Laboratory title : CNRS UMR 5297 - Daniel Choquet

Supervisor

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Thesis title :
Role of AMPA receptor trafficking in synaptic plasticity

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Abstract

The molecular composition and the organization of synapses is a fundamental determinant of synaptic transmission and information processing by the brain. Glutamate (AMPAR) AMPA receptors play a central role in these processes because they are involved in almost the entire fast excitatory synaptic transmission. AMPAR trafficking plays a decisive role in the various forms of synaptic plasticity, substrate for memory and learning. We have recently demonstrated that the movement of AMPAR controls short-term and long-term plasticity processes. We therefore assume that the mobility of the AMPAR participates actively in the process of information processing. The AMPAR form a complex with auxiliary proteins such as TARP, CNIIH, and Shisas that play a key role in their traffic, stability, kinetic and pharmacological properties.

The objective of this project is to combine the techniques of electrophysiology on brain slices with cell biology methods to determine the molecular mechanisms through which AMPAR trafficking controls synaptic plasticity. Using innovative tools for controlling on the one hand receptor mobility, and on the other hand different subunits composition, this work will analyze the role of AMPAR mobility in a physiological context. This work will appeal also to different types of KO animals and the use of innovative technologies combining imaging high resolution, glutamate uncaging, and patch-clamp.

Qualification required

Pre-requisite for this subject are an excellent motivation and attraction to cell biology and electrophysiology, a good knowledge of basic physiology and cellular imaging. Training in neuroscience is a plus but not required. A good english level is a must.