Dysconnectivity Associated with Temporal Processing in Schizophrenia: A Review

Dahye Bae¹, Kwang-Hyuk Lee¹, Jun Soo Kwon¹²,³

¹ Department of Brain and Cognitive Sciences, College of Natural Sciences, Seoul National University, Seoul, Republic of Korea; ² Department of Psychiatry, Seoul National University College of Medicine, Seoul, Republic of Korea; ³ Institute of Human Behavioral Medicine, SNU-MRC, Seoul, Republic of Korea

Introduction: Temporal processing has been found impaired in patients with schizophrenia. Although temporal processing abnormalities may be a fundamental cognitive disturbance in schizophrenia, these abnormalities have rarely been the focus of theoretical consideration.

Objective: The purposes of this study are to review the deficits of temporal processing in patients with schizophrenia and to find the neural correlates of these abnormalities.

Methods: To answer the proposed research question, we reviewed time perception and processing studies conducted in schizophrenia samples. The reviewed articles included ones ranging from studies on temporal processing of subsecond duration perception to studies on temporal order perception and the its underlying brain structural mechanism.

Results: Neuroimaging studies have shown that critical brain structures engaged in time perception include the prefrontal and parietal cortices (lateralized to the right), thalamus, basal ganglia, and cerebellum. In schizophrenia, studies using functional magnetic resonance imaging (fMRI) revealed the bilateral overlap of cortical and subcortical regions, especially in the frontal area as well as the parietal area and the basal ganglia. Other studies reported that both schizophrenia and bipolar disorder have impaired temporal processing and cognitive control functions. Meta-analyses of fMRI studies show that the temporal processing-related cortical and subcortical areas show hypoactivation.

Conclusions: Reduced activity of various brain regions reflects impaired brain functional connectivity. In schizophrenia, it is known that patients’ impaired cerebral connectivity leads to functional deficits in time perception tasks performed with increased difficulty. The brain dysconnectivity affects neural networks of patients with schizophrenia and is an element of a neurocognitive function that affects temporal processing.