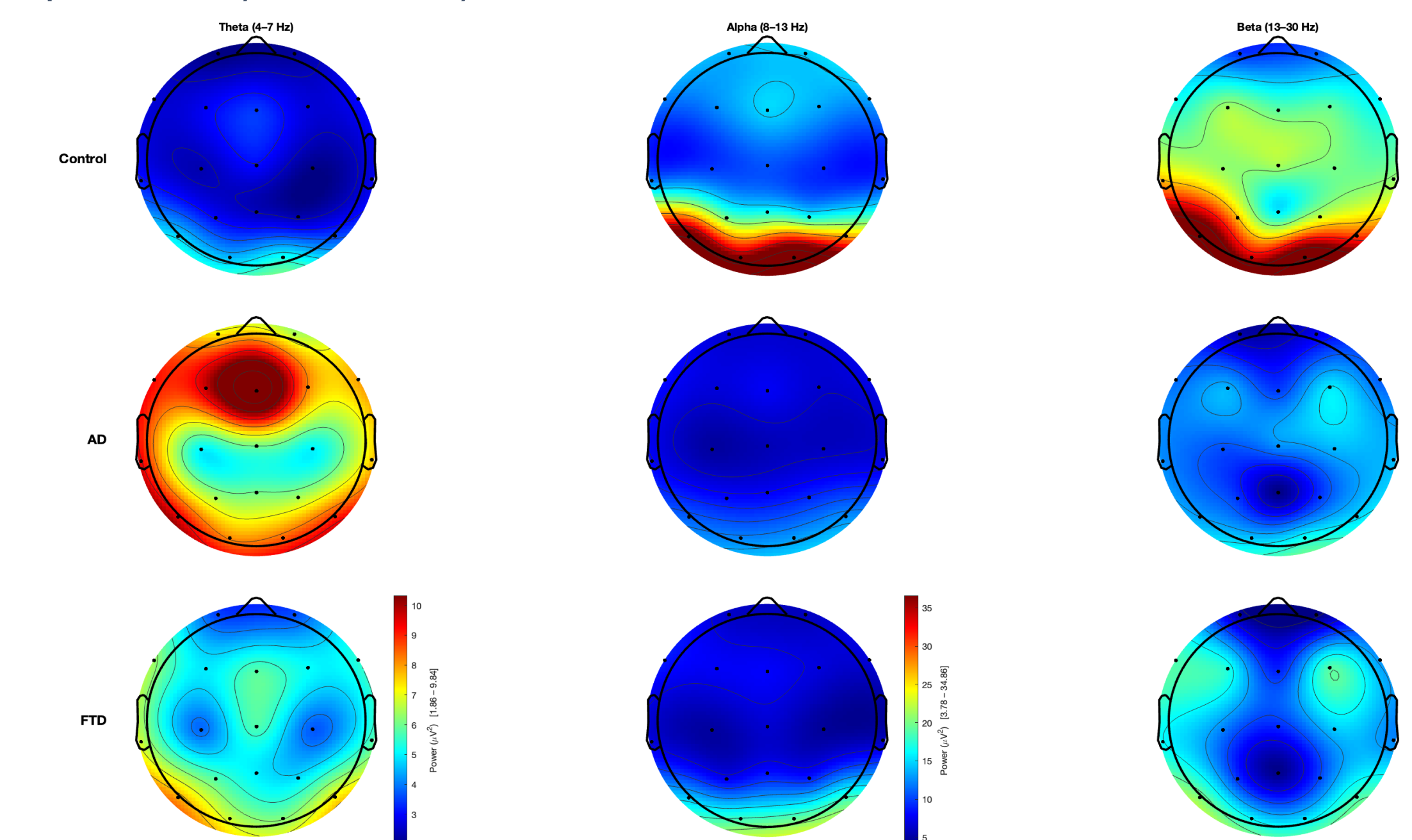
Age: no group effect ($p=0.12$)
MMSE: dementia groups impaired ($p<0.001$)
Sex distribution differed ($p=0.034$)

RESULT 1: SPECTRAL SLOWING

AD and FTD showed higher theta and lower alpha than CN; theta followed AD > FTD > CN.



