

iPSC-Derived Endothelial Cells

Trailhead Biosystems, Inc. offers committed endothelial cells from iPSC cultures. These cells offer a physiologically relevant and reliable opportunity for investigations of vascular pathology, tissue engineering and drug development.

The endothelium comprises the interface between tissues and blood lymph. They orchestrate crucial processes such as coagulation, permeability, tissue regeneration and immune responses.

Endothelial cell dysfunction is a key player in cardiovascular diseases such as hypertension and atherosclerosis. Additionally, dysfunctional endothelial cells have been implicated in nonvascular pathologies including neurodegeneration and chronic inflammatory conditions.

Using HD-DoE™*, we created a multistage protocol for the rapid and homogenous induction of endothelial cells which are capable of effectively adopting a committed endothelial fate expressing KDR, PECAM1, VE-CAD, and FLI1 (Fig. 1). This protocol results in 80-90% of endothelial cells expressing CD31, and CD144 measured by flow cytometry analysis (Fig 2).

Additionally, these cells are physiologically relevant as measured by functional assays. Our endothelial cells are capable of uptake ac-LDL, synthesize nitric oxide, and form tubes when plated on a layer of laminin-rich extracellular matrix (Fig 2B).

*HD-DoE™ is a quality-by-design compliant process that explores a high dimensional space for criticality and interactions underpinning cell fate control.

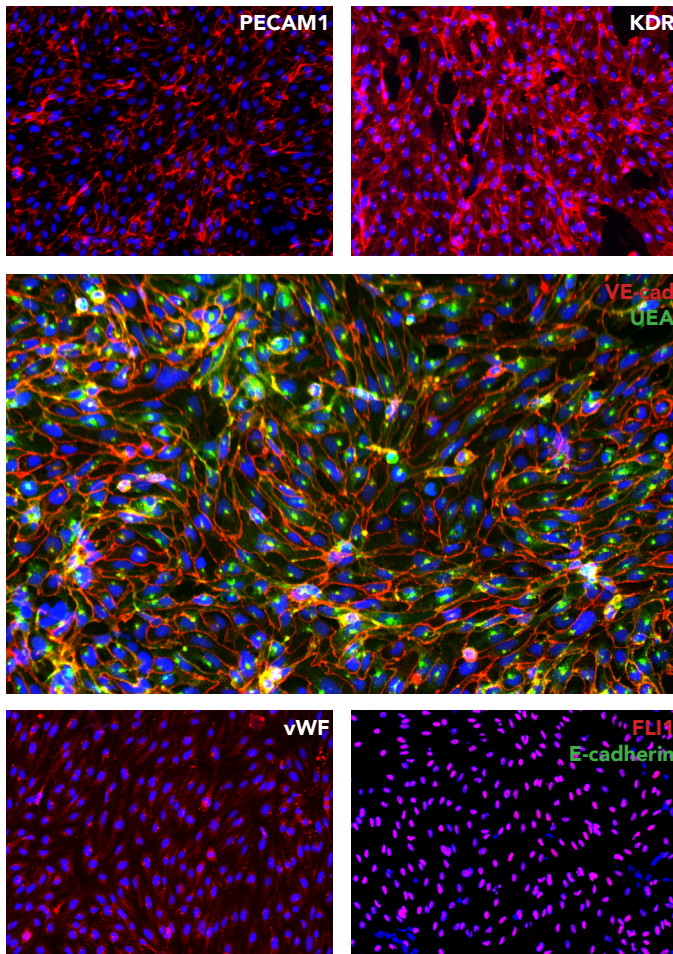


Figure 1: Expression and localization of general endothelial proteins (PECAM1, KDR, VE-CAD, vWF, and FLI1) by immunofluorescence in iPSC-derived endothelial cells. Our endothelial cells are negative for E-cadherin, an epithelial marker.

Endothelial Markers

PECAM1 or CD31

Adhesion molecule expressed by endothelial cells, and enriched cells and on interendothelial cell junctions. It regulates vascular integrity and immune cell trafficking.

KDR or VEGFR2

Receptor tyrosine kinase that binds to vascular endothelial growth factor, a crucial player during vascular development.

