Association between language functional network and attenuated psychotic symptoms in clinical high-risk psychosis patients in Shanghai

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Background: The onset of schizophrenia (SZ) occurs during young adulthood. Approximately 30% of patients who display attenuated psychotic symptoms of illness between 15 and 30 years old convert to a psychotic disorder within 3 years. Understanding the neural characteristics related to the clinical high risk (CHR) of SZ allows timely diagnosis and intervention that potentially prevents later manifestation of chronic psychosis. Studying CHR patients who haven’t received medication treatment also provides an unprecedented advantage to dissociate the risk markers from drug effect. One of the important symptoms of CHR patients is language dysfunction characterized by impairment of verbal communication and auditory hallucinations. The current study investigates the functional organization of language network in CHR patients and its relationship to SZ symptomatology.

Methods: 50 CHR patients from Shanghai Mental Health Center, together with 30 age- and gender-matched healthy controls (HC), underwent a 6-min resting state fMRI scan. SPM and CONN were used to process resting-state fMRI data. Whole-brain connectivity analysis based on Left IFG was compared between groups and related to CHR symptoms.

Results: Compared to HC, the CHR group exhibited enhanced connectivity within the left hemisphere and reduced connectivity between left and right hemispheres. In particular, the CHR group showed hyper-connectivity between left IFG and left posterior STG, as well as left premotor cortex, but hypo-connectivity between left IFG and right IFG. Brain-behavior correlation analysis showed distinct roles of these two biomarkers. The extent of hypo-connectivity between hemispheres marks the severity of the positive symptoms, while the extent of hyper-connectivity between the left frontal and posterior language nodes indexes less severe positive symptoms.

Conclusions: Reduced cross-hemispheric frontal connectivity in the CHR group is consistent with previous evidence in chronic schizophrenia patients. The decreased functional communication between hemispheres might reflect impaired inhibition pathways as predisposition to psychosis. However, greater long-distance connectivity between left IFG and left posterior STG, which is crucial for integration of speech sounds and semantics, seems to constitute a protective mechanism for at least a subset of CHR patients. Future studies will relate the longitudinal clinical outcomes with individuals’ functional network.