Identification of gibberellin signaling components in cold stress

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The phytohormone gibberellin (GA) is implicated in many agronomically important processes including plant responses to abiotic stresses such as cold. Exposure of *Arabidopsis* to low temperature results in growth inhibition and transcriptional changes that lead to cold acclimation. Exposure to cold temperature also leads to a reduction of GA hormone levels and the stabilization of DELLA proteins, critical growth repressors of the GA pathway. DELLA repressors interfere with the activity of a range of pathway-specific transcription factors through protein-protein interactions. We aim to understand how GA and DELLAs regulate the cold-stress response by identifying downstream DELLA targets in this pathway. To this end, we looked into the contribution of DELLA-dependent transcriptional changes in cold stress using RNA-Seq. We discovered that around 9 % of the cold-induced transcriptional changes are differentially expressed during concomitant GA application. Interestingly, application of GA affected a largely different gene set upon cold stress than application of GA to ambient temperature-grown seedlings. The later suggests that GA and hence the control of transcription by DELLAs depends on the different dynamics of protein- protein interactions in ambient temperature versus cold stress. To identify DELLA-regulated transcription factors that may operate during cold stress, we performed a yeast two-hybrid screen with a collection of 2000 Arabidopsis transcription factors where we identified more than 200 DELLA interactors for the two DELLAs, RGA and GAI. These included 32 DELLA- regulated transcription factors that were also differentially regulated in the above described transcriptomics experiment. Our current focus is on the elucidation of the role of DELLA interaction with candidate transcription factors in mediating cold stress-specific GA responses.

Keywords: Arabidopsis, DELLA, cold stress, gibberellin