

## Ethylene signaling components and cellular mechanisms

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The plant hormone ethylene (C<sub>2</sub>H<sub>4</sub>) has profound effects on growth and development throughout the plant life cycle. Great progress has been made in identifying key players and regulatory mechanisms in ethylene signaling, yet our understanding of the pathway is far from complete. Our lab has employed genetic screens and recently proteomics to uncover additional components/mechanisms in the plant *Arabidopsis thaliana*. The *REVERSION-TO-ETHYLENE SENSITIVITY (RTE1)* locus, for example, was identified in a screen for suppressors of ethylene insensitivity of the dominant ethylene receptor mutant *etr1-2*. *RTE1* encodes a novel integral membrane protein conserved in plants and animals, and we are currently investigating its cellular role. The RTE1 protein physically associates with the ETR1 ethylene receptor, and genetic analyses indicate that *RTE1* promotes the active signaling conformation of ETR1 in a highly specific fashion that distinguishes ETR1 from the four other *Arabidopsis* ethylene receptors. We have also initiated a proteomics study aimed at identifying post-translational modifications that occur rapidly in response to ethylene. Proteomics has the potential to yield protein targets and mechanistic insights that have not been identified by genetic approaches. In our study, the membrane fractions of etiolated *Arabidopsis* seedlings, treated with or without ethylene for 3 hours, were subjected to immobilized metal ion affinity chromatography to enrich for phosphopeptides, and the flow through and eluate analyzed independently by liquid chromatography combined with tandem mass spectrometry (LC-MS/MS). Three biological replicates were examined for changes in protein content and phosphorylation events. Of the 2673 proteins shared between the two treatments, 185 showed significant accumulation changes and 708 included at least one phosphopeptide. These data point to previously uncharacterized proteomic changes upon ethylene treatment.