Hong Kong Society for Developmental Biology Symposium Series

GROWTH CONTROL AND DIFFERENTIATION : FROM STEM CELLS TO AGING

Thursday April 27th, 2023

Cheung Kung Hai Lecture Theatre 2, LKS Faculty of Medicine
The University of Hong Kong, 21 Sassoon Road, Pokfulam

9:00 - 9:30	**Registration**
9:30 - 9:40	***Opening Remarks & Group Photo*** **Danny Chan** Professor & Interim Director of School of Biomedical Sciences LKS Faculty of Medicine, The University of Hong Kong
Keynote Talk (Session Chair: Mu He from SBMS @ HKU)	
9:40 - 10:40	***LncRNA-locus-mediated Inter-chromosomal Contact Regulates Cell Fate Decision Towards Primitive Endoderm Lineage*** **Naihe Jing** Professor & Principal Investigator Guangzhou Laboratory/Bioland Laboratory, China
10:40 - 11:00	**Break**
Invited Talks (Session Chair: Martin Cheung from SBMS @ HKU)	
11:00 - 11:30	***ATF3 Preserves Skeletal Muscle Stem Cell Quiescence by Preventing Precocious Activation*** **Huating Wang** Professor, Department of Orthopaedics and Traumatology The Chinese University of Hong Kong
11:30 - 12:00	***Mechanisms of Growth Control: Insights from Drosophila Tumor Models*** **Yan Yan** Associate Professor, Division of Life Science The Hong Kong University of Science and Technology
12:00 - 12:30	***Isthmin-1 in Renal Branching Morphogenesis and Kidney Disorders*** **Zhongjun Zhou** Professor, School of Biomedical Sciences The University of Hong Kong
12:30 - 12:45	***Closing Remarks*** **Mai Har Sham** Choh-Ming Li Professor of Biomedical Sciences, The Chinese University of Hong Kong & President, Hong Kong Society for Developmental Biology

KEYNOTE ABSTRACT

LncRNA-locus-mediated Inter-chromosomal Contact Regulates Cell Fate Decision Towards Primitive Endoderm Lineage

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3D genome organization in the mammalian nucleus is modulated by frequent physical interactions between different genomic loci and related chromatin architectural factors. These physical chromatin communications, intra-chromosomally or inter-chromosomally, could directly regulate multiple biological processes. However, compared with intra-chromosomal interactions, how inter-chromosomal interactions regulate cell lineage trajectory is largely unknown. Here, we show that genomic deletion of lncRNA-*Gm26793* could preferentially induce the cell fate decision towards primitive endoderm (PrE) lineage of mouse embryonic stem cells (mESCs). Moreover, single-cell RNA sequencing (scRNA-seq) of *Gm26793* knockout mice (KO) showed that nearly 20% of KO blastocyst cells arrested in the inner cell mass (ICM) state during lineage segregation between the epiblast (EPI) and the primitive endoderm (PrE). Mechanistically, we found that *Gm26793* genomic locus acts as a chromatin interaction hub not only recruiting chromatin architectural proteins CTCF and cohesin, but also forming an inter-chromosomal contact with *Cubn* locus to repress its expression. In parallel, genomic disruption of the inter-chromosomal anchor releases *Cubn* transcription and contributes to the opened chromatin accessibility and upregulation of H3K27ac and H3K4me3 within PrE-associated gene regions, thus enhancing the lineage differentiation capacity of mESCs towards PrE lineage. Together, this study provides a paradigm that inter-chromosomal contact collaborates with architectural factors to coordinate transcriptional control in the developmental process, which broadens the current understanding of gene regulation in cell lineage specification.

Co-organized by:

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