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The Interplay Between Tau Accumulation and Self-Reported Insomnia and Sleep-Disordered Breathing Along the Trajectory of Alzheimer's Disease

R. Ahmadi [1,2], J. D. Elberse [1,3], S. Genon [1,3], M. Gamer [4], F. Hoffstaedter [1,3], S. Eickhoff [1,3], B. Mander [5], S. Maleki Balajoo [1,3], and M. Tahmasian [1,3,6]

1. Institute of Neuroscience and Medicine, Brain and Behavior (INM-7), Research Center Jülich, Jülich, Germany; 2. Faculty of Medicine, Julius-Maximilians University of Würzburg, Würzburg, Germany; 3.Institute of Systems Neuroscience, Medical Faculty, Heinrich-Heine-University Düsseldorf, Germany; 4. Department of Psychology, Julius-Maximilians University of Würzburg, Würzburg, Germany; 5. Department of Psychiatry and Human Behavior, University of California, Irvine, CA 92603, USA; 6. Department of Nuclear Medicine, University Hospital and Medical Faculty, University of Cologne, Cologne, Germany

INTRODUCTION & AIM

Sleep disturbances, like insomnia and Sleep-Disordered Breathing (SDB), are potential risk factors for Alzheimer's Disease (AD). Despite extensive research, the interactions between sleep disturbances, imaging biomarkers, and cognitive decline in AD are not well understood. This study examines tau PET, Aβ PET, structural MRI, and cognitive assessments to investigate:

- How do sleep disturbances relate to the AD imaging profile?
- Are there differences in the effects of insomnia and SDB on imaging biomarkers due to their distinct pathophysiologies?

METHOD

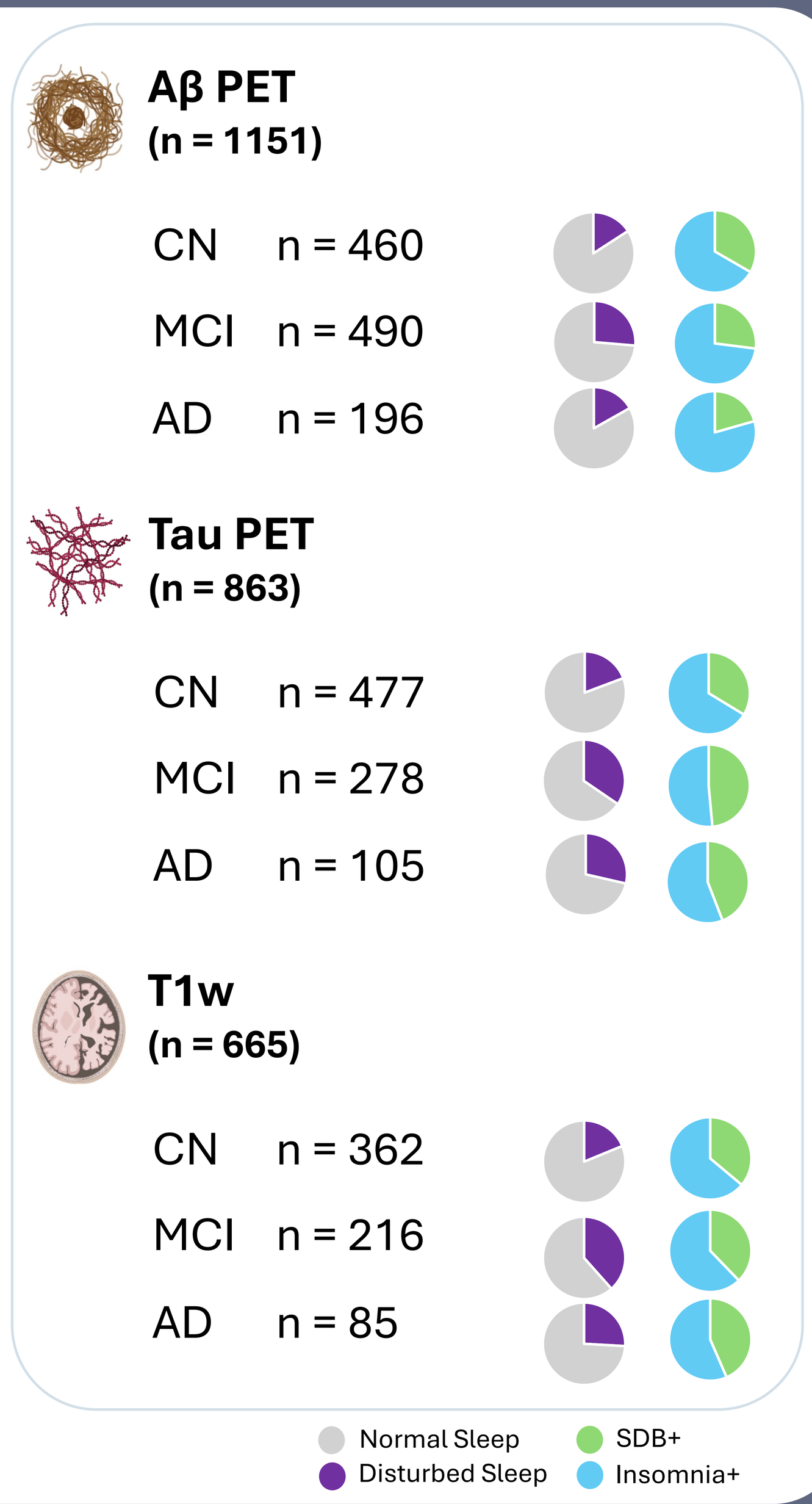
Comparative analyses using MANCOVA, ANCOVA, and post hoc tests evaluated the impact of sleep disturbances on imaging biomarkers across sleep groups and modalities. Partial correlation analysis assessed the relationship between imaging biomarkers and cognitive performance within each sleep group, controlling for age, sex, and education. These analyses were done separately for individuals with overall sleep disturbances and those with specific insomnia or SDB symptoms.

