Alzheimer's Disease Cellular Model for Diagnostic and Therapeutic Development Methods

Tech ID: 22199 / UC Case 2011-152-0

BACKGROUND

A crucial limitation to our understanding of Alzheimer's disease (AD) is the inability to test hypotheses on live, patient-specific neurons. Patient autopsies are limited in supply and only reveal endpoints of disease. Rodent models harboring familial AD mutations lack important pathologies, and animal models have not been useful in modeling the sporadic form of AD because of complex genetics. The recent development of induced pluripotent stem cells (iPSCs) provides a method to create live, patient-specific models of disease and to investigate disease phenotypes *in vitro*. A proper understanding of the initiating events of AD and the existence of live disease models that accurately recapitulate the pathogenesis would lead to a much better informed therapeutic development effort.

TECHNOLOGY DESCRIPTION

Scientists at UC San Diego have developed the first true human neuronal model for hereditary and sporadic Alzheimer's disease. Specifically, human induced pluripotent stem cells made from Alzheimer's disease patients are sequentially converted into neural stem cells and ultimately neurons. The resultant human neurons are quantified with respect to key behaviors (e.g. proteolytic processing of amyloid precursor protein, phosphorylation of the tau protein, activation of GSK3 kinase). Additionally, the cells are also suitable for measuring synaptic phenotype, autophagy and other disease behaviors. This technology may be used diagnostically to predict the development of sporadic Alzheimer's disease and allows drugs for Alzheimer's disease to be tested using human materials.

INTELLECTUAL PROPERTY INFO

A patent has been filed on this technology. U.S. patent rights are available for commercialization. Detailed information is available under a secrecy agreement.

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Published Application	WO 2012/112737	08/23/2012	2011-152

Additional Patents Pending

RELATED MATERIALS

- Israel, MA, 2011. Induced Pluripotent Stem-Cell-Derived Models of Sporadic and Familial Alzheimer's Disease. ISBN 1124540059 (Dissertation), 117p.
- Israel MA, Goldstein LS. Capturing Alzheimer's Disease Genomes with Induced Pluripotent Stem Cells: Prospects and Challenges. Genome Med. 2011 Jul 27;3(7):49.
- Researchers Induce Alzheimer's Neurons From Pluripotent Stem Cells (UCSD Press Release)
- Mason A. Israel, Shauna H. Yuan, Cedric Bardy, Sol M. Reyna, Yangling Mu, Cheryl Herrera, Michael P. Hefferan, Sebastiaan Van Gorp, Kristopher L. Nazor, Francesca S. Boscolo, Christian T. Carson, Louise C. Laurent, Martin Marsala, Fred H. Gage, Anne M. Remes, Edward H. Koo Lawrence S. B. Goldstein. 2012. Probing Sporadic and Familial Alzheimer's Disease Using Induced Pluripotent Stem Cells. Nature published online 25 January 2012.

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OTHER INFORMATION

CATEGORIZED AS

- **Medical**
  - Diagnostics
  - Disease: Central Nervous System
- **Research Tools**
  - Animal Models

RELATED CASES

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