Stephen Lin, J Stem Cell Res Ther 2014, 4:9
http://dx.doi.org/10.4172/2157-7633.S1.006

OMICS Group Conferences
Accelerating Scientific Discovery

3rd International Conference and Exhibition on
Cell & Gene Therapy
October 27-29, 2014 Embassy Suites Las Vegas, USA

Stephen Lin
Thermo Fisher Scientific, USA

Induced pluripotent stem cells as models of human disease: A promising approach for studying parkinson's disease

Parkinson's disease (PD) is a progressive neurodegenerative disorder marked by a loss of dopaminergic neurons in the substantia nigra pars compacta region of the brain. Because of the lack of access to such tissue or availability of good animal models, iPSC-generated neurons hold promise in the development of model systems to study PD. Using a non-integrating Sendai virus delivery system, we generated iPSCs from Parkinson's patients harboring mutations associated with the disease. To eliminate line-to-line variations due to genetic background, we created a set of genetic knockouts and knockins in isogenic PD iPSC lines using Transcription Activator-Like (TAL) effector nuclease technology. For instance, two genes linked to PD, LRRK2 and GBA, were discovered by Ion Torrent PGM sequencing to be mutated in one line, which could be corrected via TALs to wild-type to study their phenotype. To study PD phenotypes, patient iPSC lines were differentiated first to neural stem cells (NSCs) using a simple method that bypasses embryoid body and rosette formation. Gene clustering by our TaqMan® OpenArray® Human Stem Cell panel clearly distinguished iPSC and NSC populations. Using the NSCs, fluorescence-based, high-throughput compatible assays were developed to monitor phenotypes that are associated with PD, such as oxidative stress, metabolic activity, apoptosis, and mitochondrial function. NSCs could be further differentiated to dopaminergic neurons and glial cells. The long-term goal is to use these cells and assays is to provide a platform that allows for the interrogation of small molecule compounds in "relieving" phenotypes associated with PD.

Biography

Stephen Lin received his PhD from Washington University in St. Louis under Jeffrey Gordon in 2002 and did his Postdoctoral work with Stanley Korsmeyer at Harvard University. In 2006 he joined StemCells, Inc. of California as a scientist for liver therapeutics, where he discovered pathways that contribute to the rapid decline of function and expansion of primary human hepatocytes. Since 2012 he has been staff scientist for early-stage product concepts at Life Technologies, a global life sciences company.

Stephen.Lin@thermofisher.com