Background: Frontal cortical deficits have repeatedly been shown to be relevant in the development of psychiatric disorders and are supposed to evoke characteristic psychiatric and cognitive symptoms in schizophrenia. It is assumed that plasticity and connectivity impairments following non-invasive brain stimulation, which are observed as common patterns in the motor system of schizophrenic patients, are as well present in frontal cortical areas and cause the mentioned dysfunctions. Until now experimental evidence is lacking substantiating that this hypothesis is correct and both cortical regions show similar patterns of deficits. Hence, this study aimed to assess the plasticity and connectivity in the frontal cortex of schizophrenia patients.

Methods: We applied anodal transcranial direct current stimulation (a-tDCS) to evoke long-term potentiation (LTP)-like plasticity in the dorsolateral prefrontal cortex (DLPFC). This non-invasive brain stimulation has been demonstrated to evoke plasticity in frontal cortical regions. As tDCS modulates cortical activity we employed electroencephalography (EEG) measurements to trace potential deficits in patients with schizophrenia compared to healthy participants. In total 20 schizophrenia patients and 20 age, gender and handedness matched healthy controls received 13Min of a-tDCS (1mA). EEG was measured before and after plasticity induction (up to 50 minutes) to record neuronal changes in excitability and plasticity.

Results: First analyses obtained a significant EEG alpha-activity change after LTP application in the frontal cortex of schizophrenia patients. This effect remained stable up to 50 minutes following a-tDCS stimulation.

Discussion: We were able to show for the first time that anodal tDCS is capable of inducing stable EEG alpha-activity changes in the frontal cortex of schizophrenia patients. Future analyses will focus on differences to healthy participants, which we hypothesize to show similar but stronger patterns of activity changes after a-tDCS stimulation.

S178. ALTERED GYRIFICATION IN THE SCHIZOPHRENIA SPECTRUM

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Background: Increased gyration in diverse cortical areas has been reported in patients with schizophrenia, which is considered to reflect deviations in early neurodevelopment. Schizotypal personality disorder (SPD) is thought to be a prototypic disorder within the schizophrenia spectrum, which shares biological and psychological commonalities with schizophrenia as a neurobiological basis for vulnerability factors. However, to the best of our knowledge, no magnetic resonance imaging (MRI) studies have investigated the gyration pattern in SPD.

Methods: T1-weighted structural MRI scans were obtained by 1.5-T scanner from 101 patients with schizophrenia, 46 patients with SPD, and 77 age- and gender- matched healthy control subjects. Using FreeSurfer software (version 5.3.), the local gyration indices (LGIs) of entire cortex were obtained with the method of Schaefer and colleagues. Clinical symptoms of the patients were rated with the Scale for the Assessment of Positive Symptoms (SAPS) and the Scale for the Assessment of Negative Symptoms (SANS) at the time of scanning. A general linear model controlling for age, gender, medication dose, and duration of medication was used to compare the LGIs across the groups and to conduct vertex-by-vertex whole brain LGI correlation analyses with clinical variables. This study was approved by the Committee on the Medical Ethics of Toyama University based on the declaration of Helsinki. After a complete description of the study was provided, written informed consent was obtained from all subjects.

Results: Compared with the controls, the patients with schizophrenia showed significantly higher LGI in widespread cortical areas including the bilateral frontal, parietal, and occipital regions. The patients with SPD demonstrated significantly higher LGI in the bilateral frontal and left parietal regions compared with the controls. Compared with the patients with SPD, the patients with schizophrenia showed significantly higher LGI in the left occipital and right frontal regions. Both SAPS and SANS total scores were positively correlated with LGI in the bilateral temporal regions in patients with schizophrenia, and were negatively correlated with LGI in the bilateral occipital regions in patients with SPD.

Discussion: Increased LGI in the bilateral frontal regions may be the common morphological substrates for the schizophrenia spectrum, possibly representing vulnerability to schizophrenia. In addition, increased LGI in the left occipital and right frontal regions preferentially observed in schizophrenia may have a critical role in manifestation of florid psychotic symptoms.

S179. PROGNOSTIC UTILITY OF MULTIVARIATE MORPHOMETRY IN SCHIZOPHRENIA

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Background: Groups of spatially distributed regions show shared variance in morphometric properties (e.g. grey matter volume) among subjects, thus forming independent morphometric ‘sources’ or covariance-based networks. Source based morphometry is a multivariate approach that is based on independent component analysis, and accounts for the inter-relatedness among different brain regions while filtering out noisy artefactual effects of mass univariate voxel-based approaches. We have previously demonstrated that with multivariate SBM, it is possible to identify the structural basis of subtle psychopathological features such as formal thought disorder, whose anatomical correlates have been hitherto elusive. In the current study, we use multivariate SBM to identify the morphometric sources in drug-naïve first episode subjects that show progressive changes that predict symptom change over 1 year.

Methods: 63 first-episode, drug-naïve patients with schizophrenia underwent brain magnetic resonance imaging scans at baseline (T0) and rescanned after 1 year follow-up (T1). Positive and Negative Syndrome Scale (PANSS) was used to assess their psychopathology. Source based morphometry (SBM) was applied to the raw grey matter volume (GMV), paired T contrasts for loading coefficients of GMV were constructed to detect the components that showed a significant effect of time. The change in PANSS scores between baseline and 1 year was expressed as a ratio of the scores at baseline - adjusted change scores for positive symptoms (POS%), negative symptoms (NEG%) and disorganization symptoms (DISORG%), with each domain score derived using van der Gaag’s 5-factor approach. Multiple regression analysis was conducted to predict the percentage change scores in each domain using the T0 and T1 loading coefficients of the components showing time effect with age, gender and cumulative antipsychotic dose as covariates.

Results: Of the 30 spatial components of gray matter identified by SBM, loading coefficients of anterior cingulate cortex (ACC), anterior insula (AI) & inferior frontal gyrus (IFG), superior temporal gyrus (STG), middle temporal gyrus (MTG) and dorsal lateral prefrontal cortex (DLPFC) reduced with time in patients. The lower volume of AI & IFG at baseline and at 1 year related to poor improvement in positive and disorganization symptoms; lower volume of STG & MTG at baseline and 1 year predicted poor improvement in negative symptoms.

Discussion: The baseline distribution of GM in AI & IFG, STG and MTG are predictive of the course of illness. The relationship between GM sources and symptom severity continues even after 1 year of naturalistic exposure to antipsychotic treatment. If judiciously combined with other available predictors of prognosis, source-based morphometric analysis can aid meaningful prognostication in schizophrenia.