Docket #: S19-498

Rapid generation of nearly pure human blood and blood vessel progenitors from pluripotent stem cells

Stanford inventors have developed a method to efficiently differentiate human pluripotent stem cells (hPSCs) into nearly pure populations of human blood progenitors or blood vessel cells in a Petri dish. This method solely uses extracellular signals to guide differentiation.

Current differentiation protocols usually generate impure populations of human blood or blood-vessel cells from hPSCs. These impure populations only contain a subset of the desired cell-type, which limits the practical applications of these cell populations. Moreover, these protocols are typically lengthy that they require weeks to complete.

This novel differentiation system enables efficient and rapid generation of nearly pure cell populations from hPSCs. It can generate 60-90% pure populations of desired blood or blood vessel cells in several days of hPSC differentiation. This allows wide applications of this differentiation system in treating blood related diseases and in tissue engineering.

Stage of development
Prototype

Applications

- Blood or immune system diseases
- Recovery from chemotherapy or radiation
- Blood vessel generation

Advantages

- Generation of pure cell populations
- Efficient and rapid

Publications

- Lay Teng Ang, Alana T. Nguyen, Kevin J. Liu, Angela Chen, Xiaochen Xiong, Matthew Curtis, Renata M. Martin, Brian C. Raftry, Chun Yi Ng, Uwe Vogel, Angelika Lander, Benjamin J. Lesch, Jonas L. Fowler, Alyssa R. Holman, Timothy Chai, Siva Vijayakumar, Fabian P. Suchy, Toshinobu Nishimura, Joydeep Bhadury, Matthew H. Porteus, Hiromitsu Nakauchi, Christine Cheung, Steven C. George, Kristy Red-Horse, Joseph B. Prescott, Kyle M. Loh. (2022) Generating human artery and vein cells from pluripotent stem cells highlights the arterial tropism of Nipah and Hendra viruses. *Cell*, Volume 185, Issue 14, Pages 2523-2541. e30, ISSN 0092-8674.
- Kyle M. Loh, Sherry Li Zheng, Kevin J. Liu, Qingqing Yin, Zhainib A. Amir-Ugokwe, Sawan K. Jha, Yue Qi, Vanessa K. Wazny, Alana T. Nguyen, Angela Chen, Faith-Masong Njunkeng, Christine Cheung, Edda Spiekerkoetter, Kristy Red-Horse, Lay Teng Ang (2025). Protocol for efficient generation of human artery and vein endothelial cells from pluripotent stem cells. *STAR Protocols*, Volume 6, Issue 1, 103494, ISSN 2666-1667.

Patents

- Published Application: WO2021207251
- Published Application: 20230159894
- Published Application: 20260365983
- Issued: 12,680,077 (USA)

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