McLean Hospital Brain Imaging Study Offers New Insight into Depression

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According to the World Health Organization, globally, an estimated 350 million people of all ages suffer from depression. Now, thanks to a new brain imaging study conducted at McLean Hospital, the largest psychiatric affiliate of Harvard Medical School, we have new insights into the brain circuitry of someone with a history of depression.

In their paper, "Corticostriatal Pathways Contribute to the Natural Time Course of Positive Mood," published recently in the journal *Nature Communications*, the researchers used a first-ever approach to measure positive mood induction responses in both healthy individuals and those with a history of depression. They found that the brain circuitry of individuals with a history of depression might differ from healthy individuals in not only the magnitude of positive emotions but also the duration of mood elevation.

The study, which took place from 2013 to 2014, used both neuroimaging and a self-reporting tool to measure positive mood responses from the two groups. The study focused on the brain's response to the mood induction itself as well as participants' ability to sustain elevated mood, according to Roee Admon, PhD, instructor at McLean's Laboratory for Translational and Affective Neuroscience and the Department of Psychiatry at Harvard Medical School, and the lead author of the paper.

Neuroimaging helps researchers in their work pinpointing areas of the brain responsible for symptoms and behaviors

"While there have been studies that have looked at these components separately, none measured both and compared healthy people with those with a history of depression on how they respond to positive mood induction and how long they are able to experience this elevated mood," said Admon.

The results showed that healthy individuals not only experienced a substantial positive mood shift, but were also able to maintain the feeling for an extended period of time. By comparison, said Admon, "people with a history of depression showed a very short positive mood change, followed by a dramatic drop in mood—even lower than before the manipulation."

By conducting these tests during an MRI scan, the McLean scientists were able to see specific patterns of brain activity and synchronization between frontal regions thought to be implicated in thinking about one's self and striatal regions that are important for experiencing pleasure.

These data, combined with psychological responses from the participants indicating their emotional state, allowed them to see how the regions become jointly activated and how they exchange information. In people with a history of depression, this process showed deficit, according to **Diego Pizzagalli, PhD**,

director of McLean's Center for Depression, Anxiety and Stress Research, professor of psychiatry at Harvard Medical School, and co-author of the paper.

Only healthy individuals were able to "sustain positive mood over time and this effect was accompanied by the emergence of a mutual synchronization between brain regions that might allow humans to savor positive feelings. Findings suggest that corticostriatal pathways contribute to the natural time course of positive mood fluctuations, while disturbances of those neural interactions may characterize mood disorder," according to Pizzagalli.

"This discovery gives us a better understanding behind the mechanisms of depression and may have important clinical implications. For instance, we hope to test in future studies whether our recent discovery might allow us to identify individuals with a history of depression with increased risk of relapsing."

"In the near future, this type of information could be used for prevention purposes," he said. "Mental health providers may want to focus more on strategies that enhance and sustain positive mood among patients."

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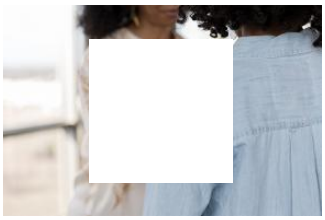

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