Microtubule Organization by Mitotic Motors Studied *In Vitro*

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During cell division, microtubules are arranged in a large bipolar structure, the mitotic spindle, to segregate the duplicated chromosomes. Antiparallel microtubule overlaps in the spindle center are essential for establishing bipolarity and maintaining spindle stability throughout mitosis. In anaphase the antiparallel microtubule overlap is tightly bundled and its size appears to be well controled. The molecular mechanism of antiparallel overlap formation and of the control of its size is however not understood. Using an in vitro reconstitution approach, we have elucidated the mechanism by which a combination of mitotic proteins form stable antiparallel microtubule overlaps and using single molecule imaging, we have elucidated how overlap size can be determined dynamically. Our results mechanistically explain how a global property such as size of a central part of the dividing cytoskeleton emerges from the combined microscopic action of several proteins with complementary activities.