UNIVERSITY OF TORONTO

CSDB
Collaborative Specialization in Developmental Biology

VOLUME 15, ISSUE 1 JANUARY 2022

Dear All,

A warm welcome as we go through a cold opening to 2022! It is my pleasure to greet you in my first newsletter as director of the CSDB program. As a previous graduate of the program, I look forwards to working with many of you to build on training opportunities for our students and foster collaborative developmental biology research at U of T. Please encourage new students to join CSDB! I will also be aiming to incorporate postdoctoral researchers into our program – please encourage postdocs in your lab to contact Cindy and join our e-mail list.

Our winter mini-retreat will be taking place **February 4th**, from 1-4PM. We will be re-starting our seminar series after that, and now have an excellent list of speakers chosen by our students that we will use for this purpose. More details to follow. I am (perhaps naively) optimistic that our next retreat may be in person (!).

In the past few months Dr. **Anne Meyer-Miner** (PhD, Ciruna lab); Dr. **Kelli Fenelon** (PhD, Hopyan lab) and **Dr. Jun Meng** (PhD; Zhen lab) have graduated. Congrats and all the best on your next endeavours!

A warm welcome to new members of CSDB: **Esra Erkut** (MSc, Scott lab) and **Dr. Brian Kalish** (SickKids, Molecular Genetics) as our newest faculty member. Brian will be presenting at our upcoming February mini-retreat.

Best,

Ian

PS – a special thanks to Jeff Stulberg for putting together this month's faculty profile.

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And on our website: devbio.utoronto.ca

WINTER MINI RETREAT 2022
FRIDAY, FEBRUARY 4TH
1-4 pm

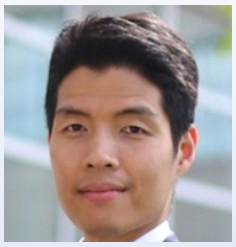
ZOOM Link:

https://utoronto.zoom.us/j/82464489327

PROGRAM

1:00 pm	**Ian Scott** Welcome and brief program updates
1:05 pm	**Evelyn Popiel (Derry lab)** *The role of mrck-1 in biological tube development*
1:35 pm	**Swathi Jeedigunta (Hurd lab)** *Determining how deleterious mutations in mtDNA are selectively eliminated from the female germline*
2:05 pm	**Yun Li** *Studying human brain development and diseases in stem cells-derived neural cells and brain organoids*".
2:35 pm	Coffee Break
2:50 pm	**Mallory Wiggins (Pearson lab)** *The conserved BAF complex is required for neoblast function in planarians*
3:20 pm	**Brian Kalish** *Decoding Translation in the Human Brain Across the Lifespan*

FACULTY PROFILE: Dr. Ho Sung Rhee



As part of an ongoing series to highlight exciting research in the developmental biology community here in Toronto, we would like to feature Dr. Ho Sung Rhee (Assistant Professor, Department of Cell & Systems Biology, University of Toronto; Scientist, UTM). His current research now focuses broadly on the development of the central nervous system and how neuronal cells are generated from embryonic stem cells.

Ho Sung completed his MSc degree at Seoul National University where he studied the biochemistry of gene regulatory proteins in cancer cells. During his MSc, he became interested in genome-wide studies of gene regulation, so decided to further study the topic of genomic regulation in Frank Pugh's lab at Penn State University. During his PhD, he developed a high-resolution genomic mapping method, called ChIP-exo, a cutting-edge technique that can be used to study genome-wide mechanisms of protein-DNA interactions in the cell. Using ChIP-exo, he revealed how general transcription machinery and histone proteins are organized and control transcription in the yeast genome. After his PhD, Ho Sung wanted to pursue research that had an impact on our understanding of neurodevelopment and neurological diseases, and so changed models to study the mammalian central nervous system during his postdoctoral training at the Motor Neuron Center at Columbia University in New York. There he studied how neuronal cell types are specified and maintained by transcription factors during motor neuron differentiation. After his postdoc, Ho Sung opened his lab in the department of Cell & Systems Biology at UofT. His lab now explores how genetic information is transferred to proteins during mammalian development and how genes are expressed to make unique cell types in the central nervous system. He loves that he has the opportunity to discover new aspects of gene regulatory mechanisms during neural development with his students.

We usually all have some innate interest in science, but for many of us there is an event or turning point that sparks our interest to pursue science in academia. For Ho Sung, this happened during his junior year in college, where he spent a summer in an organic chemistry laboratory and conducted the total synthesis of organic chemicals for potential drug targets alongside graduate students. For him, this was an eye-opening experience that ignited his desire to learn more about how these chemicals function in the cell. This experience ultimately encouraged him to enter an MSc program.

Ho Sung's lab currently has a manuscript in revision (Jaura et al., Nat Communs, in revision). In this paper, they examined the relationship between non-coding DNA lengths and neuron-specific gene expression levels. They reported a novel finding that genes associated with neural functions and diseases have significantly longer intergenic DNA than other genes, reflecting the complexity of the mammalian nervous system. They also revealed that the long intergenic DNA regions contain a large number of distinct neuronal DNA regulatory elements unique to individual neuronal subtypes, allowing spatial and temporal gene regulation patterns in diverse neuronal cell types.

