Auxin and BR induction of adventitious rooting require GSK3-like kinases in Arabidopsis

In Arabidopsis, the development of adventitious roots (AR) from the hypocotyl after transfer of dark-grown seedlings to the light is mainly driven by auxin[1]. Auxin is a crucial hormone controlling this quantitative trait through a complex regulatory network that interacts with jasmonate signaling[2,3]. While Brassinosteroid (BR) and auxin act in synergy in promoting hypocotyl elongation and the repression of seedling photomorphogenesis in the dark, the role of BR in the control of adventitious rooting remains largely unknown[4]. BR signaling pathway starts at the cell surface through BR perception by the BRASSINOSTEROID-INSENSITIVE-1 (BRI1) receptor kinase. This triggers a downstream phosphorylation cascade in which GSK3-like kinases from the BR-INSENSITIVE-2 (BIN2) family are inactivated[5].

Our recent data show that BR promotes adventitious rooting in a synergistic manner with auxin. Unexpectedly, further results demonstrate that inhibition of GSK3-like kinases dramatically reduces seedling ability to initiate AR. Gene expression patterns of GSK3-like kinases in AR primordia in the hypocotyl suggest that they are key factors controlling this developmental process. Finally, our results reveal that GSK3-like kinases are required for adventitious rooting induction by BR and auxin. Our findings unveil a novel level of complexity in the interaction between GSK3-like kinases and the canonical BR signaling pathway, as well as between BR and auxin signaling pathways.

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