

Protected fear memories

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(PhysOrg.com) -- In the latest issue of *Science*, researchers from the Friedrich Miescher Institute for Biomedical Research, Switzerland, show how a class of proteins surrounding nerve cells allows fear memories to persist despite extensive fear extinction therapy.

Hands are sweaty, the pulse is running, the mouth is dry. Speaking in front of a large audience is not everybody's most treasured activity. It can be even terrifying. However, practice and some breathing techniques can improve matters. Learning how not to be fearful is possible. Still, all the coping skills cannot guarantee that stage fright doesn't strike again.

A study by the groups of Andreas Lüthi and Pico Caroni from the Friedrich Miescher Institute of Biomedical Research, an institute of the Novartis Research Foundation, sheds a novel light on the question, why fear is almost impossible to get rid of - not even with extensive training. The scientists show in the latest issue of the renowned scientific journal *Science* that a glycoprotein class called chondroitin sulphate proteoglycans (CSPGs) supports the preservation of fear memories.

This [protein](#) forms a dense, highly organized extracellular mesh, called perineuronal net (PNN), surrounding nerve cells in the [amygdala](#), the area of the brain controlling fear. In their experiments the scientists could show that the PNN hinders fear extinction. In the presence of the PNN, fear extinction therapy creates new, learned memories of how to deal with a fearful situation. Both, fear and fear extinction memories co-exist and will be called forward depending on the situation. This mechanism explains why a person with stage fright may be coping fine

when talking to a smaller group but is speechless in front of a large audience.

In the absence of PNNs, however, fear memories become prone to erasure. Once the scientists degraded the mesh of CSPGs in the amygdala, fear memories were lost. The fear was gone.

The study uncovers a totally novel, [molecular mechanism](#) by which fear memories are preserved and protected from erasure. It is highly relevant from a clinical perspective because fear memory extinction is the cornerstone of the psychological therapy of several [anxiety disorders](#). Furthermore, it puts forward a novel explanation for the frequency of relapses of fear responses after extensive therapy, which are a major clinical problem.

More information: Gaugolla N et al. (2009) [Perineuronal nets protect fear memories from erasure](#). *Science*, 325: 1258 - 1261

Anxiety disorders

The term "anxiety disorder" covers a variety of abnormal and pathological anxieties and fears, including phobias, panic disorders, obsessive compulsive disorders and post-traumatic stress disorders. The current course of therapy includes both [cognitive behavioral therapy](#) as well as pharmaceutical therapy. In anxiety treatment, cognitive behavioral therapy exposes the patient gradually to the feared stimulus. Through this exposure, patients unlearn their fear reactions. Almost every fifth person in the United States has been reported with an anxiety disorder in a recent study.

Provided by Friedrich Miescher Institute for Biomedical Research

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