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NYSCF SCIENTISTS DEVELOP 3D STEM CELL CULTURE TECHNIQUE TO BETTER UNDERSTAND ALZHEIMER'S DISEASE

Facilitates development of treatments and cures to Alzheimer's disease

NEW YORK, NY (March 25, 2013) – A team of researchers at The New York Stem Cell Foundation Research Institute led by Scott Noggle, PhD, Director of the NYSCF Laboratory and the NYSCF – Charles Evans Senior Research Fellow for Alzheimer's Disease, and Michael W. Nestor, PhD, a NYSCF Postdoctoral Research Fellow, has developed a technique to produce three-dimensional cultures of induced pluripotent stem (iPS) cells called embryoid bodies, amenable to live cell imaging and to electrical activity measurement. As reported in their *Stem Cell Research* study, these cell aggregates enable scientists to both model and to study diseases such as Alzheimer's and Parkinson's disease.

The NYSCF Alzheimer's disease research team aims to better understand and to find treatments to this disease through stem cell research. For such disorders in which neurons misfire or degenerate, the NYSCF team creates "disease in a dish" models by reprogramming patients' skin and or blood samples into induced pluripotent stem (iPS) cells that can become neurons and the other brain cells affected in the diseases.

The cells in our body form three-dimensional networks, essential to tissue function and overall health; however, previous techniques to form complex brain tissue resulted in structures that, while similar in form to naturally occurring neurons, undermined imaging or electrical recording attempts.

In the current study, the Noggle and Nestor with NYSCF scientists specially adapted two-dimensional culture methods to grow three-dimensional neuron structures from iPS cells. The resultant neurons were "thinned-out," enabling calcium-imaging studies, which measure the electrical activity of cells like neurons.

"Combining the advantages of iPS cells grown in a 3D environment with those of a 2D system, our technique produces cells that can be used to observe electrical activity of putative networks of biologically active neurons, while simultaneously imaging them," said Nestor. "This is key to modeling and studying neurodegenerative diseases."

Neural networks, thought to underlie learning and memory, become disrupted in Alzheimer's disease. By generating aggregates from iPS cells and comparing these to an

actual patient's brain tissue, scientists may uncover how disease interferes with these cell-to-cell interactions and understand how to intervene to slow or stop Alzheimer's disease.

"This critical new tool developed by our Alzheimer's team will accelerate Alzheimer's research, enabling more accurate manipulation of cells to find a cure to this disease," said Susan L. Solomon, CEO of NYSCF.

About the New York Stem Cell Foundation (NYSCF)
The New York Stem Cell Foundation (NYSCF) is an independent research institute founded in 2005 to accelerate cures and better treatments for patients through stem cell research. NYSCF has over 40 researchers in its New York laboratory and is an acknowledged world leader in stem cell research and in developing pioneering stem cell technologies, including the NYSCF Global Stem Cell Array. Additionally, NYSCF supports another 60 researchers at other leading institutions worldwide through its Innovator Programs, including the NYSCF – Druckenmiller Fellowships and the NYSCF-Robertson Investigator Awards. NYSCF focuses on translational research in a model designed to overcome the barriers that slow discovery and encourage multi-institutional collaboration.

NYSCF researchers have achieved four major discoveries in the field, including: the discovery of a clinical cure to prevent transmission of maternal mitochondrial diseases in December 2012; the derivation of the first-ever patient specific embryonic stem cell line (named the #1 Medical Breakthrough of 2011 by *Time* magazine); the discovery of a new way to reprogram stem cells; and the creation of the first disease model from induced pluripotent stem cells (also named the #1 Medical Breakthrough by *Time* magazine in 2008). More information is available at www.nyscf.org.

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