ADNI – Alzheimer's Disease Neuroimaging Initiative

Dataset (n = 1510)

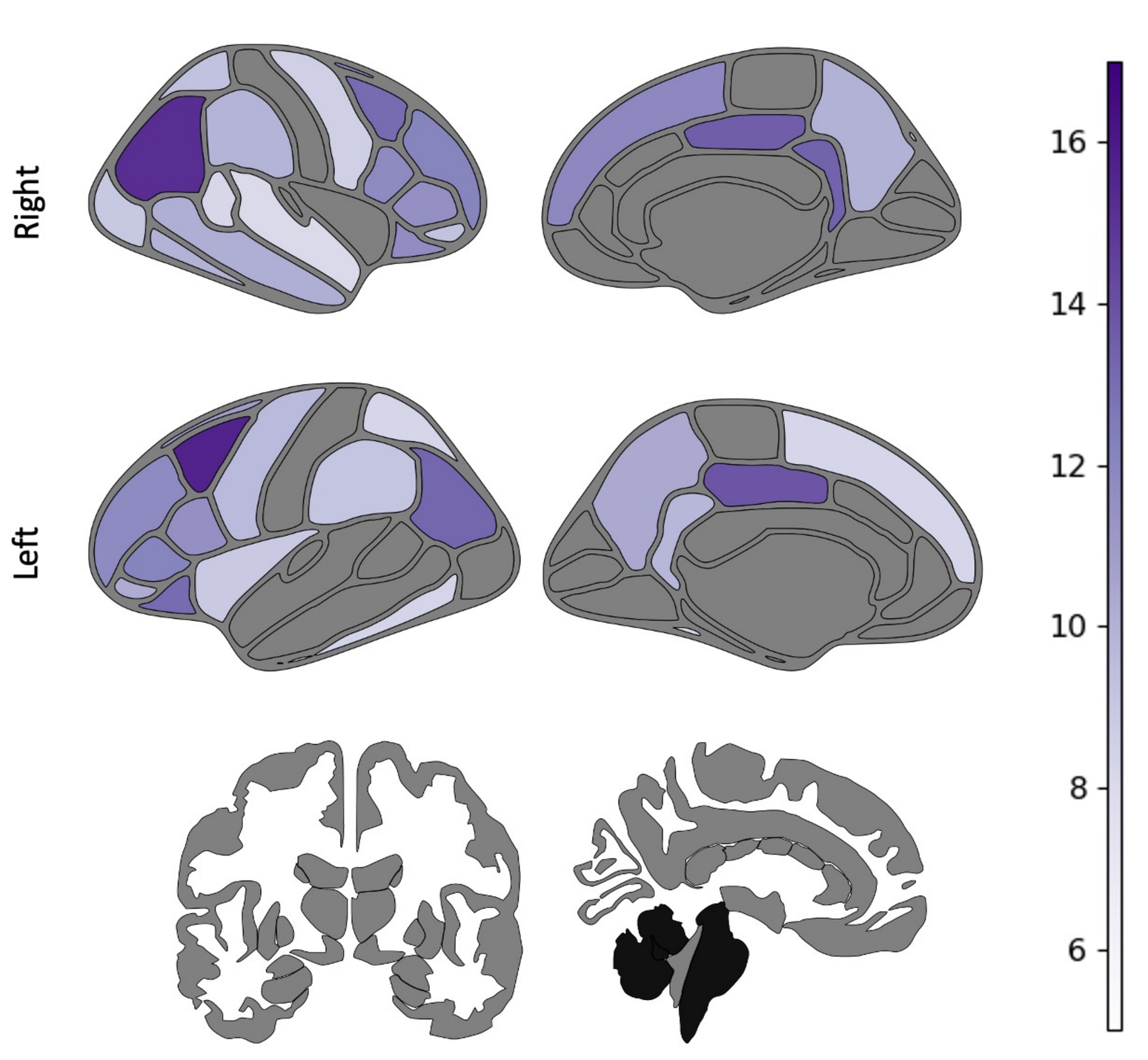
- Overall Sleep Disturbances
- Self-reported NPI-sleep subscale
- Self-reported medical report

