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PRESS RELEASE

UCF researchers develop breakthrough in neuromuscular junction studies

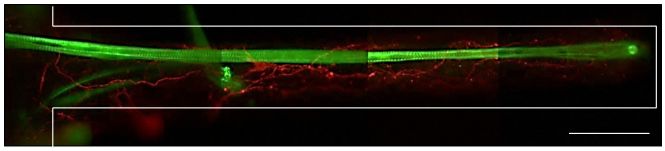
Modeling interactions could further research of treatments for chronic muscular diseases

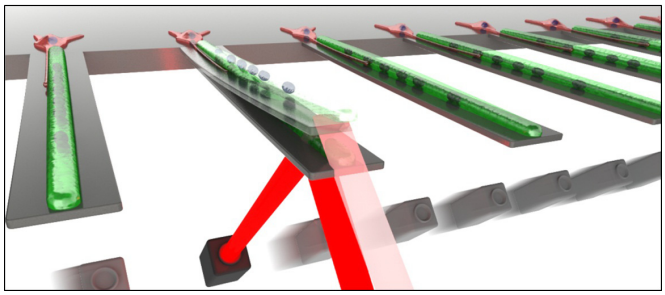
(ORLANDO, FL) — A team of researchers from the University of Central Florida (UCF)'s NanoScience Technology Center have developed the world's first selective assay system for examining neuromuscular junctions as a high throughput phenotypic screening system. Neuromuscular junctions are chemical synapses which facilitate communication between the body's nervous system and the musculature. By modeling this interaction in the lab, scientists hope to investigate subtle changes in muscle functional outputs in response to treatment with novel modulatory and inhibitory compounds. Such a system may prove invaluable in furthering research efforts aimed at the development of effective treatments for progressive muscular wasting diseases affecting the neuromuscular junction, such as Amyotrophic Lateral Sclerosis and Myasthenia Gravis.

The technology utilizes microscale silicon cantilevers, coupled with a laser scanning system, to measure the contractile activity of cultured muscle cells in real-time. Application of neural stimulants to co-cultures of muscle and nerve cells then allows assessment of contraction in response to neuronal activation. Evaluation of these responses permits the identification of functional nerve muscle pairings which can then be further interrogated with novel therapeutic compounds.

"This technology, while exciting in itself, is part of a larger goal aimed at developing functional assay systems of mammalian organs designed to better mimic conditions in the body," says James J. Hickman, Ph.D., professor of nanoscience technology, chemistry, biomolecular science and electrical engineering at UCF, and the senior author of the work. "The pharmaceutical industry is in desperate need of highly predictive pre-clinical screening systems to streamline the drug development process and shorten current validation protocols, which can take a decade to implement. Use of such models provides more complete data sets pertaining to the functionality of cultured tissues in response to drug treatment, thus generating more accurate predictions of tissue responses. This data can then be used to assess which compounds should progress to clinical trials."

The research team is currently funded from NIH to develop a 10-organ culture platform, incorporating human tissue mimics, capable of recapitulating the complex and dynamic interplay of a living system. The successful establishment of this neuro-muscular model is an exciting step towards realizing the goal of developing a fully-functional "body-on-a-chip" system to replace often uninformative, and ethically questionable, animal testing techniques in the drug development process.





Additional co-authors of the *Technology* paper are Alec Smith, Ph.D., Chris Long, Ph.D., and Kristen Pirozzi, BS. This work was supported by National Institutes of Health grants R01NS050452 and R01EB009429.

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