Institute of Molecular and Cell Biology
IMCB

SEMINAR ANNOUNCEMENT

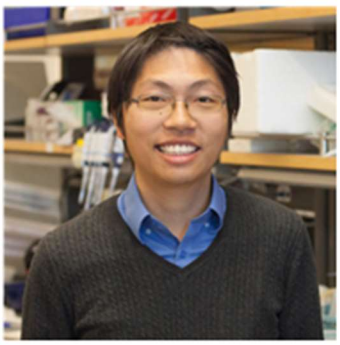
We would like to invite you to attend this seminar hosted by the Institute of Molecular and Cell Biology:

Date: **28 June 2022**
Time: **2.00PM – 3.00PM**
Venue: **IMCB Boardroom (Hybrid)**

Join Zoom Meeting
https://zoom.us/j/98596334754?pwd=SXB0Y2lJWW1RcUkrY2ltMi90TXB0UT09

Meeting ID: 985 9633 4754
Passcode: 062802

Human pluripotent stem cell differentiation: insights into development and biosafety level 4 viruses



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Abstract
How all the myriad cell-types in the human body—ranging from blood to bone to brain—emerge from a single embryonic cell is a marvel and mystery. We are mapping how human pluripotent stem cells (hPSCs) develop into 20+ different human cell-types in the endoderm, mesoderm, and ectoderm germ layers. In one project, we found that although the brain appears as a singular organ, it is actually a composite organ assembled from two different embryonic progenitors, with implications for development, disease, and evolution. In another project, we generated human blood vessels from hPSCs and used them to explore the target cells of biosafety level 4 (BSL4) viruses, the deadliest viruses on Earth. We found that Nipah virus, which has a ~59% fatality rate and first arose in Malaysia and Singapore in 1998-1999, preferentially attacked artery cells, leading to striking cellular effects within arteries.

Biography
How the richly-varied cell-types within the human body—spanning bone, blood and brain—originate from one embryonic cell is a biological marvel and mystery. As a d**evelopmental and stem cell biologist**, I aspire to map the origins of this cellular diversity. To this end, we mapped the branching lineage choices through which human embryonic and induced pluripotent stem cells (hPSCs) develop into 20+ different endodermal and mesodermal cell-types. At each branching lineage choice, we identified the *extracellular signals* that specify each celltype and the *temporal dynamics* with which these signals act. This allowed us to efficiently create new human artery, vein, bone, heart and liver progenitors in less than a week from hPSCs, by blocking the signals that specified unwanted lineages. Each of these hPSC-derived tissue progenitors could engraft mouse models and regenerate their cognate human tissue *in vivo*, with ramifications for research and therapy. Recently, we exploited human cell-types generated from hPSCs as new systems to explore the target cells and cellular effects of biosafety level 4 (BSL4) viruses. We focused on Nipah virus, which is one of the deadliest viruses on Earth: it has a ~59% fatality rate, but no approved treatments or vaccines. By modeling viral infection of human vasculature, we discovered that Nipah virus preferentially attacked artery, as opposed to vein, cells. Nipah rapidly induced artery cells to fuse into massive syncytia with up to 23 nuclei per cell, and swiftly killed them, while stealthily eluding the innate immune system; antiviral genes were hardly elevated. This marked the first discovery of a virus that specifically attacks a certain subset of blood vessels (e.g., arteries).

ALL ARE WELCOME *(No registration required)*

We appreciate if you could disseminate this email to your staff.

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Thank you.