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Redox component in the adaptation of the microalga *Chlorella sorokiniana* to Ni(II) excess

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Nickel is utilized by microalgae as a co-factor of urease. On the other hand, this transition metal represents an important pollutant of aquatic ecosystems. The effects of Ni(II) excess on microalgae and the mechanisms of adaptation are poorly understood. Redox processes represent an important component of the mechanisms of interaction of microalgae with transition metals[1]. Pertinent to this, we analyzed redox changes in *Chlorella sorokiniana* culture that are induced by high levels of Ni(II). The intracellular level of reactive oxygen species (ROS) showed a rapid two-phase increase that took place prior to Ni accumulation in the cell. This was accompanied by oxidation of thiols and drastic deglutathyonilation of proteins. PAM fluorimetry showed that Ni excess induced an increase in the efficiency of photosystem II and promoted electron flow in chloroplasts, which is most likely responsible for ROS rise. In addition, a rising trend in the chlorophyll level was observed. On the other hand, the level of lipid peroxidation and activities of key antioxidative enzymes were not increased, which implies that oxidative stress is not an important player in Ni adaptation/toxicity. After prolonged exposure the efficiency of photosystem II drops, nickel is accumulated in the cells, and new redox balance is established. Our results imply that redox signalling is involved in Ni-induced metabolic activation and that key changes take place in photosynthetic machinery.

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