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DISTINGUISHED SEMINAR

Bioengineering Human Embryo and Organ Models

Lecturer: **Jianping Fu** Ph.D.

Professor, University of Michigan, Ann Arbor

Date: Friday, 7 March 2025

Time: 16:00 - 17:00

Venue: Conference Room
B1F, Faculty of Medicine Bldg. B

Eligibility: Academic Researchers and Students

Register here

Early human development remains mysterious and difficult to study. Recent advances in stem cell biology, developmental biology, and bioengineering have contributed to significant interest in constructing controllable, stem cell-based models of human embryos and organs. The controllability and reproducibility of these models, coupled with the ease of genetically modifying stem cell lines, the ability to manipulate culture conditions, and the simplicity of live imaging, make them robust and attractive systems for disentangling cellular behaviors and signaling interactions that drive human development. In this talk, I will describe our efforts to use human pluripotent stem cells (hPSCs) and bioengineering tools to develop controllable models of early post-implantation human development and neural development. The early post-implantation human development models recapitulate various aspects of *in vivo* developmental landmarks, including amniotic cavity formation, amniotic ectoderm-epiblast patterning, primordial germ cell specification, development and organization of embryonic germ layers, yolk sac formation, and primitive hematopoiesis. I will further discuss our work in applying different bioengineering tools and hPSCs to recapitulate some critical aspects of early human neural development, including neural patterning in both brain and spinal cord regions and along both rostrocaudal and dorsoventral axes. We have also utilized these models to study the development of different cell lineages, including neural crest and neuromesodermal progenitors. Together, our work has successfully established various bioengineered human embryo and organ models with *in vivo*-like spatiotemporal cell differentiation and organization, which are useful for studying human development and disease.

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