Fish gills help understand human lung disease

Persistent inflammation of the lung leads to fibrosis, a serious and poorly understood disease that causes scarring of the lungs. A poor prognosis of only approximately 3 years survival after diagnosis demonstrates the lack of understanding of the condition and the need for efficient therapies. Risk factors implicated in the development of lung inflammation and fibrosis include cigarette smoke, which persistently injures the human lung tissue leading to chronic lung inflammation and progressive formation of a scar.

This research used the zebrafish as a model for the lung damage that occurs during the development of fibrosis. Although zebrafish do not have lungs, we show that their gills respond with a similar inflammatory response to tissue damage following cigarette smoke. Precisely, the cells and associated genes involved in inflammation in the zebrafish gills recapitulate those of the human lungs. However, we demonstrate that, unlike us, zebrafish can heal damage to their gills remarkably well. Even though they show structural remodelling similar to that seen in lungs of patients, zebrafish are able to effectively and completely restore their gill function following chronic cigarette smoke exposure without leaving a permanent scar. Using the newly-established model, our main goal is now to understand how zebrafish can avoid the build-up of scar tissue in their gills in response to cigarette smoke. We hope to develop treatments that encourage our own lungs to heal following injury and prevent them from scarring.

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Publication

Mucosal inflammation at the respiratory interface: a zebrafish model.
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