

Abstract

Auxin plays an important morphogenic role in plant development, mainly through its effect on gene expression, but also through a number of faster processes that are directly dependent on its concentration. Therefore, in many plant tissues, directional auxin transport using specific transporters in the plasma membrane, is important for the coordination of morphogenic stimuli. The amount of auxin carriers in the plasma membrane directly affects the resulting auxin concentration inside the cell. Although the localization of auxin transporters and their abundance in the plasma membrane could be determined primarily by the actin cytoskeleton and its involvement in vesicle transport processes, this relationship is currently still unclear. Therefore, in this study, we were interested in how the localization and function of auxin transporters is affected when the function of the actin cytoskeleton is affected in a given cell type. To this end, the localization of the auxin transporters PIN3, PIN4, PIN7, and AUX1 was studied in epidermal cells of cotyledons in young seedlings of *Arabidopsis thaliana* whose morphogenesis was affected by mutations in subunits of the actin nucleation complex ARP2/3. Crosses of mutants in the ARP2/3 complex subunits with marker lines carrying fluorescently labeled auxin carriers and auxin-driven gene expression sensors were prepared, microscopic observations were made, and a quantitative procedure was established to assess the localization of auxin carriers and auxin gradients by image analysis, allowing also to assess these parameters for different cell size categories. The results showed that the amount of auxin carriers on the plasma membrane of epidermal cells was reduced in mutants, as well as in the case of the actin drug latrunculin B treatments. Mutants exhibiting defective morphogenesis showed overall reduced gene expression but increased auxin-driven gene expression. These results indicate that actin dynamics is not only essential for processes related to gene expression, but it is also specifically involved in the positioning of auxin carriers in the plasma membrane, which is crucial in the establishment of auxin gradients.

Key words: auxin, auxin carriers, actin cytoskeleton, ARP2/3, plasma membrane, *Arabidopsis thaliana*