

## PHYTOCHROME SIGNALING IS MEDIATED THROUGH NDPK2

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Phytochromes, red/far-red light receptors, mediate various photomorphogenic responses ranging from germination to flowering. To investigate the molecular mechanism of phytochrome A-mediated signal transduction, we employed the yeast two hybrid system and identified five phytochrome A-associated proteins. Two of these encode phytochrome A itself and nucleoside diphosphate kinase 2 (NDPK2). We show that NDPK2 is mainly localized in the nucleus and cytoplasm where phytochrome is also localized. Recombinant NDPK2 preferentially binds to the Pfr form of phytochrome *in vitro* and the interaction is decreased with two of identified phytochrome A mutants. We demonstrate that the Pfr form of purified oat phytochrome increases the activity of recombinant *Arabidopsis* NDPK2 by decreasing the  $K_m$  value for the substrate. Furthermore, a *ndpk2* mutant shows abnormal light responses including closed cotyledons under far-red light, suggesting a partial deficiency in phytochrome-mediated response. The results indicate that NDPK2 is a positive signaling component of phytochrome A-mediated light signal transduction in *Arabidopsis*.