Article: EPA-0414
Topic: EPW01 - Schizophrenia 1

BREAKDOWN OF TEMPORAL HIERARCHY IN NEURAL PROCESSING OF NATURAL INFORMATION: EVIDENCE FROM SCHIZOPHRENIA

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Introduction: The capacity to accumulate information over time is crucial to our functioning in an ever-changing world. Recently, in healthy subjects, we showed that brain uses a distributed and hierarchical network of brain areas to process information over time. Specifically, we revealed hierarchy of information processing over time from early sensory areas toward high order perceptual and cognitive areas. Here, we investigate this issue in first-episode schizophrenia patients.
Objectives: Previous studies posited that schizophrenia is the result of impairment of hierarchical temporal processing by the brain, claiming for impairment in use of context while being processing information. The hierarchical temporal deficit is a fundamental trait that may be a better target for the study of etiology and pathophysiology of the disease.
Aims: We intended to map, in schizophrenia patients, the topographical organization of temporal scales using an ecologically relevant auditory stimulus - a real-life story. In addition, we assumed that studying healthy siblings, who are at high-risk for cognitive dysfunctions, will enable to determine functional neuromarkers of predisposition to disorder.
Methods: The fMRI data were analyzed using inter-subject correlation approach. The time-courses within each brain area in schizophrenia patients were estimated against healthy controls and unaffected siblings of the patients.
Results: Among patients, we observed impaired hierarchy with processing intact in low level but disturbed in high level. The sibling group showed an intermediate effect.
Conclusions: Better understanding of the underlying neural circuit involved in information processing in schizophrenia patients may assist in early identification of functional neuromarkers for the disease.

https://doi.org/10.1016/S0924-9338(14)77836-8 Published online by Cambridge University Press