INSCOPIX
A BRUKER COMPANY

nVue™ System

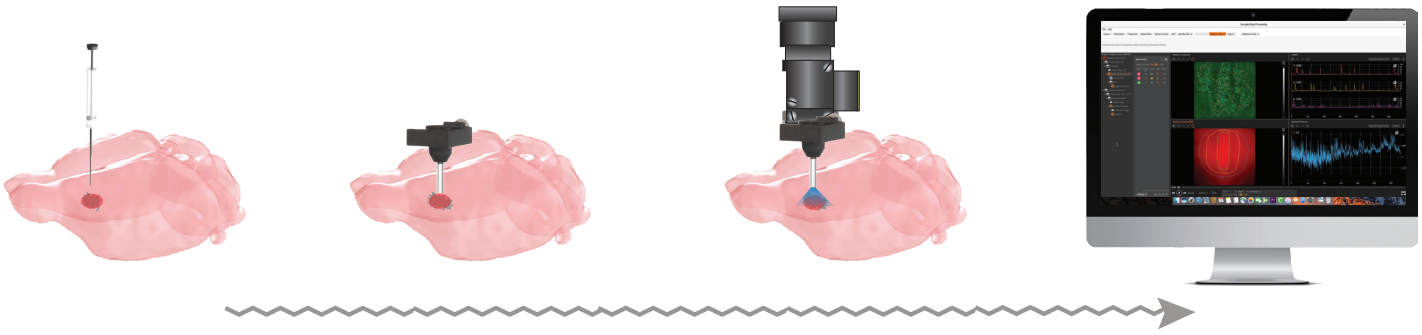
Simultaneous neurotransmitter & calcium dynamics during free behavior

Key benefits

- Record cell-type specific neuronal activity over months
- Visualize fast, genetically-encoded optical sensors of neurotransmitter activity
- Investigate the relationship between neurotransmitter dynamics and neural activity during free behavior

The Inscopix nVue system enables simultaneous dual color imaging of calcium activity and neurotransmitter signal dynamics

Our dual color miniscope enables simultaneous data collection of a calcium (Ca^{2+}) signal using genetically encoded Ca^{2+} indicators in combination with novel, genetically encoded fluorescent neurotransmitter sensors in freely-behaving animals, empowering scientists with greater neural circuit insights into function and behavior. This application highlights one approach, using GCaMP together with the red dopamine sensor – GRAB-rDA1m, to record and analyze the two signals within the same field of view.



Inject
GCaMP indicator along with a dynamic red neurotransmitter sensor of choice

