

Apr 01, 2024

Duragel Application for Acute Electrophysiology Recordings

DOI

dx.doi.org/10.17504/protocols.io.14egn2dwqg5d/v1



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Protocol Citation: Anna Lakunina 2024. Duragel Application for Acute Electrophysiology Recordings. **protocols.io**
<https://dx.doi.org/10.17504/protocols.io.14egn2dwqg5d/v1>



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Protocol status: Working

We use this protocol and it's working

Created: May 05, 2023

Last Modified: June 18, 2024

Protocol Integer ID: 81475

Keywords: duragel application for acute electrophysiology recording, implant with duragel, duragel layer, duragel application, weeks after the duragel layer, acute electrophysiology recording, duragel, preparation for in vivo electrophysiology experiment, vivo electrophysiology experiment, vivo electrophysiology, acute recording, electrophysiology, duragel seal, implant, surface of the brain, vivo, silicon probe, allowing recording

Disclaimer

The **protocols.io** team notes that research involving animals and humans must be conducted according to internationally-accepted standards and should always have prior approval from an Institutional Ethics Committee or Board.

Abstract

This protocol describes the process of coating an implant with duragel in preparation for *in vivo* electrophysiology experiments. Duragel seals and protects the surface of the brain while also being soft enough for silicon probes to penetrate through, allowing recordings to take place without disturbing or damaging the brain. It is possible to perform acute recordings for up to two weeks after the duragel layer has been added.

Materials






Anesthesia and related:

-  Isoflurane 1-3% **Patterson Veterinary Catalog #07-893-1389**

Tool Kit:

Equipment	
Iris forceps	NAME
Surgical tools	TYPE
Fine Science Tools	BRAND
11064-07	SKU

Consumable supplies:

-  Duragel **Ellsworth Adhesives Catalog #DOW DOWSIL™ 3-4680**
-  Alcohol prep pad **VWR International (Avantor) Catalog #15648-907**
-  Pressn Seal Food Wrap **Amazon Catalog #B001RHUP4Q**
- Luer-Lock Syringe, 1ml (VWR BD-309628 or equivalent)
- 20G x 1 needle (VWR BD305176 or equivalent)
- Small weigh boats
-  Double Cotton Tipped Applicator **VWR International (Avantor) Catalog #89133-810**
-  KimWipes **Fischer Scientific**
- Sugi mounted sterile absorption spears (Fine Science Tools 18105-01)

Equipment:

Equipment

Model 1900 Stereotaxic Alignment Instrument	NAME
Surgical equipment	TYPE
Kopf	BRAND
Model 1900	SKU



Equipment

Leica M80 Stereo Microscope	NAME
Surgical equipment	TYPE
Leica	BRAND
M80	SKU

Equipment

Isoflurane with oxygen delivery system	NAME
Surgical equipment	TYPE
Patterson	BRAND
78914722	SKU

Equipment

Isoflurane induction chamber	NAME
Surgical equipment	TYPE
Patterson	BRAND
78933385	SKU

Equipment

Small Animal Temperature Controller	NAME
Surgical equipment	TYPE
CWE	BRAND
08-13000	SKU

- Fiber optic illuminator
- Ear bar Headframe clamp (0155-100-00 or equivalent)

Safety:

- Non-Sterile Gloves
- Disposable lab coat
- Face mask; 0.6 micron filter (optional)
- Biohazard sharps disposal container
- Biohazard waste disposal container

Troubleshooting

Before start

Wear appropriate PPE including gloves, lab coat and optional face mask. Have biohazard waste and sharps disposal accessible.



Setup

- 1 Draw up the white and blue duragel components into separate 1 mL Luer lock syringes. Attach 20G needles. 3m

Note

The duragel components should be dispensed into separate containers when the duragel first arrives. This makes it easier to draw up the two components separately without cross-contamination!
- 2 Turn on microscope lights and heating pad. 10s
- 3 Wrap heating pad in press 'n' seal. 30s
- 4 Anesthetize the mouse (see section *Prepare the anesthesia system and anesthetize the mouse (all procedures)* in protocol **General Setup and Takedown Procedures for Rodent Neurosurgery**). 3m
- 5 Transfer mouse to stereotax. 2m
- 6 If the mouse does not currently have a well and well cap, attach a well to the headframe at this time. 15m

