SENSORIMOTOR FUNCTIONAL CONNECTIVITY CHANGES IN AMYOTROPHIC LATERAL SCLEROSIS

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Introduction: To date, little is known regarding the functional interaction among the different regions of the sensorimotor network in patients with amyotrophic lateral sclerosis (ALS).

Aims: To determine whether the resting-state (RS) functional connections to the primary SMC bilaterally is altered in ALS patients, and whether such changes represent a response to the corticospinal tract (CST) damage, assessed using diffusion tensor (DT) MRI tractography.

Methods: RS fMRI and DT MRI were obtained from 26 ALS patients with mild disability and 15 healthy controls. Functional connectivity (FC) to the left and right primary SMC was assessed. CST average fractional anisotropy (FA) values were measured.

Results: ALS patients vs. controls showed a significantly increased FC between the left SMC and the right cingulate cortex, parahippocampal gyrus, and cerebellum-crus II. No right SMC FC changes were found. The pattern of increased FC to the left SMC was more widespread when considering only patients with undetectable CST damage than the whole group of patients. In this patient group, FC was also increased between the right SMC and right parahippocampal gyrus, and bilateral middle temporal gyrus. In “CST damaged” patients vs. controls, FC was increased between the left SMC and right cingulate cortex only, while it was decreased between the right SMC and right putamen and cerebellum-lobule VI. Disease severity correlated with reduced left SMC FC.

Conclusions: Functional brain changes do occur in ALS. These changes might have a role in compensate for (limited) structural damage and might exhaust with increasing burden of disease pathology.