Cytochrome *aa3* oxidase of the cyanobacterium *Synechocystis* sp. PCC 6803 is a main terminal oxidase for the oxidation of reduced plastoquinone in the dark

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Transient change in Chl fluorescence during a light-to-dark transition in the cyanobacterium *Synechocystis* sp. PCC 6803 was investigated with respect to the respiratory electron transport components and its in vivo function. An inhibitor KCN in wild type cells substantially inhibited descending of the post-illumination Chl fluorescence. Both cytochrome *aa3* type cytochrome *c* oxidase (CtaI)- and PetM subunit of cytochrome (Cyt) *b6f* complex (PetM)- less mutants showed very similar profiles to the KCN-treated WT cells, strongly suggesting the terminal oxidase for the nonphotochemical oxidation of reduced PQ is catalyzed by CtaI via Cyt *b6f*. Compared to wild type cells, CtaI-less mutant cells showed comparable quantum efficiency of PSII (measured as Chl fluorescence parameter, Fv/Fm) and the oxidized proportion of PSI (measured as absorbance change at 810 nm, a810) during steady state illumination, indicating the respiratory electron flow involved in the nonphotochemical redox change of PQ is not likely active in the light. When CtaI-less cells are salt shocked for 20 min at 0.6 M NaCl, PSII activity was inactivated, resulting in the substantial decrease of the photosynthetic O2 evolution compared to the wild type cells. This finding suggests that CtaI-mediated electron transport is indispensable for coping against salt stress.