MedicalXpress

Study links deletion of brain-derived neurotrophic factor to major depression, anxiety, and obesity

October 8 2012

McGill researchers have identified a small region in the genome that conclusively plays a role in the development of psychiatric disease and obesity. The key lies in the genomic deletion of brain-derived neurotrophic factor, or BDNF, a nervous system growth factor that plays a critical role in brain development.

To determine the role of BDNF in humans, Prof. Carl Ernst, from McGill's Department of Psychiatry, Faculty of Medicine, screened over 35,000 people referred for genetic screening at clinics and over 30,000 control subjects in Canada, the U.S., and Europe. Overall, five individuals were identified with BDNF deletions, all of whom were obese, had a mild-moderate intellectual impairment, and had a mood disorder. Children had anxiety disorders, aggressive disorders, or attention deficit-hyperactivity disorder (ADHD), while post-pubescent subjects had anxiety and major depressive disorders. Subjects gradually gained weight as they aged, suggesting that obesity is a long-term process when BDNF is deleted.

"Scientists have been trying to find a region of the genome which plays a role in human psychopathology, searching for answers anywhere in our DNA that may give us a clue to the genetic causes of these types of disorders," says Prof. Ernst, who is also a researcher at the Douglas Mental Health University Institute. "Our study conclusively links a single region of the genome to mood and anxiety."

The findings, published in the Archives of General Psychiatry, reveal for the first time the link between BDNF deletion, cognition, and weight gain in humans. BDNF has been suspected to have many functions in the brain based on animal studies, but no study had shown what happens when BDNF is missing from the human genome. This research provides a step toward better understanding human behaviour and mood by clearly identifying genes that may be involved in mental disorders.

"Mood and anxiety can be seen like a house of cards. In this case, the walls of the house represent the myriad of biological interactions that maintain the structure," says Ernst, "Studying these moving parts can be tricky, so teasing apart even a single event is important. Linking a deletion in BDNF conclusively to mood and anxiety really tells us that it is possible to dissect the biological pathways involved in determining how we feel and act.

We now have a molecular pathway we are confident is involved in psychopathology," adds Ernst, "Because thousands of genes are involved in mood, anxiety, or obesity, it allows us to root our studies on a solid foundation. All of the participants in our study had mild-moderate intellectual disability, but most people with these cognitive problems do not have psychiatric problems – so what is it about deletion of BDNF that affects mood? My hope now is to test the hypothesis that boosting BDNF in people with anxiety or depression might improve brain health."

Provided by McGill University