

Fronto-occipital Structural Disconnectivity as an Endophenotype of ASD

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Introduction :

Autism spectrum disorders (ASD) are characterized by deficits in social interaction and behavioral impairments. Several studies have reported differences in white matter generalized Fractional Anisotropy (gFA) in ASD.

Objectives:

We studied white matter microstructural integrity in individuals with ASD.

Aims:

We conducted the first DWI-based whole brain tractography study to compare gFA in 22 deep white matter tracts in first-degree relatives of individuals with ASD to controls and individuals with ASD. Furthermore, we replicated our significant results in an independent sample.

Methods :

Fifty-one first-degree relatives of individuals with ASD, 29 controls and 14 individuals with ASD participated. We performed q-ball imaging whole-brain tractography based on 1.5 T diffusion weighted MRI over 32 non-colinear directions. Then, we computed mean gFA along 22 main deep white matter tracts. A linear mixed model using group, gender, age and IQ as fixed effects and family as a random effect was used and Bonferroni correction applied. We also recruited a replication sample comprising 23 individuals with ASD and 32 controls.

Results :

We demonstrated a significantly reduced mean gFA along the left IFOF in first-degree relatives of individuals with ASD and individuals with ASD compared with controls and replicated this finding in an independent sample of patients. A decrease in mean gFA was also observed in the left CST when we compared first-degree relatives of individuals with ASD to controls (no such decrease was present in patients).

Conclusion :

Our work suggests that structural fronto-occipital disconnectivity may be an endophenotype of ASD.