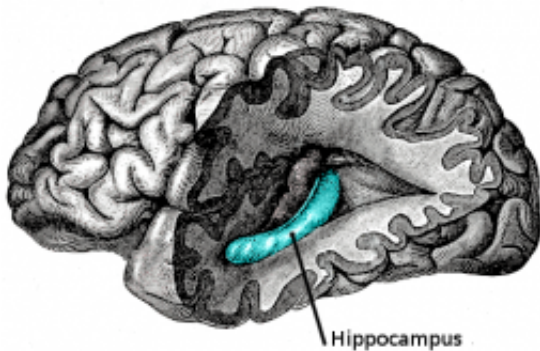


Study: 'Second-hand' psychological stress can lead to depression in mice

24 September 2021



The hippocampus is located in the medial temporal lobe of the brain. Image via Wikipedia.

Few studies have explored the effect of psychological stressors on behavior, and neurogenesis, in the context of depression. With the elucidation of a vicarious social defeat stress mouse model, scientists from Japan have successfully endeavored in connecting the dots between psychological stress and depression, according to a breakthrough study published in *Behavioural Brain Research*.

Depression is a serious and widespread medical condition. Several theories have been proposed to explain the physiological basis of depression, of which the "neurogenic hypothesis of depression" has garnered much attention. The theory follows that deterioration in [brain regions](#), like hippocampus, can result in depression. This deterioration can be caused by physical and [psychological stress](#). While the depressive effects of physical [stress](#) have been well studied, little is known about psychological stress in this regard.

Recent research has explained how vicarious social defeat can cause psychological stress in mice. This involves the mouse being made to

experience defeat by another mouse in an experimental social setting. Using this model, a group of scientists from Japan attempted to establish a link between depressive symptoms and hippocampal neurogenesis.

Prof. Akiyoshi Saitoh from Tokyo University of Science, one of the lead authors of the study, says, "The number of individuals suffering from depression has been on the rise the world over. However, the detailed pathophysiology of depression still remains to be elucidated. So we decided to focus on the possible mechanism of psychological stress in adult hippocampal neurogenesis, to understand its role in depressive disorders." The study was published in the journal *Behavioural Brain Research*.

After exposing the mice to chronic vicarious social defeat stress, Prof. Saitoh and the team, including Mr. Toshinori Yoshioka and Dr. Daisuke Yamada from Tokyo University of Science, analyzed their behavior and brains in close detail. Aside from behavioral deficits like social withdrawal, the stressed mice also showed a [significant decrease](#) in the survival rate of newborn neurons in the dentate gyrus, a region in the hippocampus responsible for sensory perception and memory, compared to the non-stressed controls. This condition persisted for up to four weeks after "stressing" the mice. However, [cell growth](#), differentiation, and maturation did not differ between the groups of mice during the period of observation. Notably, the cell survival rate was restored in the stressed [mice](#) after treatment with a chronic antidepressant called fluoxetine.

Regarding the results, Mr. Toshinori Yoshioka adds, "We have found out that chronic mental stress affects the neurogenesis of the hippocampal dentate gyrus. Also, we believe that this animal model will play an important role in elucidating the pathophysiology of depression, and in the development of corresponding novel drug."

Overall, this study has provided important insights into the pathophysiology of depression. Also, it goes without saying how this study paves the way for future research into the role of psychological stress in [depression](#).

More information: Toshinori Yoshioka et al, Chronic vicarious social defeat stress attenuates new-born neuronal cell survival in mouse hippocampus, *Behavioural Brain Research* (2021).
[DOI: 10.1016/j.bbr.2021.113536](https://doi.org/10.1016/j.bbr.2021.113536)

Provided by Tokyo University of Science

APA citation: Study: 'Second-hand' psychological stress can lead to depression in mice (2021, September 24) retrieved 2 August 2022 from <https://medicalxpress.com/news/2021-09-second-hand-psychological-stress-depression-mice.html>

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