

## Week Three Report for Group 11

We have confirmed that we will work with Prof. Keith Hengen and pursue his carbon fiber electrode jig project. Dr. Hengen wants to use carbon fiber electrodes for deep, long-term, neural recordings. Using carbon fiber instead of conventional tetrode designed electrodes is less damaging to the animal's brain, thus avoiding the immune response seen with metallic electrodes. However, using carbon fibers comes with challenges:

- The standard connection for electrode to a multiplexer is fairly large and unwieldy. The connection device, which is mounted directly to the animal's skull, adversely affects the animal's behavior and inhibits accurate readings.
- The current process for placing carbon fibers in a jig is time consuming/inefficient. This is another weakness we look to correct.

To combat the connection device issue, we have reached out to several manufacturers who develop flex cables. If we can develop or find a flex cable that can mount directly to the jig, we can separate the multiplexer from the animal's skull. This separation will allow for more implants to be placed and for the animal's behavior to be less inhibited. In addition to figuring out a novel way to connect carbon fibers to the flex cable which leads directly to the multiplexer, we wish to ask for their help as this is their expertise.

We are still waiting for a response from our first choice flex cable manufacturer (Miraco Inc). We have contacted the Hengen lab for the specifications of the current carbon fiber jig and omnetics connectors used so that we can proceed once the manufacturer responds. We believe that Miraco Inc is an ideal manufacturer for our needs because they offer custom flexible printed cables. We need to discuss this option with Dr. Hengen before creating and sending designs to Miraco. Further, Dr. Klaesner, will a company have the rights to our intellectual property if we send them a design to produce?

With regard to the jig, we intend to proceed with a novel cone shaped device (that will be 3D printed) that provides insulation between carbon fibers while in the jig, while allowing for the conductive carbon fiber tips to connect to neurons and the flex cable on either side of the jig. We look to make a large scale model before scaling the size of the jig down to the size that Dr. Hengen desires, which is smaller than the size of a penny.

We do need to discuss several ideas with Dr. Hengen regarding the connection of a flex cable to this custom jig and the maximum resolution of his current 3D printers.