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Construction and Assembly of a Hyperdrive Recording Implant

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Introduction

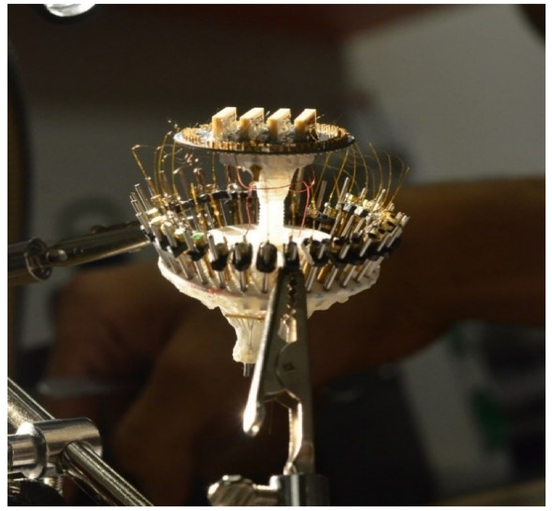
The ability to record neural activity from multiple brain areas is crucial for the understanding of how different areas of the brain function or interact. This poster will cover instructions on how to construct and assemble a hyperdrive recording implant that bilaterally targets the ACC and the hippocampus. Intriguingly, the design of the hyperdrive recording implant is flexible and can be constructed to target other brain areas. The implant consists of 32 twisted bundles of tetrodes with a total of 128 individual recording wires which are controlled by movable 'drivers' (Gray et al., 1995; McNaughton et al., 1983). All 128 recording wires are then connected to an electrode interface board that takes information from the brain and transfers it to online available open-source acquisition software platform running. Using this implant with targeted tetrodes, we are able to look at the neuronal waveforms of individual neurons or the population-level responses in specific brain areas.

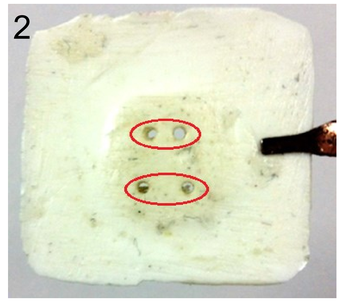
Methods

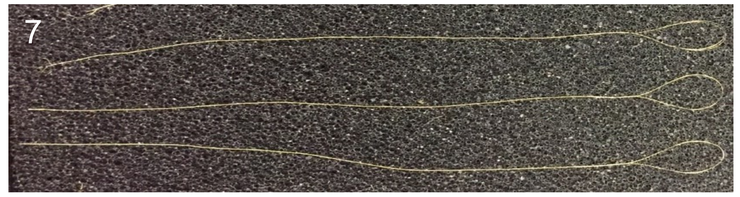
In order to construct the hyperdrive recording implant, the following steps were taken:

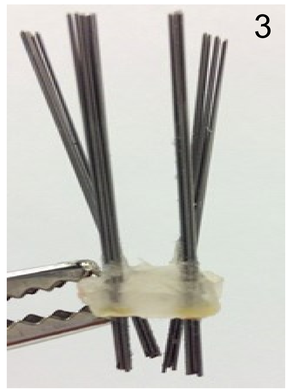
1. Constructing the hyperdrive disc.
2. The 'bundles mold' used to make the bundle
3. Making the unified bundle.
4. Inserting the bundle into the disc.
5. Cementing the bottom of the bundle.
6. Constructing the 'drivers.'
7. Twisting tetrodes (recording wires).
8. Connecting the tetrodes to the EIB.
9. Gold plating all the tetrodes.
10. The hyperdrive recording implant on a rat.

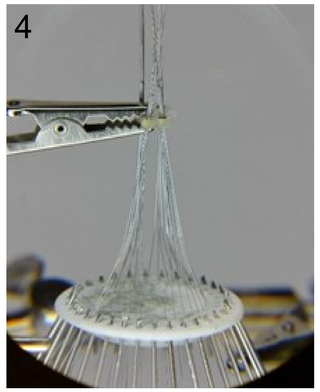
Methods

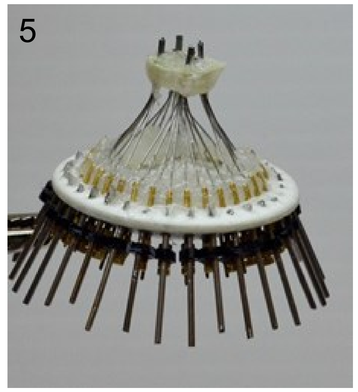


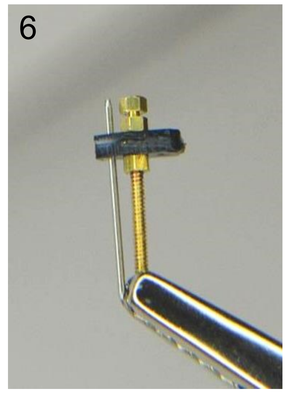


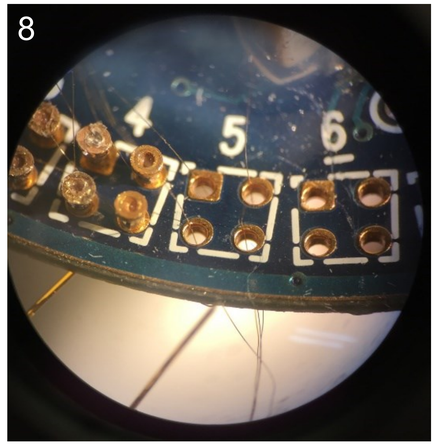


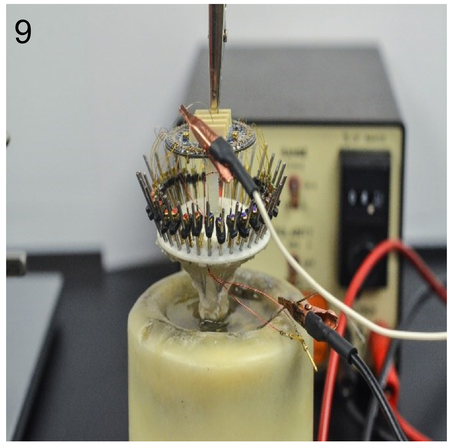


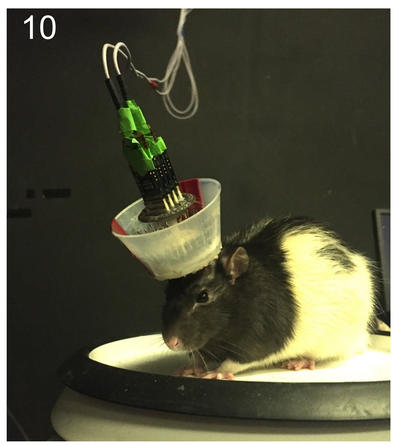












Implications

This poster illustrated a simple and efficient guide on how to construct and assemble a hyperdrive recording implant. This device is capable of bilaterally recording neuronal activity of brain areas and individual neurons. The major steps on constructing and assembly the implant included: measuring and cutting cannula, fabricating the hyperdrive plastic disc, machining the bundle, inserting the bundle into the hyperdrive disc, constructing drivers, inserting and cementing various parts, making a final cannula cut, twisting and inserting tetrodes into the EIB, and gold plating tetrodes. Using the hyperdrive recording implant gives researchers opportunities to investigate activity in specific brain areas and how multiple brain areas interact during a plethora of tasks (e.g., decision making and reward expectation) making it an important tool for neuroscience researchers.

References

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Acknowledgments

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