

A recombinant plant natriuretic peptide with a role in *Arabidopsis thaliana* cell volume regulation causes rapid and spatially differentiated K^+ , Na^+ and H^+ flux changes in *Arabidopsis thaliana* roots

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Cellular and physiological evidence suggests the presence of a novel class of systemically mobile plant molecules that are recognized by antibodies against vertebrate atrial natriuretic peptides (ANPs) (1). In order to characterize the function of these immunoanalogues we have expressed a full length recombinant and demonstrate that this molecule induces osmoticum-dependant H_2O uptake into protoplasts at nano molar concentrations and thus affects cell volume (2). A similar response is also seen with a recombinant that does not contain the signal peptide as well as a short domain of the recombinant that shows homology to the vertebrate peptide. Although it is not yet clear what the underlying mechanisms of this intriguing response to AtPNP-A are, we have since shown that the addition of 150 ng per ml of AtPNP-A to *Arabidopsis* roots leads to significant, rapid (<5 min.) and sustained changes in net H^+ fluxes. AtPNP-A also induces significant K^+ and Na^+ efflux in the mature root zone (3). One would predict that cation efflux accompanies volume reduction. Thus the fact that AtPNP-A leads to net H_2O uptake in protoplasts from this zone points to an unusual mode of action of this novel type of plant molecule. We are currently performing a set of experiments to further elucidate the physiological and cellular responses of plants to AtPNP-A.

¹Gehring, C.A. and Irving, H.R. (2003) Natriuretic peptides - a class of heterologous molecules in plants. *Int.J. Biochem.Cell Biol.* 35, 1318-1322.

²Morse, M., Pironcheva, G. and Gehring, C. (2004) AtPNP-A is a systemically mobile natriuretic peptide immunoanalogue with a role in *Arabidopsis thaliana* cell volume regulation. *FEBS Lett.* 556, 99-103.

³Ludidi, N., Morse, M., Sayed, M., Wherrett, T., Shabala, S. and Gehring, C. (2004) A recombinant plant natriuretic peptide causes rapid and spatially differentiated K^+ , Na^+ and H^+ flux changes in *Arabidopsis thaliana* roots. *Plant Cell Physiol.* 45, 1093-1098.