BIOMARKERS

POSTER PRESENTATION

BIOMARKERS (NON-NEUROIMAGING)

Older adults with subjective memory complaints and brain amyloidosis show stable electroencephalographic rhythms, cortical structure, and cognitive performances over 2 years

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Abstract

Background: It is well-known that in patients with Alzheimer's disease (AD) and high education attainment, cognitive performance is typically better than expected based on the burden of brain neuropathology and neurodegeneration (Stern et al., 2018; doi: 10.1016/j.neuroimage.2018.05.033). This resilience of the cognitive status was attributed to a sort of *cognitive reserve* (CR) accumulated by persons with high education attainment, which predicts a life with engaging job, intellectual, and social demands (Arenaza-Urquijo et al. 2015; doi: 10.3389/fnagi.2015.00134; Stern et al. 2018). Previous resting-state eyes-closed electroencephalographic (rsEEG) studies showed that alpha rhythms in posterior visual and visuospatial areas are related to CR in healthy adults, subjective memory complaints (SMC) seniors, and patients with mild cognitive impairment due to AD (ADMCI).

Method: In the present exploratory study, we used the database of the INSIGHT cohort (Dubois et al., 2018; doi: 10.1016/S1474-4422(18)30029-2), we investigated whether older adults with subjective memory complaints (SMC) and brain amyloid-β accumulation may exhibit clinical progression over 2 years as a function of educational attainment (a proxy of cognitive reserve).
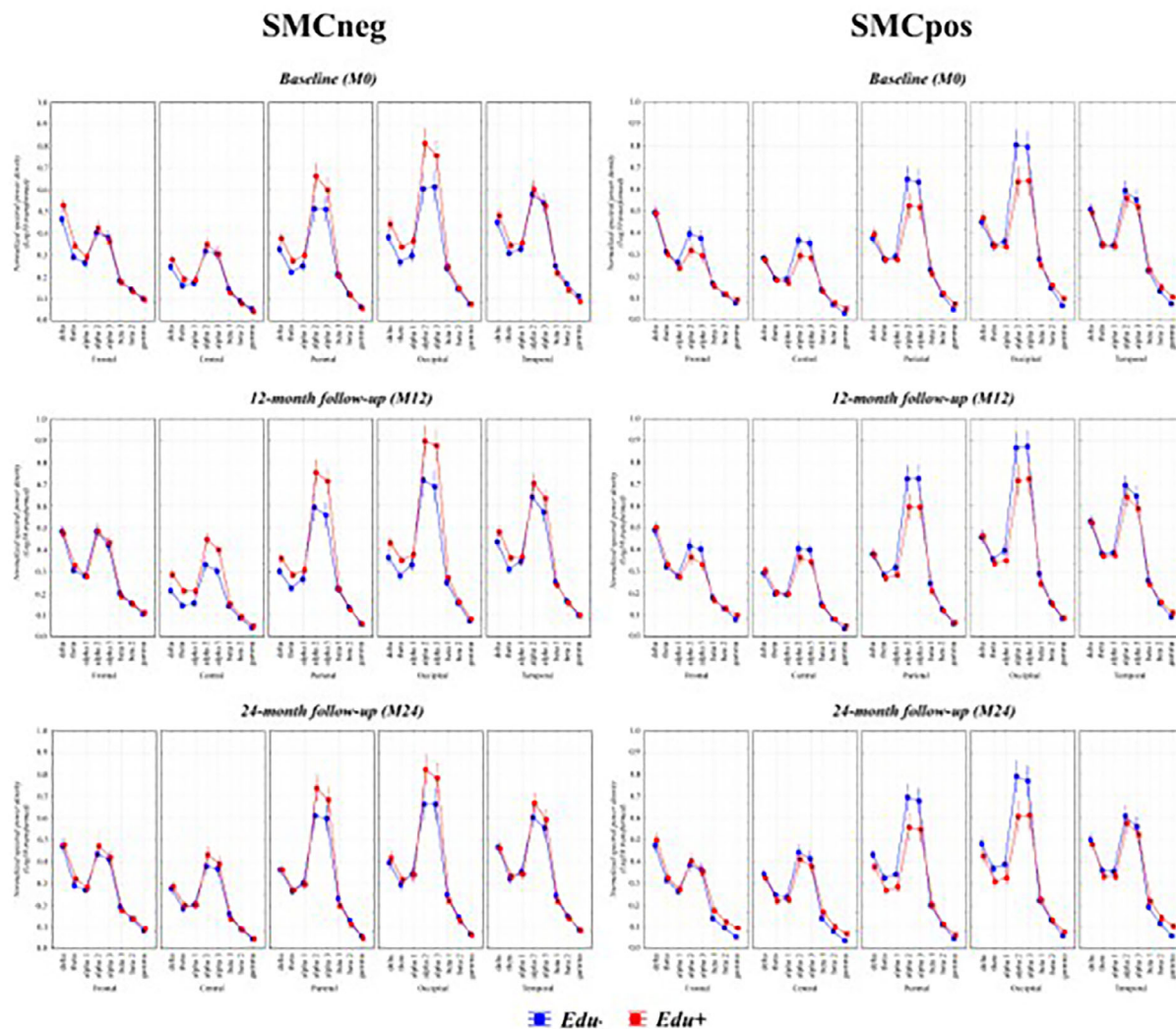
Result: SMCneg with high educational attainment (Edu+) participants showed greater posterior rsEEG alpha rhythms compared to SMCneg with low educational attainment (Edu-) participants. In contrast, SMCpos Edu+ participants exhibited reduced posterior rsEEG alpha rhythms and parietal cortical thickness compared to SMCpos Edu-participants. No EEG (Figure 1) or MRI (Figure 2) marker significantly changed over the 2-year follow-up period