When asked about any advice he would to young trainees he said to "not ignore any findings from your research even if it looks small or weird. Curiosity for a small finding or any idea from your research can be a starting point of an exciting finding in your research." In addition, he believes that what you learn and achieve in graduate school determines what you will do in your career. Your graduate school years are relatively short compared to the life after your training. Dream what you want to be in 10 years and go for it in your graduate school and postdoctoral training!

Written by Jeff Stulberg

Selected Publications

Aghazadeh Y, Poon F, Sarangi F, Wong FTM, Khan ST, Sun X, Hatkar R, **Cox BJ,** Nunes SS, **Nostro (2021)** *Microvessels support engraftment and functionality of human islets and hESC-derived pancreatic progenitors in diabetes models* **Cell Stem Cell** Nov 4;28(11):1936-1949.

Anderson MK (2021) *More Than Two to Tango: Mesenchymal Cells Are Required for Early T Cell Development* **J Immunol** Nov 1;207(9):2203-2204.

Baghdadi MB, Ayyaz A, Coquenlorge S, Chu B, Kumar S, Streutker C, **Wrana JL, Kim TH** (2021) E*nteric glial cell heterogeneity regulates intestinal stem cell niches* **Cell Stem Cell** Oct 25:S1934-5909(21)00416-1.

Cao WX, Karaiskakis A, Lin S**, Angers S, Lipshitz HD** (2021) *The F-box protein Bard (CG14317) targets the Smaug RNA-binding protein for destruction during the Drosophila maternal-to-zygotic transition* **Genetics** Oct 20:iyab177.

Dou Z, Son JE, **Hui CC** (2021) *Irx3 and Irx5 - Novel Regulatory Factors of Postnatal Hypothalamic Neurogenesis* **Front Neurosci** Nov 2;15:763856.

Dowling JJ, Weihl CC, Spencer MJ (2021) *Molecular and cellular basis of genetically inherited skeletal muscle disorders* **Nat Rev Mol Cell Biol** Nov;22(11):713-732.

Jeedigunta SP, Minenkova AV, Palozzi JM, **Hurd TR** (2021) *Avoiding Extinction: Recent Advances in Understanding Mechanisms of Mitochondrial DNA Purifying Selection in the Germline* **Annu Rev Genomics Hum Genet** Aug 31;22:55-80.

Lawlor MW, **Dowling JJ** (2021) *X-linked myotubular myopathy* **Neuromuscul Disord** Oct;31(10):1004-1012.

Pera MF, **Rossant J** (2021) *The exploration of pluripotency space: Charting cell state transitions in peri-implantation development* **Cell Stem Cell** Nov 4;28(11):1896-1906.

Rosenthal SM, Misra T, Abdouni H, Branon TC, Ting AY**, Scott IC,** Gingras AC (2021) *A Toolbox for Efficient Proximity-Dependent Biotinylation in Zebrafish Embryos* **Mol Cell Proteomics** Jul 29;20:100128.

Scepanovic G, Hunter MV, Kafri R, **Fernandez-Gonzalez R** (2021) *p38-mediated cell growth and survival drive rapid embryonic wound repair* **Cell Rep** Oct 19;37(3):109874.

Schachter NF, Adams JR, Skowron P, Kozma KJ, Lee CA, Raghuram N, Yang J, Loch AJ, Wang W, Kucharczuk A, Wright KL, Quintana RM, An Y, Dotzko D, Gorman JL, Wojtal D, Shah JS, Leon-Gomez P, Pellecchia G, Dupuy AJ, Perou CM, Ben-Porath I, Karni R, Zacksenhaus E, Woodgett JR, Done SJ, Garzia L, Sorana Morrissy A, Reimand J, Taylor MD, **Egan SE** (2021) *Single allele loss-of-function mutations select and sculpt conditional cooperative networks in breast cancer* **Nat Commun** Sep 2;12(1):5238.

Son JE, Dou Z, Kim KH, Wanggou S, Cha VSB, Mo R, Zhang X, Chen X, Ketela T, Li X, **Huang X, Hui CC** (2021) *Irx3 and Irx5 in Ins2-Cre+ cells regulate hypothalamic postnatal neurogenesis and leptin response* **Nat Metab** May;3(5):701-713.

Soo MW, **Saltzman AL** (2021) *Assessing the in vitro Binding Specificity of Histone Modification Reader Proteins Using Histone Peptide Arrays* **Bio Protoc** Sep 20;11(18):e4168.

Trotman-Grant AC, Mohtashami M, De Sousa Casal J, Martinez EC, Lee D, Teichman S, Brauer PM, Han J, **Anderson MK, Zúñiga-Pflücker JC** (2021) *DL4-µbeads induce T cell lineage differentiation from stem cells in a stromal cell-free system* **Nat Commun** Aug 18;12(1):5023.

Yu JC, Balaghi N, Erdemci-Tandogan G, Castle V, **Fernandez-Gonzalez R** (2021) *Myosin cables control the timing of tissue internalization in the Drosophila embryo* **Cells Dev** Jul 13:203721.

Witvliet D, Mulcahy B, Mitchell JK, Meirovitch Y, Berger DR, Wu Y, Liu Y, Koh WX, Parvathala R, Holmyard D, Schalek RL, Shavit N, Chisholm AD, Lichtman JW, Samuel ADT, **Zhen M** (2021) *Connectomes across development reveal principles of brain maturation* **Nature** Aug;596(7871):257-261