

Dec 23, 2025

Electrophysiological recordings

DOI

<https://dx.doi.org/10.17504/protocols.io.8epv556z4v1b/v1>

Asa Mackenzie¹

¹Lund University



Åsa Wallén-Mackenzie

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.8epv556z4v1b/v1>

Protocol Citation: Asa Mackenzie 2025. Electrophysiological recordings. **protocols.io**

<https://dx.doi.org/10.17504/protocols.io.8epv556z4v1b/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: December 23, 2025



Last Modified: April 21, 2026

Protocol Integer ID: 235677

Keywords: ASAPCRN, electrophysiological recordings electrophysiological recordings from serra et al, electrophysiological recording

Funders Acknowledgements:

Aligning Science Across Parkinson's

Grant ID: ASAP-020600

Abstract

Electrophysiological recordings from Serra et al 2023

Recordings

- 1 Patch-clamp recordings were performed under infrared gradient contrast video microscopy on an upright microscope (E600FN, Eclipse workstation, Nikon, Japan) equipped with a 603 water-immersion objective (Nikon Fluor 603/1.0 NA).
- 2 The microscope was also equipped with epifluorescence (Nikon Intensilight C-HGFI) allowing visualization of STN neurons expressing the ChR2-mCherry as well as LHb-projecting EP and VP neurons retrogradely labeled with GFP, respectively.
- 2.1 Neurons were recorded using low-resistance pipettes (impedance, 3–8 MU) prepared from borosilicate glass capillaries (GC150F10; Warner Instruments, Hamden, CT, USA) with a horizontal puller (P- 97; Sutter Instruments, Novato, CA, USA).
- 3 In voltage-clamp experiments, the internal solution contained the following (in mM): 135 K-gluconate, 3.8 NaCl, 1 MgCl₂·6H₂O, 10 HEPES, 0.1 EGTA, 0.4 Na₂GTP, 2 Mg_{1.5}ATP, 5 QX-314 and 5.4 biocytin (pH = 7.2, 292 mOsm).
- 4 Data were acquired using a Multiclamp 700B amplifier connected to a Digidata 1550B digitizer controlled by Clampex 10.3 (Molecular Devices, Sunnyvale, CA, USA). Acquisitions were performed at 20 kHz and low-pass filtered at 4 kHz. Series resistance was monitored throughout the experiment by voltage steps of 5 mV. Data were discarded when the series resistance changed by >20%. Biocytin-filled neurons were identified.

optogenetic stimulation

- 5 LED laser source (Prizmatix, Israel) connected to optic fiber (B: 500 mm) was placed above the brain slice.
- 5.1 Light intensities ranged from 4mW to 90 mW at the tip of the optic fiber depending of the type experiments.
- 6 For cell body stimulation, continuous 100 ms long duration light stimulation (λ = 470nm) was applied at low (4mW) and high (90 mW) intensities.
- 7 To evoke synaptic transmission, single pulses or train of stimulation (800 pulses at 20Hz) of 1ms duration at full power (90 mW) were used in order to maximize axon terminal depolarization and efficient release of neurotransmitter.
- 8 The magnitude of EPSCs was examined in whole-cell voltage-clamp mode at a holding potential of 60 mV. Junction potential (13 mV) was not corrected.



- 9 EPSC latencies were calculated as the difference between the time of the pulse and the beginning of the negative deflection of the EPSC.
- 10 After electrophysiological recordings, slices were fixed overnight in 4% paraformaldehyde, and maintained in PBS-azide at 0.2% at 4C until immunohistochemical processing.