CHINESE-AMERICAN LUNG ASSOCIATION

CALA Happy Friday Seminar

March 18th, 2022

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

Zoom: 849 9682 9273 (Password: 654321)

Human Pluripoten Stem Cell-derive Lung Organoids, COVID-19 and Drug Development

Shuibing Chen, PhD

Professor

Department of Surgery, Weill Cornell Medicine

Bio: Dr. Shuibing Chen is the Kilts Family Professor and the Director of Diabetes Program in the Department of Surgery at Weill Cornell Medicine. Dr. Chen received her B.S. and M.S degrees from Tsinghua University, China. She received her Ph.D. from the Scripps Research Institute and did her postdoc training at Harvard University. The major research interest in the Chen Laboratory focuses on human pluripotent stem cell (hPSC)-derived organoids for disease modeling and drug screening. In response to the COVID-19 pandemic, Dr. Chen led a consortium to create a panel of hPSC-derived cells/organoids to study cellular tropism, host response, immune cell mediated host response upon SARS-CoV-2 infection. In addition, they also perform high throughput/content chemical screens to identified drug candidates blocking viral entry, viral infection and immune-cell mediated host damage. Her work has been published on *Nature*, *Nature Medicine, Cell Stem Cell, Cell Metabolism*, *Circulation Research, Nature Chemical Biology,* etc. Dr. Chen serves at the editorial board of several stem cell journals, including *Cell Stem Cell, Stem Cell Reports,* etc. She also served as the member of Board of Directors and Chair of Scientific Program Committee of International Chemical Biology Society (ICBS) and a member of Board of Directors of Chinese American Diabetes Association (CADA). She has received many awards including New York Stem Cell Foundation Robertson Investigator, American Diabetes Association (ADA) Junior Faculty Award, ADA Innovative Award, NIH Director's New Innovator Award, American Association for Cancer Research Career Development Award, and ISSCR Dr. Susan Lim Award for Outstanding Young Investigator, etc.

Abstract: Human pluripotent stem cell (hPSC)-derived cells/organoids provide a platform to systematically evaluate the tropism and cellular response upon viral infection, which can be adapted to screen for anti-viral drugs. In response to the COVID-19 pandemic, we create a panel of hPSC-derived cells/organoids to study SARS-CoV-2 tropism. By screening ten different type of cells and organoids, we found that lung, colon, heart, liver, pancreatic organoids and dopamine neurons can be infected by SARS-CoV-2. This work presented the first stem cell model to understand the tropism of SARS-CoV-2. Furthermore, we reported the first lung organoid-based high throughput chemical screen and identified several drug candidates blocking SARS-CoV-2 entry. One identified drug, imatinib, is currently being evaluated in several phase 2/3 clinical trials globally. Using an hPSC-derived airway organoid platform, we performed a high content chemical screen and identified the role of HIF-glycolysis pathway in SARS-CoV-2 infection. Finally, we created an immune-host mini-heart tissue to model macrophage-mediated cardiomyocyte damage in COVID-19 patients. A high content screen using immune-host mini-heart tissue identified JAK inhibitor, which protects cardiomyocytes from macrophage-mediated damage upon SARS-CoV-2 infection. FDA has issued an Emergency Use Authorization (EUA) for emergency use of another JAK inhibitor to treat COVID-19 patients.