Brain study reveals how long-term memories are erased

March 31 2016

Credit: Human Brain Project

Vital clues about how the brain erases long term memories have been uncovered by researchers.

The study in rats reveals how forgetting can be the result of an active deletion process rather than a failure to remember.

It points towards new ways of tackling memory loss associated with conditions such as Alzheimer's disease and other types of dementia.

The findings could also help scientists to understand why some unwanted memories are so long-lasting - such as those of people suffering from post-traumatic stress disorders.

Memories are maintained by chemical signalling between brain cells that relies on specialised receptors called AMPA receptors. The more AMPA receptors there are on the surface where brain cells connect, the stronger the memory.

The team led by the University of Edinburgh found that the process of actively wiping memories happens when brain cells remove AMPA receptors from the connections between brain cells.

Over time, if the memory is not recalled, the AMPA receptors may fall in number and the memory is gradually erased.

The researchers also showed that actively forgetting information in this way helps the animals to adapt their behaviour according to their surroundings.

Blocking the removal of AMPA receptors with a drug that keeps them at the surface of the cell stopped the natural forgetting of memories, the study found.

Drugs that target AMPA receptor removal are already being investigated as potential therapies to prevent memory loss associated with diseases such as Alzheimer's and dementia.

However, researchers say that active forgetting could be an important facet of learning and memory. Further research is needed to understand

what consequences blocking this process could have on the ability to take on new information and retrieve existing memories.

Dr Oliver Hardt, of the Centre for Cognitive and Neural Systems at the University of Edinburgh, said: "Our study looks at the biological processes that happen in the brain when we forget something. The next step is to work out why some memories survive whilst others are erased. If we can understand how these memories are protected, it could one-day lead to new therapies that stop or slow pathological memory loss."

The study is published in *The Journal of Neuroscience*.

More information: P. V. Migues et al. Blocking Synaptic Removal of GluA2-Containing AMPA Receptors Prevents the Natural Forgetting of Long-Term Memories, *Journal of Neuroscience* (2016). DOI: 10.1523/JNEUROSCI.3333-15.2016

Provided by University of Edinburgh