

hCMEC/D3 Cells | 305024

General information

Description

The HCMEC/D3 cell line represents an immortalized human cerebral microvascular endothelial cell line, extensively utilized in the study of the blood-brain barrier (BBB). This cell line was generated through the transduction of primary human cerebral microvascular endothelial cells with a lentiviral vector expressing human telomerase reverse transcriptase (hTERT), a crucial enzyme for maintaining telomere length and thereby promoting cellular longevity without transforming the cell phenotype. The introduction of hTERT helps these cells to bypass the replicative senescence that limits the lifespan of primary cells, allowing sustained propagation in culture.

HCMEC/D3 cells retain key physiological and morphological characteristics of primary cerebral endothelial cells, making them a valuable model for in vitro studies of the BBB. These include the expression of tight junction proteins such as claudin-5, occludin, and zonula occludens-1, which are critical for maintaining barrier integrity. The cells also express various transporters and receptors typical of the cerebral endothelium, supporting their use in studies related to drug delivery and neurovascular disorders. The ability of HCMEC/D3 to form a tight monolayer with high electrical resistance underscores their suitability for BBB permeability assays.

Research utilizing HCMEC/D3 cells has covered a wide range of applications, including the investigation of cerebral pathologies such as stroke, multiple sclerosis, and metastasis of cancer to the brain. Their compatibility with various molecular biology techniques also makes them an excellent tool for studying endothelial cell responses to inflammatory stimuli, shear stress, and neurotoxic substances. This cell line provides a robust, reproducible platform for dissecting the molecular events at the cerebral endothelial level, contributing valuable insights into the complexities of neurovascular health and disease.

Organism

Human

Tissue

Brain, temporal lobe, blood microvessel

Disease

Normal cerebral microvascular endothelium (hTERT and SV40-immortalized; blood-brain barrier model; non-tumorigenic)

Metastatic site

Not applicable (normal brain endothelial cell line; not a tumor sample)

Applications

Blood-brain barrier (BBB) research; neuroinflammation; drug CNS delivery and permeability; transendothelial migration; tight junction biology (claudin-5, occludin, ZO-1); neurological disease modeling; shear stress responses; neurotoxicity testing

Synonyms

HCMEC/D3, CMEC/D3, human Cortical Microvessels Endothelial Cells/D3

Characteristics

Age

Adult

Gender

Female

hCMEC/D3 Cells | 305024**Ethnicity** Not specified**Morphology** Endothelial-like (cobblestone)**Cell type** Endothelial cell**Growth properties** Adherent**Regulatory Data****Citation** hCMEC/D3 (Cytion catalog number 305024)**Biosafety level** 1**NCBI_TaxID** 9606**CellosaurusAccession** CVCL_U985**GMO Status** GMO-S1: This human microvascular endothelial cell line (hCMEC/D3) contains lentiviral constructs encoding SV40 T-Antigen or hTERT, supporting stable immortalization. The insert is integrated into primary endothelial cells. This classification applies only within Germany and may differ elsewhere.**Biomolecular Data****Viruses** Transformant: Simian virus 40 (SV40)**Handling****Culture Medium** EGM -2 MV Microvascular Endothelial Cell Growth Medium-2 BulletKit (from Lonza, Lonza catalog number CC-3202)**Supplements** Supplement the supplied EBM-2 Basal Medium as recommended by the manufacturer**Dissociation Reagent** Accutase or 0.25% Trypsin-EDTA (brief; do not over-trypsinize)**Doubling time** approx. 24 to 36 hours**Subculturing** Remove medium, wash with PBS without Ca^{2+} / Mg^{2+} , add Accutase (3–5 min at 37°C), neutralize with complete medium, centrifuge 300×g 5 min, reseed at $1\text{--}2 \times 10^4$ cells/cm² onto collagen-coated flasks.

hCMEC/D3 Cells | 305024**Split ratio** 1 to 3**Seeding density** 1 to 2×10^4 cells/cm² (on collagen I-coated surfaces)**Fluid renewal** Every 1 to 2 days**Freeze medium** As a cryopreservation medium, we use 50% basal medium + 40% FBS + 10% DMSO, or CM-1 (Cytion catalog number 800100), which includes optimized osmoprotectants and metabolic stabilizers to enhance recovery and reduce cryo-induced stress.**Thawing and Culturing Cells**

1. Confirm that the vial remains deeply frozen upon delivery, as cells are shipped on dry ice to maintain optimal temperatures during transit.
2. Upon receipt, either store the cryovial immediately at temperatures below -150°C to ensure the preservation of cellular integrity, or proceed to step 3 if immediate culturing is required.
3. For immediate culturing, swiftly thaw the vial by immersing it in a 37°C water bath with clean water and an antimicrobial agent, agitating gently for 40-60 seconds until a small ice clump remains.
4. Perform all subsequent steps under sterile conditions in a flow hood, disinfecting the cryovial with 70% ethanol before opening.
5. Carefully open the disinfected vial and transfer the cell suspension into a 15 ml centrifuge tube containing 8 ml of room-temperature culture medium, mixing gently.
6. Centrifuge the mixture at 300 x g for 3 minutes to separate the cells and carefully discard the supernatant containing residual freezing medium.
7. Gently resuspend the cell pellet in 10 ml of fresh culture medium. For adherent cells, divide the suspension between two T25 culture flasks; for suspension cultures, transfer all the medium into one T25 flask to promote effective cell interaction and growth.
8. Adhere to established subculture protocols for continued growth and maintenance of the cell line, ensuring reliable experimental outcomes.

Incubation Atmosphere 37°C, 5% CO₂, humidified atmosphere.

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Shipping Conditions

Cryopreserved cell lines are shipped on dry ice in validated, insulated packaging with sufficient refrigerant to maintain approximately -78°C throughout transit. On receipt, inspect the container immediately and transfer vials without delay to appropriate storage.

Storage Conditions

For long-term preservation, place vials in vapor-phase liquid nitrogen at about -150 to -196°C . Storage at -80°C is acceptable only as a short interim step before transfer to liquid nitrogen.

Quality Control & Molecular Analysis

Sterility

Mycoplasma contamination is excluded using both PCR-based assays and luminescence-based mycoplasma detection methods.

To ensure there is no bacterial, fungal, or yeast contamination, cell cultures are subjected to daily visual inspections.