New insights into understanding brain performance

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(Medical Xpress) -- People who take Ritalin are far more aware of their mistakes, a University of Melbourne study has found.

The study, by Dr Rob Hester from the Department of Psychological Sciences and colleagues at the Queensland Brain Institute, investigated how the brain monitors ongoing behaviour for performance errors – specifically failures of impulse control.

It found that a single dose of methylphenidate (Ritalin) results in significantly greater activity in the brain's error monitoring network and improved volunteers' awareness of their mistakes.

Diminished awareness of performance errors limits the extent to which humans correct their behaviour and has been linked to loss of insight in a number of clinical syndromes, including Alzheimer's Disease, Schizophrenia and Attention-Deficit Hyperactivity Disorder. The findings demonstrate that activity within those parts of the brain that deal with human error, including the dorsal anterior cingulate (dACC) and inferior parietal lobule (IPL) differs depending on whether participants are aware of their performance errors. Critically, researchers showed that a single, clinically relevant dose of methylphenidate, which works by increasing the levels of catecholamines in the brain, dramatically improved error awareness in healthy adults.

Researchers used functional magnetic resonance imaging (fMRI) to

show that methylphenidate was able to promote the conscious awareness of performance errors by strengthening activation differences within the dACC and IPL for errors made with and without awareness, compared to placebo and other comparison drugs.

While the study provided only a single dose of methylphenidate to healthy participants, and needed to be replicated in people using standard clinical doses, the data highlights the potential of pharmacotherapy in addressing problems of awareness and insight that features in a range of neurologic and psychiatric conditions.

Dr Hester said failure to recognise errors was related to poor insight into a person's clinical condition, which can impair treatment.

"For example, in conditions such as Schizophrenia and Alzheimer's Disease, poor error awareness has been associated with delusions, paranoia and has been the cause of considerable distress to patients," he said.

"Failing to recognise your own error at the time can account for the difference between your recollection and the reality that confronts you. Understanding the brain mechanisms that underlie how we become conscious of our mistakes is an important first step in improving error awareness, and potentially reducing these symptoms."

Provided by University of Melbourne