Sensing and affecting conformational transitions at microtubule plus ends

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Abstract

Microtubule end binding proteins mediate various microtubule functions by transiently accumulating at microtubule ends. Proteins of the EB1 family (EBs) recruit most of these plus-end tracking proteins among which there are minus-directed motors. We will show how in vitro reconstitutions explain how competition and alternative hierarchical recruitment pathways can be used for differential microtubule end accumulation, leading for example to plus-end loading of a minus-end directed motor. Furthermore, because some autonomous plus-end tracking proteins, such as EB1 and the microtubule nucleation promoting protein TPX2, recognize different nucleotide-specific conformation in the growing microtubule end region, they can be used as tools to gain novel information about conformational processes taking place when microtubule ends mature. We show how fluorescence imaging of EB1 and TPX2-decorated microtubule ends provides novel insight into the mechanism of microtubule nucleation and dynamic instability.