The psychedelic compound psilocybin may 'reset' the brain to help manage treatment-resistant major depression

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Video Abstract

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Abstract

Accumulating evidence suggests that psilocybin – the primary psychedelic compound found in so-called magic mushrooms – can be used to safely treat a range of psychiatric conditions. Prior studies have shown that just one or two doses of psilocybin can have a rapid and lasting positive impact on mental health, but the associated brain mechanisms aren't well understood. Now, researchers based in the United Kingdom have used functional magnetic resonance imaging to map the brain activity of nineteen patients with treatment-resistant major depression who were given psilocybin. The results shed light on how the compound changes human brain function. The patients were dosed with the drug as part of an open-label clinical trial. Before and one day after treatment, the researchers used fMRI to look at cerebral blood flow and brain functional connectivity – a measure of how different regions of the brain interact. The imaging findings were compared against the patients' depressive symptoms, assessed using a self-reported questionnaire. The results showed that psilocybin produced rapid and sustained antidepressant effects. At one day after treatment, the group's mean depression score was roughly half that measured the day before. By 5 weeks post-treatment, all but one patient showed some decrease in depressive symptoms. On imaging, the researchers observed a link between decreased blood flow to the amygdala – an area that processes emotions such as fear and anxiety – and reductions in depressive mood. Intriguingly, the data on functional connectivity suggested that psilocybin seems to reset a portion of the brain known as the default mode network, which helps assimilate autobiographical information, thoughts of others, and considerations of the past and future. The drug essentially disintegrated and then re-integrated the network, analogous to a 'rebooting' effect. This effect also appeared to predict treatment response 5 weeks later. By examining how changes in brain activity that occur just one day after the use of psilocybin can promote lasting improvements in depression symptoms, the study fills an important knowledge gap regarding the longer-term effects of psychedelics. Perhaps more importantly, the work may reveal new treatment strategies for mental illness.