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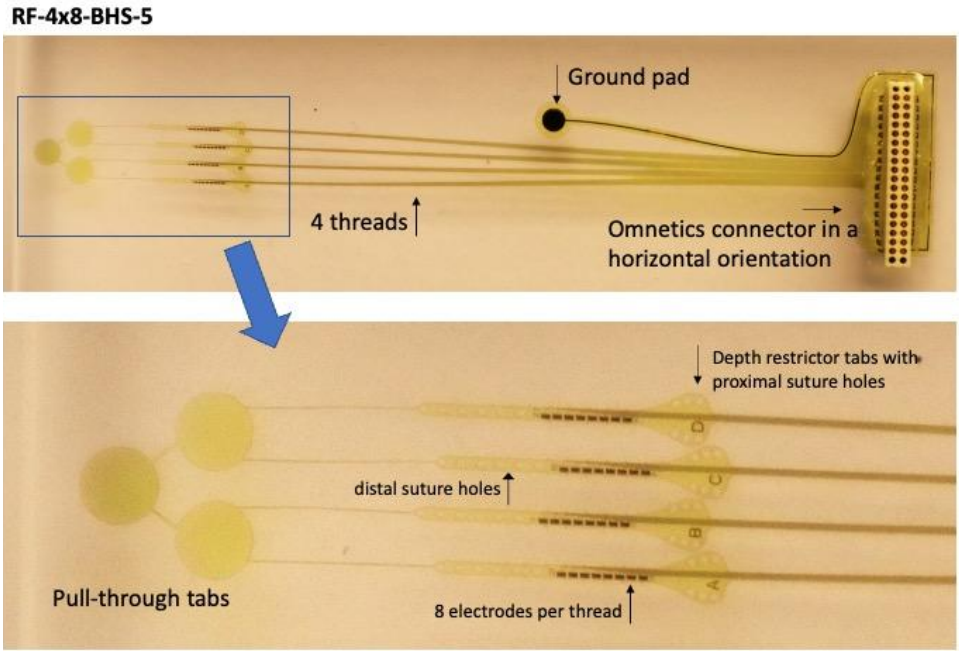
CENTER FOR ADVANCED MOTOR BIOENGINEERING RESEARCH

Chronic array implantation in mouse forelimb

Access to the set of surgical videos associated with this protocol must be requested at camber@emory.edu.



PRE-INSERTION ELECTRODE CHECK

1. Refer to **THIS DOCUMENT** for step-by-step instructions for impedance testing.

GENERAL SURGICAL PROCEDURE

Prepare Animal for Procedure

1. Place mouse under anesthesia.
2. Shave hair over surgical sites, including the top of the head and muscle of interest.
3. Place drape over the animal, isolating surgical areas.

Prep Skull

1. Apply alternating povidone-iodine and alcohol swab to surface of the head.
2. Cut away skin from head to expose skull.
3. Prepare the skull for stronger adhesion by scratching the surface with a scalpel to increase roughness.
4. The connector can be set on the side of the skull or attached above the skull with alligator clips. Anything to keep it from getting tangled up in the threads of the array.

Prepare Forelimb for Array

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Note: These instructions are written for implantation in mouse forelimb muscle but can generally apply to other muscles in the mouse or other rodent species.

1. Use tape to fix limbs or ears so that they are out of the way and allow for muscle to be optimally exposed. For example, taping the ipsilateral ear out of the way and taping the paw in an extended position can facilitate forelimb muscle exposure.
2. Make an incision over the muscle of interest. Given the skin's stretchiness, a ~10mm straight cut is typically sufficient to access the forelimb muscles.
    a. It is typically helpful to remove as much fascia as possible from the muscle and identify the target implant location prior to tunneling in step 3.
3. Use blunt forceps to tunnel under skin from the limb to the head/neck of the animal, paying attention to cut through/open up any fascia and connective tissue under the skin.
4. Leave forceps should be under the skin, from the limb to the skull.
5. Grab the pull through tabs and pull the threads carefully through the tunnel until they emerge over the muscle.
6. Suture array threads into muscle:
    a. Select and cut one of the connections between the pull through tabs and the distal end of the thread which will then be inserted in the muscle.
    b. Use suture to tie a single knot onto the most distal suture hole (recommended: 8/0 or 6/0 suture). It is important to have the suture tied to the very tip of the thread and not on the side or back of the thread.
    c. Push the needle through the muscle and carefully pull the suture to embed the array thread within the muscle, making sure all contacts are fully inside.
    d. Barbs on the thread will hold it in the muscle, so the suture on the distal end of the insertion and any excess thread can be cut.
    e. Repeat with remaining threads.
9. Suture skin closed around array using separate knots along the length of the incision

Secure Omnetics Connector

1. Place Omnetics connector on the skull and ensure proper thread placement:
    a. Place ground pad within the scruff around the neck. Another option is to suture the ground pad using the holes arranged around the periphery of the pad.
    b. Place other threads from the Omnetics connector under the skin as much as possible, making sure that the threads are tucked underneath the skin without folding or bunching.
2. Apply dental cement under and around the Omnetics connector
    a. Apply generously, allowing it to seep into and around the edge of the skin/skull to create a seal.

NOTES:

1. The Omnetics connector can be placed around different head bars and other recording configurations to suit your experimental needs.
2. We encourage you to measure the impedance at the BEGINNING and END of each day of data collection to track the quality of the implantation.
3. Elizabethan collars can be placed around an animal's neck to prevent chewing at the stitches during the first few postoperative days. It is best to accustom animals to wearing the collars for a

few days BEFORE surgery as they need to learn how to eat food while wearing the collars. Putting on the collar for the first time after surgery may lead to undesirable weight loss and stress.