Study offers new insight for preventing fear relapse after trauma

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(Medical Xpress) -- In a new study, University of Michigan researchers identified brain circuits in rats that are responsible for the return of fear after it has been suppressed behaviorally.

The findings involve a process called extinction, which is at the heart of behavioral therapies for anxiety disorders such as post-traumatic stress disorder. During extinction, the repeated exposure of a feared stimulus gradually decreases anxiety. For example, this approach is commonly used to treat PTSD in military veterans.

Extinction does not erase the original memory, but yields a "safety" memory that inhibits fear under certain conditions. Unfortunately, these "safety" memories are short-lived and place-dependent, says Stephen Maren, U-M professor of psychology and neuroscience. Individuals that undergo extinction-based therapies often exhibit relapse of fear.

Maren and his colleagues studied how fear and safety memories are retrieved by a network of three brain structures that are critical for memory and emotion—the hippocampus, prefrontal cortex and amygdala.

Rats that had been conditioned to fear an auditory stimulus by associating it with a mild shock decreased their fear when the stimulus was extinguished. This fear returned, however, when the stimulus was encountered in a place that was different from where the extinction procedure occurred. This is similar to the return of fear patients

undergoing exposure therapy experience when they leave the clinic.

Researchers examined the rats' brains to determine how the fear memory network changed when fear returned. The researchers found that the return of fear activated neurons in the hippocampus and prefrontal cortex that project to the amygdala. Next, they found that severing the connections between these structures prevented fear relapse.

The results provide new insight into the brain systems involved in the return of fear memories thought to be vanquished by extinction. Developing novel therapeutic approaches that dampens activity in these circuits might aid in preventing fear relapse after therapy.

The findings appear in current issue of the Journal of Neuroscience.

Provided by University of Michigan