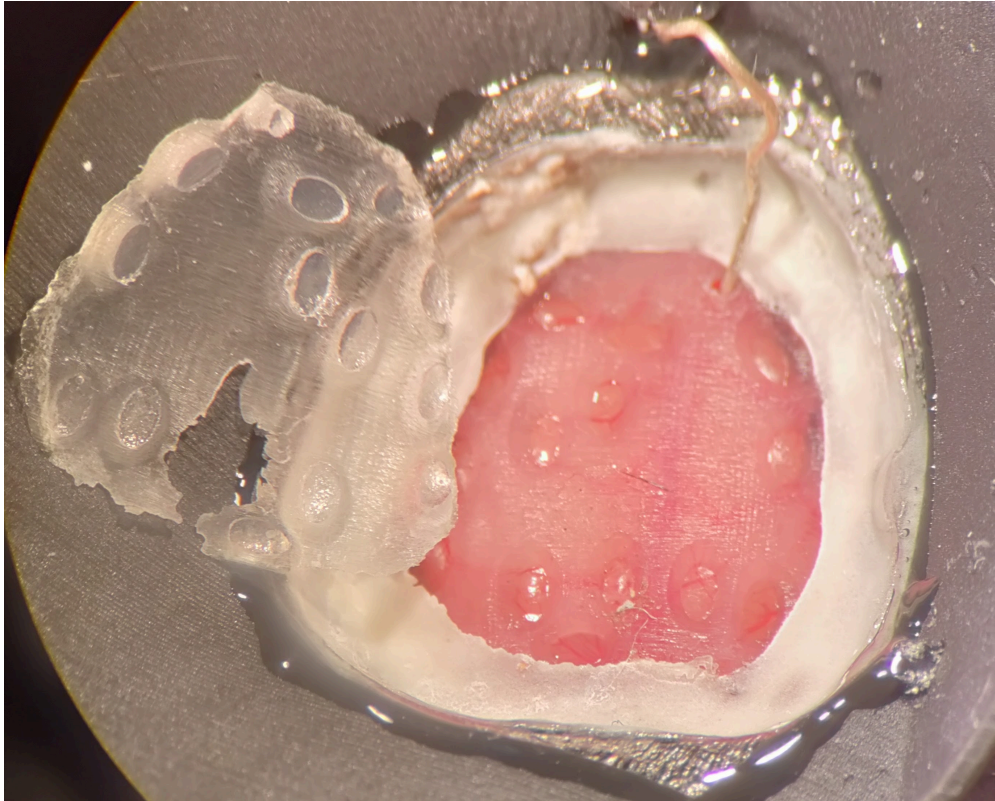
Procedure

- 7 Clean the surface of the implant and the ground wire with an alcohol wipe. 1m
- 8 Using forceps, peel away the elastomer covering the implant. 10s
- 8.1 If the holes in the implant fill with CSF, gently dab it away with a Sugi or Kimwipe.
- 9 Using forceps, insert the ground wire into the designated grounding hole in the implant.

Note

The ground wire should touch the surface of the brain, but should not penetrate or compress the brain.

1m



Elastomer removed and ground wire inserted into grounding hole.

- 10 Prepare the duragel mixture.

5m

- 10.1 Add the white and blue components to a clean weigh boat, using a ratio of 35:50 white to blue.

1m

Note

This ratio can be achieved by counting drops as you dispense the components from the syringes. More blue will ensure the mixture cures a little tougher, and will not turn sticky in a way that can damage recording electrodes.



10.2 Use the broken end of a cotton swab to mix the two components until the mixture is uniform in color.

1m

11 Apply the duragel to the surface of the implant.

5m

Note

Depending on the implant, you may wish to tilt the mouse's head to ensure even coverage. For instance, for the dual hemisphere implant, turn the mouse's head 10 degrees to the right prior to application.

