



Human Brain Microvascular Endothelial Cells (HBMEC)

Catalog Number: 1000

Cell Specification

The brain microvascular endothelial cells (MEC) are the major element of the blood-brain barrier and comprise the primary limitation to passage of substances, both soluble and cellular, from the blood into the brain. Brain MEC utilizes unique features that distinguish themselves from those of peripheral endothelial cells. Most prominent among these are the following: 1) intercellular 'tight junctions' that display high transendothelial electrical resistance and retard paracellular flux [1], 2) absence of fenestrae and a reduced level of fluid-phase endocytosis [2], and 3) asymmetrically-localized enzymes and carrier-mediated transport systems that engender a truly 'polarized' phenotype [3]. Like peripheral endothelial cells, however, brain MEC express, or can be induced to express, cell adhesion molecules on their surface that regulate the extravasation of leukocytes into the brain. In view of the organ specificity of MEC, brain MEC has been widely used for studying the molecular and cellular basis of blood-brain barrier.

HBMEC from ScienCell Research Laboratories are isolated from human brain tissue. HBMEC are cryopreserved at passage one and delivered frozen. Each vial contains $>5 \times 10^5$ cells in 1 ml volume. HBMEC are characterized by immunofluorescent method with antibodies to vWF/Factor VIII and CD31 (P-CAM) and by uptake of DiI-Ac-LDL. HBMEC are negative for HIV-1, HBV, HCV, mycoplasma, bacteria, yeast and fungi. HBMEC are guaranteed to further culture in the conditions provided by ScienCell Research Laboratories.

Recommended Medium

It is recommended to use Endothelial Cell Medium (ECM, Cat. No. 1001) for the culturing of HBMEC *in vitro*.

Product Use

HBMEC are for research use only. It is not approved for human or animal use, or for application in *in vitro* diagnostic procedures.

Storage

Directly and immediately transfer cells from dry ice to liquid nitrogen upon receiving and keep the cells in liquid nitrogen until cell culture needed for experiments.

Shipping

Dry ice.

Reference

- [1] Crone, C. and Oleson, S. P. (1992) Electrical resistance of brain microvessel endothelium. *Brain Res.* 241: 49-55.
- [2] Reese, T. S. and Karnovsky, M. J. (1967) Fine structural localization of blood-brain barrier to exogenous peroxidase. *J. Cell Biol.* 34:9-14.
- [3] Vorbodt, A. W. (1988) Ultrastructural cytochemistry of blood-brain barrier endothelia. *Prog. Histochem. Cytochem.* 18(3):1-96.

Instruction for culturing cells

Caution:

Cryopreserved cells are very delicate. Thaw the vial in a 37°C waterbath and return them to culture as quickly as possible with minimal handling!

Note:

HBMEC are very sensitive cells and they are not expected to proliferate many times in culture. Experiments should be well organized before thawing the cells. It is recommended that HBMEC are used for experiments at earliest passage after initial plating and minimal expanding. If subculture is inevitable, follow the instructions below with special care and it is recommended that the cells only be subcultured once.

Set up culture after receiving the order:

1. Prepare a fibronectin coated flask (2 µg/cm², T-75 flask is recommended). Add 10 ml of sterile Dulbecco's phosphate buffered saline, Ca⁺⁺ and Mg⁺⁺ free (ScienCell, Cat. No. 0303) to a T-75 flask and then add 150 µl of fibronectin stock solution (ScienCell, Cat. No. 8248). Leave the flask in incubator overnight.
2. Prepare complete medium: decontaminate the external surfaces of medium and medium supplements with 70% ethanol and transfer them to sterile field. Aseptically open each supplement tube and add them to the basal medium with a pipette. Rinse each tube with medium to recover the entire volume.
3. Aspirate fibronectin solution and add 20 ml of complete medium to the flask. Leave the flask in the hood and go to thaw the cells. The fibronectin solution can be used twice.
4. Place the vial in a 37°C waterbath, hold and rotate the vial gently until the contents are completely thawed. Remove the vial from the waterbath immediately, wipe it dry, rinse the vial with 70% ethanol and transfer it to a sterile field. Remove the cap, being careful not to touch the interior threads with fingers. Using a 1 ml eppendorf pipette gently resuspend the contents of the vial.
5. Dispense the contents of the vial into the equilibrated, fibronectin coated culture vessels. A seeding density of 5,000 cells/cm² is recommended.
Note: Dilution and centrifugation of cells after thawing are not recommended since these actions are more harmful to the cells than the effect of DMSO residue in the culture. It is also important that cells are plated in fibronectin coated flask that promotes cell attachment and growth.
6. Replace the cap or cover, and gently rock the vessel to distribute the cells evenly. Loosen cap if necessary to permit gas exchange.
7. Return the culture vessels to the incubator.

