

Involvement of Ca²⁺ sensing receptor (CAS) and Ca²⁺ in the integrated regulation of chloroplast photo-acclimation and photo-adaptation

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CAS is a plant-specific putative calcium binding protein localized in the thylakoid membrane of the chloroplast. To elucidate the role of CAS in *Chlamydomonas reinhardtii*, we generated six independent CAS knock-down *C. reinhardtii* lines (*cas*-kd). Upon shift to high-light (HL) conditions, *cas*-kd lines are unable to fully induce LHCSR3, a protein crucial for non-photochemical quenching. Prolonged exposure of *cas*-kd lines to HL is lethal. Interestingly, the addition of exogenous calcium rescues both the induction of LHCSR3 and the growth of *cas*-kd lines under HL. Under HL conditions, LHCSR3 expression in wild type cells (WT) was inhibited by the calmodulin antagonist W7. In summary we propose that CAS and calcium are involved in the regulation of the HL response and particularly in the regulation of expression of LHCSR3 suggesting that chloroplast-dependent Ca²⁺-signaling contributes to the cellular Ca²⁺-communication network in *C. reinhardtii*.