

Discovery of 'teen gene' could hold promise for combating severe mental illnesses

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As many parents of mentally ill adults will confirm anecdotally, the first symptoms of "something not quite right" with their children begin to appear during the teen years. It is known that during this teenaged phase of brain development, adolescents are particularly vulnerable to psychiatric disorders, including schizophrenia, depression and drug addiction.

Researchers at the Douglas Institute Research Centre, affiliated with McGill University, have isolated a gene, DCC, which is responsible for dopamine connectivity in the [medial prefrontal cortex](#) during adolescence. Working with mice models, they have shown that dysfunction of this gene during adolescence has behavioral consequences which carry into adulthood.

The breakthrough provides the first clues towards a fuller understanding of this important phase of [brain development](#). "Certain [psychiatric disorders](#) can be related to alterations in the function of the prefrontal [cortex](#) and to changes in the activity of the brain chemical dopamine," says Cecilia Flores, senior author on the study and professor at McGill's Department of Psychiatry, "Prefrontal cortex wiring continues to develop into early adulthood, although the mechanisms were, until now, entirely unknown."

Even subtle variations in DCC during adolescence produce significant alterations in prefrontal cortex function later on. To determine whether the findings of such basic research can translate to human subjects, researchers examined DCC expression in postmortem brains of people who had committed suicide. Remarkably, these brains showed higher levels of DCC expression – some 48 per cent higher when compared to control subjects.

Prefrontal cortex is associated with judgment

"The prefrontal cortex is associated with judgment,

and mental flexibility—or with the ability to change plans when faced with an obstacle," explained Dr. Flores, "Its functioning is important for learning, motivation, and cognitive processes. Given its prolonged development into adulthood, this region is particularly susceptible to being shaped by life experiences in adolescence, such as stress and drugs of abuse. Such alterations in [prefrontal cortex](#) development can have long term consequences later on in life."

Hope to reverse the course of an illness

By identifying the first molecule involved in how the prefrontal dopamine system matures, researchers now have a target for further investigation for developing pharmacological and other types of therapies. "We know that the DCC gene can be altered by experiences during adolescence," said Dr. Flores. "This already gives us hope, because therapy, including social support, is itself a type of experience which might modify the function of the DCC gene during this critical time and perhaps reduce vulnerability to an illness."

The psychiatric consensus is that early therapy and support in adolescence, as soon as a mental health issue first manifests itself, has dramatically greater potential for a successful outcome—and for a healthy adulthood.

This discovery is reported in *Translational Psychiatry*. The article's first author is Dr. Colleen Manitt. Dr. Flores, who is the senior investigator, has her laboratory at the Douglas Institute Research Centre, associated with McGill. She studies brain abnormalities at the cellular and molecular levels that contribute to behaviors associated with schizophrenia and addiction. More specifically, she studies dysfunctions of the dopaminergic brain system.

Provided by Douglas Mental Health University

Institute

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