

TeleFiOpt

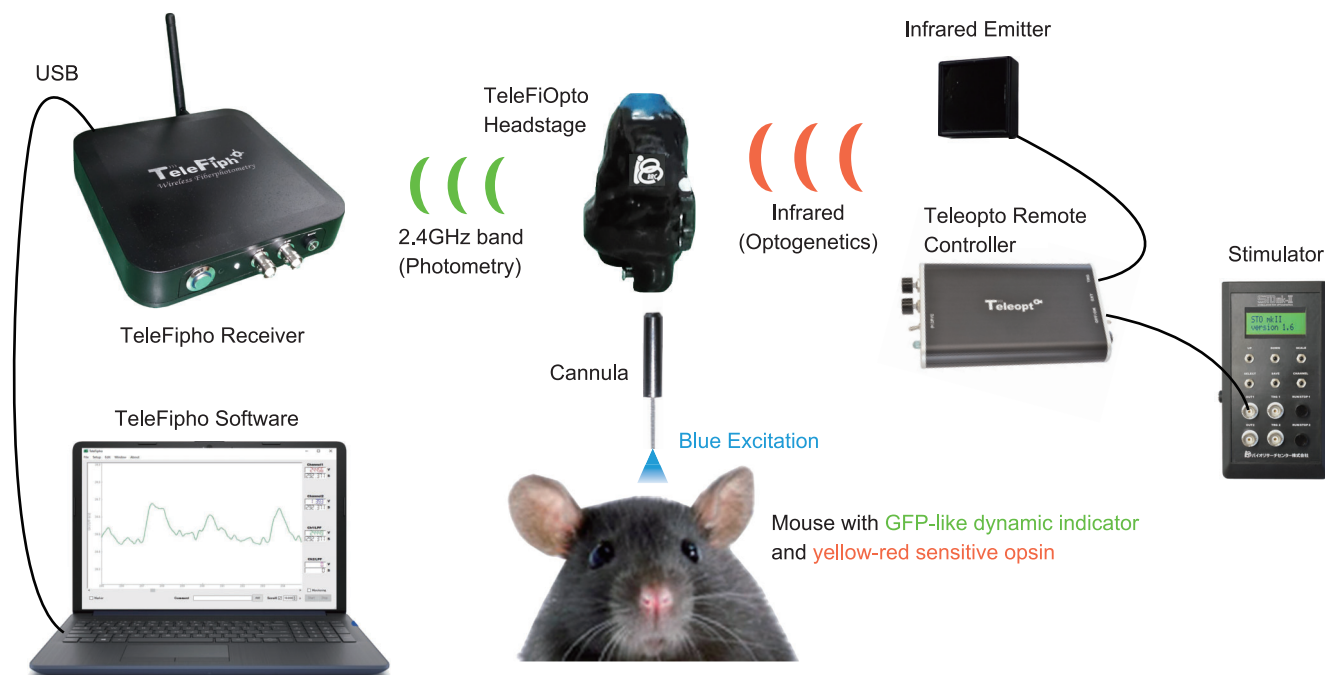
Wireless Fiber Photometry & Optogenetics



TeleFiOpto Headstage

TeleFiOpto can perform both fiber photometry recording and optogenetic stimulation simultaneously in wireless manner. Before the fiber cannulation, both GFP-like dynamic indicator (GCaMP, dLight, GRAB-DA, etc.) and yellow-red color sensitive opsins (NpHR, Chrimson, Jaws, etc.) should be expressed by injecting both viruses at the target position, then fiber cannula should be implanted aiming at the target. Then you can optically record and stimulate the target simultaneously. TeleFiOpto is a fusion of our established two technologies, Teleopto and TeleFipho. That is, photometry data is sent to the TeleFipho receiver by 2.4GHz band, and stimulation timing is sent to the headstage by infrared signal. If you already have Teleopto or TeleFipho, you can establish TeleFiOpto system just by adding some components, so it is fairly more economical than newly buying a complete photometry & optogenetics system.

System configuration



TeleFiOpto-set contents

| | |
|----------------------|--------------------------------|
| TeleFiOpHs | 1x TeleFiOpto Headstage |
| TeleFiR | 1x TeleFipho Receiver |
| TeleFiCharger | 1x TeleFipho Charger |
| TeleFiC-I-d | 3x TeleFipho Cannula |
| TeleFiTool | 1x TeleFiTool |
| TeleFiDummy | 1x TeleFiDummy |
| | 1x TeleFipho Software |
| TeleRemocon | 1x Teleopto Remote Controller |
| TeleEmitter | 1x Infrared Emitter |
| STOMk-2 | 1x Stimulator for Optogenetics |

