Brain activity is inherited, may inform treatment for ADHD, autism

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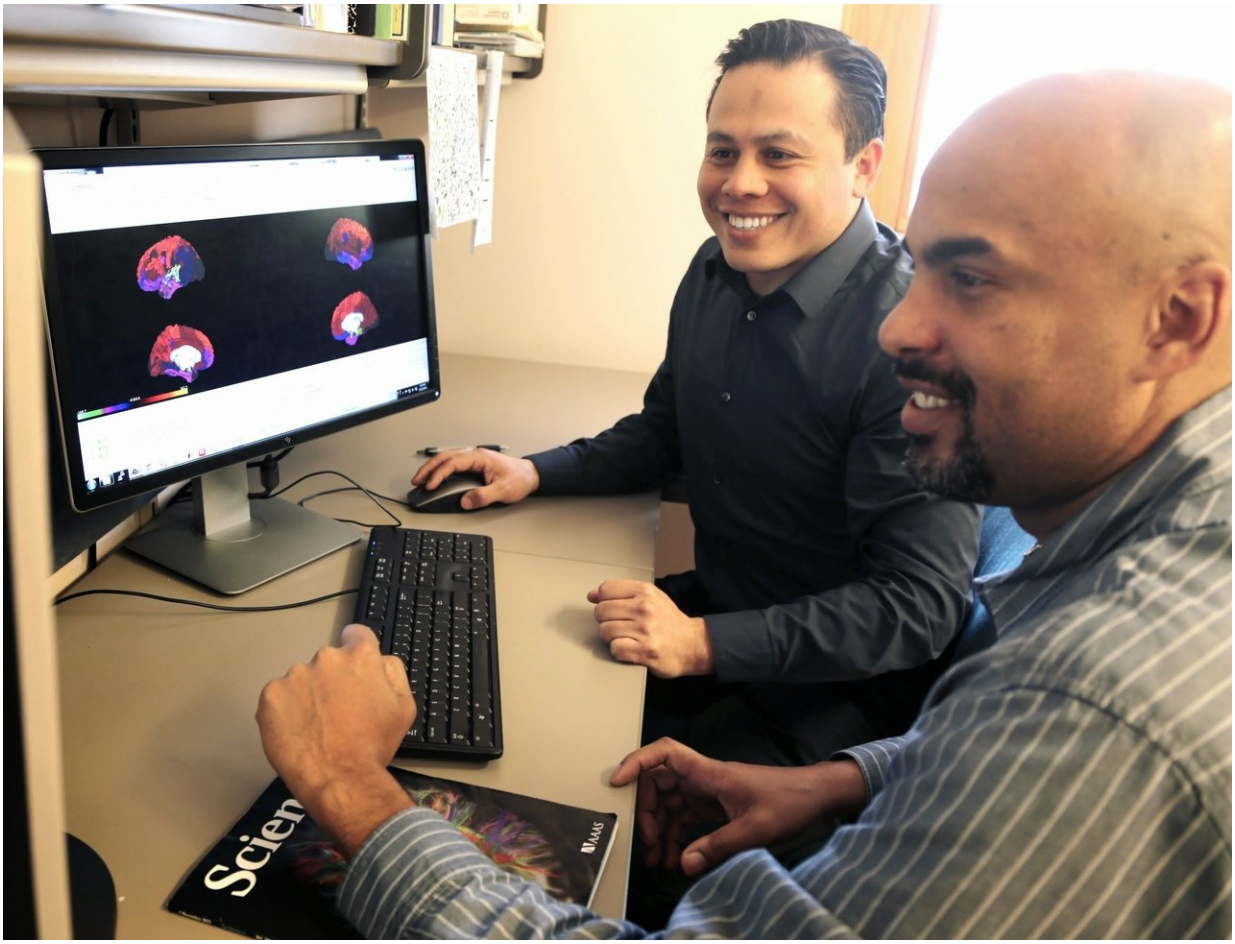

Research findings may help to better characterize aspects of altered brain activity, development and disease. Credit: OHSU

Every person has a distinct pattern of functional brain connectivity known as a connectotype, or brain fingerprint. A new study conducted at OHSU in Portland, Oregon, concludes that while individually unique, each connectotype demonstrates both familial and heritable relationships. The results published today in *Network Neuroscience*.

"Similar to DNA, specific brain systems and connectivity patterns are passed down from adults to their children," said the study's principal investigator Damien Fair, Ph.D., P.A.-C., associate professor of behavioral neuroscience and psychiatry, OHSU School of Medicine. "This is significant because it may help us to better characterize aspects of altered brain activity, development or disease."

Using two data sets of functional MRI brain scans from more than 350 adult and child siblings during resting state, Fair and colleagues applied an innovative technique to characterize functional connectivity and machine learning to successfully identify siblings based on their connectotype.

Through a similar process, the team also distinguished individual sibling and twin pairs from unrelated pairs in both children and adults.

"This confirms that while unique to each individual, some aspects of the family connectome are inherited and maintained throughout development and may be useful as early biomarkers of mental or neurological conditions," said lead author Oscar Miranda-Dominguez, Ph.D., research assistant professor of behavioral neuroscience, OHSU School of Medicine.

Research, conducted by Damien Fair and Oscar Miranda Dominguez of the OHSU Department of Behavioral Neuroscience and Psychiatry, published in *Network Neuroscience*. Credit: OHSU

Overall, the connectotype demonstrated heritability within five brain systems, the most prominent being the frontoparietal cortex, or the part of the brain that filters incoming information. The dorsal attention and default systems, important for attention or focus and internal mental thoughts or rumination, respectively, also showed significant occurrences.

"These findings add to the way we think about normal and altered brain function," said Fair. "Further, it creates more opportunity for personalized and targeted treatment approaches for conditions such as

ADHD or autism."

More information: Óscar Miranda-Domínguez et al. Heritability of the human connectome: a connectotyping study, *Network Neuroscience* (2017). DOI: 10.1162/NETN_a_00029

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