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Microtubule Severing Stymied by Free Tubulin JENNIFER ROSS, MEGAN BAILEY, Univ of Massachusetts - Amherst — Proper organization of the microtubule cytoskeletal network is required to perform many necessary cellular functions including mitosis, cell development, and cell motility. Network organization is achieved through filament remodeling by microtubule-associated proteins (MAPs) that control microtubule dynamics. MAPs that stabilize are relatively well understood, while less is known about destabilizing MAPs, such as severing enzymes. Katanin, the first-discovered microtubule-severing enzyme, is a AAA+ enzyme that oligomerizes into hexamers and uses ATP hydrolysis to sever microtubules. Using quantitative fluorescence imaging on reconstituted microtubule severing assays in vitro we investigate how katanin can regulate microtubule dynamics. Interestingly, we find microtubule dynamics inhibits katanin severing activity; dynamic microtubules are not severed. Using systematic experiments introducing free tubulin into the assays we find that free tubulin can compete for microtubule filaments for the katanin proteins. Our work indicates that katanin could function best on stabile microtubules or stabile regions of microtubules in cells in regions where free tubulin is sequesters, low, or depleted.

Jennifer Ross
Univ of Massachusetts - Amherst

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