CHINESE-AMERICAN LUNG ASSOCIATION

CALA Happy Friday Seminar

Feb 4th, 2022

Time: EST 10:30 am; PST: 7:30 am; Beijing time: 11:30pm

Zoom: 82407021221 (Password: 654321)

COVID-19 imprints airway basal cells to impair epithelium regeneration

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Bio: Dr. Ai received her bachelor from Fudan University and Ph.D. in Neuroscience from Case Western Reserve University. She was trained as a postdoc fellow in Cell & Developmental Biology at University of Pennsylvania. Dr. Ai studies how the disruption of lung development by environmental and genetic factors negatively impacts on long-term airway function. Leveraging a variety of experimental tools and models, Dr. Ai focuses on disease mechanisms of childhood asthma, sudden infant death syndrome, and lung defects in congenital diaphragmic hernia. Dr. Ai's research has revealed critical roles of the nerves in the regulation of airway smooth muscle contractility, neuroendocrine secretion, and T helper type 2 differentiation. Dr. Ai is supported by multiple NIH R01. She has published numerous high impact papers including Immunity, Cell Reports, J Allergy Clin Immunol, Mucosal Immunol.

Abstract: Whether acute inflammation caused by respiratory viral infection imprints airway stem cells is unknown. Here, utilizing lower airway basal stem cells (BSC) derived from intubated COVID-19 patients, we have found that COVID-19 exposure reprograms BSCs to impair epithelial regeneration. We showed that COVID-19-exposed BSCs were not infected by SARS-CoV-2. However, COVID-19-exposed BSCs in culture exhibited early cell cycle arrest and maintained changes in basal cell markers and elevated inflammatory gene expression, which partially reproduced airway epithelial phenotypes in patients with COVID-19. Transcriptome and open chromatin profiling revealed STAT3 hyperactivity and elevated expression of inflammatory signature genes associated with excessive chromatin opening at these gene loci in COVID-19-exposed BSCs. In addition, COVID-19-exposed BSCs differentiated into abnormal mucous-ciliated hybrid cells in air-liquid interface that was partially reversed by STAT3 blockade. Taken together, COVID-19 imprints BSCs to impair their function in regeneration.