**Gibberellin signaling regulates wound-induced regeneration through SlGRF1 in tomato**

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**Abstract**

Many dicotyledonous plants exhibit considerable developmental plasticity and are capable of regenerating new organs upon wounding. Cytokinin is crucial for callus induction in response to wounding. However, the molecular mechanisms underlying the acquisition of specific cell fates during callus formation in the absence of exogenous hormones remain largely unknown. In this study, we analyzed tomato hypocotyl-derived shoots at the single-cell resolution and characterized the factors involved in shoot regeneration. We determined the cells with the meristem-like cell transcriptional identity required for organ regeneration originate from pericycle cells. In meristem-like cells, the *Solanum lycopersicum* transcription factor gene *GROWTH-REGULATING FACTOR1* (*SlGRF1*) is co-expressed with *WUSCHEL* (*WUS*), which is required for the acquisition of specific cell fates. Our data indicate that SlGRF1 functions downstream of the gibberellin signaling pathway and mediates wound-induced shoot formation. We propose that gibberellin plays a dual role, serving as an enhancer of callus formation and a repressor of cell transitions related to shoot primordium formation. Furthermore, the activation of SlGRF1 at low gibberellin levels is responsible for the acquisition of specific cell fates during wound-induced organ regeneration.