Секция «Биоинженерия»

Electrogenic reactions in Photosystem I from cyanobacterial menB mutant

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All higher organisms on Earth receive energy directly or indirectly from oxygenic photosynthesis performed by plants, green algae and cyanobacteria.

Photosynthetic pigment-protein complex of PS I catalyzes the light-induced electron transfer from reduced plastocyanin or cytochrome c6 at the lumenal side of the thylakoid membrane to ferredoxin, a [2Fe-2S] at the stromal side via the primary electron donor P700, a monomeric form of chlorophyll, phylloquinone (PhQ) (A1) and iron-sulfur clusters, [4Fe-4S]. [1]

Deletion of the *menB* gene in cyanobacteria *Synechocystis* sp. PCC 6803 results in the incorporation of a foreign quinone, termed Q, into the A1 site of PS I identifying Q as plastoquinone-9. The latter due to weak binding can be easily replaced by various quinones without the use of organic sol, which can disturb the protein structure. [2]

In this work we make an attempt to examine the nature of forward electron transfer in isolated PS I complexes from *men B* mutant incorporated into phospholipid vesicles using a direct electrometrical technique.

Excitation of oriented PS I complexes with a single turnover flash leads to the generation of a transmembrane electric potential difference from which the forward electron transfer rates and dielectrically weighted transmembrane distances can be measured.

In the presense of exogenously added decyl-plastoquinone the increase of the overall amplitude of the signal as well as appearance of an additional phase in the sub-millisecond time range (40 microseconds) were observed. The latter indicate that the reaction of electron transfer between PQ and terminal iron-sulfur cluster FA/FB is electrogenic. These data allowed us to elucidate the nature of the electron transfer between various synthetic quinones and FA/FB.

Источники и литература

1) Fromme P., Grotjohann I. Structural Analysis of Cyanobacterial Photosystem I. In: Photosystem I. The Light-Driven Plastocyanin:Ferredoxin Oxidoreductase, Springer,2006 . C 47-70.

2) Srinivasan N., Golbeck J.H. Protein–cofactor interactions in bioenergetic complexes: The role of the A1A and A1B phylloquinones in Photosystem I. Biochim Biophys Acta , 2009.C 1787, 1057–1088