Synaptic levels of clathrin protein are important for neuronal plasticity

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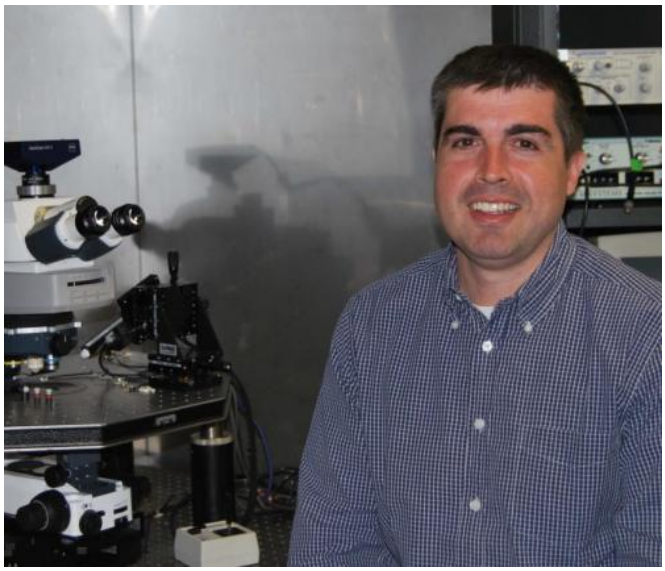

Researcher Artur Llobet

Researchers of the group of cellular and molecular neurobiology of the Bellvitge Biomedical Research Institute (IDIBELL) and the University of Barcelona, led by researcher Artur Llobet, have shown that synaptic levels of the protein clathrin are a determinant factor for synaptic plasticity of neurons.

Chemical synapses and synaptic vesicular transmission cycle

Neurons transmit information in a specialized contact points called synapses. These structures consist of two elements: the presynaptic one, information donor, and postsynaptic, which receives the information. In the case of the presynaptic terminal, information is stored in vesicles containing neurotransmitters. When a stimulus arrives at the presynaptic terminal releases a vesicle by exocytosis. But to prevent the terminal to run out vesicles, immediately after exocytosis, occurs endocytosis. This coupling between exo and endocytosis defines what is known as vesicular synaptic vesicle cycle and is essential for neurons to release information correctly.

The vesicular cycle must adapt to constant changes in neuronal activity, and thus is a determinant of neuronal plasticity.

The dogma of the clathrin

Study investigators have sought to determine the role of clathrin in synaptic plasticity. "This protein is involved in all processes of endocytosis in all cells of the body and until now it was thought that it presents as abundant levels that it wouldn't pose a limiting factor" explained Artur Llobet.

"Our study," adds the researcher "questions this dogma because we found that in periods of intense neuronal stimulation, but within physiological levels, presynaptic levels of clathrin decrease reversibly. Ie levels clathrin are a dynamic property of the terminals".

"This is not surprising, what it is, is that a drop of only 20% are able to alter synaptic function. Specifically, this reduction reduces the number of vesicles that can be released, which has a direct action on exocytosis and therefore on the release of information. "

"In short," said Llobet "we showed that clathrin levels are a limiting factor for synaptic transmission, thus contributes to synaptic plasticity." Article's reference

More information: Francisco J. López-Murcia, Stephen J. Royle and Artur Llobet. Presynaptic Clathrin Levels Are a Limiting Factor for Synaptic Transmission. The *Journal of Neuroscience*. DOI: 10.1523/JNEUOSCI.5081-13.2014

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