BIOCHEMICAL AND PHYSIOLOGICAL ANALYSIS OF ARABIDOPSIS NDPK2

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Introduction

In the course of plant growth and development, light plays many crucial roles such as seed germination, hook opening, stem elongation, leaf expansion and inhibition of mesocotyl elongation (Mohr and Shroshire, 1983; Borthwick *et al.*, 1954;Klein *et al.*, 1967;Weintraub and Price, 1947). These light responses are at least partially mediated by phytochrome perception of the light (Vazquez-Yanez and Smith, 1982; Scopel *et al.*, 1991; Deregibus *et al.*, 1994). Recently, the molecular mechanisms of phytochrome action and its physiological role in plants are beginning to emerge (Whitelam *et al.*, 1997; Casal, 2000; For a most recent review, see Kim et al., 2002).

Efforts to identify signaling molecules and transcription factors involved in light signaling used genetical and biochemical methods, resulting in the identification of diverse array of molecular components. For example, in the approach using the c-terminal domain of phyB as a bait, several interacting proteins were isolated. Among these, the function of PIF3, a basic helix-loop-helix protein, was studied in detail. The PIF3 is known to simultaneously bind to the Pfr form of phyB and to the promoters of some of the light responsive genes such as *LHY* and *CCA1* (Ni et al., 1998, 1999). The molecular approach using yeast two-hybrid system also was employed to identify proteins interacting with phyA, resulting in the isolation of PKS1, NDPK2 and PIF3. The PKS1 is a novel phosphoprotein that is localized in the cytoplasm and can be phosphorylated by phyA. It has been shown that binding of NDPK2 to the red-light-activated form of phytochrome *in vitro* increased the activity of NDPK2 (Choi et al., 1999). However, the role of NDPK2 in phytochrome mediated light signaling remains to be elucidated.

Biochemical analysis of the interaction between phytochrome and NDPK2

It appears that phytochrome-induced light signaling is partly mediated by the interaction between phytochrome and its signaling partners, such as PIF3 and NDPK2.