INSTITUT PARIS DESCARTES NEUROSCIENCES COGNITION

FÉDÉRATION DE RECHERCHE EN NEUROSCIENCES

Neuroscience Seminar Series

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Salle des Conférences (R229)

Centre Universitaire des Saints-Pères

45 rue des Saints-Pères, 75006 Paris

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TRPC3-dependent synaptic transmission in central mammalian neurons

The metabotropic glutamate receptor type 1 (mGluR1) is highly expressed in Purkinje cells (PCs) of the mammalian cerebellum. At parallel fiber-PC synapses, activation of mGluR1 evokes a complex synaptic response consisting of IP3 receptor-dependent Ca^{2+} release from endoplasmic reticulum (ER) Ca^{2+} stores (Takechi et al., Nature, 1998) and a slow excitatory postsynaptic potential (sEPSP) (Batchelor and Garthwaite, Neuropharmacology, 1993). A few years ago, in collaboration with Lutz Birnbaumer, we demonstrated that the sEPSP is mediated by the transient receptor potential (TRPC) channel subunit TRPC3 (Hartmann et al., Neuron 2008). However, the link of mGluR1 to its downstream effectors remained unknown. We recently tested the possible involvement of the stromal interaction molecule 1 (STIM1), known to interact in non-excitable cells with TRPC channels. Using quantitative single cell RT-PCR and immunostaining, we determined that STIM1 is ten times more abundant than its homolog STIM2 in PCs. We then demonstrated in a newly generated knockout (STIM1pko) mouse line that the PC-specific deletion of Stim1 caused impairments in cerebellar motor behavior. On the cellular level, we found that in STIM1pko mice, ER Ca^{2+} stores are largely depleted. Surprisingly, also mGluR1-dependent TRPC3-mediated currents were largely suppressed (Hartmann et al., Neuron, 2014). Together, these results demonstrate that in mammals STIM1 is a key regulator of neuronal Ca^{2+} signalling, metabotropic glutamate receptor-dependent synaptic transmission, and motor coordination.

Those interested in meeting with the speaker please contact

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