8. For best result, do not disturb the culture for at least 16 hours after the culture has been initiated. Change the growth medium the next day to remove the residual DMSO and unattached cells, then every other day thereafter. A healthy culture will display cobblestone or spindle shaped morphology, non-granular cytoplasm and the cell number will be double after two to three days in culture.

Maintenance of Culture:

1. Change the medium to fresh supplemented medium the next morning after establishing a culture from cryopreserved cells.
2. Change the medium every three days thereafter, until the culture is approximately 70% confluent.
3. Once the culture reaches 70% confluence, change medium every other day until the culture is approximately 90% confluent.

Subculture:

1. Subculture the cells when they are over 90% confluent.
2. Prepare fibronectin coated flasks ($2 \mu\text{g}/\text{cm}^2$) one day before subculture.
3. Warm medium, trypsin/EDTA solution (T/E, cat. no. 0103), trypsin neutralization solution (TNS, cat. no. 0113), and DPBS to **room temperature**. We do not recommend warming the reagents and medium at 37°C waterbath prior to use.
4. Rinse the cells with DPBS.
5. Add 10 ml of DPBS first and then 1 ml of trypsin/EDTA solution into flask (in the case of T-75 flask); gently rock the flask to make sure cells are covered by trypsin/EDTA solution; incubate the flask at 37°C incubator for 1 to 2 minutes or until cells are completely rounded up (monitored with inverted microscope). During incubation, prepare a 50 ml conical centrifuge tube with 5 ml of fetal bovine serum (FBS, cat. no. 0500); transfer trypsin/EDTA solution from the flask to the 50 ml centrifuge tube (a few percent of cells may detached); continue incubate the flask at 37°C for 1 minutes (no solution in the flask at this moment); at the end of trypsinization, one hand hold one side of flask and the other hand gently tap the other side of the flask to detach cells from attachment; check the flask under inverted microscope to make sure all cells are detached, add 5 ml of trypsin neutralization solution to the flask and transfer detached cells to the 50 ml centrifuge tube; add another 5 ml of TNS to harvest the residue cells and transfer it to the 50 ml centrifuge tube. Examine the flask under inverted microscope to make sure the cell

harvesting is successful by looking at the number of cells left behind. There should be less than 5%.

Note: Use ScienCell Research Laboratories' trypsin/EDTA solution that is optimized to minimize the killing of the cells by over trypsinization.

6. Centrifuge the 50 ml centrifuge tube (harvested cell suspension) at 1000 rpm (*Beckman Coulter Allegra 6R centrifuge or similar*) for 5 min; re-suspend cells in growth medium.
7. Count cells and plate cells in a new, fibronectin coated flask with cell density as recommended.

Caution: Handling human derived products is potentially biohazardous. Although each cell strain tests negative for HIV, HBV and HCV DNA, diagnostic tests are not necessarily 100% accurate, therefore, proper precautions must be taken to avoid inadvertent exposure. Always wear gloves and safety glasses when working these materials. Never mouth pipette. We recommend following the universal procedures for handling products of human origin as the minimum precaution against contamination [1].

[1]. Grizzle, W. E., and Polt, S. S. (1988) Guidelines to avoid personal contamination by infective agents in research laboratories that use human tissues. *J Tissue Culture Methods*. 11(4).