Omnibus: theta $F(2,85)=23.92$, $p=5.73e-9$, $\eta^2=0.36$; alpha $F(2,85)=15.6$, $p=1.70e-6$, $\eta^2=0.27$; beta ns.



Scalp maps show stronger theta and posterior alpha loss in dementia.

INTERPRETATION

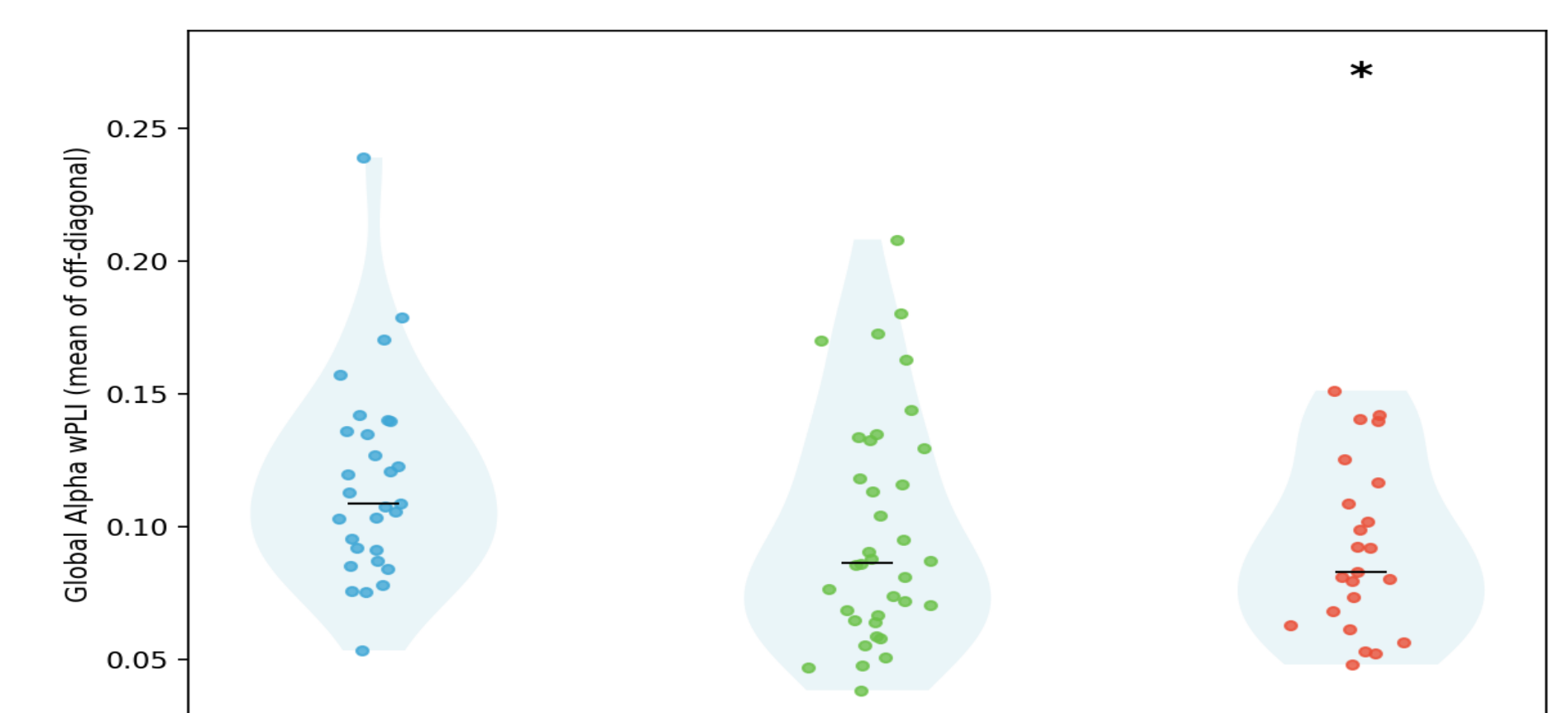
Spectral slowing tracks overall disease burden, but connectivity is needed to separate AD vs FTD network profiles.

