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Prime 95B™ Scientific CMOS Camera

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Neuroscience and Calcium Imaging

Geoffrey G. Murphy, Ph.D., Research Professor

Molecular & Behavioral Neuroscience Institute

University of Michigan

BACKGROUND

Dr. Geoffrey Murphy, professor of physiology at the University of Michigan's Molecular & Behavioral Neuroscience Institute studies the how the mammalian brain encodes, stores and retrieves information. Dr. Murphy explains, "We do a lot of mouse molecular genetics, in vitro neurophysiology, and mouse behavior. We are interested in the dendritic architecture, and the calcium signaling within the dendritic structure versus the somatic structure."

CHALLENGE

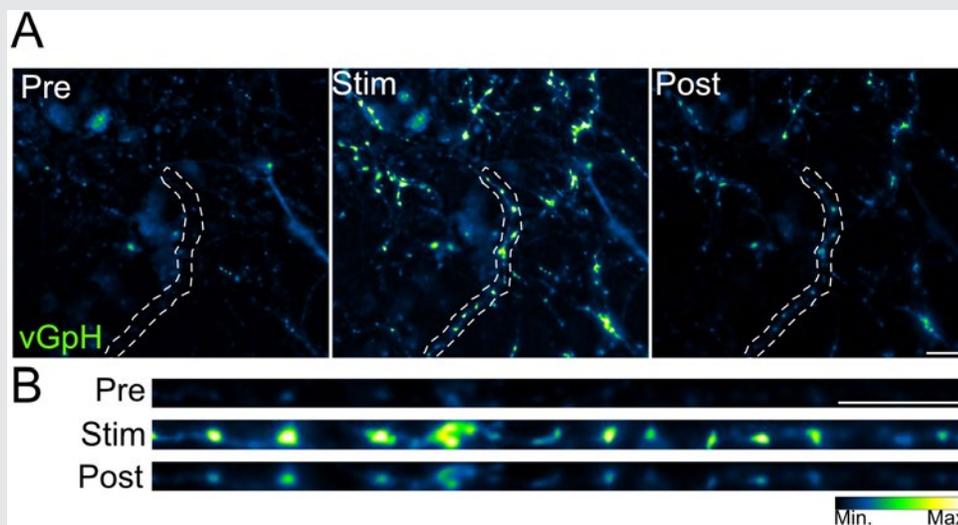
For many neuroscience researchers, speed, sensitivity, and resolution are all critical to visualizing small changes in calcium signals in different regions of the neuron. Dr. Murphy told us, "Being able to image at 100 Hz is very important to us. That allows us to get high resolution, rapid calcium signals." Additionally, the samples to be imaged require a sensitive camera to visualize as the samples are often thick and can be troublesome to image through.

“The Prime 95B allowed us to not only increase the frame rate we were using to acquire images, but we also achieved higher resolution. For us, that meant being able to look at subcellular structures in real time.”

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SOLUTION

For Dr. Murphy, the 11 μ m pixel size and speed of the Prime 95B provided a solution to the challenges of calcium imaging in neurons. Dr. Murphy told us, "Previously, we had been using cameras that had a lower frame rate and worse resolution, so using the Prime 95B allowed us to not only enhance the frame rate that we were using to acquire images, but get higher resolution too. For us, that meant being able to look at subcellular structures in real time so the speed is certainly something that we like. Also, it's a really easy camera to use and it interfaces well with our preferred software application [for further analysis]."



Fluorescence imaging of the fluorescent reporter for vesicle cycling (VGLUT1-pHluorin, vGpH) in hippocampal neurons.

A: Images of fluorescent intensity before (Pre), during (Stim) and after electrical stimulation (100 pulses, 10 Hz) of neurons.

B: Enlarged view of an axonal segment (from outlined region in A).

Learn more about the Murphy Lab at the University of Michigan:

<https://sites.google.com/a/umich.edu/murphy-lab/home>



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