Tubulin cytoskeleton in elongation zone of Arabidopsis root is affected by clinorotation

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Our aim is to find out how clinorotation influences root growth. For this purpose we followed the dynamics of tubulin cytoskeleton (cortical and endoplasmic microtubules) in cells from elongation zone of Arabidopsis roots transfected with GFP-MAP4 (3 day old seedlings). In distal part of elongation zone in epidermal cells mainly distinct endoplasmic microtubules were observed. Prominent cortical microtubules start to be evident in cells in central elongation zone. Under clinorotation, clusters formed by MAP4 appear in all parts of elongation zone, evidencing that microtubule arrangement is somehow distorted there. Application of cytochalasin D, which disrupts proper functioning of actin cytoskeleton, in controls affected mainly the endoplasmic microtubules in cells with isotropic growth, where MAP4 was clustered. Under clinorotation, disruption of actin cytoskeleton by cytochalasin D caused appearance of MAP4 clusters in cells growing anisotropically. In those cells cortical microtubules are affected as well as endoplasmic. Due to the fact that cortical microtubules are responsible for ordered growth of plant cell and are arranged into a robust structure, change of their organization under clinorotation could impact cell growth. This proves that cells in elongation zone switching their growth mode from isotropic to anisotropic are rather sensitive to altered gravity. The fact, that more severe distortion of cortical microtubules was noted in cells with damaged actin microfilaments proves mutually related functioning of actin and tubulin cytoskeletons under clinorotation. Currently, we are investigating the growth rate of cells in elongation zone of Arabidopsis roots under clinorotation.