



Single Cell Research in Progress Seminar Series

“Single-cell longitudinal analysis of SARS-CoV-2 infection in human airway epithelium identifies target cells, alterations in gene expression, and cell state changes”

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Host: Mario Skarica, M.D., Associate Research Scientist in Neuroscience

Zoom: <https://zoom.us/j/93100138305?pwd=U0E4UVZkdzRhTjVBSSswNzNGWXXFFUT09>

Wednesday, April 14, 2021

12:00 p.m. to 1:00 p.m. Seminar

There are currently limited Food and Drug Administration (FDA)-approved drugs and vaccines for the treatment or prevention of Coronavirus Disease 2019 (COVID-19). Enhanced understanding of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection and pathogenesis is critical for the development of therapeutics. To provide insight into viral replication, cell tropism, and host-viral interactions of SARS-CoV-2, we performed single-cell (sc) RNA sequencing (RNA-seq) of experimentally infected human bronchial epithelial cells (HBECs) in air-liquid interface (ALI) cultures over a time course. This revealed novel polyadenylated viral transcripts and highlighted ciliated cells as a major target at the onset of infection, which we confirmed by electron and immunofluorescence microscopy. Over the course of infection, the cell tropism of SARS-CoV-2 expands to other epithelial cell types including basal and club cells. Infection induces cell-intrinsic expression of type I and type III interferons (IFNs) and interleukin (IL)-6 but not IL-1. This results in expression of interferon-stimulated genes (ISGs) in both infected and bystander cells. This provides a detailed characterization of genes, cell types, and cell state changes associated with SARS-CoV-2 infection in the human airway.



Dr. Alfajaro is a Postdoctoral Associate in Laboratory Medicine and Immunobiology under the supervision of Dr. Craig Wilén. She studies RNA viruses including coronavirus, norovirus, and rotavirus with emphasis on the host-pathogen interactions. Dr. Alfajaro received his Doctor of Veterinary Medicine at the University of the Philippines and pursued her master's in Veterinary Science and PhD in Molecular Medicine in South Korea where she focused on antiviral therapies and mechanism of pathogenesis for enteric RNA viruses. She also trained as a veterinary pathologist focused on disease diagnosis for small and large animals. Her current work in the Wilén lab is focused on elucidating mechanism of COVID-19 pathogenesis utilizing a diverse array of techniques including organoid culture, single-cell RNA sequencing, genome-wide CRISPR screening, and transgenic animal models.

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