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VIRTUAL

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A Lecture Series Focused on Induced Pluripotent Stem Cells  
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## USING STEM CELLS AND ORGANOIDs TO UNDERSTAND HUMAN DEVELOPMENT AND DISEASE

Human pluripotent stem cell (hPSC) derived organoids, which have the amazing ability to self-organize into complex structures mimicking the cellular complexity, tissue architecture, and physiological function of their *in vivo* counterparts, provides unique opportunities for the study of human development and disease that complement animal models. Using patient-specific PSC derived vascular cells, we revealed novel mechanistic insights into the etiology of various cardiopulmonary diseases such as Pulmonary Arterial Hypertension (PAH) and Hypoplastic Left Heart Syndrome. Given that PSC derived endothelial cells (ECs) recapitulate the disease phenotypes and drug response of the native pulmonary arterial ECs, we also carried out high-throughput drug screening using six PAH iPSC-EC lines combined with bioinformatic approaches to identify new therapies reversing vascular remodeling in PAH. Recent advancements in generating three-dimensional (3D) organoid from PSCs offer unprecedented opportunity to study the cell-cell communication during organogenesis and disease development. Using vessel organoid derived from patients with Alveolar Capillary Dysplasia, we modeled the abnormal growth of the pulmonary capillary network in a dish. Collectively, with the creation of robust, reproducible and functionally relevant *in vitro* modeling systems, we can explore complex disease etiologies in a meaningful way to create precise therapeutic strategies in the coming era of precision medicine.



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