BASi RESEARCH PRODUCTS

BASi Research Products Application Note

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Background

Penetrating macro- and micro-electrodes that can both record and stimulate focal regions of brain tissue can act as powerful tools for neuroscience discovery or rehabilitative clinical therapy. Studies aimed at understanding basic neuroscience phenomenon using implanted devices are most often performed in rodents, in which there are a wide variety of genetically-altered models available for characterization and/or manipulation of distinct molecular and cellular mechanisms. Longitudinal study of rodent physiology *in vivo* is made possible with the use of automated or wireless telemetry systems, such as the Raturn™, which allow researchers to use implanted devices to sample or modulate from small animals while they are awake and undisturbed in their acclimated housing environments. Considering the surge in advanced *in vivo* technologies intended for the real-time acquisition and manipulation of neurophysiological signals over the past several decades, it is important that these telemetry systems are engineered in a way that allows them to be compatible with the specific experimental and technical goals of the individual researcher.

Description of the experimental outcome.

The goal is to perform long-term recording, stimulation, and neuromodulation using chronic headstage cables connected from an IZ2 32-channel stimulator (Tucker-Davis Technologies, Alachua County, Florida) to an omnetics connector for implanted microelectrodes within rats and mice. Currently, the cable passage within the Raturn™ is not wide enough to accommodate the large profile of chronic TDT headstage cables (0.38in).

What, if any, are the off-the-shelf solutions?

The liquid swivel is one option used to connect multiple fluid lines to rodents. Another option is the electric commutator, which is designed to detect and mitigate the mechanical torque of twisting or entangled cables via an electrical rotating mechanism.

Why did the off-the-shelf not work for your application?

Responses to rodent movement using the liquid swivel becomes increasingly difficult with the use of more fluid lines (>2) and the swivel cannot be connected to commutator or electrical lines at the same time. Electric commutators are dependent on electrical machinery which can be prone to failure and risk unwanted harm or discomfort on the animal.

Description of BASi's approach.

A balance arm extension loop (see graphic below) was attached to the front side of the balance arm and is wide enough to accommodate the passage of larger TDT headstage cables while maintaining a fixed and secure connection between the animal and the Raturn™ cage.

What did the balance arm extension loop help you accomplish?

The balance arm extension provided long-term compatibility of TDT headstage cables with the Raturn™ system. This extension also frees up the original through-hole of the Raturn™ for fiber optic cables or fluid lines for optogenetic or pharmacological manipulation, respectively.

Does your study design require a customized solution? Or maybe you have an 'outside of the box' idea that can revolutionize your industry. As a manufacturer, BASi can help. Contact us at basi@basinc.com with your idea or submit your request for a product development project here!