Resting state network abnormalities in amyotrophic lateral sclerosis mirror those of frontotemporal dementia

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Introduction. Amyotrophic lateral sclerosis (ALS) is increasingly recognized to be a multisystem disorder which includes both clinical and neuropathological features of a frontotemporal dementia (FTD)1, 2. Previous studies have demonstrated that patients with FTD undermined the RS connectivity in frontal cortex, but intensified the connectivity of the posterior regions of the default mode network (DMN)3. To date, how RSNs other than the sensorimotor are affected by ALS have not been fully investigated yet.

Objective. To investigate whether resting state brain networks (RSNs) related to cognition are affected in patients with ALS.

Methods. Using RS functional MRI (fMRI) and independent component analysis, the connectivity patterns of the DMN, as well as the fronto-parietal, executive, and salience networks (Figure 1) were explored in 16 non-demented patients with sporadic ALS and no cognitive impairment, and 15 healthy controls.

Results. Compared with healthy controls, ALS patients showed a decreased connectivity of the DMN in the right middle and inferior orbitofrontal cortex, but enhanced DMN connectivity in the left precuneus (Figure 2). ALS patients relative to healthy controls also had increased fronto-parietal network connectivity in the left inferior parietal lobule and right angular gyrus, and a decreased connectivity in the left inferior frontal gyrus (Figure 2). No change was found in the executive and salience network connectivity in ALS patients relative to healthy controls.

Conclusions. In non-demented ALS patients, there is an alteration of large-scale functional brain networks associated with cognition. The increased parietal coactivation seen in these patients may have a role in an attempt to maintain cognitive efficiency in the presence of structural frontotemporal injury. The pattern of RSN abnormalities in ALS (i.e., decreased connectivity in frontal regions, enhanced connectivity in posterior parietal regions) mirrors that observed in FTD patients3. RS fMRI may contribute to shed light on to the overlap between ALS and FTD.