

Publication

Abnormal connectivity of the sensorimotor network in patients with MS : a multicenter fMRI study

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In this multicenter study, we used dynamic causal modeling to characterize the abnormalities of effective connectivity of the sensorimotor network in 61 patients with multiple sclerosis (MS) compared with 74 age-matched healthy subjects. We also investigated the correlation of such abnormalities with findings derived from structural MRI. In a subgroup of subjects, diffusion tensor (DT) MRI metrics of the corpus callosum and the left corticospinal tract (CST) were also assessed. MS patients showed increased effective connectivity relative to controls between: (a) the left primary SMC and the left dorsal premotor cortex (PMd), (b) the left PMd and the supplementary motor areas (SMA), (c) the left secondary sensorimotor cortex (SII) and the SMA, (d) the right SII and the SMA, (e) the left SII and the right SII, and (f) the right SMC and the SMA. MS patients had relatively reduced effective connectivity between the left SMC and the right cerebellum. No interaction was found between disease group and center. Coefficients of altered connectivity were weakly correlated with brain T2 LV, but moderately correlated with DT MRI-measured damage of the left CST. In conclusion, large multicenter fMRI studies of effective connectivity changes in diseased people are feasible and can facilitate studies with sample size large enough for robust outcomes. Increased effective connectivity in the patients for the simple motor task suggests local network modulation contributing to enhanced long-distance effective connectivity in MS patients. This extends and generalizes previous evidence that enhancement of effective connectivity may provide an important compensatory mechanism in MS.

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