Generation Of Choroid Plexus Epithelial Cells From Human Embryonic Stem Cells

Tech ID: 21453 / UC Case 2010-316-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,748,176	06/10/2014	2010-316

BRIEF DESCRIPTION

The process developed involves the generation of human choroid plexus epithelial cells from human embryonic stem cells to enable novel clinical applications.

FULL DESCRIPTION

Choroid plexus epithelial (CPe) cells are a relatively understudied cell type in the nervous system with untapped clinical potential. These cells are the primary cells comprising the choroid plexus, the tissue that produces the cerebrospinal fluid (CSF) that bathes and nourishes the human brain. The CPe cells also form a physical barrier (“blood-CSF barrier”) and has important adsorptive functions that protect the brain from toxins. Atrophy and other defects in CPe cells have been implicated in human neurodegenerative diseases, particularly Alzheimer’s Disease, and choroid plexus transplant studies have shown benefit in animal models of some of these diseases. The ability to generate large number of CPe cells in culture, which is not currently possible, should therefore enable a number of novel clinical applications.

In published animal model studies, whole choroid plexus dissected from donor rodents have been used as transplant sources. A human source for transplantable CPe cells has not previously been available. In addition, unlike some other epithelia in the human body, the CPe is not highly proliferative and does not turnover significantly, which makes expansion of CPe cells from the endogenous choroid plexus in culture less feasible.

The process developed at the University of California involves the generation of human CPe cells from human embryonic stem cells (ESCs). Certain nervous system cells are first generated from human ESCs using previously-published protocols. These nervous system cells are then cultured with an inducer of CPe cell fate. CPe identity in culture is then assessed and confirmed using a variety of morphologic and molecular parameters (histology, immunocytochemistry, real-time qRT-PCR, and electron microscopy).

SUGGESTED USES

Proposed uses include efficacy testing of human CPe cells as therapeutics in animal models of neurodegenerative diseases, genetic engineering of CPe cells to produce large amounts of secretory proteins, and drug screens using cultured CPe cells to identify compounds that can cross the blood-CSF barrier.

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OTHER INFORMATION

CATEGORIZED AS

- **Biotechnology**
  - Health
  - Other
- **Medical**
  - Disease: Central Nervous System
  - New Chemical Entities, Drug Leads
  - Other
  - Research Tools
  - Screening
  - Stem Cell

» Therapeutics

» **Research Tools**

» Other

» Screening Assays

ADVANTAGES

Based on the ability to expand human ESCs to large numbers in culture, the invention should enable the subsequent production of large numbers of CPe cells for a variety of downstream applications.

RELATED CASES

2010-316-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Three-dimensional organoid culture system for basic, translational, and drug discovery research
- Microfluidic Device for Cell Separation Using Dielectrophoresis and/or Magnetohydrodynamics

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