

Biological link between stress, anxiety and depression identified for the first time (w/ Video)

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Scientists at The University of Western Ontario have discovered the biological link between stress, anxiety and depression. By identifying the connecting mechanism in the brain, this high impact research led by Stephen Ferguson of Robarts Research Institute shows exactly how stress and anxiety could lead to depression. The study also reveals a small molecule inhibitor developed by Ferguson, which may provide a new and better way to treat anxiety, depression and other related disorders. The findings are published online in the journal *Nature Neuroscience*.

Ferguson, Ana Magalhaes and their colleagues used a behavioural [mouse model](#) and a series of molecular experiments to reveal the connection pathway and to test the new inhibitor. "Our findings suggest there may be an entire new generation drugs and drug targets that can be used to selectively target [depression](#), and therefore treat it more effectively," says Ferguson, the director of the Molecular Brain Research Group at Robarts, and a professor in the Department of Physiology & Pharmacology at Western's Schulich School of Medicine & Dentistry. "We've gone from mechanism to mouse, and the next step is to see whether or not we can take the inhibitor we developed, and turn it into a pharmaceutical agent."

The research was conducted in collaboration with Hymie Anisman at Carleton University, and funded through the Canadian Institutes of Health Research (CIHR). "According to the World Health Organization,

depression, [anxiety](#) and other related mood disorders now share the dubious distinction of being the most prevalent causes of chronic illness," says Anthony Phillips, the scientific director of the CIHR Institute of Neurosciences, Mental Health and Addiction. "Using the power of molecular biology, Stephen Ferguson and colleagues provide novel insights that may be the key to improving the lives of so many individuals coping with these forms of mental ill health."

The linking mechanism in the study involves the interaction between corticotropin releasing factor receptor 1 (CRFR1) and specific types of serotonin receptors (5-HTRs). While no one has been able to connect these two receptors on a molecular level, the study reveals that CRFR1 works to increase the number of 5-HTRs on cell surfaces in the brain, which can cause abnormal brain signaling. Since CRFR1 activation leads to anxiety in response to stress, and 5-HTRs lead to depression, the research shows how stress, anxiety and depression pathways connect through distinct processes in the brain. Most importantly, the inhibitor developed by the Ferguson lab blocks 5-HTRs in the pathway to combat anxious behaviour, and potentially depression, in mice.

While major depressive disorder often occurs together with anxiety disorder in patients, the causes for both are strongly linked to stressful experiences. Stressful experiences can also make the symptoms of anxiety and depression more severe. By discovering and then blocking a pathway responsible for the link between [stress](#), anxiety and depression, Ferguson not only provides the first biological evidence for a connection, but he also pioneers the development of a potential drug for more effective treatment.

Provided by University of Western Ontario

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