GFCF2 markers are associated with cortical volume and thickness in temporal and fusiform gyri.

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Abstract

GFCF2 markers are associated with cortical volume and thickness in temporal and fusiform gyri.

Objective

The objective of this study is to investigate the neuroimaging implications of GFCF2 markers that have previously been implicated in neuroimaging and/or dyslexia-related cognitive phenotypes.

To accomplish this goal, we used genetic and neuroimaging data collected in the PING study. Specifically, we assessed whether these genetic markers influence several neuroimaging measures, including cortical thickness, cortical volume and subcortical hippocampal volume.

GFCF2 markers and previous associations

<table>
<thead>
<tr>
<th>SNP</th>
<th>BP Associated With:</th>
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<tr>
<td>rs917235</td>
<td>75819737</td>
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<td>rs6732511</td>
<td>75819737</td>
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<tr>
<td>rs2298948</td>
<td>75935615</td>
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</table>

Table 1: GFCF2 markers previously associated with neurobehavioral and/or neuroimaging traits.

The PING Study

The PING study is a cross-sectional cohort of typically developing children between the ages of 3 and 20 years. These children were recruited from 10 participating sites including Yale University. Subjects were genotyped on the Illumina Human660W-Quad BeadChip (San Diego, CA), with markers passing quality control filters (sample call rate > 98%, SNP call rate > 98%, minor allele frequency > 5%). Only subjects of European genetic ancestry were included in analyses to prevent population stratification.

PING Imaging Analysis. A standardized multiple modality high-resolution structural MRI protocol was implemented across ten sites with 12 examiners, which involved 3D T1- and T2-weighted volumes and a set of diffusion-weighted scans. Data were acquired on all examiners to estimate relaxation rates and measure and correct for scanner-specific gradient coil nonlinearity warping. Image bias in ETVORM format were processed with an automated processing stream written in MATLAB (National, MA) and C++ by the UCSD Multimodal Laboratory. L11-T-weighted structural images were corrected for distortions caused by gradient nonlinearities, coregistered, averaged, and rigidly resampled into alignment with an atlas brain. Image processing and analysis were performed using a fully automated set of tools available in the FreeSurfer software suite. An atlas-based method was used for delining and labeling WM fiber tracts.

Table 2: Regions of interest to be examined. 16 regions of interest were derived from structural and functional Magnetic Resonance Imaging (MRI) and fMRI, respectively. Data previously associated with various neurobehavioral and structural neuroanatomic phenotypes. Cortical volume and thickness on each of these regions of interest was measured and used to examine genetic relationships. We further evaluated n2298948 for subcortical hippocampal volume in both the left and right hemispheres.

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Conclusions

We performed a follow-up of 3 GFCF2 markers previously associated with various neurobehavioral and/or neuroimaging traits. We demonstrated association with both cortical volume and thickness in the inferior temporal gyrus and fusiform gyrus as well as cortical volume in the fusiform gyrus. There was also weaker association with cortical thickness in both the supratemporal and transverse temporal regions.

Our findings complement expression studies showing increased expression of GFCF2 markers in various temporal regions. However, our results do not support a relationship between GFCF2 and the hippocampus, as reported in Alzheimer disease.

Future work will examine the effects of GFCF2 on white matter volume in ROIs and fractional anisotropy of language related fiber tracts.

Acknowledgements

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