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https://www.gesundheitsindustrie-bw.de/en/article/press-release/unlocking-lungs-ability-heal-nk-cell-immunotherapy-offers-new-hope-fibrosis

Unlocking the Lung's Ability to Heal: NK Cell Immunotherapy offers New Hope for Fibrosis

Research jointly led by scientists at the Heidelberg site of the German Center for Lung Research and investigators in Boston at Massachusetts General Hospital and Harvard Medical School identifies a new immunotherapy-based approach for lung fibrosis: reactivating natural killer cell (NK cells) to eliminate senescent fibroblasts, reverse scarring and restore the lung's ability to heal.

Senescent Fibroblasts: A Key Driver of Lung Scarring and Failed Repair

In pulmonary fibrotic diseases, the lung's ability to regenerate and repair itself is severely impaired by the accumulation of pro-inflammatory "senescent" fibroblasts, damaged cells that block normal tissue repair, promote pathological scarring (fibrosis), and ultimately cause life-limiting respiratory decline. Existing antifibrotic therapies only slow, but not reverse, fibrosis progression in patients. The study, spearheaded by Dr. Wolfgang Merkt, MD, at the University Hospital Heidelberg, and senior author Dr. David Lagares, PhD, MBA, scientist-entrepreneur and former faculty member at Harvard Medical School and Massachusetts General Hospital, focused on restoring NK-cell activity to enable selective removal of senescent fibroblasts, reversal of lung fibrosis, and to support the lung's natural capacity to regenerate.

Releasing the NK-Cell "Brake"

In a series of experiments the study demonstrates that the clinical-grade immunotherapy Monalizumab can reactivate NK cells in vivo and clear senescent fibroblasts in preclinical models of lung fibrosis, restoring lung function. The researchers also uncover why this approach works: NK cells from patients with fibrotic lung disease express high levels of NKG2A, an inhibitory checkpoint receptor that suppresses their ability to eliminate senescent fibroblasts, allowing these pathogenic cells to persist and drive scarring. By blocking NKG2A with Monalizumab, NK cells are released from this brake.

In ex vivo human translational studies, the investigators show that Monalizumab robustly reactivates patient-derived NK cells and significantly enhances their ability to kill human senescent fibroblasts in vitro. "Our findings suggest that by reactivating NK-cell surveillance, we may be able to eliminate senescent fibroblasts and reopen the road to lung regeneration, not only in idiopathic pulmonary fibrosis, but also in autoimmune disorders that develop lung fibrosis, such as systemic sclerosis and rheumatoid arthritis" says Dr. Merkt. "ImportantlyImportantly, this pathway is druggable with NK cell immunotherapy and opens a first-in-class strategy to reverse fibrosis by restoring the lung's natural ability to heal," adds Dr. Lagares, senior author of the study. The results of the study were published in *Science Translational Medicine*.

Original publication

Merkt W, Rodon L, Deicher FS, Freitag M, Claus M, Lister R, Han H, Zhou Y, Horne A, Stütz A, Li YN, Kreuter M, Kahn N, Schneider MA, Egea-Zorrilla A, Blasco-Iturri Z, Nikulina N, Turkowski K, Ruppert C, Guenther A, Rizzo R, Rizzo S, Ferraresi M, Hübschmann D, Haas S, Blank N, Watzl C, Tykocinski LO, Lorenz HM, Savai R, Pardo-Saganta A, Lagares D. Natural killer cell immunotherapy reverses lung fibrosis by eliminating senescent fibroblasts. Sci Transl Med. 2026 May 13;18(849): eadq5442.
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Press release

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Further information

- German Center for Lung Research (Deutsches Zentrum für Lungenforschung e. V.)