Researchers induce PTSD symptoms in mice

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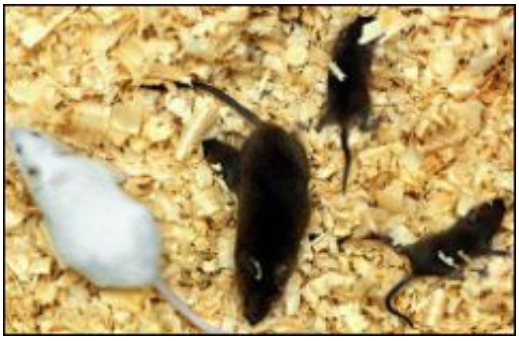

(Medical Xpress) -- Post traumatic stress disorder (PTSD) is a condition in which people find themselves experiencing intense fear following a traumatic experience due to unrelated circumstances. It's quite common in soldiers returning from the battlefield but can also be found in people that have experienced an assault, abuse or tragedy such as surviving a hurricane or tornado. And because it can persist for years after the initial trauma, those that suffer from it can find their lives seriously disrupted. Because of this, research into ways to treat the condition has been ongoing by both military and civilian entities. Now, a French team of researchers has found, as they describe in their paper published in *Science*, a way to induce what appears to be PTSD symptoms in mice, a move that could help scientists better understand the chemical processes that go on in the brain in people with the disorder.

To replicate the traumatizing effects of conditions that cause people to

experience PTSD, the researchers set a group of mice in a plastic cage where they were subsequently shocked on the feet with an electric probe right after a tone was played. This quite naturally caused them to become conditioned to expect pain upon hearing the tone. To make the experience more heightened, which is a main component of PTSD, the mice were also given a dose of corticosterone (a stress response hormone) injected directly into their hippocampus right after being shocked. In extremely high stress situations, corticosterone levels in the hippocampus (an area of the brain associated with memory) are naturally higher. In a second experiment, they did exactly the same thing, except they omitted the part where the tone was played before the shock.

In testing the mice afterwards, the dose of corticosterone given after the traumatic event seemed to cause confusion as to which thing should be tied to the fear. Some mice who had not heard the tone prior to the shock displayed fear when hearing it nonetheless.

In a wholly different experiment, the team also attempted to induce PTSD symptoms by restraining the mice inside their cage causing stress hormones to be released naturally after the tone and shock were administered and found virtually the same results.

This all suggests, the team writes, that very traumatic and stressful situations cause hormone levels to rise, at least in some mice (and perhaps humans) and that is what leads to PTSD.

The team also found in studying the brains of the mice after the experiment that hippocampus activity levels were lower than normal while the amygdale, a part of the brain involved in processing and emotional memory, showed more.

More information: Glucocorticoids Can Induce PTSD-Like Memory Impairments in Mice, Published Online February 23 2012, *Science* DOI:

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ABSTRACT

Post-traumatic stress disorder (PTSD) is characterized by a hypermnesia of the trauma and by a memory impairment that decreases the ability to restrict fear to the appropriate context. Infusion of glucocorticoids in the hippocampus after fear conditioning induces PTSD-like memory impairments and an altered pattern of neural activation in the hippocampal-amygdalar circuit. Mice become unable to identify the context as the right predictor of the threat and show fear responses for a discrete cue non-predicting the threat in normal conditions. These data demonstrate PTSD-like memory impairments in rodents and identify a potential pathophysiological mechanism of this condition.