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Investigating the Mechanism of Microtubule Plus-End Tracking by the Arabidopsis Spiral1 Protein

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Microtubules are tubulin-based polymers that are critical for numerous cellular activities such as division, morphogenesis, migration and intracellular transport. The ability of the microtubule cytoskeleton to perform different functions depends on its organization. While centrosome-mediated microtubule organization has been studied extensively, little is known about the mechanisms by which noncentrosomal microtubules become arranged into ordered arrays. This work focuses on the plus-ends of microtubules because they greatly influence the polymer dynamics and interactions of microtubules and thus array organization. I am particularly interested in plus-end tracking proteins (+TIPs), which preferentially associate with growing microtubule plus-ends and regulate microtubule behavior and function. Some +TIPs bind to microtubule plus-ends on their own, while others rely on the End Binding1 (EB1) protein to target them to the plus-ends. The *Arabidopsis thaliana* Spiral1 (SPR1) protein is a +TIP that is unique to plants and is implicated in cortical microtubule organization. Mutants lacking SPR1 contain skewed cortical microtubule arrays and show twisted growth, indicating that SPR1 is important for array organization and morphogenesis. I am using a biochemical approach combined with total internal reflection fluorescence (TIRF) microscopy to elucidate the mechanism for plus-end tracking by SPR1 and its impact on microtubule plus-end dynamics.