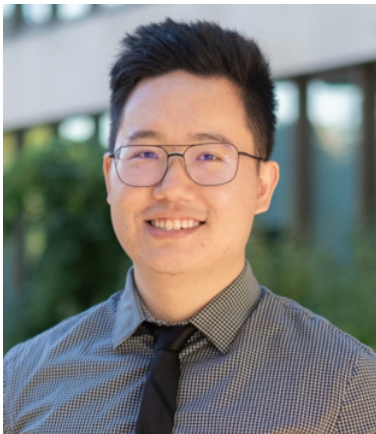# CARNEGIE MELLON UNIVERSITY
BME 2025 SPRING SEMINAR SERIES

Mapping Lung Scarring vs. Healing Across Time and Space

PRESENTED BY

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SCHEDULE

Doherty Hall (DH) 2315

**Thursday,
February 20, 2025**
(11:00-12:00 PM)

Fibrosis, the replacement of healthy tissue with collagen-rich scars, can occur in almost every organ and accounts for ~45% of all deaths globally. In the lungs, pulmonary fibrosis can be initiated by various factors, including exposure to irritants or acute injury from respiratory infections such as influenza and COVID-19. Fibrosis can also be unrelentingly progressive in chronic diseases like idiopathic pulmonary fibrosis (IPF), which presents a median survival of only 3-5 years after diagnosis. Given the paucity of effective anti-fibrotic therapies, there is an urgent clinical need to elucidate the biological mechanisms that mediate fibrotic progression vs. resolution.

Mouse lungs follow stereotyped sequences of fibrogenesis-to-resolution after bleomycin injury, and we reasoned that spatiotemporally profiling the post-injury response in mice could uncover biological factors relevant to human disease. In this talk, I will describe how we utilized a machine learning-based fiber algorithm to map both trajectories and regions of scar progression/resolution in mouse and human lungs. Further, I will discuss how we applied a subset of biological factors centered on fibroblasts, which are traditionally thought of as pro-fibrotic, to (1) ameliorate scarring in mice and (2) modulate fibrosis in ex vivo patient-derived lung slices. Collectively, this seminar will illustrate our development of a biological atlas covering pro-/anti-fibrotic factors that underlie intra-scar heterogeneity in the lungs, as well as my vision to carry forward these platforms to answer new systems-biological questions in lung health and disease.

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