

Jan 31, 2024

🌐 Live tracking of multiple mice in a neuromelanin-inducing PD model over several weeks

DOI

<https://dx.doi.org/10.17504/protocols.io.36wgq3z25lk5/v1>

Cristian González-Cabrera¹, Matthias Prigge¹

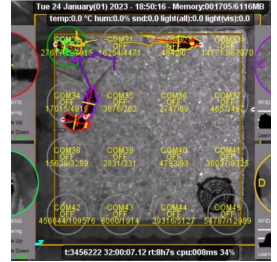
¹Neuromodulatory Network Group. Leibniz Institute for Neurobiology, Magdeburg

TeamPrigge



Team Prigge

Leibniz Institute for Neurobiology



Create & collaborate more with a free account

Edit and publish protocols, collaborate in communities, share insights through comments, and track progress with run records.

Create free account

OPEN  ACCESS



DOI: <https://dx.doi.org/10.17504/protocols.io.36wgq3z25lk5/v1>

External link: <https://livemousetracker.org/>

Protocol Citation: Cristian González-Cabrera, Matthias Prigge 2024. Live tracking of multiple mice in a neuromelanin-inducing PD model over several weeks. **protocols.io** <https://dx.doi.org/10.17504/protocols.io.36wgq3z25lk5/v1>



License: This is an open access protocol distributed under the terms of the **Creative Commons Attribution License**, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited

Protocol status: Working

We use this protocol and it's working

Created: January 31, 2024

Last Modified: May 31, 2024

Protocol Integer ID: 94442

Keywords: Neuromelanine, Tracking, Social behavior, long-term track, Locus coeruleus, phenotyping PD, ASAPCRN, live tracking of multiple mice, tracking mouse behavior, live mouse tracker, behavioral analysis of mice, mouse vocalization, involving mouse vocalization, multiple mice, mouse, neuromelanin, live tracking, mouse behavior, stage parkinson, parkinson, observing behavioral shift, mice, inducing pd model, automated tracking, behavioral analysis, integrating machine learning, pd model over several week, behavioral shifts across various domain, parkinson disease

Funders Acknowledgements:

ASAP

Grant ID: 020505

Abstract

 The Live Mouse Tracker (LMT) system is engineered for long-term, automated tracking and behavioral analysis of mice, integrating machine learning, computer vision, and RFID technology for simultaneous monitoring of multiple subjects. Specifically designed for the research community, LMT offers a Python-based framework for in-depth data analysis and is adept at facilitating studies involving mouse vocalizations. This cost-effective, DIY system is compatible with Windows OS and is tailored for tracking mouse behavior. Currently employed in our studies, LMT is pivotal in observing behavioral shifts across various domains such as arousal-resting, social interaction, and motor functions in a Neuromelanin-accumulating early-stage Parkinson's Disease model utilizing the tyrosinase approach.

Materials

RFID chip: <https://chiphandel.de/produkt/rfid-tierchip-mini-de-laendercode-276/>

Animal Preparation for Recordings

- 1
 1. **Anesthetizing the Mouse:** Anesthetize the mouse in the isoflurane induction chamber. Monitor the mouse to ensure it is properly anesthetized and does not feel pain.
 2. **Implantation Site Preparation:** Gently clean and disinfect the area of the belly where the RFID probe will be implanted.
 3. **Implanting the RFID Probe:** The RFID comes with a provided single-use injector. Carefully insert the injector at the predetermined site in the belly. Gently push the probe into place subcutaneously.
 4. **Finishing the Procedure:** Withdraw the injector and ensure the probe is properly placed. Using your thumb and index fingers, move the RFID probe away from the injection site. Apply antiseptic to the implantation site if necessary.
 5. **Post-Procedure Care:** Monitor the mouse as it recovers from anesthesia. Provide appropriate care and monitor for any signs of infection or complications.

LMT Recordings (de Chaumont 2019)

- 2
 - Open Provide fresh bedding, food, and water in the LMT arena.
 - Make sure that the C: drive has enough space. Consider about 70GB per week of recording.
 - Adjust the dark/light controller according to your animal's cycle.
- 3
 - Open the LMT software and activate the option "calibrate"
 - Adjust the arena position to fit the depicted area on the screen. Make sure that all the corners are properly aligned and the floor arena green dots are in green.
 - Close the LMT software.
 - Open the LMT software and activate the option "Live mouse Tracker"
 - In the GUI choose the number of mice you will place for recordings (1-4).
 - Rename your experiment as needed.
 - Start the recordings

End Recordings

- 4
 - Stop the recordings from the GUI.
 - Remove the mice and place them back in their home cage.
 - Transfer your data to the D: drive and delete it from C: one.
 - Clean up the arena and empty the water bottle.



Data analysis

- 5 Data analysis and pipelines can be found at <https://github.com/fdechaumont/lmt-analysis>

Protocol references

de Chaumont, F., Ey, E., Torquet, N. *et al.* Real-time analysis of the behaviour of groups of mice via a depth-sensing camera and machine learning. *Nat Biomed Eng* **3**, 930–942 (2019). <https://doi.org/10.1038/s41551-019-0396-1>

<https://livemousetracker.org/>