生物化学専攻/GCOE セミナー

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演題: **Microtubules, microfluidics, and cell shape**

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The microtubule cytoskeleton is essential for cellular processes such as mitosis, organelle transport, and cell polarity. The key organizer of microtubules is the microtubule organizing center (MTOC). All MTOCs are composed of multi-protein complexes and share three general properties: a) They nucleate microtubules, via the gamma-tubulin ring complex (γ-TuRC). b) They arrange the microtubules into functional patterns. And c) They attach the microtubules to their proper organelle targets. My lab studies mechanisms which generate linear arrays of microtubules.

The fission yeast *Schizosaccharomyces pombe* is an ideal organism to study linear arrays of microtubules and MTOCs because they are genetically tractable, optically convenient for high spatial-temporal resolution imaging and analysis, and have MTOCs which organize linear arrays of microtubules.

Using a combination of in vivo live cell imaging and in vitro motility assays with purified proteins, and combined with microfabrication and microfluidic technologies, we are investigating the molecular mechanism of how antiparallel linear arrays of microtubules are formed and their function in cell polarity. We discovered that: 1) mto2p recruits γ-TuRCs to pre-existing microtubules and activates de novo nucleation of a new microtubule on the pre-existing microtubule, 2) ase1p preferentially bundles the new and old microtubules into an antiparallel array, 3) this new antiparallel microtubule array is then pulled to the site of the iMTOC by the minus end kinesin klp2p, 4) this microtubule architecture allows for the initiation and maintenance of polarized cell growth. Our results suggest a model where microtubules, MAPs, and motors interact in a coordinated manner to organize linear and dynamic microtubule structures for proper organization of cell shape.

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