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A cyanobacterial mutant with inactivated *chl*P gene as a source of several medical compounds

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Background/Aim: A ΔChlP null mutant of the cyanobacterium *Synechocyctis* sp. PCC 6803 with an inactivated *chl*P gene (ORF sll1091 [1]) is described. Complete lack of geranylgeranyl reductase (ChlP) function led to production of novel biochemical compounds as well as altered amounts of the common pigments in its cells [2]. Based upon these observations, the mutant can be considered as a potential source for obtaining several medical drugs, *i. e.,* menaquinone-4 (menatetrenone or MK-4), geranylgeranylated chlorophyll *a* (Chl a_{gg}), and phycocyanin.

Methodology: Gene inactivation was achieved by insertion of a Km^r-cassette. The mutant was analyzed by absorption and 77 K fluorescence emission spectroscopy, HPLC, and oxygen evolution measurements [2].

Results: No paralogs of *chl*P were found. Together with the failure to obtain spontaneous revertants this indicates the exclusive role of sll1091 for coding ChlP in *Synechocystis*. ΔChlP grows well, if supplied with glucose in a medium. 77 K fluorescence emission spectra revealed the presence of photosystems, and oxygen evolution measurements confirmed their functionality. Absorption spectra indicated a high abundance of phycocyanin. HPLC analyses demonstrated exclusive accumulation of Chl a_{gg} and α-tocotrienol in the mutant instead of the usual (phytylated) Chl *a* and α-tocopherol [2].

Conclusions: (i) The data imply the additional presence of menaquinone-4 instead of phylloquinone in ΔChlP; (ii) the mutant exclusively synthesizes Chl a_{gg}. As potential drugs, Chl a_{gg} and its derivatives might have certain clinical advantages vs. their phytylated counterparts; (iii) ΔChlP has an increased amount of phycocyanin. Thus, the mutant can be considered as a potential source for the production of these compounds. It should be noted that the respective plant mutants cannot be useful in this regard due to inability to survive beyond the seedling stage [3], whereas the cyanobacterium mutant can be successfully propagated under photoheterotrophic conditions in bioreactors for providing ample biomass, and the mentioned compounds can be produced from the same culture in one technological cycle.