New understanding of how we remember traumatic events

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(PhysOrg.com) -- Neuroscientists at The University of Queensland have discovered a new way to explain how emotional events can sometimes lead to disturbing long term memories.

In evolutionary terms, the brain's ability to remember a fear or trauma response has been crucial to our long term survival.

However, in the modern world, when a similar type of fear response is triggered by a traumatic event such as being in combat; being exposed to abuse or being involved a major car accident, we do not want to repeatedly re-experience the episode, in vivid detail, for the rest of our lives.

During studies of the almond-shaped part of the brain called the amygdala – a region associated with processing emotions – Queensland Brain Institute (QBI) scientists have uncovered a cellular mechanism underlying the formation of emotional memories, which occurs in the presence of a well known stress hormone.

In a scientific paper published in the Journal of Neuroscience, QBI's Dr Louise Faber and her colleagues have demonstrated how noradrenaline, the brain's equivalent of adrenaline, affects the amygdala by controlling chemical and electrical pathways in the brain responsible for memory formation.

“This is a new way of understanding how neurons form long term

memories in the amygdala," Dr Faber said.

"Our strongest and most vivid human memories are usually associated with strong emotional events such as those associated with extreme fear, love and rage."

"For many of us, our deepest memories are mental snapshots taken during times of high emotional impact or involvement," she said.

"Some aspects of memory formation are incredibly robust – and the mechanism we've discovered opens another door in terms of understanding how these memories are formed."

Dr Faber said her team's discovery could help other scientists to elucidate new targets, leading to better treatments for conditions such as anxiety disorders and post-traumatic stress disorder.

Established with the generous support of the Atlantic Philanthropies in 2003 as part of the Queensland Government's Smart State Initiative, QBI is dedicated to understanding the molecular basis of brain function and applying this knowledge to the development of new therapeutics to treat brain and mental health disorders.

Paper: "Modulation of SK channel trafficking by beta adrenoceptors enhances excitatory synaptic transmission and plasticity in the amygdala," *Journal of Neuroscience*, 22 October 2008.

Provided by University of Queensland