

FRONTAL CORTICO-SUBCORTICAL MRI CORRELATES OF FATIGUE AND DUAL-TASK PERFORMANCE IN PROGRESSIVE MULTIPLE SCLEROSIS

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Introduction. Damage of frontal cortico-subcortical networks may contribute to fatigue and dual-task performance impairment in multiple sclerosis (MS). However, the substrates underlying these clinical deficits in progressive (P) MS still need to be fully explored. We investigated the associations between structural and functional MRI abnormalities of frontal cortico-subcortical circuits and fatigue and dual-task performance in PMS.

Methods. Structural and functional brain MRI scans, modified fatigue impact scale (MFIS), single- and dual-task performances were obtained from 57 PMS patients, with impaired cognitive processing speed but no depression, and 10 healthy controls (HC) from 4 centers. The associations of thalamic, caudate nucleus and dorsolateral prefrontal cortex (DLPFC) atrophy, microstructural abnormalities of their connecting fibers and their resting state effective connectivity (RS EC) with fatigue, single- and dual-task performances were investigated.

Results. Compared to HC, PMS patients showed significantly higher MFIS score and subscores ($p < 0.027$), and worse single- and dual-task performances ($p < 0.001$). In PMS, higher MFIS-physical score was predicted by lower RS EC from left-caudate nucleus to left-DLPFC ($R^2 = 0.112$, $p = 0.027$), whereas higher RS EC from right-thalamus to right-DLPFC ($R^2 = 0.102$, $p = 0.046$) predicted higher MFIS-psychosocial score. Single- and dual-task motor performances were predicted by lower RS EC from left-DLPFC to left-thalamus ($R^2 \geq 0.137$, $p \leq 0.032$). Several structural MRI measures independently predicted single- and dual-task correct response rates ($R^2 = 0.454$, $p < 0.042$; $R^2 = 0.307$, $p < 0.010$) and dual-task cognitive cost ($R^2 = 0.188$, $p = 0.002$). Fatigue was not significantly associated with single- and dual-task performances.

Conclusion. Different frontal cortico-subcortical structural and functional MRI abnormalities contribute to fatigue and worse single- and dual-task performances in PMS.

TOPIC

6. Cognitive neurology/neuropsychology

18. MS and related disorders

23. Neuroimaging