Relationship between Functional Connectivity and Sensory Impairment: red flag, or red herring?

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Résumé en anglais	Resting-state functional magnetic resonance imaging (fMRI) can be used to study the functional connectivity in the somatosensory system. However, the relationship between sensory network connectivity, sensory deficits, and structural abnormality remains poorly understood. Previously, we investigated the motor network in children with congenital hemiparesis due to middle cerebral artery strokes (MCA, n = 6) or periventricular lesions (PL, n = 8). In the present study, we validate the use of interleaved resting-state data from blocked fMRI designs to investigate the somatosensory network in these patients. The approach was validated by assessing the predicted “crossed-over” connectivity between the cerebral cortex and the cerebellum. Furthermore, the impact on the volume of gray-matter (GM) in primary (S1) and secondary (S2) somatosensory cortex on functional connectivity measures was investigated. We were able to replicate the well-known “crossed-over” pattern of functional connectivity between cerebral and cerebellar cortex. The MCA group displayed more sensory deficit and significantly reduced functional connectivity in the lesioned S2 (but not in lesioned S1) when compared with the PL group. However, when accounting for GM volume loss, this difference disappeared. This study demonstrates the applicability of analyzing resting-state connectivity in patients with brain lesions. Reductions of functional connectivity within the somatosensory network were associated with sensory deficits, but were fully explained by the underlying GM damage. This underlines the influence of cortical GM volume on functional connectivity measures
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