



3D Human Blood–Brain Barrier Model

Product Information

Product Name: 3D Human Blood–Brain Barrier Model

Catalog Number: NEO3DHB-12

Format: 6-well, 12-well, or 24-well insert-based model

Product Type: Human in vitro BBB co-culture model

Storage: Store frozen model at -80°C until ready for use

Media Storage: Store supplied media at or below -20°C

Recommended Use Window: Day 4 to Day 7 after thawing/activation

For Research Use Only

Description

The 3D Human Blood–Brain Barrier Model is an advanced in vitro co-culture system designed to mimic key structural and functional properties of the human blood–brain barrier. The model is generated using human brain microvascular endothelial cells, human brain pericytes, and human brain astrocytes arranged in an insert-based format to support endothelial polarization, tight junction formation, and physiologically relevant barrier function.

This model is designed for studying BBB permeability, transporter activity, receptor-mediated transcytosis, endothelial barrier integrity, CNS drug delivery, BBB toxicology, and disease-related barrier disruption.

Model Components

Each kit includes:

- Frozen 3D Human BBB Model
- Blood Brain Barrier Growth Medium, 100 mL
- Endo-Neuro-Pharmaceuticals Medium, 100 mL



- Blood Brain Barrier Transportation Medium, 100 mL
 - Supporting kit components for model handling
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Key Characteristics

- Human cell-based BBB model
 - Triple co-culture system containing endothelial cells, pericytes, and astrocytes
 - Insert-based structure with separate blood-side and brain-side compartments
 - Supports tight junction formation and endothelial barrier integrity
 - Designed for permeability and transport assays
 - Compatible with TEER measurement
 - Suitable for compound screening and CNS drug delivery studies
 - Can be monitored during activation and experimental use
 - Reduces dependence on animal-derived BBB models
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Biological Features

The model is designed to reproduce important BBB-associated properties, including:

- Enhanced endothelial barrier formation
- Increased tight junction organization
- Expression of BBB-associated tight junction proteins such as occludin, claudin-5, and ZO-1
- Polarized blood-side and brain-side compartments



- Improved cell-to-cell and cell-matrix interactions
 - Relevant human cellular response for CNS transport studies
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Applications

The 3D Human Blood–Brain Barrier Model is suitable for:

- Drug BBB permeability assays
- CNS drug delivery studies
- Blood-to-brain transport studies
- BBB physiology research
- BBB toxicology studies
- Brain endothelial toxicity assays
- Disease modeling
- Cell-cell interaction studies
- Transport pathway modulation studies
- Receptor-ligand interaction studies
- Endocytosis and transcytosis studies
- Paracellular barrier studies
- Tight junction protein expression and localization studies
- Microbial pathogenesis studies involving viruses, bacteria, or parasites
- Neuroimmune target compound screening



Recommended Media Use

Medium 1: Blood Brain Barrier Growth Medium

Used during thawing and initial recovery of the BBB model.

Medium 2: Endo-Neuro-Pharmaceuticals Medium

Used for culturing and activating the BBB model after thawing.

Medium 3: Blood Brain Barrier Transportation Medium

Used during permeability and transport assays.

Recommended Feeding Volumes After Thawing

Plate Format	Blood-Side Volume	Brain-Side Volume
6-well plate	2,000 μ L	1,500 μ L
12-well plate	500 μ L	1,000 μ L
24-well plate	200 μ L	400 μ L

Activation Timeline

The BBB model is supplied frozen and should be thawed approximately 4 days before the planned experiment.

Day 0: Thaw model using BBB Growth Medium

Day 0–1: Initial recovery and medium exchange

Day 1–3: Culture in Endo-Neuro-Pharmaceuticals Medium

Day 4–7: Measure TEER and begin assay when barrier is activated

Assay Phase: Use BBB Transportation Medium for permeability testing

TEER Quality Control

Trans-endothelial electrical resistance, or TEER, is used to confirm barrier integrity before beginning permeability assays.

**Minimum recommended TEER for activated BBB model:**

$$\geq 150 \, \Omega \times \text{cm}^2$$

Only inserts that meet or exceed the recommended TEER threshold should be used for permeability assays.

TEER Calculation

6-well format:

$$\text{TEER} = (\text{Total Resistance} - \text{Blank Resistance}) \times 4.5 \, \text{cm}^2$$

12-well format:

$$\text{TEER} = (\text{Total Resistance} - \text{Blank Resistance}) \times 1.1 \, \text{cm}^2$$

24-well format:

$$\text{TEER} = (\text{Total Resistance} - \text{Blank Resistance}) \times 0.3 \, \text{cm}^2$$

Permeability Assay Overview

For blood-to-brain permeability testing, the test compound is added to the blood-side compartment. After incubation, samples are collected from the brain-side compartment and analyzed to determine compound transport across the BBB model.

Recommended workflow:

1. Confirm BBB activation by TEER measurement.
 2. Prepare assay buffer and test compound.
 3. Add compound to the blood-side compartment.
 4. Incubate under controlled conditions.
 5. Collect samples from the brain-side compartment.
 6. Measure compound concentration.
 7. Calculate apparent permeability coefficient, or P_{app} .
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Recommended Experimental Notes

- Use the BBB model from Day 4 to Day 7 after thawing.
 - Confirm TEER before beginning permeability assays.
 - Avoid touching or disturbing the insert membrane during handling.
 - For compounds dissolved in DMSO, keep final DMSO concentration at or below 0.2%.
 - Use non-cytotoxic test compound concentrations.
 - For unknown compounds, begin with a low screening concentration and optimize as needed.
 - Maintain the model at 37°C with 5% CO₂ during recovery and culture.
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Storage and Handling

Frozen Model: Store at -80°C until ready to activate.

Media: Store at or below -20°C.

After Thawing: Maintain at 37°C with 5% CO₂ using the recommended media schedule.

Avoid: Repeated freeze-thaw cycles, membrane disruption, and prolonged handling outside controlled culture conditions.

Limitations

This product is intended for in vitro research use only. It is not intended for human clinical use, diagnostic procedures, therapeutic applications, or use in humans or animals as a medical product.

Research Use Only Statement

For Research Use Only. Not for diagnostic, therapeutic, clinical, or human use.