ADAS 13 items -Cognitive subscale

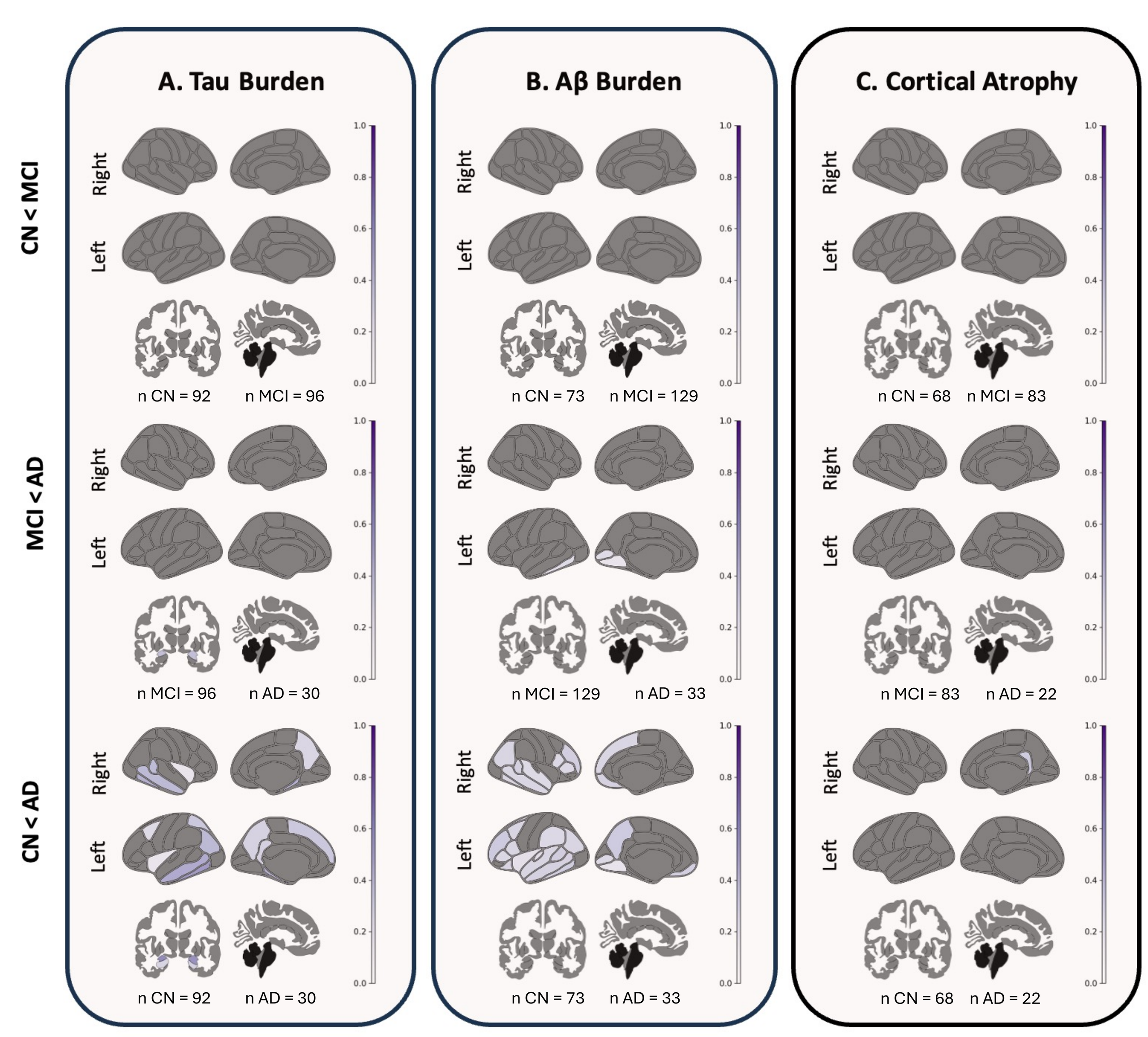


RESULTS