STRONGEST PAIRWISE EFFECTS

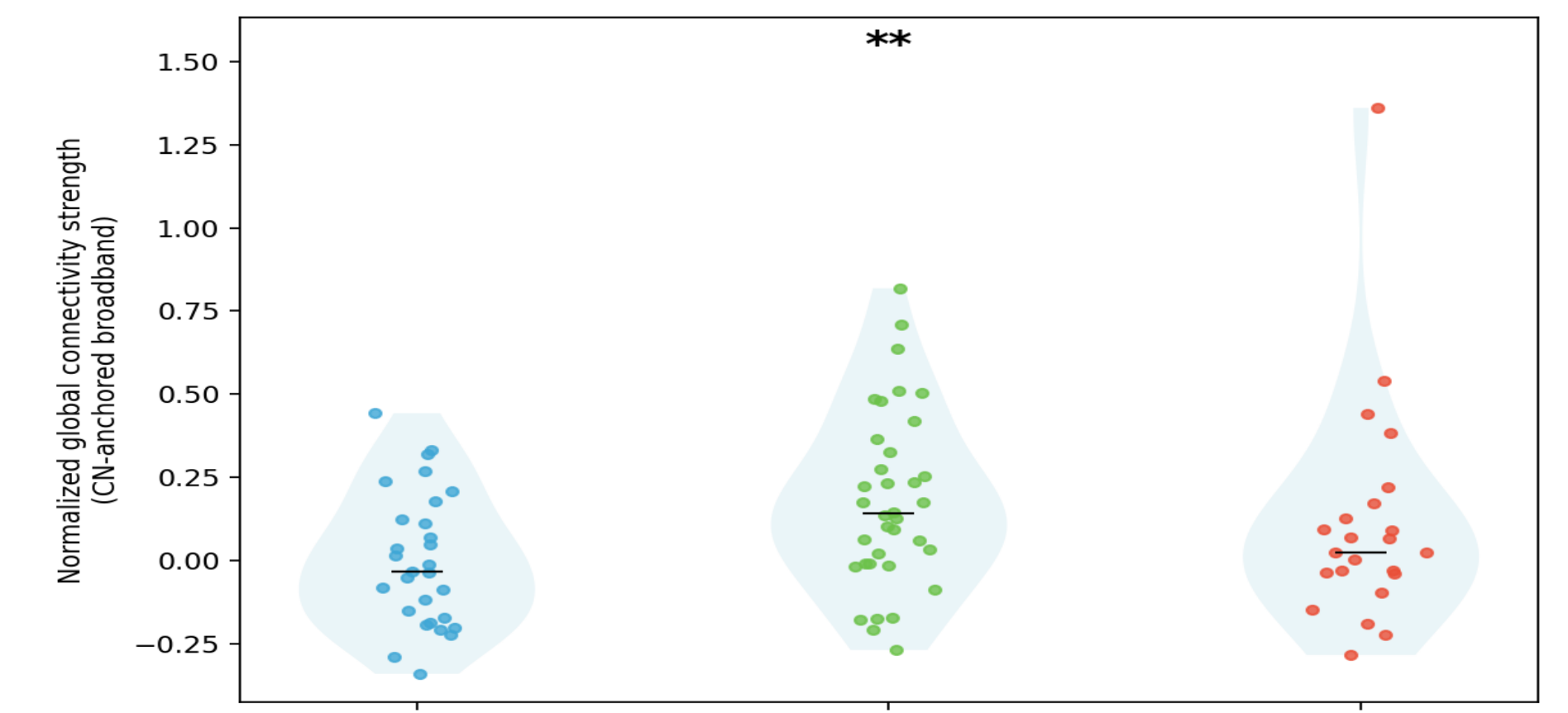
FTD < CN: Global alpha wPLI ($p=0.037$)
AD > CN: Broadband node strength ($p=0.0089$)
Shared slowing: AD/FTD vs CN in theta/alpha

RESULT 2: CONNECTIVITY

Global alpha synchrony was lowest in FTD, while CN-anchored broadband connectivity was higher in AD.

