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Role of metallothionein and glutathione-s-transferase expression in *Chlamydomonas reinhardtii* for detoxification sewage water from some heavy metals

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The maintenance of ion detoxification in living cells is a fundamental physiological requirement for sustainable their growth, development, and production. Metallothioneins (MTs) are a superfamily of cysteine-rich, low-molecular-weight metalloproteins that bind heavy metal ions. These cytosolic metalloproteins are widely distributed in living organisms and are thought to be involved in metal homeostasis, metal detoxification, and oxidative stress protection. Here in Transgenic *Chlamydomonas reinhardtii* was constructed via cloning and sub cloning with PTRA-GST and PATRA-PT- Smta plasmids. The first one was restricted via ASC1 and BAM and the second restricted by BAM. Their products were purified according to protocol kits and to allowed to ligase. The product was introduced into Agrobacterium-mediated, and then transformed to *Chlamydomonas reinhardtii*. The transgenic alga was selected on solid TAP medium supplemented with Basta at concentration (12ug/ml). The efficiency of algal transformation was confirmed by SDS –gel electrophoresis and RT- PCR. To evaluate that toxicity of heavy metal an experiment was conducted in which the wild and transgenic *Chlamydomonas reinhardtii* allowed to grow in sewage water for six days and the rate of removal heavy metal with calculated. Results revealed that, the transgenic *Chlamydomonas reinhardtii* has MtIII clearly can have an important role in metal detoxification. Transgenic *Chlamydomonas reinhardtii* with metallothionein gene was selective for sequestration of cytosolic Cd²⁺. It has been found that MtIII synthesis is related to degree of pollution in an aquatic environment.

Keywords: Autophotosynthetic, biomarker, Cd²⁺, *Chlamydomonas reinhardtii*, glutathione-s-transferase, heavy metals, metallothionein.

Biography

Abdelhamed M Elkbash is currently a researcher at Biotechnology Labs Faculty of Science, Zagazig University, Egypt. He has Bachelor of Science, Alazher University, Microbiology Department. His scientific grade (Excellent). He works as a Biologist in the Central Lab. for drinking water, Behira Water and Drainage Company (BWADC), where he is responsible for water and wastewater treatment analysis (chemical and microbiological) for surface and ground water. He accumulated 13-years of experience in different Labs, and implementation of ISO 17025 (general requirement for competence of testing and calibration laboratories), and ISO 22000 (food safety management system) applicable for safety of drinking water.

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