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**Protocol status:** Working
We use this protocol and it's working

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# Electrophysiological recording from a chronic chamber-implanted non-human primate

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ABSTRACT

This protocol describes the preparation and insertion of extracellular recording electrodes into intracranial targets of a non-human primate implanted with a chronic recording chamber. A piercing guide cannula is used to penetrate the dura and to guide the electrode. Practices related to targeting, electrode cleaning, and electrode movement and settling relative to brain tissue are discussed.

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## Preparation before the day of recording

1 Choose the target area using resources such as an MRI or prior brain mapping.

2 Calculate the distance from the micro-drive to the surface of the brain.

> Note
>
> It is highly recommended to measure this distance immediately after the craniotomy because the dura begins to thicken.

3 Draw a mark on the dura piercing guide at the calculated distance from the tip.

> Note
>
> This mark will tell us how deep we can insert the piercing guide with minimum damage to the cortex.

4 Mount an electrode or multi-electrode-array on the micro-drive.

5 Cover the micro-drive and leave a message for other lab members to exercise caution when working near the micro-drive to avoid accidental damage.

## Preparation before chairing the animal

Check that the recording system is working properly.

6

7 Clean the electrode and piercing guide (follow the instructions for the specific electrode in use). For our recordings, we soak the electrode and piercing guide in a 1% solution of enzymatic detergent (Metrex, EmPower Dual-Enzymatic Detergent) for 30 minutes, followed by multiple rinses with sterile water, and then another rinse with saline.

## Preparation after chairing the animal

8 After chairing the animal, secure the animal with restraints such as arm restraints and a neck-plate.

9 Secure the animal's head using head-fixation posts.

10 Wipe the surface of the implant with a sani-cloth (PDI health care).

11 Clean the recording chamber (see our other protocol).

12 Fill the chamber with saline so that any tissue is not exposed to air.

13 Transfer the animal into the recording rig.

## Piercing the dura and lowering the electrode

14 Rinse the electrode and piercing guide with sterile water and saline.

15 Mount the micro-drive on the animal’s head.

16 Connect the micro-drive to the depth monitor if available.

17 Check/note the offset of the electrode if the depth on the monitor is not zero.

18 Connect the electrode to the recording system.

19 Lower the piercing guide to the marked depth (surface of the dura).

> **Note**
>
> Researchers may need to lower the piercing guide by 1-2 mm from the marked depth if the dura and the tissue above the dura are thick and hard.

20 Lower the electrode 1-2 mm above the dura with coarse drive.

21 Start monitoring the signal from electrode.

Note

It is highly recommended to export the neural signal from theanalog output and connect to the speaker so that researchers can notice the spike activity without seeing the oscilloscope.

22 Start lowering the electrode with the fine drive until researchers can confirm the spike activity.

Note

1: researchers should keep their eyes on the electrode while lowering the electrode. Be on the lookout for any bending.

2: The electrode may start bending if the piercing guide fails to pierce the dura. Researchers should immediately raise the electrode, raise the piercing guide, unmount the micro-drive, and confirm the tip of the electrode is still intact (not bent). Then resume from step 1.

23 Continue lowering the electrode to the target depth.

Note

The electrode may be blocked if there is a blood clot inside the piercing guide. Check if the electrode is still straight if units are not observed. If units are not observed, consider raising the electrode even if it has not bent.

24 Lower the electrode 0.5 to 1 mm below the target depth.

25 Wait for 10 minutes (it is recommended to let the animal do a behavioral task or to give reward to the animal during this period. Movement of the face and jaw aids in settling the electrode).

26 Pull up the electrode to the target depth.

27 Wait for 50 minutes. This is especially important when recording from deep structures to account for any potential movement of the brain that occurred while lowering the electrode.

> Note
>
> Check the depth on the depth monitor regularly and adjust the depth if the micro-drive drifted a lot.

28 Start the recording.

> Note
>
> 1: Many recording systems have "Preview" mode to check the signal without recording. **ENSURE you have enough data storage space in the computer and select "Record" mode**.
>
> 2: Check the depth on the depth monitor regularly and adjust the depth if the micro-drive drifted a lot.

## After the recording

29 Pull up the electrode slowly all the way.

30 Pull up the piercing guide.

31 Unmount the micro-drive.

32 Move the animal from the recording chamber to the place for chamber cleaning.

33 Clean the chamber as outlined in our other protocol.

34 Put the chamber cap back on the chamber.

35 Return the animal to its home cage.

36 Clean the electrode and piercing guide (follow the instructions for the electrode being used).