

Cerebellar predictive mechanisms in social cognition: a study on patients with cerebellar neurodegenerative disease.

Saturday, September 13, 2025 9:50 AM (15 minutes)

Introduction: Current neuroscientific literature suggests the cerebellum is a key node in the predictive social brain. Although social and mentalizing deficits have been observed in patients with cerebellar neurodegenerative diseases (CNDp), social-prediction processes have not been systematically studied. To address this, we examined social-prediction, social-cognition abilities, and mentalizing brain networks in CNDp using tailored tasks and structural and functional MRI.

Methods: Eighteen adult CNDp and twenty-six matched controls (CN) completed three computerized prediction tasks, where contextual cues set expectations for interpreting and predicting ambiguous emotional expressions, personality traits, or objects. Participants were also administered two social-cognition tests: the Reading the Mind in the Eyes Test (RMET) and the Faux Pas Test. All underwent 3T brain MRI scans, including T1-weighted and resting-state functional connectivity (FC) sequences. Voxel-based morphometry (VBM) and FC analyses were used to assess cerebellar volume differences and FC within the mentalizing cerebellar-cerebral network.

Results: Compared to CN, CNDp showed impaired performance on the personality traits task, which taps into advanced mentalizing compared to the other prediction tasks. CNDp also performed worse on the Faux Pas Test, which demands higher inferential mentalizing, compared to the RMET. VBM revealed widespread cerebellar atrophy in CNDp, extending to posterior lobules associated with social processing. These areas also showed altered FC with mentalizing cerebral regions.

Conclusion: These results indicated that cerebellar alteration affects social cognition and social prediction, especially when stimuli reflect advanced mentalizing processes. In addition, they confirmed the role of the cerebellum in predicting social stimuli based on previous contextual knowledge.

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