

Role of PsbO isoforms in *Arabidopsis thaliana*

Abstract

Photosystem II (PSII) uses sunlight to catalyze water oxidation and reduce plastoquinone. Water oxidation takes place in oxygen evolving complex (OEC). OEC is stabilized by extrinsic subunits of PSII. The largest and most important of them is PsbO, manganese-stabilizing protein which can be found in all known oxygenic photosynthetic organisms. Model plant *Arabidopsis thaliana* expresses two isoforms of *psbO* gene, namely PsbO1 and PsbO2. Mutants *psbo1* and *psbo2* lacking PsbO1 and PsbO2, respectively, recently brought new findings on the particular roles of isoforms in maintaining photosynthesis. PsbO1 is commonly considered as the main isoform facilitating water splitting, whereas PsbO2 is believed to be involved in PSII repair process (replacement of photodamaged D1 subunit).

This work focuses on particular roles of *Arabidopsis* PsbO isoforms in maintaining photosynthesis with special focus on response to light stress. Mutants *psbo1*, *psbo2* and wild type plants Col-0 were used for extensive biochemical investigation. Our aim was to find out what is the impact on overall thylakoid structure and composition in mutants. Furthermore, to investigate response to light stress in wild type regarding to yields of particular subcompartments, changes in photosystem II subpopulations and particularly, changes in distribution of PsbO isoforms.

We found that PsbO isoforms are distributed heterogeneously among thylakoid subcompartments (grana core, grana margins and stroma lamellae). PsbO2 showed more pronounced response to light stress than PsbO1, these findings support earlier hypothesis about role of PsbO2 in PSII repair cycle. We also found that PsbO accumulates in high amounts in lumen after exposure to light stress. Interestingly, our investigation regarding to *psbo1* mutant, lacking PsbO1 isoform, showed considerably impaired saccharide metabolism.

Key words

PsbO, manganese-stabilizing protein, photosystem II, digitonin fractionation, thylakoid subcompartments, lumen, light stress, nonstructural saccharides.