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A light-gated K⁺ channel for sustained neuronal inhibition in freely moving animals

Currently available inhibitory optogenetic tools provide short and transient silencing of neurons, but fail to provide long-lasting inhibition because of the requirement for high light intensities or ion gradients. We have engineered a light-sensitive K⁺ channel, BLINK2, which is activated by low doses of blue light ($\mu\text{W}/\text{mm}^2$) and remains active over (tens) of minutes in the dark. This activation causes long periods of inhibition in neuronal firing in mouse neurons in *ex vivo* recordings and impairs motor neuron response in zebrafish *in vivo*. As a proof-of-concept for potential applications we show that, in a free moving rat model for neuropathic pain, activation of a small number of BLINK2 channels caused a remarkable long lasting (> 30 min) reduction in pain sensation.

Hôte : Christophe Moreau (IBS/Groupe Canaux)