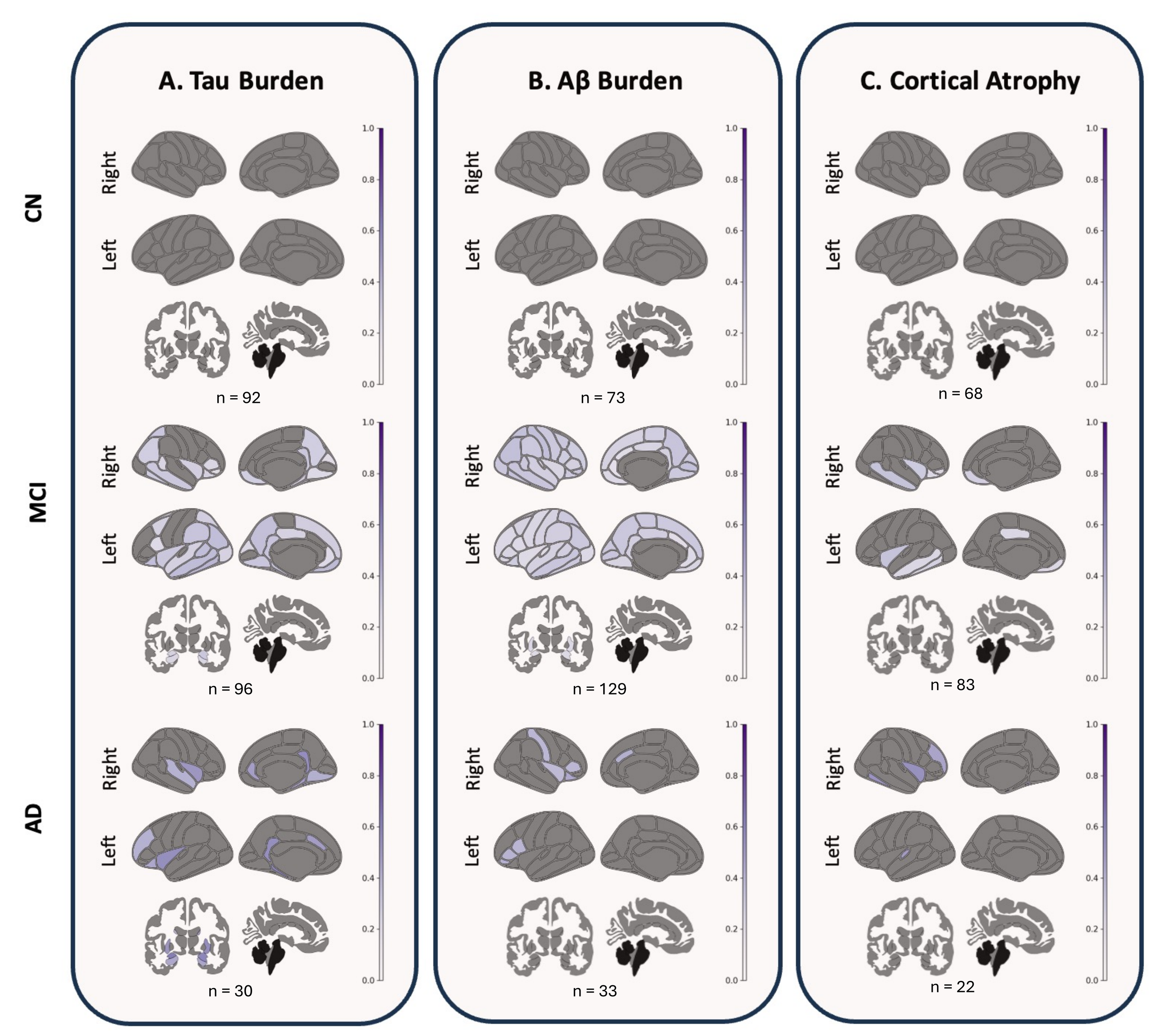
1. Diagnosis & overall sleep disturbances interaction effect on tau PET burden



