

## **DESCRIPTION FOR THE GENERAL PUBLIC**

Schizophrenia is a severe mental illness, related to disturbances in neurodevelopment and brain maturation which were believed as reason of later cognitive, emotional and social deficits and schizophrenia-characteristic positive and negative psychopathological symptoms. Some researchers suggests, that communication skills may be a core feature of schizophrenia, and this disease may be considered as communication disorder. One of the special aspect of the human interactions, the ability to understanding and use the figurative meaning of speech, e.g. metaphors, humor, sarcasm or irony, were impaired in schizophrenia.

Recent research indicate, that people with schizophrenia revealed difficulties in understanding and use of paralinguistic and figurative aspects of language. This is manifested by specific and selective part of communication deficits in schizophrenia, i.e. diminished ability to humor and metaphor comprehension (Adamczyk et al., 2016; Schizophrenia Research, 176: 331-339). The analysis of the current literature data indicates that problem of understanding and use of the figurative aspects of language in schizophrenia, such as humor and metaphor, is not sufficiently studied. To the best of our knowledge, this project the first attempt to apply the network approach to study this problem.

This project's objective is to identify the neural mechanism behind the deficit of metaphor comprehension in schizophrenia by complex network analysis using state-of-the-art neuroimaging methods including functional, structural and connectivity methods. Furthermore, as continuation of our previous research on the neural correlates of diminished humor comprehension, additional aim of this project is to investigate on specificity and/or differentiation of the various brain regions activated during figurative meaning of speech processing. This may better describe their role in communication deficits observed in schizophrenia. Thus, based on our previous research, in this project we want to verify the hypothesis of impaired efficiency of the processes involved in the integration of metaphorical meaning within the semantical context of the language.

The planned study involves two experiments with use of EEG and fMRI methods.

In order to test hypotheses and answering the question about neural causes of this deficit, we plan the present study to include:

- functional Magnetic Resonance Imaging assessments including BOLD signal analysis in order to analyze functional abnormalities in activation of structures related to this deficit.
- the structural connectivity analysis with use of Diffusion Tensor Imaging method in order to analyze the volume of axonal connections between regions engaged in metaphor processing
- the effective connectivity analysis which reflects the strength and direction of propagation of activation within neuronal network using information flow analysis of the EEG recordings (Directed Transfer Function).

The comparison of results in healthy people and in schizophrenic patients will allow to determine the potential cause of metaphor comprehension deficit in schizophrenia.

The study will serve to broaden the knowledge concerning the mechanism of deficits in understanding the figurative meaning of speech in schizophrenia. In particular, the knowledge of their neuronal basis (the analysis of the information flow in neuronal networks) by application of the network approach, which is relatively new and most complex and comprehensive state of the art methods. As it will contribute to better understanding of the causes of communication deficits, it will become a starting point for determining the potential areas of therapeutic intervention aimed at improvement of social functioning and social integration of people suffering from schizophrenia.