Docket #: S24-024

Method for Generating Endothelial Cells from Pluripotent Stem Cells

Stanford researchers have developed a novel xeno-free, no purification, robust, quick, low-cost method for generating pure endothelial cell cultures by sequentially inducing mesodermal-lineage cells from pluripotent stem cells, using differentiation stage-specific extracellular signals. The process, conducted in a xeno-free condition, involves culturing mesoderm-lineage cells in an endothelial progenitor cell specification medium, then switching to a complete endothelial cell growth medium for maturation and expansion. Additionally, methods for screening optimal extracellular signal cocktails are provided for each differentiation stage. These methods allow for the mass production of high-purity vascular endothelial cells in large quantities, within a short time frame.

Stage of Development
In vitro

Applications

- iPSC-EC differentiation kit
- iPSC-ECs for basic and translational research of vascular dysfunction
- Differentiation process mimics the developmental trajectory of this cell type in vivo, therefore, it is a great model to understand genetic variants or environmental risk factor-induced developmental defects of this cell type in congenital heart disease

Advantages

- Xeno-free system for the first time
- No purification is required

- High efficiency: 98% CD31+/CD144+ cells as compared to 20% by most existing protocols
- Rapid generation of cells: with 5-6 days of differentiation versus 14-28 days by most existing protocols
- Highly expandable: up to 8 passages versus 2-3 passages by existing protocols

Publications

- Manuscript in preparation.

Patents

- Published Application: WO2025184351

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