Altered sensorimotor network of resting state fMRI in Leukoaraiosis

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Target audience

Neurologist could treat patients with gait disturbance in a more targeted way so as to alleviate symptoms. In term of medicine, researcher might discover a new biomarker for leukoaraiosis (LA), basing on the finding in pathogenesis.

Purpose

By investigating the motor system of LA by resting state functional MRI (fMRI), the mechanism of motor dysfunction in LA patients is going to be explored.

Methods

Forty-four LA patients (twenty-six males) aged 41-79 years old (Mean ±SD: 62±9.29), and twenty-six healthy controls (HC) (thirteen males) aged 35-74 years old (Mean ±SD: 49±7.85) were scanned under their resting condition. The sensorimotor network in resting state fMRI was extracted by using group ICA. The network difference between LA and HC was determined by two sample t-test ($p \leq 0.0001$). The quantity of positive z-scores among a significant between-group difference region of precuneus (PCC) was counted, then the correlation analysis with the Montreal Cognitive Assessment (MoCA)[1] score of visuospatial ability part was implemented.

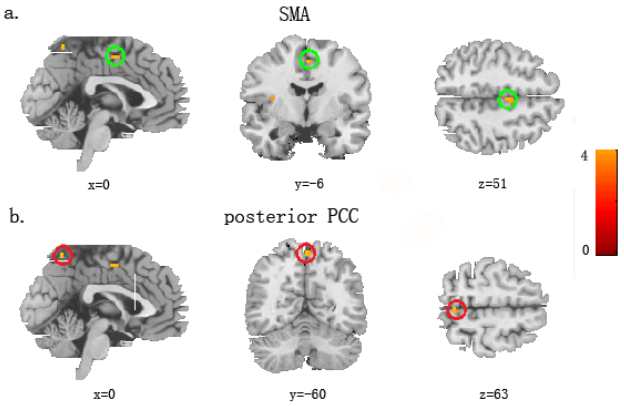

Figure 1. Illustrated the group-between difference in sensory-motor network determined by a two-sample t-test ($p<0.0001$). a. the activation in green circle was a part of SMA. b. The medial volumes of dorsal posterior precuneus were showed in the red circle.

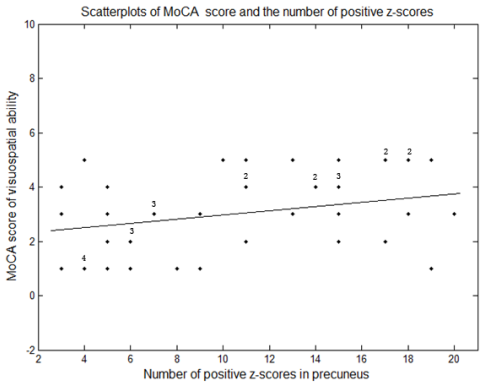

Figure 2. The relationship between the MoCA score of visuospatial ability and the number of positive z-scores in PCC was demonstrated by the scatterplots. The solid line represented the regression fit.

Results

Comparing with LA, HC had significant increased functional connectivity in medial volumes of dorsal posterior precuneus precuneus, left lingual gyrus and supplementary motor area (SMA), as Figure. 1 demonstrated. The reverse contrast (LA vs. HC) did not yield any significant clusters.

The relationship between the MoCA score of visuospatial ability and the number of positive z-scores in PCC was revealed in Figure 2. The correlation coefficient is 0.426 ($p=0.0039$).

Discussion

The medial volumes of dorsal posterior precuneus has been reported to play an important role in visuospatial function[2,3], while over 63% of LA patients were not normal in the visuospatial ability part of MoCA. In this study, it was found a strong correlation between the visuospatial score of MoCA and the number of positive z-scores in posterior PCC. It was suggested that the motor dysfunction in patient with LA maybe highly associated with the impairment in visuospatial function.

References

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