early neurodevelopmental pathologies. It is unclear, however, whether such structural changes might be evident across the schizophrenia spectrum, involving at-risk subjects as well as even healthy subjects with subclinical or attenuated psychotic-like symptoms.

**Methods:** We analysed high-resolution MRIs (3 Tesla, T1-weighted MPRAGE, 1x1x1mm resolution) from n=177 healthy subjects with no current or previous psychiatric condition recruited from the local community. Subjects completed the SCL90R, a general symptom checklist (i.e. self-rating of symptoms), which includes subscales for psychoticism (with subclinical psychotic-like symptoms) and paranoid ideation. We used the CAT12 toolbox to analyse both gray matter and white matter alterations in both brain structures, affecting morphological relationships with both salience and default network regions. To our knowledge, no studies have examined covariance across all possible regional pairwise connections was tested using 2-tailed voxelwise t-test with FDR correction (p=0.05, 5% rate for false positives).

**Results:** Patients had a significant reduction in structural covariance affecting between right posterior insula and right precentral gyrus (within sensori-motor network, t=3.86, Hedge's g = 1.15); between right posterior insula and left ventral prefrontal cortex (between sensorimotor and salience network, t=3.71, Hedge's g = 1.10); and between right anterior cingulate cortex and right dorsal prefrontal cortex (between sensorimotor and default-mode network, t=3.10, Hedge's g = 0.92). There were no pairwise connections with increased structural covariance among FEP subjects compared to healthy controls.

**Discussion:** Our findings suggest that (1) structural covariance is disrupted even by the time of first-episode of psychosis; thus, the disruptions in morphological relationships reported in schizophrenia are not explicable by antipsychotic usage or illness duration (2) sensorimotor network regions show a predominant disruption in structural covariance, affecting morphological relationships with both salience and default mode regions. The functional and developmental plasticity of sensorimotor networks may be crucial for the early trajectory of psychosis.

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**T163. SUBMISSION WITHDRAWN**

**T164. STRUCTURAL COVARIANCE IN DRUG-NAIVE FIRST EPISODE PSYCHOSIS: AN ULTRA-HIGH FIELD MRI STUDY**

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**Background:** Structural neuroimaging studies report disrupted morphological relationship in the grey matter volume (structural covariance) in patients with schizophrenia, indicating an impairment in functional and/or developmental plasticity. To our knowledge, no studies have examined the alterations in structural covariance across the entire brain in drug-naive first episode psychosis. TOPSY (Tracking Outcomes of Psychosis) is one of the first studies intending to track the neurobiological trajectory using ultra-high field (7T) imaging starting from a drug-naive first episode state. Here, we report the initial findings from the structural covariance of grey matter volume. To our knowledge, this is the first structural covariance being reported using a 7T anatomical MRI acquisition.

**Methods:** We used ultra-high field (7 Tesla) MRI in 28 patients with FEP (satisfying criterion A of DSM-5 schizophrenia) and 18 controls, to evaluate differences in the grey matter. Volume in a voxelwise manner. FEP and controls were matched for age, sex and parental socioeconomic status. Patients were recruited at an early intervention unit (PEPP, London Ontario) and had active psychotic symptoms at the time of scanning. Morphometric analysis was done using SPM12, after DARTEL based registration and segmentation but without spatial smoothing on 160 brain regions (6mm spheres) obtained using Dosenbach's atlas. Correlation matrix for each group was constructed from 160x160 Pearson correlation coefficients, followed by estimation of a bias matrix for each subject using jack-knife bias estimation. Bias values for each pair of nodes in an individual subject quantified the contribution of that subject in the overall within-group covariance. Higher positive values meant greater covariance between the two given nodes in that subject, relative to the rest of the group. These bias matrices can be considered equivalent to demeaned and normalised matrices of structural covariance. Structural covariance across all possible regional pairwise connections was tested using 2-tailed voxelwise t-test with FDR correction (p=0.05, 5% rate for false positives).

**Results:** Patients had a significant reduction in structural covariance affecting between right posterior insula and right precentral gyrus (within sensorimotor network, t=3.86, Hedge's g = 1.15); between right posterior insula and left ventral prefrontal cortex (between sensorimotor and salience network, t=3.71, Hedge's g = 1.10); and between right anterior cingulate cortex and right dorsal prefrontal cortex (between sensorimotor and default-mode network, t=3.10, Hedge's g = 0.92). There were no pairwise connections with increased structural covariance among FEP subjects compared to healthy controls.

**Discussion:** Our findings suggest that (1) structural covariance is disrupted even by the time of first-episode of psychosis; thus, the disruptions in morphological relationships reported in schizophrenia are not explicable by antipsychotic usage or illness duration (2) sensorimotor network regions show a predominant disruption in structural covariance, affecting morphological relationships with both salience and default mode regions. The functional and developmental plasticity of sensorimotor networks may be crucial for the early trajectory of psychosis.
Abstracts for the Sixth Biennial SIRS Conference

T166. SPATIAL INCOHERENCE OF LARGE-SCALE CORTICAL NETWORKS RELATES TO FORMAL THOUGHT DISORDER IN SCHIZOPHRENIA: A 7T MRI-BASED THICKNESS STUDY

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Background: The thickness of cerebral cortex varies across individuals as well as across different regions within an individual. Shared trophic or plastic influences such as repeated task-related recruitment of extant brain regions results in morphological covariance within large-scale brain networks. Pathological processes disrupting functional co-activation can result in higher than expected degree of variability within large-scale networks in an individual level, resulting in spatial incoherence. We studied spatial incoherence of cortical thickness in 17 cortical networks identified on the basis of well-known patterns of intrinsic connectivity, to identify the spatially incoherent networks and relate them to differences in severity of thought disorder among patients with schizophrenia.

