

ABSTRACT

Spatial and temporal regulation of microtubule nucleation and dynamics is required for formation of specific microtubular arrays that react to internal and external signals and change accordingly. Microtubules are nucleated from microtubule-organizing centres such as centrosomes in animal cells or spindle pole bodies in fungi. All higher plants lack centrosomes and thus present a model for study of acentrosomal cell division and microtubule nucleation and organization.

γ -Tubulin is a conserved protein from tubulin superfamily with a central role in microtubule nucleation. It also regulates microtubule dynamics and organization including mitotic spindle positioning. Moreover, γ -tubulin functions in cell cycle regulation, checkpoints control, regulation of transcription, and coordination of late mitotic events.

We aimed to characterize protein interactions of γ -tubulin and their functions in *Arabidopsis*.

We identified *Arabidopsis* homologue of putative centrosomal protein RanBPM. Our data showed that AtRanBPM is a member of CTLH complexes. Our finding of CTLH complexes in plants confirmed their conservation in eukaryotic cells.

We found that NITRILASE1 is a cell cycle regulator in *Arabidopsis* that is important for maintenance of genome stability and proper cell division.

We studied a role of AtTPX2, *Arabidopsis* homologue of TPX2 protein, in microtubule nucleation and organization. We showed that Ran-dependent importin pathway regulates AtTPX2 protein in acentrosomal plant cells. AtTPX2 enhanced an ability of nuclear envelope and chromatin to promote microtubule nucleation.

We characterized MAPK kinase MPK6 functions with microtubules. We found novel interactions of MPK6 with proteins of microtubule nucleation machinery and microtubule plus end complexes. These interactions might be behind function of MPK6 in the cell division revealed in our functional studies of MPK6 mutants in *Arabidopsis*.

We further focused on NSF protein with function in membrane trafficking and fusion and its interaction with γ -tubulin in *Arabidopsis*.

Our data contributed to knowledge of functions of γ -tubulin and its interactors with microtubules and to understanding of regulation of the cell division in acentrosomal plant cells.