

**KNOCK-OUT OF CYTOCHROME C OXIDASE SUBUNIT III  
GENE *ctaE* INDUCES THE ALKALINE PHOSPHATASE  
ACTIVITY IN *Synechocystis* sp. PCC6803**

Hyunsub Cheong, Minkyun Kim

School of Agricultural Biotechnology, Seoul National University

Induction of the alkaline phosphatase activity under phosphate-limiting condition is regulated by two-component system, phosphate sensor and response regulator, in cyanobacteria. To further understand the regulatory mechanism controlling the induction of alkaline phosphatase activity in cyanobacteria, the mutant showing the high alkaline phosphatase activity even at high concentration of external phosphate level was obtained through the screening of Tn5-mutagenized *Synechocystis* sp. PCC6803 population. The sequencing of the transposon-flanking regions in the mutant revealed that the interruption of the *ctaE*, encoding the cytochrome c oxidase subunit III, causes the increased alkaline phosphatase activity. RT-PCR analyses revealed that the increased alkaline phosphatase activity in the mutant was due to the increased expression of the *phoA* gene encoding the alkaline phosphatase. In addition, disruption in respiration due to the knock-out of the cytochrome c oxidase subunit III down-regulated the photosynthetic electron transports especially in photosystem I and also decreased the intracellular ATP level to 40% of the wild type level. Combined together, it is speculated that the internal ATP level, besides the external phosphate level, also regulates the induction of alkaline phosphatase activity in cyanobacteria.