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15 Oct 2024 (Tue), 4pm
The Auditorium (Level 1)

Hosted by: Dr ONG Chin Tong

Collective induction of oogenesis via long-range cytoplasmic streaming



Fumio completed his doctoral degree at the Univ. of Tokyo. He did his postdoctoral work at RIKEN and Johns Hopkins Univ. He joined TLL and MBI as a Principal Investigator in 2012 and holds a joint appointment as an Assistant Professor at DBS, NUS. He was appointed as a Professor at Institute for Genetic Medicine, Hokkaido Univ. in Oct 2020.

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We investigated oogenesis in *C. elegans* and found that the process is stimulated via long-range cytoplasmic streaming driven by collective suction of the cytoplasm in enlarging oocytes. The germ cells establish actin-dependent cytoplasmic streaming and initiate anisotropic reorganization of the plasma membrane. Although approximately half of the germ cells undergo apoptosis, inhibition of apoptosis did not impede cytoplasmic streaming and allowed germ cells to complete anisotropic morphogenesis. Local manipulation of the cytoplasm revealed that cytoplasmic streaming from distal to pro-oocytes is mediated through collective suction of the cytoplasm by developing oocytes on the external surface of the U-shaped syncytium. In conclusion, our results support a model of non-cell-autonomous induction of oogenesis, in which long-range streaming of the cytoplasm contributes to oogenesis.

Recent Publications:

1. Lim, Y. W., Wen, F. L., Shankar, P., Shibata, T., & Motegi, F. (2021). A balance between antagonizing PAR proteins specifies the pattern of asymmetric and symmetric divisions in *C. elegans* embryogenesis. *Cell Reports*, 36(1).
2. Zhao, P., Teng, X., Tantirimudalige, S. N., Nishikawa, M., Wohland, T., Toyama, Y., & Motegi, F. (2019). Aurora-A breaks symmetry in contractile actomyosin networks independently of its role in centrosome maturation. *Developmental cell*, 48(5), 631-645.
3. Ramanujam, R., Han, Z., Zhang, Z., Kanchanawong, P., & Motegi, F. (2018). Establishment of the PAR-1 cortical gradient by the aPKC-PRBH circuit. *Nature chemical biology*, 14(10), 917-927.