

Deficit of theory of mind in individuals at ultra-high-risk for schizophrenia

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Abstract

Background: Although a deficit in social cognition is regarded as an early indicator of schizophrenia, few studies have investigated social cognition in ultra-high-risk (UHR) individuals.

Methods: Our investigation involved subjects at UHR for psychosis ($N=33$) and an age- and IQ-matched healthy control (HC) group ($N=36$). Two types of theory of mind (ToM) tasks and a neuropsychological test battery were measured.

Results: Compared to the HC group, the UHR group performed significantly worse for ToM tasks, with the effect size at an intermediate level (0.64–0.68). Furthermore, the UHR group showed impaired performance in the executive and working memory tests, but not verbal memory tests. These deficits for ToM tests observed in the UHR group were significantly correlated with set-shifting tasks.

Conclusions: Deficits in social cognition may be modest at the prodromal stage of schizophrenia and may be attributed to prefrontal dysfunction. To prevent or delay transition to psychosis, there is a need for specific preventive strategies targeting social functioning for the UHR group.

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1. Introduction

In recent years, several research groups have investigated the characteristics of ‘at-risk mental states’ or prodromes to warrant early intervention before the

development of psychosis. In this regard, a recent study (Cornblatt et al., 2003) has suggested four domains of risk factors that appear to be particularly good targets for early intervention for schizophrenia, based on published studies: cognitive deficits, affective disturbance, social isolation, and academic failure. Previous research regarding cognitive domains in high-risk individuals has reported several areas of cognitive dysfunction, including working memory (Simon et al., 2007), verbal memory (Hawkins et al., 2004; Niendam et al., 2006; Pukrop et al., 2006), attention (Hawkins et al., 2004),

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verbal executive function (Simon et al., 2007; Hawkins et al., 2004), and speed of processing (Niendam et al., 2006). Based on these findings, researchers have described the early intervention that may prevent further cognitive damage in the treatment of high-risk individuals.

With respect to the social domain of high-risk individuals, there has been little investigation relative to the cognitive domain. Social skills required to manage social interaction effectively are encompassed by the term social cognition, and a deficit in social cognition is an important feature of schizophrenia (Pinkham et al., 2003). Furthermore, patients with schizophrenia exhibit a poor level of community functioning, even prior to the onset of the first psychotic episode (Davidson et al., 1999). A core aspect of social cognition is the ability to conceptualize other people's mental states, i.e., their beliefs and intentions; this is known as theory of mind (ToM). Several studies have investigated ToM mind-reading skills with various ToM tasks in schizophrenia and have reported a deficit in detecting deception and false belief (Brüne and Brüne-Cohrs, 2006; Corcoran et al., 1995) in schizophrenia, compared to healthy controls (HC). However, little is known regarding the ToM ability in subjects at ultra-high-risk (UHR) for schizophrenia.

One study (Janssen et al., 2003) has found evidence for reduced mentalizing capability in unaffected relatives of patients with schizophrenia and suggested that those deficits in ToM ability have been associated with IQ and neuropsychological factor, especially executive functions, but another study (Kelemen et al., 2004) has found evidence against such a phenomenon. Recently, it has been reported that ToM deficits for individuals at high genetic-risk of schizophrenia are related to the experience of clinical symptoms (Marjoram et al., 2006). Comparison of the ToM ability in high genetic-risk group with that of controls has shown that there is increased activation in the prefrontal cortex (PFC) in the unaffected relatives compared to affected relatives and controls during the performance of a ToM paradigm (Marjoram et al., 2006). Considering these findings, together with the various clinical and neurocognitive deficits in the UHR group mentioned above, social cognition deficit in schizophrenia may precede the initial stage of psychotic breakdown, and furthermore, accelerate disease progression, with a strong interaction with social environment.

Our primary objective was to investigate social cognition capacity in a UHR group compared to that in an HC group, using two types of ToM tasks. Considering the possible influence of other components of

cognitive function such as memory, language, and executive function on ToM tasks, a neuropsychological test battery was administered to both the UHR and HC groups. Our secondary objective was to delineate the relationship between deficits in social cognition, indexed by ToM tasks, and other cognitive dysfunction observed in the UHR group. Based on previous reports, we hypothesized that ToM task performance in the UHR group would be worse than that in the HC group, and that a subset of cognitive dysfunctions, especially a deficit in executive function, would be correlated with ToM ability.

2. Methods

2.1. Recruitment strategy

The Seoul Youth Clinic (SYC), which is a prospective, longitudinal project for the investigation of people at high-risk for schizophrenia, was established in 2004. Subjects made initial contact by telephone or via the website (<http://neuroimage.snu.ac.kr/youth/index.html>), having heard about the project from various sources, including a mental health education program for early psychosis, referral from health care providers, and hospitals. For subjects who were considered to be at UHR after a brief telephone interview, a screening interview was completed by two experienced psychiatrists (SYY and DHK).

2.2. Participants

Sixty-nine age- and IQ-matched subjects were recruited from the SYC in the Seoul metropolitan area between November 2004 and April 2007, and consisted of 36 HC and 33 UHR individuals. All subjects were aged 16–29 years.

The UHR group was recruited according to the Comprehensive Assessment of At-Risk Mental States (CAARMS) criteria (Yung et al., 2005); the participants met the criteria for at least one of three groups at intake, as determined by specific state and/or trait risk factors for psychosis. The three groups were those with: (1) trait plus state risk factors; (2) attenuated symptoms; and (3) brief, limited intermittent psychotic symptoms. The criteria met by the subjects were as follows: attenuated symptoms, 31; brief, limited intermittent psychotic symptoms, 0; trait plus state and attenuated symptoms, 6. Four of the latter subjects were included in two criteria because they had attenuated symptoms and trait plus state and attenuated symptoms. A total of 13 subjects in the UHR group (39%) received low-dose

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