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2 ReaChR: a red-shifted variant of channelrhodopsin enables deep transcranial optogenetic excitation.

Lin JY, Knutsen PM, Muller A, Kleinfeld D, Tsien RY.
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Recommendations:

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This new version of channelrhodopsin (ChR) optimized for activation by red light (ReaChR) shows better membrane trafficking and larger photocurrents than previous red-shifted variants (i.e. C1V1). Indeed, the authors use in vivo recordings to show that ReaChR can activate brainstem neurons, simply by applying LED illumination to the external ear canal. This ChR variant is potentially ideal for non-invasive activation of neurons in behaving animals--without the need for chronic cranial windows or the implantation of optical fibers.

Abstract:

Channelrhodopsins (ChRs) are used to optogenetically depolarize neurons. We engineered a variant of ChR, denoted red-acti orange to red light (λ ~590-630 nm) and offers improved membrane trafficking, higher photocurrents and faster kinetics compa scattered by tissue and is absorbed less by blood than the blue to green wavelengths that are required by other ChR variants. cortex to drive spiking and vibrissa motion in awake mice when excited with red light through intact skull. Precise vibrissa move motor nucleus in the brainstem and illumination with red light through the external auditory canal. Thus, ReaChR enables trans structures without the need to surgically thin the skull, form a transcranial window or implant optical fibers.

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