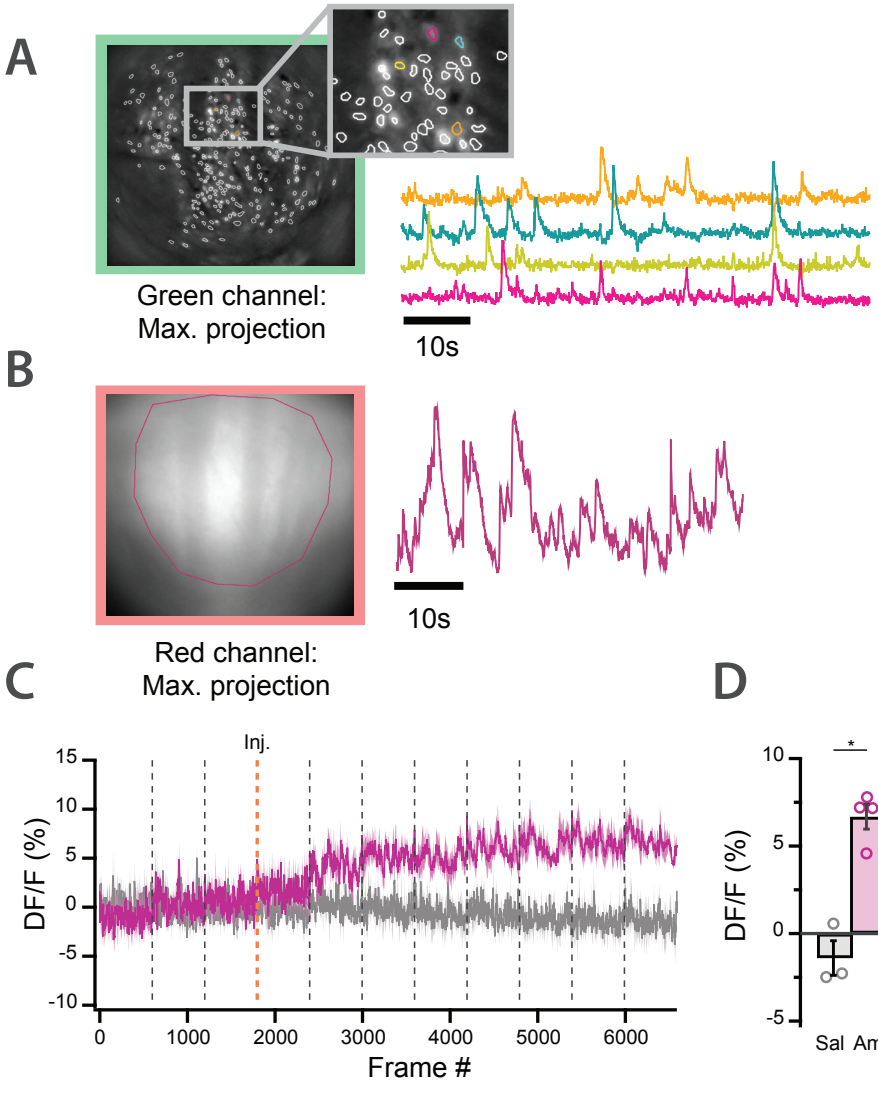
Implant
ProView™ DC Integrated Lens

Image
Calcium activity and neurotransmitter dynamics simultaneously during free behavior

Process and Analyze
Imaging data from two cell populations with Inscopix Data Processing Software (IDPS)

Simultaneous imaging of dopamine release and neural activity with the nVue system

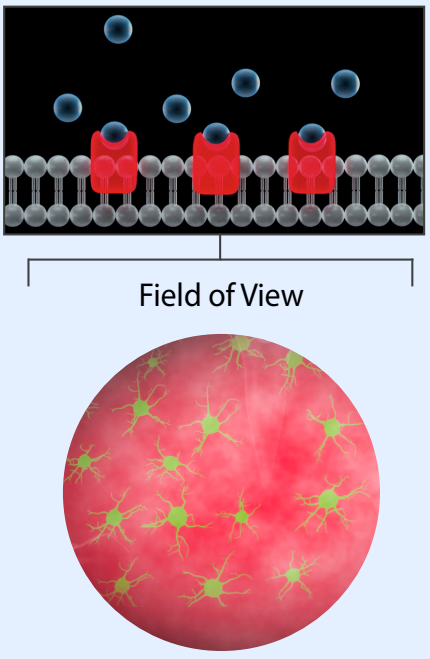
Miniscopes have been routinely used to image genetically encoded sensors such as GCaMP, allowing for free behavior while monitoring neural activity with single-cell resolution. Here, we leverage GCaMP in combination with a red variant of the novel GPCR-activation-based dopamine sensor $GRAB_{DA}$, enabling us to simultaneously monitor dopamine release and cellular-resolution neuronal Ca^{2+} activity in the dorsal striatum during free behavior.



Simultaneous imaging of neuronal calcium dynamics and dopamine release with the nVue system. GCaMP and $GRAB_{DA}$ viral constructs were injected into the dorsal striatum; two weeks later, a ProView DC Integrated Lens was implanted at the same site to enable optical access for the nVue miniscope (*see workflow, front page*). (**A**) Data from an example subject. A maximum projection from each channel is shown. More than 250 cells were identified in the green channel using CNMFe, and GCaMP fluorescence traces were extracted. (**B**) rDA1m signal from the red channel was analyzed using a manual ROI. (**C**) rDA1m-mediated fluorescence change following amphetamine administration. Magenta trace represents the mean of mice receiving amphetamine (n = 6), gray trace represents the mean of mice receiving saline vehicle injection (n = 3). Shading indicates SEM. Dashed lines indicate 90-second breaks between 30-second recording periods (600 frames each). Orange dashed line indicates the off-period during which injection of amphetamine or saline was administered. (**D**) Average fluorescence change 15 minutes after saline (gray) and amphetamine (magenta) injection compared to pre-injection baseline, frames 0 to 1800 (t-test, *p<0.01).

Inscopix nVue System

Application



Our Complete Solution

- Biological reagents & accessories
- Cutting-edge instrumentation
- Powerful data processing
- Expert scientific support

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