



Iowa State University

Interdepartmental Plant Biology Major
2025 Spring Seminar Series (PLBIO 6960)

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4:25 pm – 5:45 pm

ATRB 1330

Plasmodesmata-located protein 5 negatively regulates hydrogen peroxide transport

Abstract

Plasmodesmata provide physical connections between adjacent cells to facilitate the exchange of signaling molecules and nutrients. Despite their fundamental role, we are still uncovering the regulation and function of plasmodesmata. Among the proteins that regulate plasmodesmal function, plasmodesmata-located protein 5 (PDLP5) is known to regulate callose accumulation at plasmodesmata and plant immunity. To determine the molecular function of PDLP5, we conducted an enzyme-catalyzed proximity labeling (PL) assay, identifying over 600 proteins as potential functional partners of PDLP5. To further narrow down the candidate list and identify the proteins that physically interact with PDLP5, we employed AlphaFold-Multimer and AlphaPulldown (AP-AFM) to predict the formation of PDLP5-containing protein complexes. I will present how we coupled the PL assay and AP-AFM guided approach to study plasmodesmal biology. We predicted PDLP5 homo- and heterodimers. Following the AlphaFold prediction, we demonstrated the physical interactions between PDLP5 and several members of plasma membrane intrinsic proteins (PIPs), which transport water and hydrogen peroxide, using a split-ubiquitin yeast two-hybrid (suY2H) assay. We observed that *Arabidopsis pdlp5* mutants are more sensitive to root inhibition by hydrogen peroxide, whereas *PDLP5* overexpressors are less sensitive to the treatment. Furthermore, PDLP5 overexpressors uptake less hydrogen peroxide into *Arabidopsis* root tips. Our findings suggest that PDLP5 negatively regulates hydrogen peroxide transport, likely by blocking the PIP channels.

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Saiful received his B.S. and M.S. degree from University of Dhaka, Bangladesh. He joined Dr. Aung's lab at the Department of Genetics, Development and Cell Biology in 2022. Apart from research, he likes traveling, doing photography and learning animation.

