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Cerebellar atrophy in pathological subtypes of frontotemporal lobar degeneration

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State of the art: The cerebellum is differentially affected in various frontotemporal dementia syndromes, but associations of cerebellar atrophy with specific neuropathologies have not been systematically analyzed. We examined cerebellar grey matter volume with brain imaging in patients with all major pathological subtypes of frontotemporal lobar degeneration (FTLD).
Methodology: We applied voxel-based morphometry to the earliest structural magnetic resonance imaging scans of autopsy-proven FTLD cases (n=175), and age-, sex-, and education-matched healthy controls (n=102). Patients with FTLD were distributed between FTLD-tau (108 patients: 24 Pick' disease, 37 corticobasal degeneration (CBD), 47 progressive supranuclear palsy (PSP)) and FTLD-TDP (67 patients: 13 type A, 25 type B, 17 type C, 12 FTLD with motor neuron disease (FTLD-MND)). Patients' functional status was measured using the Clinical Dementia Rating Scale PLUS National Alzheimer's Coordinating Center Behavior and Language Domains (FTLD-CDR).
Results: Compared with controls, distinct patterns of cerebellar atrophy were observed in all pathological subtypes spanning bilateral hemispheres and vermis (*P*FWE-corr<0.05, >100 contiguous voxels). Significant cerebellar grey matter changes were even found in the early stage (FTLD-CDR = 1) of CBD, PSP, Pick's disease, TDP-type A, type B, and FTLD-MND. Degree of cortical atrophy significantly predicted cerebellar atrophy in all subtypes.
Conclusion: This study is the first to identify distinct early patterns of cerebellar atrophy across pathological subtypes of FTLD, and to show these directly correspond with cortical grey matter volume. These results clarify the cerebellar involvement in FTLD and underscore the potential for cerebellar neuroimaging to be a non-invasive biomarker for disease monitoring.

Conflicts of interest

N/A