3. Pairwise comparison results in individuals with overall sleep disturbances across imaging modalities



5. Partial correlation results between imaging biomarkers and cognition in individuals with overall sleep disturbances



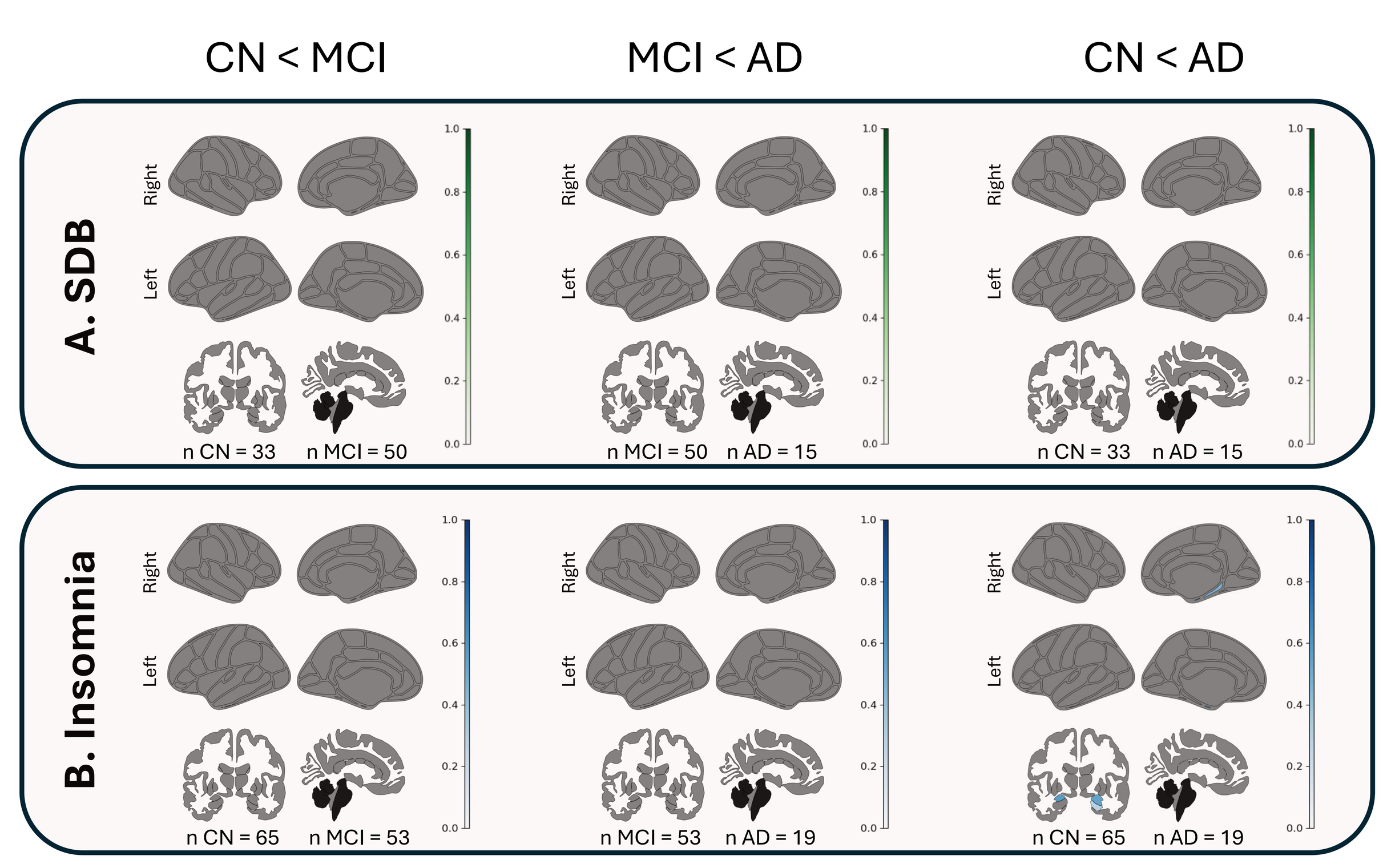
2. Significant interactions between diagnostic groups and SDB in Braak stages III & IV and V & VI (p=0.024, p=0.013, respectively), and with insomnia in Braak stages V & VI (p=0.037).

