# A single stressful event may cause long-term effects in the brain

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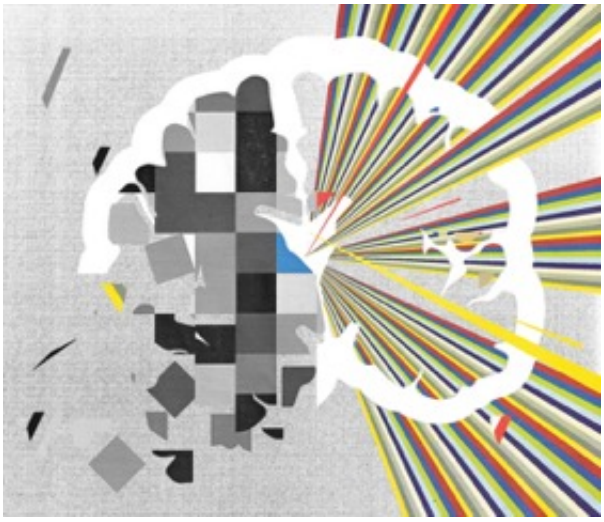

Credit: Università degli Studi di Milano

A person experiences deep stress caused by a sudden incident (a traffic accident, a natural catastrophe, an episode of violence). Later, this person could develop a serious neuropsychiatric disorder that lasts for years, post-traumatic stress disorder (PTSD).

Stress is considered a primary risk factor for neuropsychiatric disorders. However, traditional animal models for these disorders are based on repeated or chronic stress, although it is known that in some cases (e.g., PTSD) even a single traumatic incident may be enough to induce the disorder.

A recent study found that a single stressful event may have long-term consequences in the brain. The authors had found earlier that a short protocol of stress (40 min) enhances the release of glutamate (the major excitatory transmitter) in the prefrontal cortex (PFC), an effect due mainly to an increase in the number of glutamate-containing vesicles available for release at synapses. Now, they've found that the enhancement of glutamate release in PFC is sustained for at least 24 hours after stress. They also found that after 24 hours, significant atrophy of apical dendrites (the receiving part of neurons containing receptors for glutamate) is observed in PFC. Dendrite atrophy is usually measured after weeks of chronic stress in stress-based animal models.

These results alter the traditional distinction between the effects of acute vs. chronic stress. It appears that a single exposure to stress may have long-term functional (glutamate release) and structural (dendrite atrophy) consequences. The dendrite atrophy was found to be sustained for two weeks after stress. These stress-related changes may be relevant for pathophysiology of PTSD and other stress-related disorders. Moreover, the assessment of glutamate release and related parameters after stress represents an experimental model to test new compounds for therapy of PTSD, a disorder in which an efficient therapy is still missing.

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