

Abstract

In growing plant cells the combined activities of the cytoskeleton and the cell wall delivery system define the growth properties of the cell. Actin nucleation by the ARP2/3 complex and its activator the SCAR/WAVE complex plays an important role in the morphogenesis of epidermal cells. The SCAR/WAVE complex consists of the five subunits PIR121, NAP125, ABI, BRICK and SCAR/WAVE. An essential role in SCAR/WAVE complex mediated morphogenesis of trichomes and pavement cells has been shown for four of the five subunits. By characterising the *ABIL3* amiRNA knock-down lines I could prove the crucial role of ABIL proteins (ABI-like proteins) as part of the ARP2/3 pathway in plants. The knock-down lines exhibit distorted trichome phenotype reminiscent of ARP2/3 mutants. However, the knock-down of *ABIL3* leads to elongated roots an opposed effect on root development compared to the ARP2/3 mutants indicating distinct functions of the ABIL3 protein in different tissues.

Furthermore, the expression of GFP fused ABIL proteins in *Nicotiana benthamiana* revealed a hitherto unknown association of a SCAR/WAVE subunit with microtubules *in vivo*, opening up the intriguing possibility that ABIL proteins connect SCAR/WAVE-dependent actin nucleation with organization of the microtubule cytoskeleton.

In this study I could further identify a hitherto unknown direct interaction between actin regulatory proteins and Exo70 in plants, a subunit of the tethering complex exocyst involved in spatially regulated exocytosis. Direct protein-protein interactions between the SCAR/WAVE subunits ABIL2, ABIL3, SCAR2 and ARPC1, a subunit of the ARP2/3 complex, with Exo70 could be shown. The co-localisation of ABIL3 and Exo70A1, associated with microtubules and with dotted structures, suggests a function in connecting SCAR/WAVE dependent actin nucleation and exocyst dependent vesicle transport in close proximity to the microtubule cytoskeleton. These findings can be a starting point to elucidate how the regulation of the actin network is linked to the cellular growth machinery during cell expansion. Further genetic characterisation of the SCAR/WAVE, ARP2/3 and exocyst mutants and localisation studies should provide deeper insights in mechanisms underlying polarized growth.