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Striatal Cannula Window Implantation

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Protocol status: Working

We use this protocol and it's working.



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Abstract

This protocol describes how to implant a cannula window over the dorsolateral striatum in mice to enable two-photon imaging of dopamine axons in the dorsal striatum.

- 1 Prepare and administer appropriate pre-operative analgesics.
- 2 Anesthetize the mouse with isoflurane (5% in oxygen for induction and 1-2% in oxygen for maintenance) and secure in stereotaxic frame. Remove fur over the head and clean skin surface with Betadine solution. Then, make an incision over the midline, exposing the skull. Clip off excess skin around the skull.
- 3 Tilt the animal's head 30 degrees horizontally clockwise or counterclockwise depending on which hemisphere the cannula will be implanted in. Perform a craniotomy, 2.75mm in diameter, using a circular hollow-core dental drill bit over the dorsolateral striatum (+0.3mm rostral, +2.7mm lateral to bregma).
- 4 Remove the skull piece and aspirate the underlying cortical tissue until the external capsule fibers over the striatum are exposed. To aspirate, apply gentle vacuum suction on the tissue while continuously washing with cold 1X PBS (Dombeck et al., 2010). Carefully remove some of the external capsule fibers until only a thin layer remains over the striatal surface.
- 5 Continue washing with cold 1X PBS until there is no bleeding into the cavity and the exposed striatal surface is clean.
- 6 Allow the surface to dry slightly and then apply a thin (~100-150µm) layer of Kwik-Sil over the exposed tissue. Insert the cannula (stainless-steel tube, 2.7mm outer diameter, 2.3mm inner diameter, 1.6mm length, covered at one end by a 1mm-thick glass coverslip that is glued on) into the cavity until the coverslip contacts the Kwik-Sil over the fibers. Allow Kwik-Sil to harden.
- 7 Attach a metal headplate to the skull surface, centered over the cannula, with dental cement (Metabond).
- 8 Once the Metabond hardens, remove the mouse from anesthesia and place it back into its home-cage. Allow it to recover over a heating pad.
- 9 Check the animal's recovery 24 hours post-surgery and readminister appropriate analgesics.

Protocol references

Dombeck, D. A., Harvey, C. D., Tian, L., Looger, L. L. & Tank, D. W. Functional imaging of hippocampal place cells at cellular resolution during virtual navigation. *Nat. Neurosci.* 13, 1433–1440 (2010).