Title:	DNA-dependent homodimerization, sub-cellular partitioning, and protein destabilization control WUSCHEL levels and spatial patterning
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Abstract:	The homeodomain transcription factor WUSCHEL (WUS) promotes stem cell maintenance in inflorescence meristems of Arabidopsis thaliana. WUS, which is synthesized in the rib meristem, migrates and accumulates at lower levels in adjacent cells. Maintenance of WUS protein levels and spatial patterning distribution is not well-understood. Here, we show that the last 63-aa stretch of WUS is necessary for maintaining different levels of WUS protein in the rib meristem and adjacent cells. The 63-aa region contains the following transcriptional regulatory domains: the acidic region, the WUS-box, which is conserved in WUS-related HOMEOBOX family members, and the ethylene-responsive element binding factor-associated amphiphilic repression (EAR-like) domain. Our analysis reveals that the opposing functions of WUS-box, which is required for nuclear retention, and EAR-like domain, which participates in nuclear export, are necessary to maintain higher nuclear levels of WUS in cells of the rib meristem and lower nuclear levels in adjacent cells. We also show that the N-terminal DNA binding domain, which is required for both DNA binding and homodimerization, along with the homodimerization sequence located in the central part of the protein, restricts WUS from spreading excessively and show that the homodimerization is critical for WUS function. Our analysis also reveals that a higher level of WUS outside the rib meristem leads to protein destabilization, suggesting a new tier of regulation in WUS protein regulation. Taken together our data show that processes that influence WUS protein levels and spatial distribution are highly coupled to its transcriptional activity.
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