Press Release

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Brain Alterations Support Categorical and Dimensional Features of the Neurobiology of Autism

Reports new study in Biological Psychiatry

Philadelphia, PA, July 21, 2016 – A study in *Biological Psychiatry* provides a new understanding of brain alterations in children with autism spectrum disorder (ASD) that may help researchers and clinicians better define the disorder.

Many people think of an illness as something you have or you don't. But this concept gets tricky with an illness such as ASD, which is defined based on behaviors that can differ in type and severity from person to person. Patients with ASD tend to be diagnosed into specific subgroups, based on a categorical model of the disorder. But research supports a dimensional model, where symptoms occur along a spectrum that likely expand beyond those categorical definitions.

In the study, a team of researchers, led by senior author Wei Gao, Director of neuroimaging research at Cedars-Sinai in Los Angeles, used brain imaging to determine if the neurobiology of ASD fits a categorical model or a dimensional model of the disorder. First author Dr. Amanda Elton, a postdoctoral researcher at UNC Chapel Hill where the research was conducted, and colleagues analyzed functional magnetic resonance imaging data from 90 boys with ASD and 95 typically developing boys. They looked at relationships between behavior, diagnosis, and functional connectivity of four large-scale brain networks related to ASD.

The researchers found that variations in functional connectivity were associated with a spectrum of behavioral symptoms in all of the children, regardless of whether they were diagnosed with ASD. This indicates a dimensional nature of the disorder, where ASD impairments are associated with alterations in brain regions that govern typical behaviors. However, they also found that some brain regions differed in their strength of functional connectivity between boys with ASD and typically developing boys, supporting a categorical nature of the disorder.

"In contrast with considerations that categorical and dimensional models of autism spectrum disorder are in competition, this study revealed evidence of both models in the brain," said Gao, supporting a complementary nature of the two models instead of a dichotomy.

"Moving forward, a better conceptualization of ASD, and potentially other brain disorders too, might benefit from embracing a hybrid model incorporating both categorical and dimensional mechanisms," said Gao.

Dr. John Krystal, Editor of *Biological Psychiatry*, also thinks that the impact of the study extends beyond autism, with implications for the debate on the nature of psychiatric diagnosis, which contrasts the categorical model, exemplified by the American Psychiatric Association's Diagnostic and Statistical

Manual (DSM), and dimensional model, illustrated by the US National Institute of Mental Health Research Doman Criteria (RDoC).

“There are an increasing number of examples where patient groups are distinguished from the general population by both dimensional and categorical features. This may suggest that the diagnostic process, in the future, will need to integrate perspectives from both DSM and RDoC,” said Krystal.

Notes for editors

The article is "Neural Connectivity Evidence for a Categorical-Dimensional Hybrid Model of Autism Spectrum Disorder," by Amanda Elton, Adriana Di Martino, Heather Cody Hazlett, and Wei Gao (doi: 10.1016/j.biopsych.2015.10.020). It appears in *Biological Psychiatry*, volume 80, issue 2 (2016), published by Elsevier.

Copies of this paper are available to credentialed journalists upon request; please contact Rhiannon Bugno at +1 214 648 0880 or biol.psych@utsouthwestern.edu. Journalists wishing to interview the authors may contact Jane Engle at Jane.Engle@cshs.org.

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

John H. Krystal, M.D., is Chairman of the Department of Psychiatry at the Yale University School of Medicine, Chief of Psychiatry at Yale-New Haven Hospital, and a research psychiatrist at the VA Connecticut Healthcare System. His disclosures of financial and conflicts of interests are available here.

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Biological Psychiatry is the official journal of the Society of Biological Psychiatry, whose purpose is to promote excellence in scientific research and education in fields that investigate the nature, causes, mechanisms and treatments of disorders of thought, emotion, or behavior. In accord with this mission, this peer-reviewed, rapid-publication, international journal publishes both basic and clinical contributions from all disciplines and research areas relevant to the pathophysiology and treatment of major psychiatric disorders.

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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