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Inter-hemispheric functional connectivity between motor regions reflects motor recovery in stroke

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Background & Purpose: The analysis of resting-state connectivity has been widely used to reveal the intrinsic functional connectivity in macroscopic scale level. The recovery of hand function is dependent on the functional connectivity among the major motor networks. Therefore, the aim of this study is to find a change of connectivity after stroke related with prognosis in patients with severe hand disability using resting-state fMRI.

Materials & Methods: The participants were 26 patients with unilateral MCA infarction consisting of 12 stroke patients with good recovery and 14 with poor recovery in terms of hand function evaluated with Brunnstrom motor stage. Fourteen age-sex matched control group were also enrolled. All MRI data were acquired with a 3.0T MR scanner (HD, General Electric Healthcare). Resting-state BOLD images were obtained using an echo planar-imaging sequence (repetition time (TR)=2000 ms, echo time (TE)=30 ms, flip angle=90, matrix=64x64, field of view (FOV)=210 mm, and 4 mm thickness with no gap). All patients underwent resting functional magnetic resonance imaging about 1 month (27.8±8.4 days) from the onset of stroke. We evaluated the functional connectivity between ipsilateral and contralateral motor networks

Results: The functional connectivity score between the homologous primary motor cortex is 0.31±0.26 in good recovery group and 0.03±0.19 in poor recovery group, and 0.45±0.26 in controls respectively. The statistically significant decreased functional connectivity was found in poor recovery group compared with the good recovery group ($p=0.016$) and the controls ($p<0.001$).

Conclusion: Therefore, altered resting-state functional connectivity scores can be used as predictors in recovery of hand function after stroke. This tool has the potential to help determine appropriate stroke treatment strategies and monitor the efficacy of rehabilitation.

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