

京都産業大学 生命科学部 バイオフィォーラム 2024

最先端の生命科学研究に触れてみませんか

2024年 9月 10日(火) 13:30~15:00

【場所】 京都産業大学 15号館1階15102セミナー室

【講師】 Prof. Karuna Sampath

(Warwick Medical School, University of Warwick)

【演題】 「Pinning down germline development」
「生殖細胞の発生の秘密を探る - ゼブラフィッシュを用いた研究」

【要旨】 In many animals, the embryonic animal-vegetal axis is established during oogenesis. A key feature in many vertebrate oocytes is a membrane-less compartment, the Balbiani body (Bb), that contains many organelles and ribonucleoprotein (RNP) complexes. The Bb facilitates the organisation of the oocyte into a polarized cell with discrete cytoplasmic domains, including localisation of germ plasm RNP complexes which specify the germline. In zebrafish, the Bb first forms adjacent to the nucleus and subsequently, its position defines the vegetal pole of the oocyte, where germplasm and axis determinants (e.g. Wnt8) are anchored. In fertilised embryos, germ granules relocate to the animal blastoderm, and aggregate at the distal ends of cleavage furrows during early cell divisions. The cells that acquire the granules later become germline progenitors or primordial germ cells (PGCs). The molecular mechanisms that govern oocyte polarity, Balbiani body formation and germplasm distribution remain largely unknown.

Through quantitative image analysis of germplasm dynamics and cytoskeletal reorganisation in zebrafish eggs and embryos, we find that germ granule movements commence with furrow formation during early cleavage divisions. Analysis of zebrafish mutants affecting the RNA-binding protein Ybx1 (Y-box binding-protein 1) and a Ybx1 target called pinchado, shows that the timing and dynamics of germ granule accumulation in the oocyte and blastoderm is a crucial factor for appropriate distribution of the complex to PGCs. Loss of pinchado leads to defects in oogenesis, loss of oocyte polarity and embryonic lethality. Maternal ybx1 mutant embryos show reduced germplasm and mutant adults show biased adult sex ratios. Germplasm distribution is disrupted in pinchado mutant oocytes, and reduced and ectopic aggregates form at the blastoderm margin of maternal ybx1 mutant embryos. Germline gene expression is altered and there is increased expression of some somatic markers in the ovary. Pinchado associates with the Actin cytoskeleton at the cortex. Our findings suggest that pinchado functions in maintaining Bb integrity and anchoring of germplasm to the cortex. Thus, Pin and Ybx1 have crucial roles in regulation of oocyte polarity, germplasm distribution and germline development.

※本講演は英語講演となります。通訳はありませんので、ご注意ください。



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