

# ASHBi SEMINAR

## Deciphering Embryonic Cell Fate: Insights from Micro-RNAs and Nuclear Mechanics

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**Date** Thursday, 24 April 2025

**Time** 11:00 – 12:00 [JST]

**Venue** Conference Room **Onsite Only\***  
B1F, Faculty of Medicine Bldg. B

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### Abstract

When a human embryo reaches the morula stage, acquisition of cell fates begins with the segregation of future placental and inner cell mass cells. This process continues with differentiation of inner cell mass cells to future yolk sac and fetal precursor cells at the blastocyst stage. Several growth and transcription factors are known to regulate cell fate decisions but how is their heterogeneity achieved? And why and how do the embryonic cells gain specific shapes and morphologies? In the first part of the talk the focus will be on the micro-RNA-mediated regulation of cell fate changes. We have previously profiled micro-RNAs in human early embryos, and investigate in an ongoing project how micro-RNA hsa-miR 92a-3p regulates the transcriptome that directs the first embryonic cell fate specifications. In the second part of the talk the focus will be on the mechanical properties of the nucleus, and how they participate in the regulation of cell fate decisions. We have characterized nuclear properties in human preimplantation embryos and performed a variety of mechanistic experiments in both human pluripotent stem cells and stem cell-based three-dimensional embryo model systems. Our findings show that nuclear deformation and mechano-osmotic forces associate with cell fate decisions in human blastocyst-stage embryos, and while biochemical signals are required for robust cell differentiation, mechano-osmotic properties can accelerate cell fate transitions.

Organizer : Graduate School of Medicine  
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