
EXPLORING GENETIC AND ENVIRONMENTAL DETERMINANTS OF BRAIN VOLUMES IN SCHIZOPHRENIA

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Background: Schizophrenia is an aetiologically complex disorder associated with significant familial risk. It is marked also by reductions in whole brain, grey and possibly white matter volumes. How these pathological abnormalities are influenced by schizophrenia's genetic and environmental risk remains uncertain.

Methods: We investigated the relationship between familial and environmental risk on brain volume in twin pairs varying in their zygosity and concordance for schizophrenia, and healthy control twins, using a variety of complementary imaging strategies. These included region of interest and automated tissue segmentation volumes and voxel based morphometry.

Results: We found that whole brain, grey, white, frontal and right hippocampal volumes were smaller in probands with schizophrenia compared to healthy controls. Well co-twins from MZ discordant pairs showed a trend towards lower white matter volume compared to the healthy controls. Well co-twins from DZ discordant pairs had smaller hippocampal volumes compared to the healthy controls. The patients with schizophrenia and their well co-twins from MZ discordant pairs differed in the superior frontal cortex using both region of interest and VBM techniques. Lower birth weight and hypoxia were both associated with lower whole brain volumes, and with lower white and grey matter volumes respectively.

Conclusions: Our data suggest that total brain and grey matter volume reductions in schizophrenia, possibly focused in part in the frontal cortex, are related primarily to unique environmental factors, including perinatal complications. The white matter and local hippocampal volume reductions suggest an additional vulnerability to genetic risk effects.