

In vivo localization of annexin 1 during post-embryonic Arabidopsis development

ANNEXIN 1 (ANN1) is the most abundant member of the evolutionary conserved multigene protein superfamily of annexins. Annexins participate in diverse cellular processes, such as cell growth, differentiation, vesicle trafficking and stress responses. Moreover, they can associate with cytoskeleton and membrane phospholipids in a calcium dependent manner. Expression of annexins is developmentally regulated and it is sensitive to the external environment. ANN1 is expressed in almost all Arabidopsis tissues, while it is the most abundant in the root, hypocotyl epidermal cells and in the root hairs. Study of developmental expression patterns and subcellular localization of ANN1 could help to clarify its role during early stages of Arabidopsis seedling development. Using modern microscopy techniques, including spinning disc microscopy and advanced light-sheet fluorescence microscopy (LSFM), we followed developmental expression and subcellular localization of ANN1-GFP under natural conditions. By contrast to conventional microscopy, LSFM allows long-term imaging of plants in near-environmental conditions without affecting plant viability. Overall, live imaging of tissue-specific and developmentally regulated localization of ANN1-GFP in young Arabidopsis root showed accumulation of ANN1 in the root cap and epidermal cells. However, ANN1-GFP was absent in the root meristematic zone. During root hair development, ANN1-GFP accumulated in emerging tips of root hairs, which was accompanied by decreased abundance in trichoblasts. In aerial plant parts ANN1-GFP was localized mainly in epidermal cells of hypocotyls, leaves and petioles.

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