Identification of MEG Biomarkers for Schizophrenia and Its Subtypes

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Schizophrenia is a chronic mental disorder that has a variety of detrimental symptoms and a greater risk factor of suicide. In this study, magnetoencephalography, a noninvasive brain imaging technique, was used to identify biomarkers for differentiating schizophrenia's two primary subtypes: deficit (DS) and non-deficit (non-DS), while comparing them to control subjects. During the resting state task, subjects looked at an image while brain activity was recorded. In the evoked state task, patients listened to an auditory oddball task paradigm (P300). Using pre-existing data, the data was filtered into beta (14-30 Hz) and gamma (30-80 Hz) bands. A model of the cortical brain surface was created from a standard MRI, then morphed to fit the digitized head shape collected during MEG acquisition. Using Multi Resolution FOCUSS, a current distribution source imaging technique, brain activity was mapped onto this model. Coherence Source Imaging was used for both resting and evoked data to identify active cortical networks. Coherence (COH) is a measure of functional connectivity between brain regions, higher values indicate more areas of the brain are actively connected. A discriminant analysis of the data was done to find differences in locations of brain activity between groups. During rest, patients with DS were found to have significantly higher COH values than control subjects, and DS activity was concentrated in the parietal lobe of the brain. In the evoked analysis, significant differences between groups were detected in COH level and in locations of focused brain activity. These biomarkers allow differentiation of schizophrenia into its specific subtypes. This method may be able to diagnose schizophrenia earlier, and tailor more specialized treatments for these subtypes.

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