

Publication

Arabidopsis MAP kinase phosphatase 1 and its target MAP kinases 3 and 6 antagonistically determine UV-B stress tolerance, independent of the UVR8 photoreceptor pathway

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Plants perceive UV-B radiation as an informational signal by a pathway involving UVR8 as UV-B photoreceptor, activating photomorphogenic and acclimation responses. In contrast, the response to UV-B as an environmental stress involves mitogen-activated protein kinase (MAPK) signalling cascades. Whereas the perception pathway is plant specific, the UV-B stress pathway is more broadly conserved. Knowledge of the UV-B stress-activated MAPK signalling pathway in plants is limited, and its potential interplay with the UVR8-mediated pathway has not been defined. Here, we show that loss of MAP kinase phosphatase 1 in the mutant *mkp1* results in hypersensitivity to acute UV-B stress, but without impairing UV-B acclimation. The MKP1-interacting proteins MPK3 and MPK6 are activated by UV-B stress and are hyperactivated in *mkp1*. Moreover, mutants *mpk3* and *mpk6* exhibit elevated UV-B tolerance and partially suppress the UV-B hypersensitivity of *mkp1*. We show further that the MKP1-regulated stress-response MAPK pathway is independent of the UVR8 photoreceptor, but that MKP1 also contributes to survival under simulated sunlight. We conclude that, whereas UVR8-mediated acclimation in plants promotes UV-B-induced defence measures, MKP1-regulated stress signalling results when UV-B protection and repair are insufficient and damage occurs. The combined activity of these two mechanisms is crucial to UV-B tolerance in plants.

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