Methods: Ultra-high field 7T anatomical MRI scans (MPRAGE) were obtained from 20 subjects in a clinically stable, medicated early stage of schizophrenia, and 19 sex, parental socioeconomic-status and age matched healthy controls. Cortical thickness was estimated using Freesurfer v5.0, across 17 networks based on the parcellation scheme of Yeo et al. We computed within-network coefficient of variation in thickness (CVT) across vertices that constitute each network. Higher CVT of a network in a subject indicates higher spatial incoherence.

Results: Patients had a significant reduction in GMV in left fusiform gyrus (Hedge’s g = 1.98, T = 6.7), and increased GMV in the right precuneus (Hedge’s g = 1.63, T = 5.5) and lingual cortex (Hedge’s g = 1.19, T = 4.0). We did not find any other areas of significant GMV change. Of these 3 circumscribed GMV changes, reduced fusiform GMV was found among FEP patients with lower processing speed (ß=0.45, p=0.04), higher severity of delusions (ß=0.43, p=0.049) and unusual thought content (ß=0.59, p=0.01). Increased precuneus GMV was found among FEP patients with higher severity of delusions (ß=0.62, p=0.008) and unusual thought content (ß=0.50, p=0.03). Right lingual changes were not related to the severity of delusions or processing speed scores.

Discussion: Our findings suggest that (1) GMV deficits are minimal in drug-naive FEP subjects, with large effect-size changes concentrated around face processing (fusiform) region (2) GMV increases co-occur with GMV reduction especially in those with most severe delusions and cognitive deficits indicating a role for compensatory plasticity. Subtle early brain structural changes appear to predict symptom burden and cognitive deficits at the time of first clinical presentation with psychosis. Focusing on treatments that manipulate the structure of fusiform cortex could potentially reduce the severity of some of the early symptoms in FEP.

T167. ABERRANT MYELINATION OF THE CINGULUM BUNDLE IN PATIENTS WITH SCHIZOPHRENIA: A 7T MTI/DTI STUDY

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Background: The structural integrity of the anterior cingulum has been repeatedly observed to be abnormal in patients with schizophrenia. Reduced glutathione levels, indicating oxidative stress, is associated with reduced structural integrity of cingulum bundle in patients with schizophrenia. Variations in neuregulin-1, a well-established candidate marker for schizophrenia, results in oligodendrocyte dysfunction and defective myelination, and is shown to affect the structural integrity of the anterior cingulum in patients with schizophrenia. While the evidence to date has been obtained using diffusion tensor imaging, abnormal tract-specific changes in myelin content can be more directly inferred by combining multiple modalities of WM imaging such as diffusion tensor (DTI) and magnetization transfer imaging (MTI) in parallel.

Methods: We used ultra-high resolution (7 Tesla) MTI in 17 patients with schizophrenia and 20 controls, to evaluate the macromolecular (predominantly myelin) content of the brain. Immediately after the 7T scanning, we also obtained a 3T diffusion tensor image (DTI) and undertook probabilistic tractography using FSL software (AutoPtx, ProbTrackX) to delineate anterior cingulum bilaterally. Unpaired t tests were used for group comparisons along with estimates of Cohen’s d or Hedge’s g for effect sizes.

Results: Patients had a significant reduction in magnetization transfer ratio (MTR) in right (Cohen’s d=0.91, p=0.007) but not left (d=0.03, p=0.92) cingulum bundle. There was also a trend level reduction in fractional anisotropy of right (d=0.60, p=0.07) but not left (d=0.47, p=0.17) cingulum bundle. We did not find any significant relationship between the 3 major symptom dimensions of schizophrenia (Reality Distortion, Disorganization, Psychomotor Poverty) and Cingulum MTR. Patients with Schneiderian delusions (n=5) showed a significantly reduced MTR of left cingulum compared to patients (n=12) with no Schneiderian delusions (Hedges g=1.36, p=0.02).

Discussion: Our findings suggest that MTR changes in anterior cingulum, resulting from either dysmyelination or neuroinflammation, is present in clinically stable patients with schizophrenia despite their medicated status. We lacked sufficient power to detect association between MTR changes of cingulum and symptom dimensions. Nevertheless, our results suggest that MTR changes are of higher magnitude than changes in fractional anisotropy, indicating the sensitivity of measuring myelination as a biological marker of white matter aberrations in schizophrenia.

T168. STRUCTURAL COVARIANCE AND CORTICAL REORGANIZATION IN SCHIZOPHRENIA: AN MRI-BASED MORPHOMETRIC STUDY

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