VE-cad or CD144

Adhesion molecule located at cell-cell junction of endothelial cells. Besides regulation of vascular permeability, VE-CAD plays a key role in proliferation, apoptosis and growth factor signaling.

vWF

Glycoprotein required for hemostasis and it is expressed by endothelium and megakaryocytes. It is involved in platelet adhesion to the endothelium at injury site.

FLI1

Transcription factor expressed by endothelial cells required for vascular development and vascular function.

Functional iPSC-Derived Endothelial Cells

These cells offer the opportunity for investigations of functional endothelial assembly. Other uses include 3D-bioprinting, drug screening, safety assessment, vascular tissue engineering and disease modeling.

Benefits

- Functional and physiologically relevant
- Reliable, big batch production, allowing for consistency and robustness
- Human model suitable to a plethora of in vitro assays

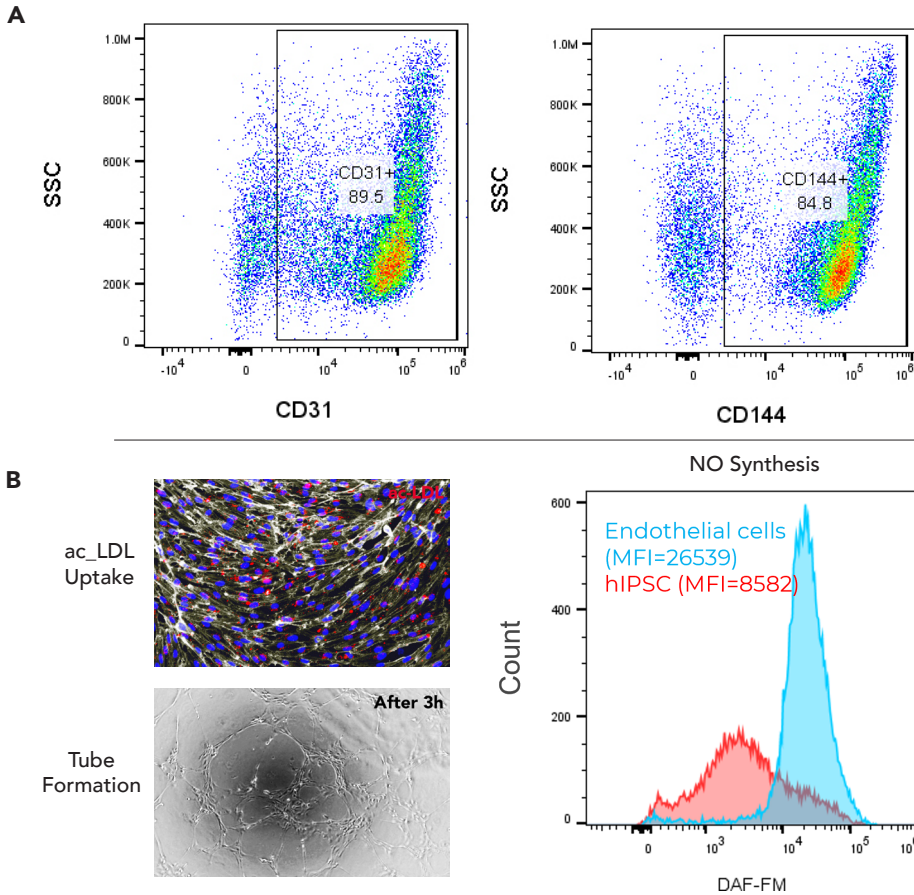


Figure 2:

A) Flow cytometry analysis of endothelial proteins identifies a highly pure population of iPSC-derived endothelial cells.

B) Functional activity of iPSC-derived endothelial cells was measured by its ability to uptake ac-LDL and form tubular structures when plated in a thin layer of Matrigel. Additionally, these cells produce nitric oxide as measured by flow cytometry analysis of DAF-FM staining.

About Trailhead Biosystems

The human organism consists of more than 500 distinct cellular phenotypes, working in concert to generate a sophisticated and complex unit. We at Trailhead Biosystems intend to make them all. Moreover, our goal is to generate them at scale using our revolutionary development process.

Trailhead's cells are well suited for use in 2D and 3D applications, including drug discovery, disease-modeling, drug toxicity, 3D tissue printing, organoid formation, tissue on-a-chip manufacturing, and functional assay development for diagnostic purposes.

Please visit our website www.trailbio.com for more information of existing and upcoming products and our technology platform.



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