



iCell® Blood-Brain Barrier Isogenic Kit

The blood-brain barrier (BBB) functions to maintain a tightly controlled microenvironment around the brain. For many years, the drug discovery market has needed a robust in vitro BBB model system to evaluate drug permeability and barrier function, as well as to study the diseases that affect it.

The inherent power of induced pluripotent stem (iPS) cell technology provides access to the specialized cell types required to assemble such a model system, but the field has been plagued with difficulties in reliably manufacturing a consistent and functional supply of these cells at scale. FUJIFILM Cellular Dynamics Inc., the market leader in iPSC technology and innovation, has developed a new human iPS cell-derived BBB isogenic kit to model the BBB system in a cell culture insert format.

The iCell BBB Isogenic Kit includes iCell Astrocytes, iCell Brain Microvascular Endothelial Cells (iCell BMEC) and iCell Pericytes (all derived from the same proprietary donor background), and media that enables their long-term survival and superior functional performance assessed by transendothelial electrical resistance (TEER) assays.

The iCell BBB Isogenic Kit has the potential to integrate with emerging organ-on-a-chip technologies and other 3D cell culture systems, thus offering an exciting new capability for the drug discovery community to advance the understanding of BBB function with respect to human health and disease.

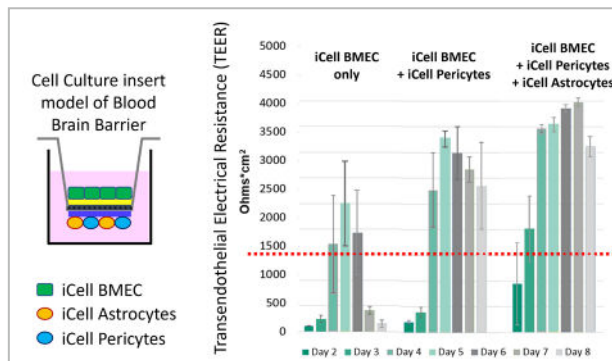


Figure 1: Assessing Barrier Function of iCell Blood Brain Barrier Model by Measuring Transendothelial Electrical Resistance (TEER). TEER is a widely accepted technique to measure barrier integrity and tight junction dynamics for a cell monolayer. The iCell BBB Kit was developed and optimized using a sandwich assay on Transwell cell culture inserts (left). Testing of the functional BBB tri-culture system is ready as soon as Day 2 with values typically beginning $>500 \Omega\text{cm}^2$. TEER data generated with the iCell BBB Isogenic Kit is exceed the minimum range for physiological TEER ($1500 \Omega\text{cm}^2$) (right).

Advantages

- Human Cells:** The three cell types (iCell Brain Microvascular Endothelial Cells, iCell Pericytes, and iCell Astrocytes 2.0) in the iCell Blood-Brain Barrier Isogenic Kit are differentiated from human iPS cells from the same donor.
- Reproducible:** Rigorous quality control ensures the same performance with every batch to yield reliable and reproducible results.
- Superior Function:** iCell Blood-Brain Barrier Isogenic Kit in vitro model enables long-term survival and superior functional performance assessed by trans-endothelial electrical resistance (TEER) assay ($>1500 \Omega\text{cm}^2$) in cell culture insert format.
- Easy to Implement:** iCell Blood-Brain Barrier Isogenic Kits are shipped cryopreserved with media specially formulated for optimal cell performance. Cells can be simply thawed, plated and assayed.
- Compatible with Organ-on-Chip (OOC) Platform:** The iCell Blood-Brain Barrier Isogenic Kits can be used with some optimization with many of the commercial OOC platforms.

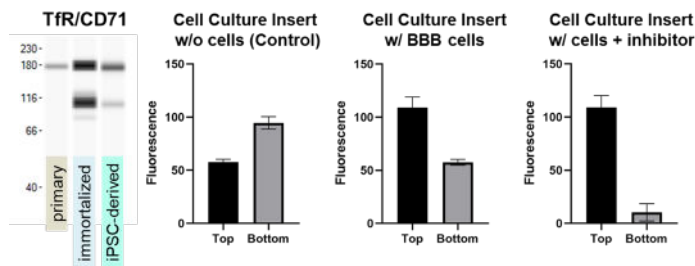


Figure 2: Building an Assay for Receptor-Mediated Transcytosis.

A primary application of the iCell BBB Isogenic Kit is to measure receptor-mediated transcytosis (RMT). We have characterized expression of the transferrin receptor (TfR) by Western (on Day 5 of BMEC culture) and investigated timing of uptake/endocytosis of pHrodo red-labeled transferrin on an IncuCyte S3 (Sartorius - data not shown). Visikol, Inc. has also examined movement of fluorescent-labeled transferrin across the BBB, comparing cell culture inserts with and without iCell BBB tri-cultures, as well as with cells plus an inhibitor, Ferristatin II, that binds to the TfR and prevents transcytosis. Data was collected at the 18-hour timepoint.

Applications

iCell BBB Kits are amenable to a variety of assays including:

- Compound permeability
- Barrier integrity
- Transendothelial Electrical Resistance (TEER)
- Efflux transporter function
- Uptake transporter function
- Cell proliferation
- Receptor-mediated Transcytosis
- Tube formation

Specifications

Cell Type	BMEC, Pericytes and Astrocytes
Organism	Human
Source	Differentiated from an FCDI reprogrammed human iPS cell line
Quantity	Various (see below)
Shipped	Frozen

Ordering Information

Item	Component(s)*	Catalog Number
iCell Blood-Brain Barrier Isogenic Kit, 01279	$\geq 3.0 \times 10^6$ viable iCell Brain Microvascular Endothelial Cells $\geq 1.5 \times 10^6$ viable iCell Pericytes $\geq 1.0 \times 10^6$ viable iCell Astrocytes 2.0	R1241

* Kits are provided with iCell Plating Supplement (200 μ l), iCell Astrocyte & Pericyte Medium (30 ml) and iCell BMEC Maintenance Medium (100 ml)

** Serum-free media option is also available

*** A User's Guide is provided in each Blood-Brain Barrier Isogenic Kit

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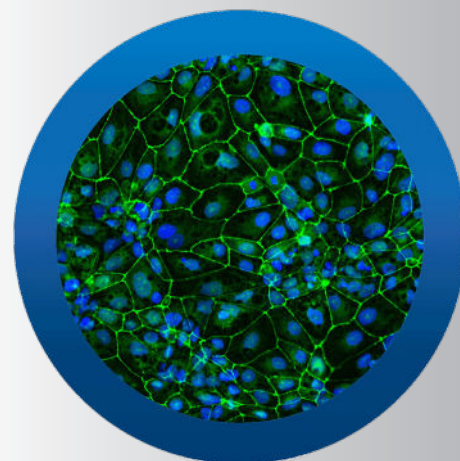
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iCell Products

Provide access to biologically relevant, human iPS cells for disease modeling, drug discovery, toxicity testing, and regenerative medicine. FUJIFILM Cellular Dynamics' (FCDI) rapidly growing portfolio of iCell products includes human cardiomyocytes, cardiac fibroblasts, cardiac progenitor cells, GABAergic, glutamatergic, dopaminergic, motor, sensory and induced excitatory neurons, hepatocytes, endothelial cells, astrocytes, hematopoietic progenitor cells, macrophages, blood-brain barrier models and others.

Visit the [FCDI website](http://fcdi.com) for the most current list of supported cell types.



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