BDR SEMINAR (Kobe & online hybrid)

David Drutovic

Laboratory of DNA Integrity, Pigmod Center, Institute of Animal Physiology and Genetics of the Czech Academy of Sciences (IAPG CAS)

Tuesday, October 29, 2024

16:00-17:00

1F Auditorium, DB Building C, Kobe / Broadcast online via Zoom

Zoom meeting URL will be announced on the event day by e-mail.

※Non-BDR members: Please register from the following link.

https://krs2.riken.jp/m/bdrseminarregistration (Registration deadline: October 24)

Spatiotemporal control of spindle assembly in mammalian oocyte meiosis

Summary

Chromosome missegregation during mammalian oocyte meiosis can give rise to aneuploid gametes. The formation of a functional bipolar spindle is critical for proper chromosome segregation. Aurora kinases (AURKs), a family of serine/threonine protein kinases, are critical regulators of chromosome segregation and spindle assembly in mitotic and meiotic cells. Three known AURKs (A, B, and C) encoded in mammalian cells differ in subcellular localization and function. Using a conditional Aurka mouse oocyte knock-out model and advanced light-sheet microscopy of live oocytes, we previously showed that AURKA is uniquely needed for building proper bipolar meiosis I spindle by controlling the initial fragmentation of acentriolar microtubule-organizing centers (aMTOC) and the localization of TACC3, an essential protein of newly discover liquid-like spindle domains. Recently, we studied spatial and temporal requirements of AURKA during meiotic maturation. Our results suggest that AURKA is required explicitly for early spindle building and later for spindle stability. To answer which AURKA subpopulation is required for building spindle, we used Aurka/Aurkb/Aurkc knock-out (ABC-KO) oocytes combined with expression of specifically targeted AURKA and neural network approach. Our analysis showed that expression of MTOC- or chromosomal-AURKA rescued the timing of microtubule nucleation and spindle bipolarization; however, the spindle volume was only partially rescued. Taken together, we established the temporal requirements of AURKA during spindle formation and suggested that MTOC-AURKA is the major population required for spindle organization.

Host: Tomoya Kitajima

Laboratory for Chromosome Segregation, BDR

Contact: tomoya.kitajima@riken.jp