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Is The Pattern Of Brain Folding A “Fingerprint” For Schizophrenia?

Findings from a new study in Biological Psychiatry

Philadelphia, PA, September 11, 2014 – Anyone who has seen pictures or models of the human brain is aware that the outside layer, or cortex, of the brain is folded in an intricate pattern of “hills”, called gyri, and “valleys”, called sulci.

It turns out that the patterns of cortical folding are largely consistent across healthy humans, broadly speaking. However, disturbances in cortical folding patterns suggest deeper disturbances in brain structure and function.

A new study published in the current issue of *Biological Psychiatry* suggests that schizophrenia is associated with reductions in the complexity of the cortical folding pattern that may reflect deficits in the structural connections between brain regions.

“The cortical folding pattern itself may not be so important, but the disturbances in connections between brain regions implicated by the changes in cortical folding could provide critical clues to deficits in the integrity of brain circuits that contribute to symptoms and functional impairment in schizophrenia,” commented Dr. John Krystal, Editor of *Biological Psychiatry*.

The study, conducted by an international group of scientists, measured cortical folding using regional local gyrification index values in patients with psychotic disorders, their first-degree relatives, and healthy controls. The patient group included individuals with diagnoses of schizophrenia, schizoaffective disorder, and bipolar disorder.

Local gyrification index is an advanced metric that quantifies cortical folding using a 3-dimensional approach.

Senior author Dr. Matcheri Keshavan, a Professor at Harvard Medical School, describes their results: “The main finding was that psychotic disorders are characterized by reduced folding of the cortex in key brain regions such as the cingulate cortex (a brain region involved in thinking and emotions). Reductions in cortical folding may reflect alterations in brain development early in life in these disorders. We also observed these alterations in first degree relatives at high risk for psychotic illnesses.”

With imaging data from 931 participants, this study is one of the largest of its kind and helps to resolve a diverse literature that has produced inconsistent findings, particular in studies of schizophrenia patients. With the consistency of this data in both the patient and relative groups, compared to the healthy group, this study suggests that hypoglycemia may mark familial risk for psychotic illnesses.

Thus, Keshavan added, “This study lays groundwork for further understanding of the causes of psychotic disorders.”

The article is “Local Gyrification Index in Proband with Psychotic Disorders and Their First-Degree Relatives” by Pranav Nanda, Neeraj Tandon, Ian T. Mathew, Christoforos I. Giakoumatos, Hulegar A. Abhishekh, Brett A. Clementz, Godfrey D. Pearson, John Sweeney, Carol A. Tamminga, and Matcheri S. Keshavan (doi: 10.1016/j.biopsych.2013.11.018). The article appears in *Biological Psychiatry*, Volume 76, Issue 6 (September 15, 2014), published by Elsevier.

Notes for editors

Full text of the article is available to credentialed journalists upon request; contact Rhiannon Bugno at +1 214 648 0880 or Biol.Psych@utsouthwestern.edu. Journalists wishing to interview the authors may contact Dr. Matcheri Keshavan at +1 617 754 1256 or mkeshava@bidmc.harvard.edu.

The authors' affiliations, and disclosures of financial and conflicts of interests are available in the article.

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The journal publishes novel results of original research which represent an important new lead or significant impact on the field, particularly those addressing genetic and environmental risk factors, neural circuitry and neurochemistry, and important new therapeutic approaches. Reviews and commentaries that focus on topics of current research and interest are also encouraged.

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