

Cerebellar Cortex And Cognition Following Mild Traumatic Brain Injury

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Purpose

Limited reports discussed the impact of the trauma to the cerebellum. Here we used automated cerebellar structural features extraction, followed by region-of-interest (ROI) analyses to identify any volumetric changes in the cerebellar cortex in mild TBI.

Materials And Methods

Patients with acute mild TBI and healthy controls were recruited on voluntary basis. Acute high resolution MRI was done and repeated six months thereafter. Screening Module of the Neuropsychological Assessment Battery (S-NAB) was used to assess the cognitive functions of the patients at admission and at six-month follow-up. Cerebellum cortical volume (CCV) was computed. Cross sectional and longitudinal CCV analyses and its correlation with the NPP scores were inferred using Bayesian statistics.

Results

Sixty-three patients (mean age 27.2 ± 8.3 years) and 27 controls (mean age 30.0 ± 5.7 years) were recruited. Twenty-one patients completed the 6-month follow-up. Longitudinally, the patients showed mostly bilateral volumetric cortex expansion upon follow up at lobules V and VI, crus I and II, lobules VIIb, VIIIa+b, and IX ($BF_{10} > 30$). In addition, association was strongly evident between the relative changes of the attention domain scores and the relative changes of the CCV at the left X and the right V lobules ($r = 0.643$ and $r = -0.607$, respectively; $BF_{10} > 10$).

Conclusion

Subtle yet significant cerebellar cortex change can occur following a mild TBI. Unconventionally, the attention domains were also associated with the cortical volumetrics. Future TBI studies should also consider the role of the cerebellum in cognition.