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Role of Polyamine in Plant Defense Response to High Salt

Tomonobu Kusano

Graduate School of Life Sciences, Tohoku University
2-1-1 Katahira, Aoba, Sendai, Miyagi 980-8577, Japan

Summary

It is well known that changes in abiotic conditions such as the concentration of ions, temperature and humidity lead to modulation of polyamine contents in plants. However, little is known about the relevant parts these polyamines play in abiotic stress responses. Here I addressed a specific role of spermine during high salt stress using an *Arabidopsis* double knockout-mutant plant (*acl5/spms*) which cannot produce spermine. The mutant showed higher sensitivity to high salt than wild type plants. This phenotype was cured by exogenous spermine but not by the other polyamines putrescine and spermidine, suggesting a strong link between spermine-deficiency and NaCl-hypersensitivity. The mutant was also hypersensitive to high levels of KCl but not to MgCl₂ or to high osmoticum. NaCl-hypersensitivity of the mutant was compromised by treatment with Ca²⁺ channel blockers. Moreover, the mutant showed poor growth on Ca²⁺-depleted Murashige-Skoog agar media. The data suggest that the absence of spermine causes an imbalance in Ca²⁺ homeostasis in the mutant plant. Based on the data obtained, I propose a model for a role of spermine in high salt stress responses.

- Ref. 1) Yamaguchi K, Takahashi Y, Berberich T, Imai A, Takahashi T, Michael A, Kusano T (2007) A protective role for the polyamine spermine against drought stress in *Arabidopsis*. *Biochemical and Biophysical Research Commun* 352: 486-490
- 2) Yamaguchi K, Takahashi Y, Berberich T, Imai A, Miyazaki A, Takahashi T, Michael A, Kusano T (2006) The polyamine spermine protects against high salt stress in *Arabidopsis thaliana*. *FEBS Letters* 580: 6783-6788.