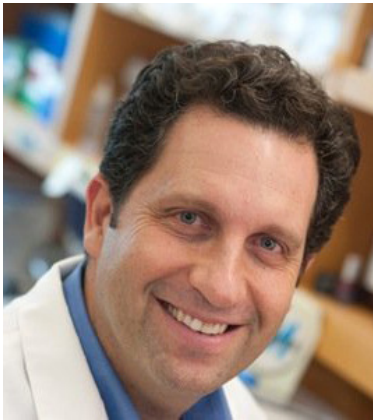


CARNEGIE MELLON UNIVERSITY BME 2020 FALL SEMINAR SERIES

Pluripotent stem cells for modeling lung development and disease



PRESENTED BY

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SCHEDULE

**Thursday,
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The derivation of relatively undifferentiated lung progenitors as well as a wide diversity of differentiated lung airway and alveolar epithelia from pluripotent stem cells in culture enables access to a wide variety of cells for basic developmental studies, in vitro disease modeling, and potential therapeutic applications. Using both mouse and human pluripotent stem cells, including induced pluripotent stem cells (iPSCs) made from patients with monogenic lung diseases, we have applied this model system to generate the two predominant epithelial progenitor pools that maintain proximal and distal lung epithelia, namely airway basal epithelial cells and alveolar type 2 epithelial cells. Once derived in vitro in serum-free media these iPSC-derived progenitors can be expanded indefinitely in self-renewing cultures, harnessed to generate organoids of increasing complexity, or differentiated into a diversity of downstream mature lineages. Mapping the fate trajectories of these engineered cells, using techniques such as scRNA-Seq as they proceed through the milestones of developmental “directed differentiation,” reveals windows of developmental plasticity and suggests a wide variety of cell surface markers and transcription factors associated with lung cell fate decisions. As will be demonstrated in this presentation, this in vitro model system provides a platform for understanding genetic or environmental lung diseases, developing new therapies, and understanding the mechanisms that regulate cell fate decisions in the developing lung.

