MedicalXpress

First genetic map of the cerebral cortex produced in collaborative effort

March 20 2020

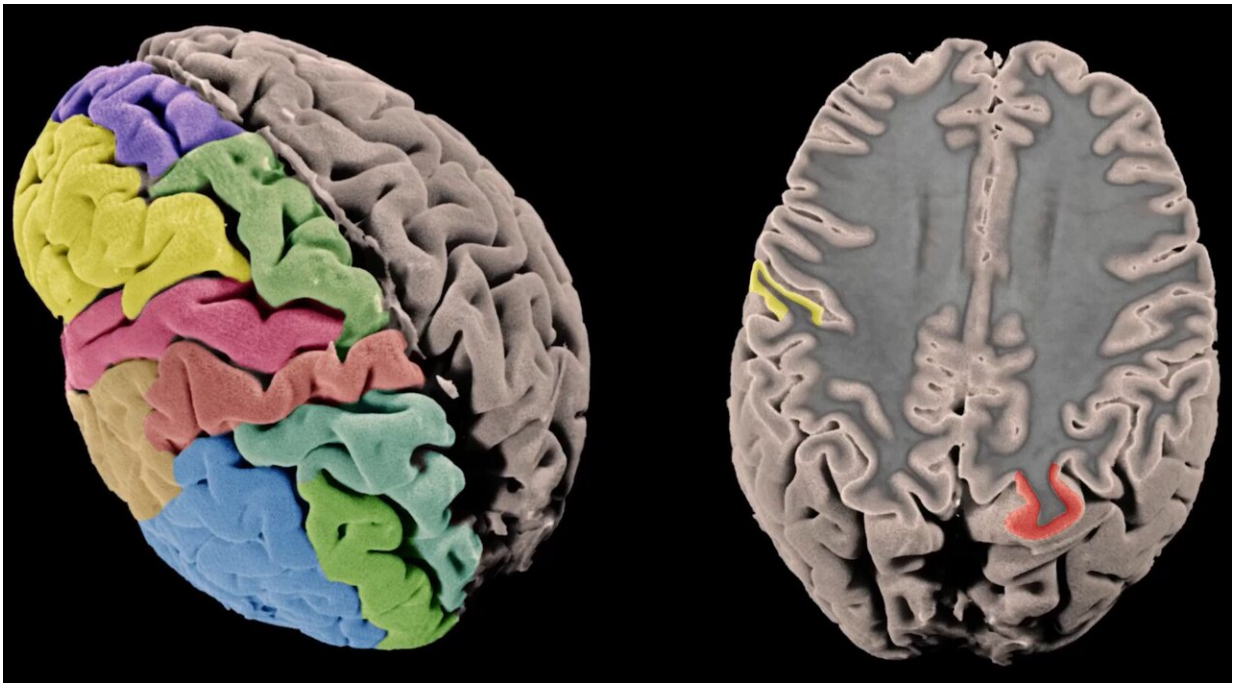

Image of cortical surface area and thickness. Credit: Tyler Ard, James Stanis, and Arthur Toga at the Stevens Neuroimaging and Informatics Institute, Keck School of Medicine of the University of Southern California

A major international collaboration has produced the first genetic map of the cerebral cortex, identifying more than 300 genetic variants that influence the structure of the key brain region.

The cerebral cortex—often referred to as the 'grey matter' – plays a crucial role in thinking, information processing, memory and attention. It is the relatively thin, folded, outer layer of the brain. Its folds are a way of packing in more neurons, or brain cells.

The extent of the folds—which are measured by surface area—and the thickness of the cortex have previously been linked to cognitive abilities and various psychiatric traits, including schizophrenia, bipolar disorder, depression, attention deficit hyperactivity disorder (ADHD), and autism.

However, until now, not a lot was known about the genetic variants that influence the size of the surface area and thickness of the cortex.

More than 360 scientists from 184 different institutions contributed to the global effort, which has been published today in the prestigious journal *Science*.

The key analysis was conducted by Dr. Katrina Grasby from the Psychiatric Genetics Research Group at QIMR Berghofer, as well as other researchers from the Institute, the University of Southern California and the University of North Carolina.

Dr. Grasby said the researchers identified 306 genetic variants that influenced the structure of the cerebral cortex.

"We conducted this study to identify genetic variants that influence brain structure in order to shed light on how our genetics contribute to these differences among us," Dr. Grasby said.

"We found that the genetic variants that are linked to a smaller surface area of the cerebral cortex—or less folding—also contribute to a greater risk of ADHD, depression and insomnia.

"This gives us a starting point to further explore this genetic link between the structure of the brain and ADHD.

"Our findings are now a resource that can be used by other scientist to help answer more questions about the genetic influences on the brain and how they relate to numerous behavioral or disease outcomes."

QIMR Berghofer's Associate Professor Lucía Colodro-Conde, who was also a co-author, said the researchers studied MRI scans and DNA from more than 50 thousand people.

"By analyzing brain images and genetic information from such a large group of people, we were able to predict one third of the differences in cortex structure between individuals with genetic variants," Associate Professor Colodro-Conde said.

"It is only by sharing data through these major, international collaborations that we can continue to unpick the highly complex relationship between our genes, brain structure, and various disorders."

More information: Katrina L. Grasby et al. The genetic architecture of the human cerebral cortex, *Science* (2020). DOI: 10.1126/science.aay6690

Provided by QIMR Berghofer Medical Research Institute