TeleFiOpto-Opac (Opto pack) contents

| | |
|--------------------|--------------------------------|
| TeleFiOpHs | 1x TeleFiOpto Headstage |
| TeleRemocon | 1x Teleopto Remote Controller |
| TeleEmitter | 1x Infrared Emitter |
| STOMk-2 | 1x Stimulator for Optogenetics |

TeleFiOpto-Fpac (Fipho pack) contents

| | |
|----------------------|-------------------------|
| TeleFiOpHs | 1x TeleFiOpto Headstage |
| TeleFiR | 1x TeleFipho Receiver |
| TeleFiCharger | 1x TeleFipho Charger |
| TeleFiC-I-d | 3x TeleFipho Cannula |
| TeleFiTool | 1x TeleFiTool |
| TeleFiDummy | 1x TeleFiDummy |
| | 1x TeleFipho Software |

| Model | Descriptions |
|-----------------|-------------------------|
| TeleFiOpto-set | TeleFiOpto complete set |
| TeleFiOpto-Opac | TeleFiOpto Opto pack |
| TeleFiOpto-Fpac | TeleFiOpto Fipho pack |
| TeleFiOpHs | TeleFiOpto Headstage |

Example Data: GCaMP signal evoked by rsChRmine activation

Data is provided by the courtesy of Dr. Masanori Nomoto in Toyama University, Inokuchi lab.

TeleFioOpto cannula (TeleFic-3.0-600) is inserted aiming at mPFC in a mouse expressing both GCaMP and rsChRmine in the same subset of neurons. GCaMP recording and optogenetic stimulation are performed by TeleFioOpto system. rsChRmine is red-shifted channelrhodopsin evokes neuronal excitation.

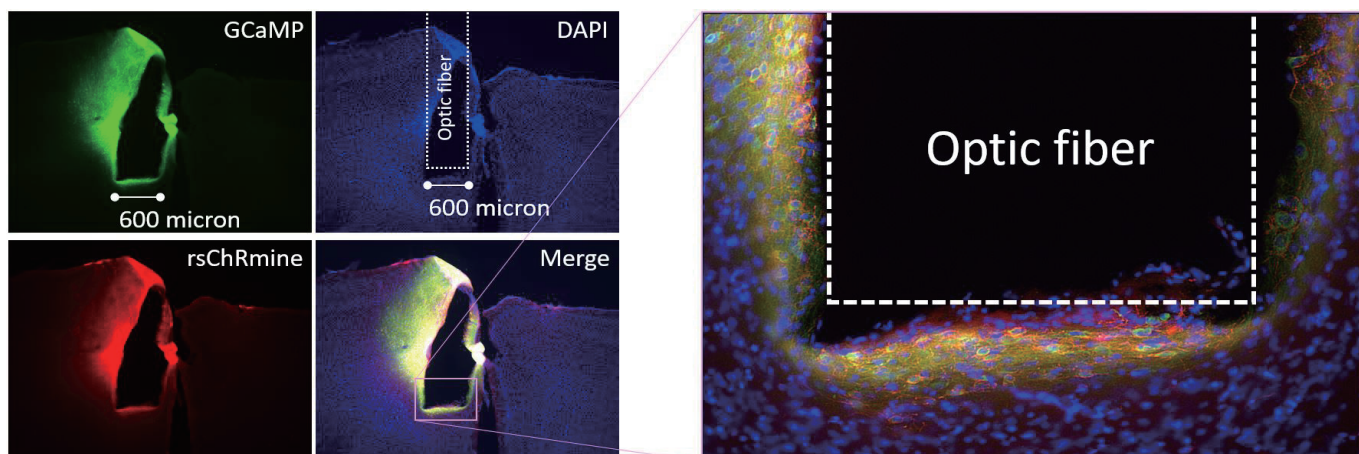


Figure 1: Histological observation of GCaMP and rsChRmine expression in a fluorescence microscope. We confirmed both GCaMP and rsChRmine were well expressed in the same cell subset under the implanted cannula. This histology has been done after the recording session.

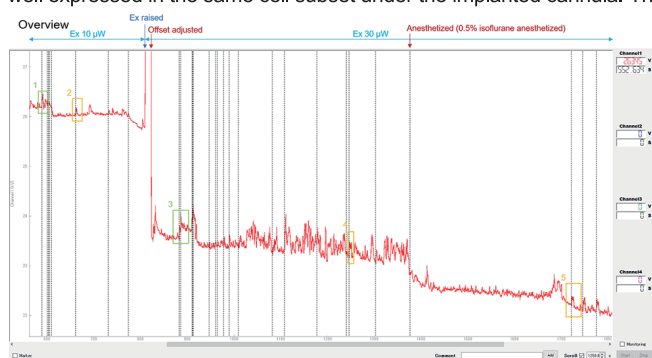


Figure 2: Raw data in a whole recording session. The excitation light was changed from 10uW to 30 uW at 809 second, then offset was adjusted in range at 823 second. The mouse was lightly anesthetized by 0.5% Isoflurane at 1376 second, then GCaMP signal was depressed.

