Drug Discovery & Development

Blood-Brain Barrier Model

View U.S. Patent No. 8,293,495 in PDF format.

WARF: P06318US02

Inventors: Eric Shusta, Clive Svendsen, Christian Weidenfeller

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a simpler, more reproducible *in vitro* model of the blood-brain barrier for drug screening.

Overview

Accurately reproducing the blood-brain barrier in an *in vitro* setting has been a longstanding challenge. Current methods require the independent isolation of multiple cell types, and the quality of these preparations varies.

The Invention

UW–Madison researchers have developed a simpler, more reproducible *in vitro* model of the blood-brain barrier. Most existing models include primary brain microvasculature endothelial cells (BMECs), which form the blood-brain barrier *in vivo*, and the corresponding primary astrocytes, which affect the barrier. The improved model consists of primary BMECs on a permeable membrane support. Embryonic neural progenitor cells (NPCs), which can be stimulated to differentiate into each of the major brain lineages that help govern the blood-brain barrier, are co-cultured with the BMECs.

Adding differentiating NPCs to the BMEC model results in more realistic and *in vivo*-like properties, including increased trans-endothelial electrical resistance, reduced permeability and rearranged tight junctions. Alternatively, NPCs that have differentiated into a mixture of astrocytes, neurons and oligodendrocytes can be co-cultured with the BMECs to “tune” the model for specific applications.

Applications

- Drug screening

Key Benefits

- More accurately predicts *in vivo* behavior than current models, including astrocyte co-culture
- Less labor intensive than current models
- Reproducible and reliable
- Because embryonic NPCs are easily isolated and expand rapidly, a large, relatively homogeneous cell stock can be obtained.
- NPCs survive cryopreservation, making possible multiple uses of the same NPC stock over a long period of time.
- The relative percentages of neurons and astrocytes differentiated from NPCs can be controlled to create designer mixtures of brain cells that can be co-cultured with the BMECs.

Additional Information

For More Information About the Inventors

- Eric Shusta

Tech Fields

- Drug Discovery & Development : Disease models
- Drug Discovery & Development : Preclinical testing

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854