

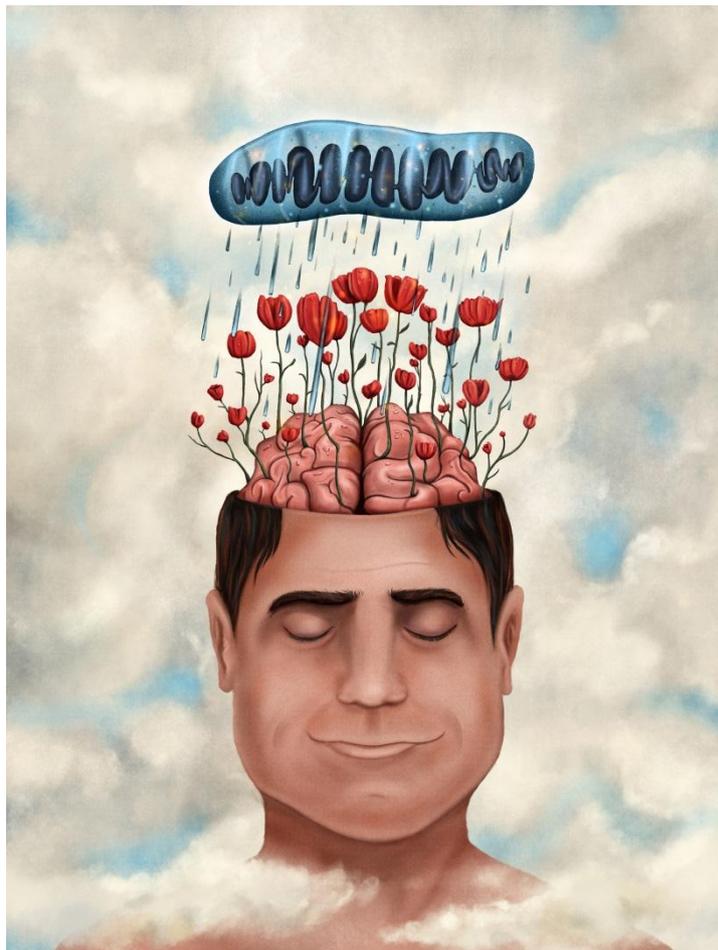


Paris, 21 November 2016

Press release

Mitochondria are essential to memory

Numerous studies have shown that using cannabis can lead to short- and long-term memory loss. These effects on memory may be related to the presence of specific receptors on several types of brain cells (glial cells as well as neurons). Inserm researchers led by Giovanni Marsicano (Neurocentre Magendie, U1215) have shown that these effects on memory are related to the presence of these same receptors on the mitochondria, the energy centre of the cell. This is the first time that the direct involvement of mitochondria in higher brain functions, such as learning and memory, has been shown. This work is published in the journal [Nature](#).



Mitochondria develop our memory by providing brain cells with energy.

Image credit: Charlie Padgett

Mitochondria are the energy centre of the animal cell. They are present within cells to produce the energy (in the form of ATP) needed for all biochemical processes. To do this, they use oxygen to transform nutrients into ATP. These functions are obviously necessary for the survival of all the cells in the body, but in the brain the impact of mitochondria goes beyond simple cell survival. Although the brain represents only 2% of the weight of the body, it actually consumes up to 25% of its energy. As a result, the energy balance of the brain is highly important for its functions, and is therefore tightly regulated. We know very well that chronic impairment of mitochondrial functions (e.g. in mitochondrial diseases) produces serious neurological and neuropsychiatric symptoms.

However, the direct functional involvement of mitochondria in higher brain functions, such as learning and memory, was not known before now. In other terms, do we use the mitochondria in our brain when we are learning or remembering something?

This study, which is based on the discovery that the cannabinoid receptor CB1 is also present on the brain mitochondria (where it is known as mtCB1), reveals that this is indeed the case. With the help of innovative tools, the Inserm researchers showed that the active component of cannabis, THC (delta-9-tetrahydrocannabinol), causes amnesia in mice by activating mtCB1 receptors in the hippocampus.

“The impairment in memory induced by cannabis in the mouse requires activation of these hippocampal mtCB1 receptors,” explains Giovanni Marsicano. Conversely, *“Genetically deleting them prevents this effect induced by the active drug in cannabis. We therefore think that mitochondria develop our memory by providing the brain cells with energy.”*

This study is important not only because it reveals a new mechanism underlying the effects of cannabis on the memory, but also because it shows that mitochondrial activity is an integral part of the functions of the brain.

Source

A cannabinoid link between mitochondria and memory

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Nature: <http://dx.doi.org/10.1038/nature20127>

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