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## A New Link between Traumatic Brain Injury and Posttraumatic Stress Disorder

*From a new study in Biological Psychiatry*

**Philadelphia, PA, February 22, 2012** – Mild traumatic brain injury (TBI) and posttraumatic stress disorder (PTSD) are cardinal injuries associated with combat stress, and TBI increases the risk of PTSD development. The reasons for this correlation have been unknown, in part because physical traumas often occur in highly emotional situations.

However, scientists at University of California at Los Angeles provide new evidence from an animal model of a mechanistic link underlying the association between TBI and PTSD-like conditions.

Using procedures to separate the physical and emotional traumas, Dr. Maxine Reger and colleagues trained rats using fear conditioning techniques two days after the rats had a concussive brain trauma. This ensured the brain injury and experience of fear occurred on different days.

Dr. Michael Fanselow explained their findings: “We found that the rats with the earlier TBI acquired more fear than control rats (those without TBI). Something about the brain injury rendered them more susceptible to acquiring an inappropriately strong fear. It was as if the injury primed the brain for learning to be afraid.”

To further understand why this happened, the researchers analyzed a small piece of brain tissue, the amygdala, which is the brain's critical hub for fear learning. They found that there were significantly more receptors for excitatory neurotransmitters that promote learning. “This suggests that brain injury leaves the amygdala in a more excitable state that readies it for acquiring potent fear,” added Fanselow.

These findings now suggest a causal link between TBI and the increased susceptibility to PTSD, and identified an important role for the amygdala in this effect. “The next challenge is to characterize the neural circuitry and neurobiology of this effect. These are critical steps in building from these findings to preventative or therapeutic advances,” commented Dr. John Krystal, editor of *Biological Psychiatry*.

Although this work was performed in rats, these findings also suggest that people who suffer even a mild traumatic brain injury are more likely to develop an anxiety disorder, and that proper management of stress after such an injury could be critically important to maintaining ones' mental health.

The article is “Concussive Brain Injury Enhances Fear Learning and Excitatory Processes in the Amygdala” by Maxine L. Reger, Andrew M. Poulos, Floyd Buen, Christopher C. Giza, David A. Hovda, and Michael S. Fanselow (doi:10.1016/j.biopsych.2011.11.007). The article appears in *Biological Psychiatry*, Volume 71, Issue 4 (February 15, 2012), published by Elsevier.

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### Notes for editors

Full text of the article is available to credentialed journalists upon request; contact Rhiannon Bugno at +1 214 648 0880 or [Biol.Psych@utsouthwestern.edu](mailto:Biol.Psych@utsouthwestern.edu). Journalists wishing to interview the authors may contact Michael Fanselow at +1 310 206 0247 or [fanselow@ucla.edu](mailto:fanselow@ucla.edu).

The authors' affiliations, and disclosures of financial and conflicts of interests are available in the article.

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