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## Over expression of glutathione s-transferase in *Chlamydomonas* and the activities of antioxidant enzymes under a biotic stress

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Heavy metals (HMs) toxicity is one of the most abiotic stresses leading to hazardous effects in green algae. Their toxicities are related to the excessive accumulation of reactive oxygen species (ROS), which can cause lipid peroxidation, oxidation of protein, inactivation of enzymes, DNA damage and/or interact with other vital constituents in the cells. Green algae evolved a sophisticated antioxidant defense system not only to scavenge ROS but also to sequester by several specific binding ligands of glutathione (GSH). In both direct and indirect control of ROS and their reaction products in algal cells protecting the cells from HM-induced oxidative damage. Recent biotechnological molecular studies have shown that cloning and transformation technique of Glutathione S-transferase that cloned into pTRA-K-GST via *Agrobacterium tumefaciens* strain (GV3101) to *Chlamydomonas reinhardtii* is one of the recent techniques for the auto defense against HMs. In this regard an experiment was conducted in which both transgenic and wild *Chlamydomonas* sp was allowed to grow in presence of different concentrations of nickel and cadmium (25.50 and 75  $\mu\text{m}$ ) for the mid exponential phase (7 days) then the specific activities of GST and some antioxidant enzymes were calculated. Moreover the expression of GST in both transgenic and wild was carried out using real time PCR. Spectrophotometric studies reveal that specific activity of glutathione S-transferase and the activity of antioxidant enzymes in transgenic were obviously more than their corresponding activities in wild species. Nickel enhance the specific activity of antioxidant enzymes (peroxidase, superoxide dismutase and catalase) rather than cadmium.

**Keywords:** *Agrobacterium*, antioxidants, *Chlamydomonas*, Glutathione S- transferase, heavy metals.

### Biography

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