> **Conclusion:** These findings suggest that a substantially longer time interval than 2 years should be assessed to evaluate the Alzheimer's disease progression and biomarker-guided targeted therapies in presymptomatic SMCpos adults.
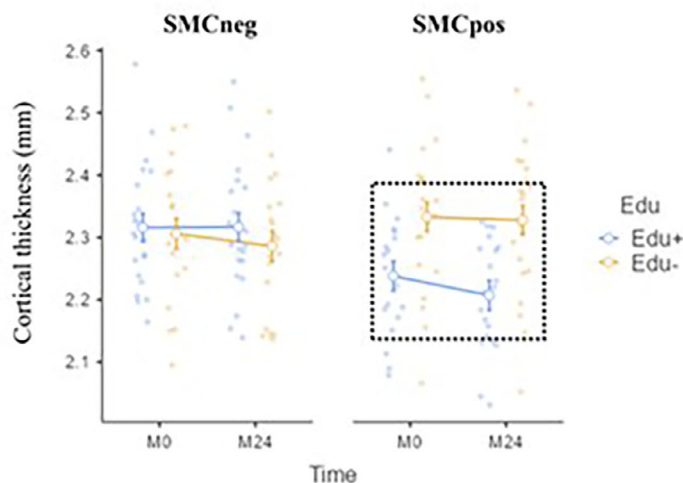

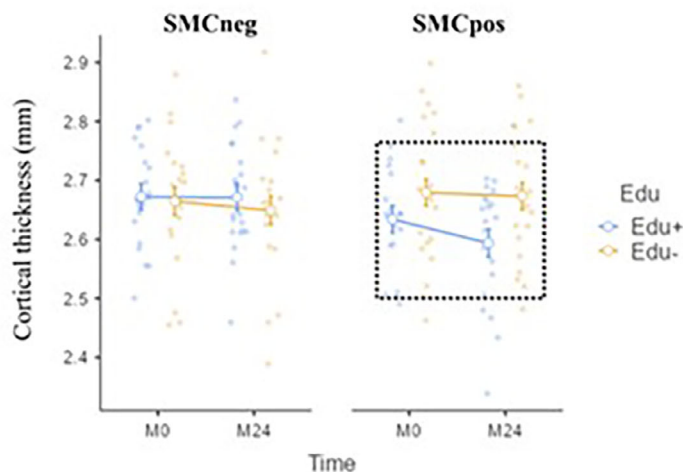Topographic and frequency patterns of the resting-state eyes-closed electroencephalographic (rsEEG) rhythms over 24 months. Mean values ($\pm$ standard error mean, SE) of power density in normalized resting-state eyes-closed electroencephalographic (rsEEG) rhythms in seniors with subjective memory complaint (SMC) found to be amyloid negative (SMCneg; 1a) and positive (SMCpos; 1b) to the marker of Alzheimer's neuropathology derived from ^{18}F-florbetapir positron emission tomography (amyloid PET). These data are ordered for (1) low or higher educational attainment level (Edu- and Edu+), (2) five regions of interest of the scalp, ROIs (frontal, central, parietal, occipital, and temporal), (3) eight frequency bands of rsEEG rhythms (delta, theta, alpha 1, alpha 2, alpha 3, beta 1, beta 2, and gamma), and (4) three timepoints, namely the baseline (M0), 12-month follow-up (M12), and 24-month follow-up (M24). No statistically significant effect was produced by the ANOVA design ($p > 0.05$) using the factors Time, Group, Edu, Band, and ROI. *Legend: SMC = subjective memory complaint; rsEEG = resting-state electroencephalographic.*

MRI cortical thickness
ANOVA interaction between Group and Edu

= Edu- > Edu+ , p < 0.05 Bonferroni corrected

Effect of education on the MRI variables in the SMCneg and SMCpos seniors. Mean values (± standard error mean, SE) of the cortical inferior parietal thickness for: (1) two groups (SMCneg and SMCpos seniors), (2) two Education levels (Edu+ and Edu-), and (4) two timepoints, namely the baseline (M0) and 24-month follow-up (M24). No statistically significant effect was produced by the ANOVA design (p > 0.05) using the factors Time, Group, and Edu. The ANOVA showed a statistically significant 2-way interaction effect (F (1, 78) = 0.167, p < 0.005) among the factors Group and Education. Only for the SMCpos seniors, a statistically significant difference Edu+ ≠ Edu- was observed both at the M0 and M24 timepoints (Duncan post hoc test, p < 0.05 corrected for multiple comparisons = p < 0.0125; see "Methods" for the criterion of such correction). *Legend: SMC = subjective memory complaint; MRI = magnetic resonance imaging.*