Amyloid beta vs. Tau
- Widespread Aβ and localized tau

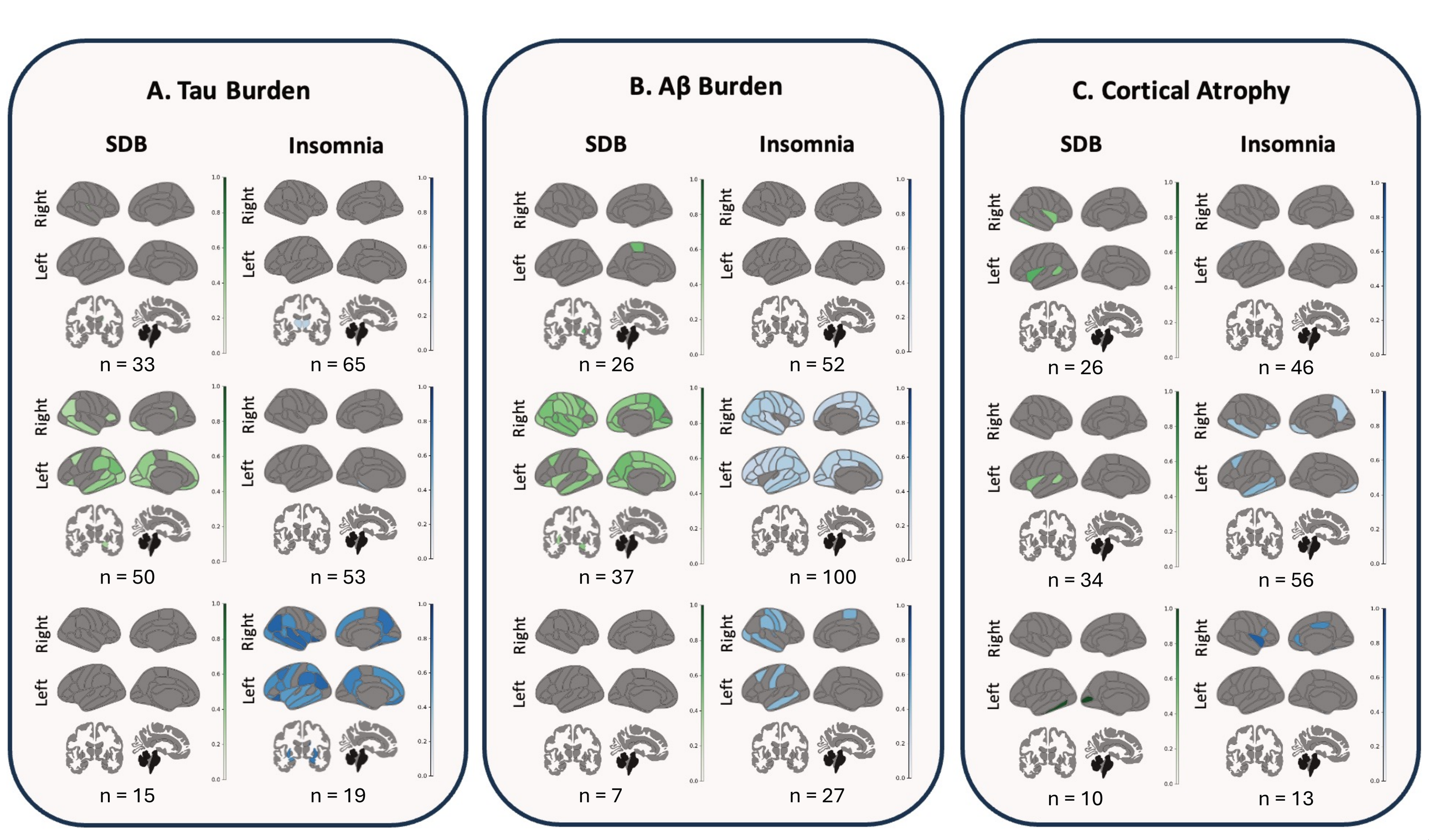
Sleep & Tau
- Middle and higher stages of AD

Insomnia vs. SDB
- Impact of SDB in earlier stages

4. Pairwise comparison results in individuals with insomnia/SDB symptoms across imaging modalities



6. Partial correlation results between imaging biomarkers and cognition in individuals with insomnia/SDB symptoms



CONCLUSIONS

- Sleep impacts **tau pathology** and interacts with diagnosis in **middle and higher stages** of AD
- Typical imaging profile in individuals with sleep disturbances for tau, Aβ and cortical thickness with distinct temporal impact between insomnia & SDB
- **SDB** symptoms affect the link between biomarker and cognitive performance in **earlier stages** compared to insomnia

CONTACT INFORMATION

r.ahmadi@fz-juelich.de
@reihaneh-ahmadi-55489115b

Julius-Maximilians-UNIVERSITÄT WÜRZBURG
JÜLICH Forschungszentrum