New study furthers understanding of lung regeneration

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Researchers at Boston Medical Center (BMC) and Boston University (BU) have published a new study detailing the development of a method for generating human alveolar epithelial type I cells (AT1s) from pluripotent stem cells (iPSCs).

The ability to recreate these cells in an iPSC-based model will allow researchers to analyze the historically difficult to isolate cells in greater detail, helping to further the understanding of human lung regeneration and may ultimately expedite progress in treatment and therapeutic options for people living with pulmonary diseases. The study is published in the journal *Cell Stem Cell*.

Pulmonary diseases, including pulmonary fibrosis and chronic obstructive pulmonary disease (COPD), cause significant mortality and morbidity worldwide, and many pulmonary diseases lack sufficient treatment options. As science and medicine have progressed, researchers have identified a clear need for additional knowledge about lung cells to help improve patient health.

The results of this study provide an in vitro model of human AT1 cells, which line the vast majority of the gas exchange barrier of the distal lung, and are a potential source of human AT1s to develop regenerative therapies. The new model will help researchers of pulmonary diseases deepen their understanding of lung regeneration, specifically after an infection or exposure to toxins, as well as diseases of the alveolar epithelium such as acute respiratory distress syndrome (ARDS) and pulmonary fibrosis.
"Uncovering the ability to generate human alveolar epithelial type I cells (AT1s), and similar cell types, from pluripotent stem cells (iPSCs), has expanded our knowledge of biological processes and can significantly improve disease understanding and management," said Darrell Kotton, MD, Director, Center for Regenerative Medicine (CReM) of Boston University and Boston Medical Center.

This new study also furthers the CReM's goal of generating every human lung cell type from iPSCs as a pathway to improving disease management and provides a source of cells for future transplantation to regenerate damaged lung tissues in vivo.

"We know that the respiratory system can respond to injury and regenerate lost or damaged cells, but the depth of that knowledge is currently limited," said Claire Burgess, Ph.D., Boston University Chobanian and Avedisian School of Medicine, who is the study's first author.

"We anticipate this protocol will be used to further understand how AT1 cells react to toxins, bacteria, and viral exposures, and will be used in basic developmental studies, disease modeling, and potential engineering of future regenerative therapies."

**More information:** Claire L. Burgess et al, Generation of human alveolar epithelial type I cells from pluripotent stem cells, *Cell Stem Cell* (2024). [DOI: 10.1016/j.stem.2024.03.017](https://doi.org/10.1016/j.stem.2024.03.017)

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