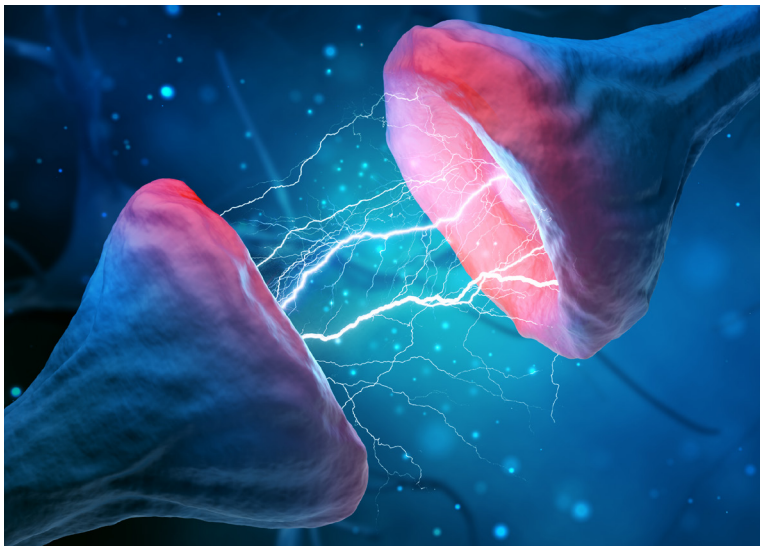

CASE STUDY

At Work in the Lab:

Taking on neurodevelopmental and neurodegenerative conditions

The Stem Cell Institute Leuven (SCIL) in Leuven, Belgium is hard at work conducting cutting-edge electrophysiology studies. Using cortical neurons and astrocytes generated from induced pluripotent stem cells (PSC) from multiple Duchenne muscular dystrophy (DMD) subjects and healthy controls, they observed that, in addition to classical muscle dysfunction, dystrophin deficient brain cells are also affected.

DMD astrocytes were impaired in their glutamate uptake functionality. Neuronal activity was recorded using a Multiwell microelectrode array to investigate effect of DMD astrocytes on healthy neuronal cultures. When co-cultured with healthy neurons on MEA, these DMD astrocytes led to hyperactive network phenotype.

Although speculative, it is very much possible that astrocytic dysfunction – and corresponding alterations in neuronal network activity might be one of the contributors to the cognitive defecit which is often oberserved in DMD patients.

The Challenge

Previously, the Lab had been relying on traditional patch-clamp techniques to evaluate electrophysiology parameters in neurons in their research. While informative at a single-cell level, this technique was not adequate for the network-level neuron evaluations essential to certain studies. Additionally, the patch-clamp method was slow, offering only very low-throughput and extremely labor intensive.

The Solution

After consulting with the Multi Channel Systems (MCS) team, the Lab procured a Multiwell-MEA System. This system supported the high-throughput, network-level assessments of the electrophysiology of cortical neurons requisite to much of the Lab's work.

As an example, the neurons in one of their studies were treated with astrocytes deficient in the protein Dystrophin. The MEA system allowed the scientists to quickly screen multiple perturbations to obtain critical data about their iPSC neuron-astrocyte model.

The results supported their thesis that the absence of dystrophin in astrocytes downregulates their neurotrophic function, while promoting a neurotoxic phenotype.

The Outcome

With the MEA System firmly in place, the SCIL benefited from consistent delivery of robust, reproducible and statistically-driven multiplexed readouts requisite to their research.

- High throughput in vitro electrophysiology analysis
- Accurate screening of multiple factors, drugs and other biochemical perturbations
- Easy to implement with a straight-forward plate design and modular nature

> "The Multiwell-MEA system delivered the robust, reproducible and statistically-driven multiplexed readouts critical to our neurodevelopmental and neurodegenerative research. I recommend this system for any lab involved with electrophysiology studies requiring high throughput."
>
> *– Samie Patel, PhD, previously a doctoral student at the Stem Cell Institute Leuven (SCIL), and currently a Postdoctoral Researcher at the Geschwind Lab, University of California Los Angeles*

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