

Stem Cells, Signaling Pathways Identified in Lung Repair

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DENVER — Researchers at National Jewish Health have identified cells and signaling molecules that trigger the repair of injured lungs. Stijn De Langhe, PhD, and his colleagues report October 10, 2011, online in the *Journal of Clinical Investigation*, that destruction of lung tissue in mice induces smooth muscle cells surrounding the airways to secrete a protein known as fibroblast growth factor 10 (FGF10), which induces surviving epithelial cells in the airways to revert to a stem-cell state, proliferate, repair and repopulate the lining of the lungs.

“The repair process in the lungs turns out to be very similar to the developmental process that originally formed the lungs,” said Dr. De Langhe, Assistant Professor of Pediatrics at National Jewish Health. “These findings identify important cells and signaling molecules that could be used in therapeutic strategies to promote repair of injured lungs and turn off aberrant repair that occurs in many lung diseases.”

In mouse lungs, most cells lining the airways were destroyed as a result of exposure to toxic substances naphthalene, ozone or bleomycin. One type, known as variant Clara cells, however, resisted damage from those substances.

In a series of experiments, Dr. De Langhe and his colleagues showed that nearby parabronchial smooth muscle cells began secreting FGF10 soon after the injury. The FGF caused the variant Clara cells to revert to their original stem-cell state. They proliferated and restored the full complement of epithelial cells lining the airways, thus repairing the injury.

These findings could be valuable for both turning on and off the repair process. In acute lung injury, it could be valuable to augment the repair process. But in other diseases, such as asthma and pulmonary fibrosis, the repair process goes awry leading to scarring or build up of excess cells in the airways. Turning off the repair process might help treat those diseases.

National Jewish Health is the leading respiratory hospital in the nation. Founded 123 years ago as a nonprofit hospital, National Jewish Health today is the only facility in the world dedicated exclusively to groundbreaking medical research and treatment of patients with respiratory, cardiac, immune and related disorders. Patients and families come to National Jewish Health from around the world to receive cutting-edge, comprehensive, coordinated care. To learn more, visit the media resources page.

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