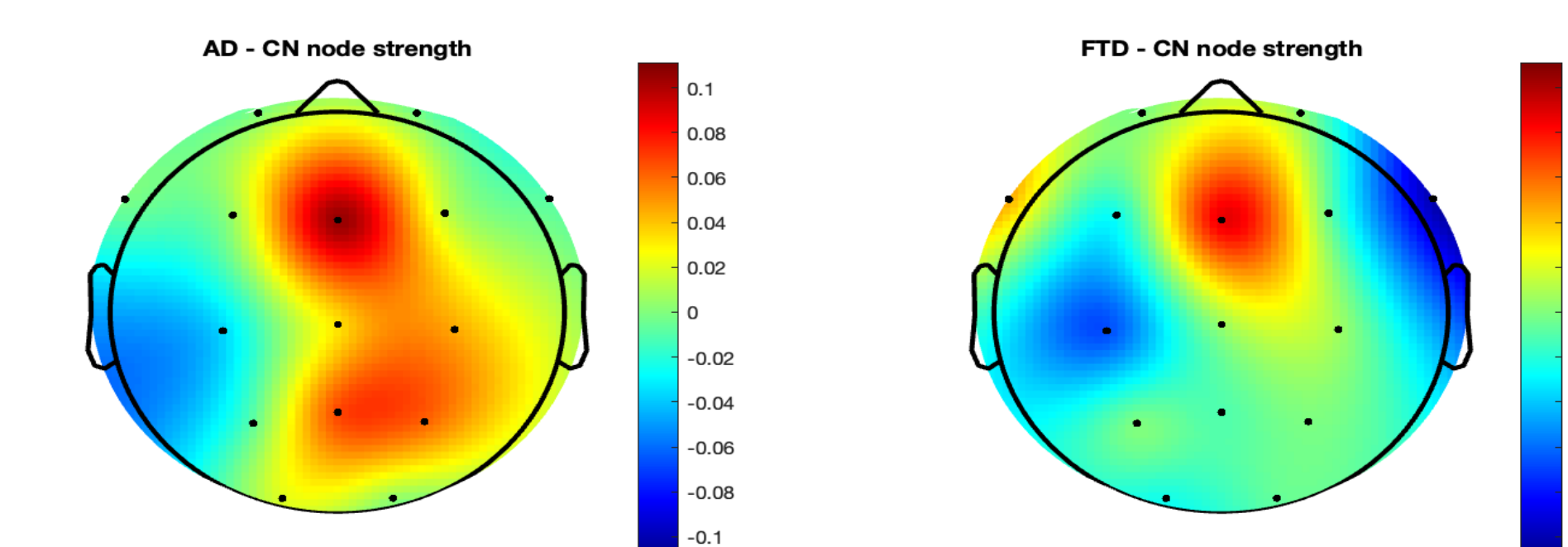


Global alpha wPLI: CN 0.117, AD 0.098, FTD 0.092; FTD < CN after correction.



Broadband node strength: AD 0.179, FTD 0.110, CN near 0; AD > CN after correction.

TOPOGRAPHY



AD: relatively higher frontocentral strength with posterior reductions.
FTD: broader lateral/posterior decreases.

CONCLUSIONS

- Shared slowing in AD and FTD
- Connectivity adds syndrome-relevant information
- Next: larger longitudinal cohorts + multimodal biomarkers