Anatomical integrity within the inferior fronto-occipital fasciculus and semantic processing deficits in schizophrenia spectrum disorders

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The core symptoms of schizophrenia spectrum disorders (SSD) include abnormal semantic processing which may rely on the ventral language stream of the human brain. Thus, structural disruption of the ventral language stream may play an important role in semantic deficits observed in SSD patients. Therefore, we compared white matter tract integrity in SSD patients and healthy controls using diffusion tensor imaging combined with probabilistic fiber tractography. For the ventral language stream, we assessed the inferior fronto-occipital fasciculus [IFOF], inferior longitudinal fasciculus, and uncinate fasciculus. The arcuate fasciculus and corticospinal tract were used as control tracts. In SSD patients, the relationship between semantic processing impairments and tract integrity was analyzed separately. Three-dimensional tract reconstructions were performed in 45/44 SSD patients/controls ("Bern sample") and replicated in an independent sample of 24/24 SSD patients/controls ("Basel sample"). Multivariate analyses of fractional anisotropy, mean, axial, and radial diffusivity of the left IFOF showed significant differences between SSD patients and controls (p; (FDR-corr); <ă0.001, η; p; 2; =ă0.23) in the Bern sample. Axial diffusivity (AD) of the left UF was inversely correlated with semantic impairments (ră=ă-0.454, p; (FDR-corr); =ă0.035). In the Basel sample, significant group differences for the left IFOF were replicated (pă<ă.01, η; p; 2; =ă0.29), while the correlation between AD of the left IFOF and semantic processing decline (ră=ă-0.376, pă=ă.09) showed a statistical trend. No significant effects were found for the dorsal language stream. This is direct evidence for the importance of the integrity of the ventral language stream, in particular the left IFOF, in semantic processing deficits in SSD.
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