Abstract

Microtubular cytoskeleton plays crucial roles during diverse cellular processes, such as intracellular transport, cell motility and chromosome segregation during cytokinesis. Tubulin, the building block of microtubules, undergoes numerous post-translational modifications which affect microtubular dynamics and organization as well as their interaction with associated proteins. Understanding the role post-translational modifications play in the diversification of functions and properties of microtubules is key for our comprehension of the dynamics of the complex microtubule cytoskeleton. However, mechanisms behind the effect of post-translational modifications on microtubule cytoskeleton are not fully understood. In this work, we focus on the influence of post-translational modifications on microtubule polymerization and interaction with molecular motor kinesin-1. Using total internal fluorescence and interference reflection microscopy techniques, we here show that high levels of post-translational modifications on microtubules decrease the time of microtubule-kinesin interaction whereas binding affinity and median velocity are not significantly different on modified and unmodified microtubules. Further, we show that the absence of polyglutamylation on tubulin isotypes leads to a faster microtubule polymerization. These results show that post-translational modifications are pivotal regulators of microtubule dynamics and interaction with motor proteins.