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Photometry Acquisition in Freely Moving Mice

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We use this protocol and it's working

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Abstract

This protocol describes the steps for acquiring photometry data for freely moving mice.

Materials

- Mice expressing sensor of interest implanted with a cannula for fiber photometry (e.g. 400um, 0.48 NA) above the area of interest
- Clear acrylic behavioral chamber
- Optical fiber patch cable (e.g. 400um, 0.48 NA, Thorlabs)
- RZ5P fiber photometry processor (TDT)
- Photoreceiver (AC low, Newport)
- LED Driver (Thorlabs)
- Synapse software (TDT)
- 70% ethanol

Troubleshooting

Habituation

1 Habituate the mouse to tethering and the behavioral chamber for 10 minutes/day for two days prior to starting testing sessions.

1.1 Scruff the mouse and attach the optical fiber patch cable to the mouse's implant.

1.2 Place mouse in the behavioral chamber (a clear acrylic cylinder, 25 cm in diameter).

1.3 Monitor the mouse for the duration of the session to ensure it does not become tangled by the patch cable and moves freely about the chamber. Also check that the patch cable does not twist around itself such that the mouse cannot move freely.

Computer and Optical Setup

2 Computer and optical setup

2.1 Turn on the computer.

2.2 Turn on TDT RZ5P (power button on top left of box, blue light turns on).

2.3 Flip the red switch on the Photoreceiver (left switch) towards you to turn it on. Do not touch the other switch.

2.4 Turn on the LED Driver (switch on back of box). You should see the screen turn on. Make sure you are in "External Command" mode and use the click wheel and LED button to select the LED wavelengths you wish to turn on.

2.5 Open Synapse Software (TDT). Make sure that the desired experimental design is selected. Click "Preview" and serially cover and uncover the sleeve at the end of the patch cable to ensure that the light is emitted properly and the photodetectors are functional.

Testing

3 Testing

3.1 Scruff the mouse and attach optical cable to the photometry implant, and place into the behavioral chamber.

3.2 Press the red “Record” button in Synapse and enter the file name for the experiment. This will start the experiment. It is important that you start the photometry recording before any other signals, as it will serve as the master data file, collecting timestamps from all other devices.

3.3 To check the fiber signal, right click the axis on the computer screen and select auto scale to bring signal into frame.

3.4 Recording will end after 10 minutes. Remove mouse from chamber and unplug the mouse from the optical cable. Return to home cage. Before testing additional mice, clean the chamber with 70% ethanol.

Cleanup

4 Cleanup

4.1 Remove mouse from chamber and unplug optical cable. Return to home cage.

4.2 Clean chamber with 70% ethanol between mice and at end of the day.

4.3 When experiments are completed for the day, turn off the photodetectors, LED drivers, TDT system, and Synapse programs. Transfer and back up files.