Neuroscientists find cellular mechanism that shapes your memories

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(Medical Xpress) -- VU University Amsterdam neuroscientists discovered what happens in your nerve cells upon memory recall, as appeared in this week's advance online publication of *Nature Neuroscience*. This is important for experimental-based therapies relying on memory recall to permanently rewrite fearful and traumatic memories.

Upon retrieval, memories return to a receptive state of several hours, during which their strength is modified to maintain their relevance. Even more so, retrieved memories can be updated with new (non-fearful) information in order to alter their content on the long-term, resulting in the fading of these memories. VU neuroscientist Dr. Sabine Spijker and her team discovered a prime molecular mechanism explaining that memories are not graved in stone, but rather that they are adapted every time you remember them.

"We showed that this memory adaptation depends on a receptor molecule, a protein enabling neuronal communication using the neurotransmitter glutamate' says Sabine Spijker. "This adaptive process can be exploited in several forms of psychotherapy aimed at 'rewriting' memories to treat disorders related to traumatic memories."

The researchers showed that during a period of only four hours after fear memory retrieval, glutamate receptors are gradually internalized from nerve cells within the hippocampus, the brain area involved in the encoding of memory. This period mirrors the time window in which the memory is susceptible to modification. Spijker: "Blockade of the internalization of glutamate receptors resulted in enhanced expression of fear during the following hours to days after memory recall."

Moreover, the researchers showed that the glutamate receptor internalization, provoked by retrieval of the memory, is at the basis of a new form of behavioral therapy - used successfully in rodents and humans - that prevents the return of fear in the long-term. Spijker: "We show that timing and place of a few glutamate receptor proteins might make the difference between a normal life, and a life in permanent fear."

More information: The article 'Retrieval-specific endocytosis of GluA2-AMPARs underlies adaptive reconsolidation of contextual fear' is published today in *Nature Neuroscience*.

Provided by VU University Amsterdam