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The function of NAD(P)H oxidases during pollen tube growth

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Abstract

Reactive oxygen species (ROS) produced by NAD(P)H oxidases regulate diverse biological processes in plants, including pathogen defense, abiotic stress response and plant development. The data presented here indicate that ROS produced by NAD(P)H oxidases are required for the maintenance of cellular integrity in *Arabidopsis thaliana* pollen tubes. Functional loss of the pollen expressed NAD(P)H oxidases *RBOHH* and *RBOHJ* in homozygous double mutants causes premature pollen tube discharge ultimately resulting in male deficiency. The polar localization of NAD(P)H oxidases at the subapical shank coincides with the site of the pollen tube collapse indicating that extracellular ROS modify specific cell wall components within this region. Using immunocytochemical staining, it is shown that the patterning of cell wall associated arabinogalactan proteins (AGPs) is altered in *rboh h rboh j* mutant pollen tubes. This provides evidence that RBOH-derived ROS are required for AGP cross-linking and cell wall reinforcement during polarized cell growth. These results define a role for ROS produced by RBOH proteins as connecting mediators at the plasma membrane-cell wall interface.