



CDB SEMINAR

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Tuesday, November 21

16:00~17:00 A7F CDB Conference Room

Molecular mechanism of microtubule dynamics in mitosis

Summary

Microtubules polymerize and depolymerize by the addition and loss of $\alpha\beta$ -tubulin dimers from their ends. The discovery of dynamic instability revealed a tubulin-intrinsic mechanism for enhancing microtubule turnover. Microtubules exhibit dynamic instability when assembled from purified tubulin as well as in a physiological cytoplasmic environment. However, compared to purified tubulin, microtubules *in vivo* exhibit a faster polymerization rate and dramatically more frequent catastrophe, the transition from polymerization to depolymerization. The combination of rapid polymerization and high catastrophe rates is a hallmark of physiological microtubule dynamics and allows microtubules in cells to effectively search three-dimensional space and rapidly change spatial distributions.

How do microtubules in a physiological environment exhibit a high catastrophe rate while still maintaining a high polymerization rate? The studies using *Xenopus* egg extracts suggested that the microtubule-stabilizing protein XMAP215 and the microtubule-destabilizing kinesin MCAK have activities that may explain the ability of physiological microtubules. We have shown that a simple mixture of three purified components: tubulin, XMAP215 and MCAK can reconstitute essential features of physiological microtubule dynamics. Therefore, we propose that proper spatial and temporal regulation of the opposing activities of XMAP215 and MCAK is essential for modulation of microtubule dynamics during the cell cycle and spindle assembly. I also will talk about how XMAP215 is regulated to promote centrosome-specific microtubule assembly in mitosis.

Speaker Profile

Dr. Kinoshita received his Ph.D. from the Yanagida lab at Kyoto University. Following a fruitful eight years at Tony Hyman's lab at the Max Plank Institute, Molecular Cell Biology and Genetics, Dresden, he has just returned to Japan. During his time in Germany he carried out a series of elegant studies focusing on the regulation of microtubule dynamics.

Host:

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