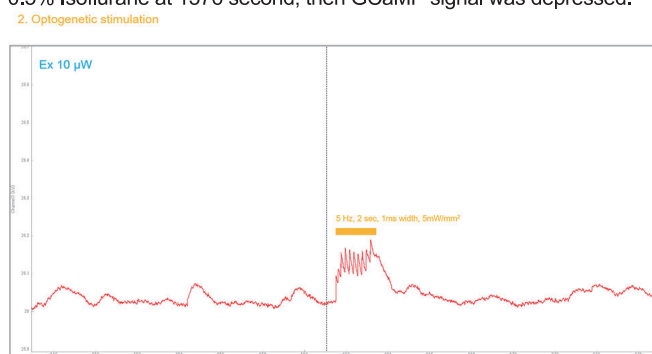


Figure 4: GCaMP activity evoked by optogenetic stimulation under 10uW excitation light. Pulse width: 1ms, pulse frequency: 5Hz, period: 2 seconds.

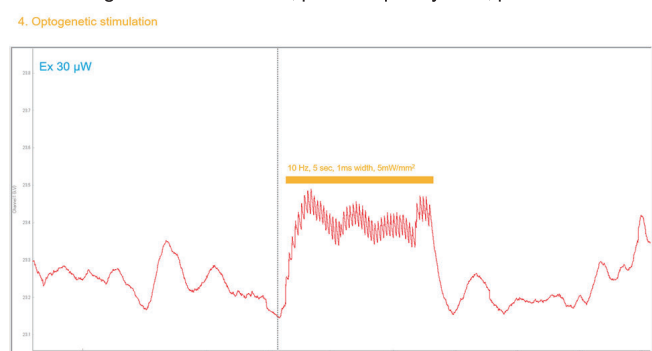


Figure 6: GCaMP activity evoked by optogenetic stimulation under 30uW excitation light. Pulse width: 1ms, pulse frequency: 10Hz, period: 5 seconds.

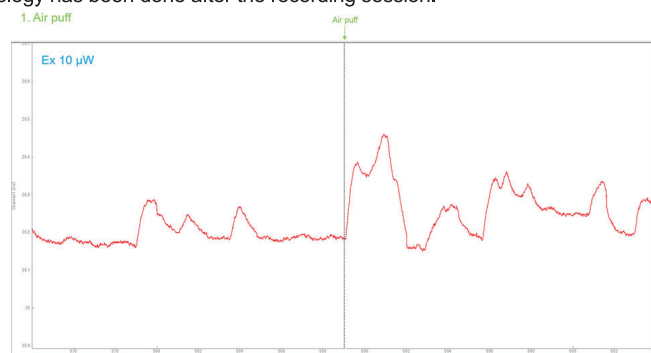


Figure 3: GCaMP activity evoked by an air puff stimulation under 10uW excitation light.

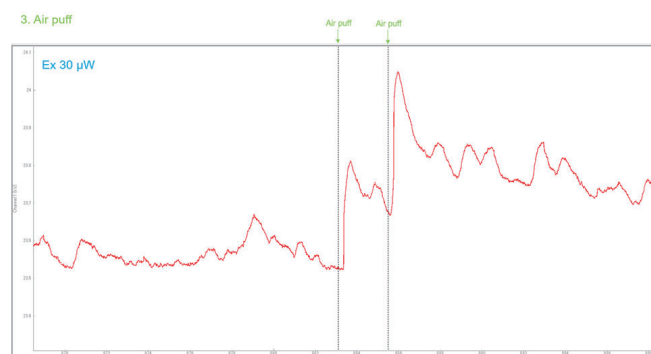


Figure 5: GCaMP activity evoked by two successive air puff stimulation under 30uW excitation light.

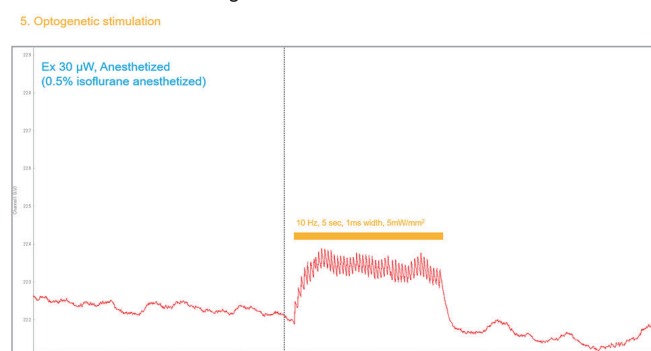


Figure 7: GCaMP activity evoked by opto stimulation under 0.5% isoflurane anesthetization. Pulse width: 1ms, pulse frequency: 10Hz, period: 5 seconds.

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