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Linking resting-state gamma activity to associative memory: a potential biomarker for cognitive aging and Alzheimer's Disease

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Associative memory is often impaired from the early stages of Alzheimer's Disease (AD). Gamma band (30–120 Hz) brain oscillations are crucial for cognitive functions like multisensory integration and memory consolidation. This study investigates whether resting-state EEG (rsEEG) spectral power can predict associative memory performance, potentially serving as an early biomarker for memory decline in AD.
RsEEG recordings were obtained from 48 young adults who completed a face-name association test (FNAT), assessing immediate (IR) and delayed recall (DR) of cross-modal associative memory.
Slow-gamma (30–49 Hz) power significantly predicted DR performance, explaining 22% of the variance ($p = .024$), with increased power in temporal regions correlating positively with memory ($p = .038$). Fast-gamma (51–100 Hz) power explained 27% of the variance in DR ($p = .006$), with higher frontal ($p = .045$) and lower posterior ($p < .001$) activity linked to better outcomes. For IR, a trend emerged where increased temporal and reduced posterior fast-gamma power corresponded with improved recall.
Higher temporal slow-gamma power supports the role of the temporal lobe in memory processes, aligning with findings of reduced gamma activity in this region in AD. Elevated frontal fast-gamma activity may reflect greater involvement of executive functions in memory retrieval, while reduced posterior fast-gamma may signal a shift from sensory to higher-order processing—patterns often disrupted in AD. These results highlight specific gamma-band signatures as potential early indicators of associative memory decline, offering insights for early detection and monitoring of AD-related cognitive changes.

If you're submitting a symposium talk, what's the symposium title?

"Typical and Atypical"Aging: From Cognitive Aging to Neurocognitive Disorders

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No

Primary authors: MANIPPA, Valerio; SCARAMUZZI, Giorgia Francesca (Dipartimento di Biomedicina Traslazionale e Neuroscienze, Università Studi di Bari); Mr SCIANATICO, Gaetano (University of Bari "A. Moro"); CORNACCHIA, Ester; BONVINO, Aurora (Università degli studi di Bari); GASPARRE, Daphne (University of Bari Aldo Moro); Prof. RIVOLTA, Davide (University of Bari "A. Moro"); TAURISANO, Paolo (Università degli Studi di Bari "Aldo Moro")

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