

SomaGCaMP: A Cell Body Targeted Genetically Encoded Calcium Sensor

Technology #20999

Applications

This technology is a novel calcium indicator which specifically localizes to the soma of neurons to facilitate precise detection of activated neurons in a neural network at the single cell resolution for use in neuroscience research.

Problem Addressed

In vivo calcium imaging is a common strategy used to visualize neural network activity. GCaMP, a genetically encoded calcium indicator, fluoresces upon binding to intracellular calcium to provide a measurable readout of neural activation. However, expression of calcium indicators is not specific to the cell body of the neuron, and molecules such as GCaMP also can be found in neurites. Moreover, the cell body of one neuron may be covered by neurites of nearby neurons. Thus, it is currently difficult to interpret whether the signal emitted from GCaMP originates from the cell body of one neuron or from the processes of neighboring neurons. This imprecise signal, called neuropil contamination, is a hindrance to detecting true neuronal spikes. This technology, called SomaGCaMP, is a GCaMP molecule with a modified sequence that specifies its localization to the cell body of neurons to enable single-cell detection of neural activation.

Technology

SomaGCaMP is an improved version of GCaMP, a genetically encoded peptide commonly used as an *in vivo* calcium indicator in neuroscience studies. In contrast to GCaMP, which can disperse throughout the neuronal cell, SomaGCaMP is comprised of the GCaMP coding sequence with the addition of two peptide sequences that restrict the calcium indicator to the cell body of neurons in both mice and zebrafish. SomaGCaMP fluoresces specifically in the cell body of activated neurons. Expression of SomaGCaMP in neurons enables researchers to precisely identify which neurons within a network are activated under various experimental conditions and eliminates neuropil contamination that is characteristic of data derived from other fluorescent calcium indicators.

Advantages

- Single-cell resolution of activated neurons in a neural network
- Reduces biological noise (neuropil contamination) associated with existing calcium indicators

Intellectual Property

IP Type: Published PCT Application

IP Title: Cell body targeted sensors

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