## **ETHYLENE SIGNALLING**

## Gas hormone induces histone modifications

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The plant hormone ethylene induces a complex signalling cascade to activate diverse developmental programs and stress responses. A key player in the ethylene signalling cascade, ETHYLENE INSENSITIVE 2 (EIN2), resides in the endoplasmic reticulum membrane; while in the presence of ethylene its hydrophilic C-terminus can be cleaved and translocated into the nucleus. The movement of EIN2-C to the nucleus stabilizes the transcription factors ETHYLENE **INSENSITIVE 3 (EIN3) and ETHYLENE** INSENSITIVE 3-LIKE1 (EIL1), and triggers downstream transcriptional changes in ethylene response genes. However, additional mechanisms have been proposed by recent studies from Hong Qiao's group at The University of Texas at Austin, USA, about the involvement of histone modifications in EIN2-dependent ethylene responses.

The researchers revealed that the application of ethylene induces specific acetylation of H3K14 and H3K23 in *Arabidopsis* seedlings. This interesting association between ethylene and histone acetylation requires EIN2 and essentially a functional EIN2-C. To examine the potential

networks of EIN2-C in the nucleus, they conducted a yeast two-hybrid screening and uncovered a novel EIN2 nuclear-associated protein 1 (ENAP1) that contains a conserved chromatin-remodelling SANT domain. They further confirmed that ENAP1 can interact with histone H3 and sufficiently regulate the acetylation of H3K14 and H3K23 in an ethylene-dependent manner. More detailed investigation of the interplay between EIN2-C and ENAP1 shows that ENAP1 partially mediates the association between EIN2 and chromatin; EIN2 levels are also found to influence the binding between ENAP1 and chromatin.

The concepts of epigenetic modifications that may modulate the function of plant hormones are emerging. In this case, ethylene-induced histone acetylation adds another layer of complexity to the comprehensive regulatory networks of the ethylene signalling cascade.

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