

Reduced fMRI Functional Connectivity of Language-Related Cerebellar Regions of Schizophrenia Patients

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Schizophrenia (SZ) is one of the most debilitating psychiatric disorder, in which the crucial role of cognitive deficits has been increasingly identified. However, the neural correlates underlying these impairments are still largely unknown. The cerebellum, conventionally tied to motor functions, is now recognized as a key region for cognition, and evidence of cerebellar abnormalities has been associated with SZ cognitive impairment. However, within-cerebellum spontaneous functional interactions are often overlooked.

The present study explored the resting state functional connectivity (rsFC) within the cerebellum and its link to cognition in 74 SZ patients and 74 matched healthy controls (HC). A new multi-domain task battery (MDTB) cerebellar parcellation was applied. In addition, we investigated the relationship between SZ patients' rsFC and their symptoms, as assessed with the Positive and Negative Syndrome Scale (PANSS).

SZ patients exhibited significant differences in cerebellar connectivity compared to HCs, particularly in regions involved in attention, language, and memory. Correlations between connectivity values and affective symptoms were identified. Distinct connectivity patterns were found in post-hoc analysis when splitting SZ patients in three sub-groups based on their vulnerability to hallucinatory phenomena: non-hallucinating and low-hallucinating patients showed higher cerebellar rsFC than high-hallucinating patients, especially in language- and motor-related areas, suggesting a gradient of cerebellar connectivity alterations corresponding to hallucination vulnerability.

Our results provided novel insights into cerebellar abnormalities in SZ, highlighting the role of within-cerebellum connectivity in cognitive deficits. The observed connectivity patterns in language-related regions might contribute to understanding linguistic mechanisms and auditory verbal hallucinations in SZ.

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Primary authors: Dr BIONDI, Margherita (Padova Neuroscience Center, University of Padova, Italy); Dr MARINO, Marco (Department of General Psychology, University of Padova, Italy; Movement Control and Neuroplasticity Research Group, KU Leuven, Belgium); Prof. MANTINI, Dante (Movement Control and Neuroplasticity Research Group, KU Leuven, Belgium); Prof. SPIRONELLI, Chiara (Padova Neuroscience Center, University of Padova, Italy; Department of General Psychology, University of Padova, Italy)

Presenter: Dr BIONDI, Margherita (Padova Neuroscience Center, University of Padova, Italy)

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