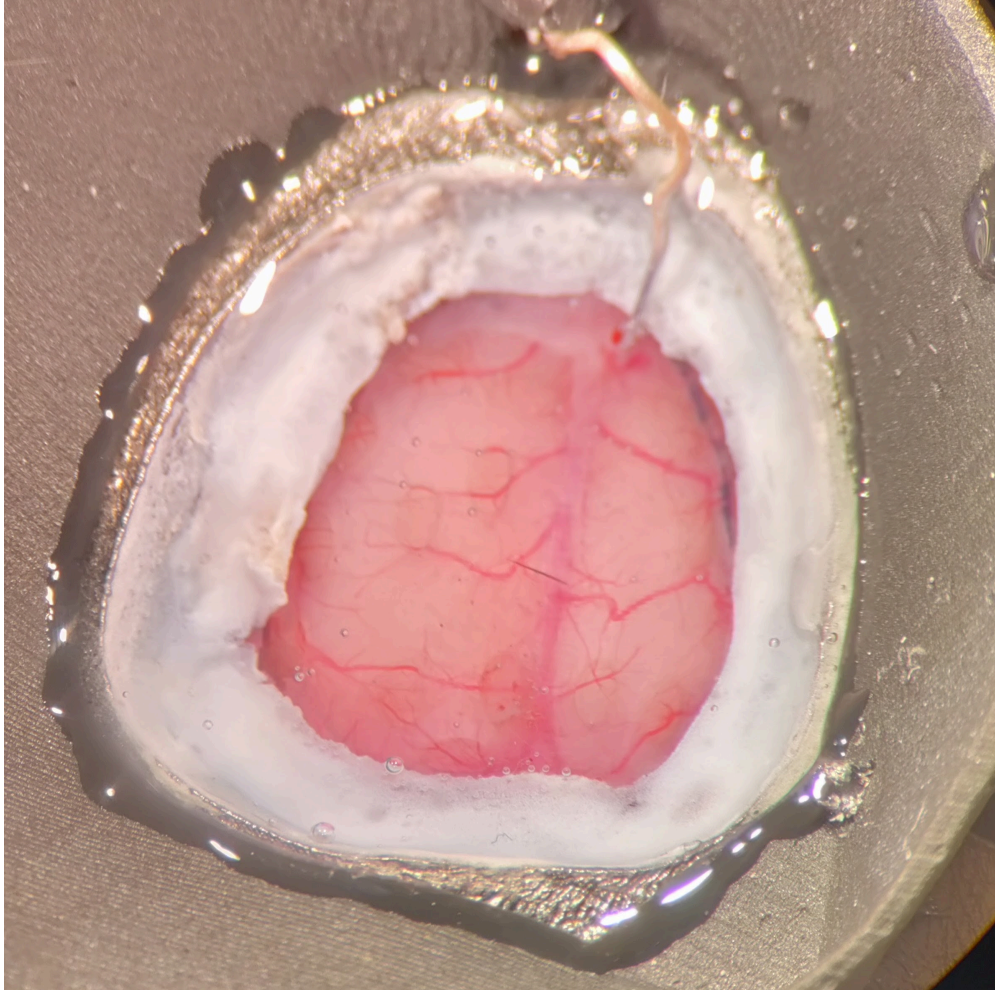
11.1 Apply a few drops at a time with the broken end of a cotton swab (you can use the same swab you used to mix the components). Do not apply directly to the holes in the implant as this can cause bubbles. Try to apply near the holes and let the mixture flow into the holes.

2m

11.2 If bubbles do form in the holes, try to push them out with the cotton swab.

11.3 Continue applying until all parts of the implant are covered with a layer of duragel at least 1 mm thick.

3m



Implant covered with layer of duragel.

- 12 Wait to allow the duragel to cure. You can test this by checking the unused mixture in the weigh boat: tilt the boat to see if the mixture is still flowing. If it's not, the duragel is cured enough. This usually takes around ten minutes. 10m
- 13 Replace well cap and return mouse to its cage. 1m

Note

Wait at least 24 hours before performing electrophysiological recordings, to allow sufficient time for the duragel to cure completely. Otherwise, there is a risk that the duragel will stick to the probes used for recording.

Take Down

3m



- 14 Dispose of the syringes containing the duragel components in the sharps container. 10s
- 15 Dispose of the elastomer implant cover and any other consumable that came in contact with the mouse in the biohazard waste container. 30s
- 16 Turn off oxygen and isoflurane flow. 10s
- 17 Turn off heating pad and microscope lights. 10s
- 18 Clean and disinfect stereotax, surfaces, and induction chamber with 70% ethanol. 2m