Webinar Q&A Report

Simultaneous Multi-Region Neuronal Calcium Imaging in Freely Behaving Subjects

Questions in this Q&A Report were submitted during the live webinar, Simultaneous Multi-Region Neuronal Calcium Imaging in Freely Behaving Subjects.

Answers have been provided by:

Yasaman Soudagar, PhD
CEO, Neurescence

Roshni Christo, PhD
Application Scientist, Neurescence

Can this simultaneous imaging be used in blood vessels? If so, how would you do it?

Yes, one can certainly image the vessels in the brain and of the spinal cord. For other parts of the animal body, a surgical protocol that enables the implantation of the lens-connector, enables imaging the vessels in that part. When a fluorescent agent, such as fluorescein dye, is injected into a vein, it passes through the blood vessels and the Quartet can record the blood flow. The images/videos can reveal abnormal blood vessels or damage.

What about on a rat?

Yes, multiple lens-connectors can be implanted in rats and mice (and juvenile animals), birds and non-human primates, in the brain and/or spinal cord. There are methods to protect the optical fibers and the connectors from rat's touch or chewing during recording and when the animal is in home cage. With mice, no such protection is required. They do not destroy the optical fibers.

Do you offer support for implantation surgery and getting the system to work in your brain region of interest? Other companies offer support where they'll come to your lab to help you troubleshoot.

We provide hands-on-surgical training in your lab, neuronal trace extraction and device synchronization with other behavior equipment in your lab. We also troubleshoot all your scientific and technical questions through in-person visits, video, phone, and emails.

How deep can you go for mice? Can you do imaging in PAG or deeper areas?

We can target any brain region of interest, the lens-connectors are customizable to any depth in the brain. Once the lenses are implanted the imaging fibre optics can image.

How long can you use this system to image the same areas in the brain? Is it days, weeks, or months?

It can be used for longitudinal imaging of the brain circuits over weeks or months (we have used it for 6-7 months).

Can you implant multiple different areas in the same animal?

Yes! That is one of the major strengths of the system. We can implant up to 4 lens-connectors in the same animal.

How many cells is possible to record from a single field recording?

The number of cells totally depends on the success of the implantation surgery. After a successful lens-implantation surgery, we can image the activity of 100s of neurons with single-neuron resolution.

Are anesthetics necessary? If so, how might these affect the results?

Since anesthetics impair the performance of animals in behavioral tests, they are not used during the imaging sessions with Neurescence multiscopes. The lens-connectors are designed to easily connect and disconnect in an awake animal.

How many animals can be connected simultaneously?

Four animals with single implants can be connected and recorded simultaneously. Or if multiple brain areas are being imaged, two animals with combination of 2 implants in each animal or 1 implant in one, and 3 in the other can be connected and imaged simultaneously.

Can this technique be used with LFP recording at the same time?

Neurescence imaging probes can be used in combination with E-phys probes to collect optical images and electrophysiology data simultaneously. In fact, for its internal R&D, Neurescence routinely combines electrophysiology and optical recording.

What customisation is needed? Is it the size of the lens?

Yes, the diameter and length of the lens is custom designed to match the size and depth of the brain area.

Do you have to do separate surgeries to 1) inject virus and 2) implant a lens? Is there a separate step to mount a baseplate as needed for the Miniscope?

There is no baseplate. In terms of viral expression and lens implantation, it depends on the individual lab protocol. There are certain labs who prefer to perform two separate surgeries and there are a few labs that perform viral injection and lens implantation on the same day. The lenses are cemented on the skull using Metabond. Weight of each Lens-Connector is < 400 milligrams and the fiber optics are very flexible, eliminating the need for the use of set screws to be sufficiently secured on the skull.

Contact Information

If you have additional questions for Dr. Yasaman Soudagar, Dr. Roshni Christo, or Neurescence regarding content from this webinar, please contact them at:

Neurescence, Inc.

Phone: +1 (647) 865 2098
Email: info@neurescence.com
Web: https://www.neurescence.com/new/
Twitter: http://twitter.com/neurescence
LinkedIn: https://www.linkedin.com/company/neurescence-inc/
YouTube: https://www.youtube.com/channel/UCJnEQij8JFvL47MPLW87Tmg

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