

GLUTATHION- S TRANSFERASE ACTIVITY OF THE MUSSEL MYTILUS GALLOPROVINCIALIS DURING EXPOSURE OF BISPHENOL-A

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Abstract

Bisphenol A (BPA), is one of the most important industrial chemicals synthesized for diverse applications. The environmental concentrations of BPA are at high risk level due to use widely in many fields of industry according to the latest studies. In our study mussels *Mytilus galloprovincialis* were exposed to 50, 75 and 100 µg-BPA/L and the changes of hepatic biomarker glutathione-s transferase (GST) activity were investigated. The results showed that the activity of GST was increased in all concentrations of BPA group. Based on this experiment, we recommended that GST might be used as a biomarker of environmental pollution.

Keywords: *Ecotoxicology, Aegean Sea*

It is well-known that a wide variety of man-made chemicals in the environment is capable of adversely affecting aquatic organisms. BPA has generated concern due to their high production and widespread use BPA produce is used to make polycarbonate, epoxy resin production and other products such as specialty resins and in the manufacture of flame retardants. The environmental concentrations of these chemicals, which are used extensively in households and in industry, have been determined by researchers. It is released into the environment through permitted discharges of treated industrial waste water or directly marine environments. Several studies have been completed to determine the fate of BPA in the environment and the possible impacts on aquatic organisms [1]. Exposure to environmental stressors can result in biochemical, physiological and histological alterations in living organisms. Biological changes in organisms that under environmental stress, observed at various organization levels; molecular, cellular, population, community and ecosystem. The presence of these alterations can serve as biomarkers signaling exposure to stressors or adverse effect [2]. Biomarkers can be measured in different organisms, but mussel biological indicators in determining pollution are preferred in most ecotoxicological studies as they filter-feeding, live as sessile, and are of economic interest. The enzymes GST frequently used as biomarker of oxidative stress. Detoxification exists in all organisms this generally affected by various environmental factor. So that detoxification enzymes are useful assessment of an organism under environmental pollution. Induction of the antioxidant defense system can be considered an adaptation of species to their environment; however inhibition may lead to antioxidant-mediated toxicity [3]. In this study we asses suitability of using GST of *M.galloprovincialis* as potential biomarkers of BPA in the environment. For this purpose, the concentration of 50, 75 and 100 µgBPA/L was added mussels environment (15 day). During the experiment the water quality parameters were stable and the mortality of the mussels was not observed. the hepatopancreas of groups of samples were found to be a significant increase in enzyme activity. The mussels exposed to the BPA showed a different pattern of GST activity when the compared control groups (Figure 1)

This specific enzyme activity was observed 0.033 µmol/min/mg protein in control group in digestive gland of mussel. The lowest GST activities recorded in mussels at 12.5 µgBPA/L were significantly different than those at control group. Previous studies indicates that the level of expression of GST is an important factor in determining the sensitivity of cells to toxic chemicals and that GST induction is part of an adaptive response mechanism to chemical stress that is widely distributed in nature. Walsh and OHalloran [4] were investigated the possibility of oxidative stress (GST) in *Mytilus edulis* which exposed to tannery effluents and these researcher presents the effluents not induce the GST specific activity in *M. edulis*. This result compared with our study, levels of GST enzyme activity of control similar to our measurement however BPA significantly increased GST enzyme activity in mussel digestive gland (0.005). The study by Xiangli et al [5] was to evaluate the use of endogenous glutathione and glutathione-related enzymes as biomarkers of exposure to landfill leachate effluent and BPA in the freshwater snail, *Bellamya purificata* following exposure to 1, 5 and 10% landfill leachate effluent and 1, 10, 50 and 100µgBPA/L for 0, 2, 7 and 15 d, activities of GST, In this study significant dose-dependent changes were observed for GST activities and total glutathione levels in the gills and digestive glands, and also GST activities increased by about 80%, while total glutathione decreased to 70-80% in the gills and digestive glands, respectively. Based on this literature information, the various GST-like proteins may have different binding properties for many different types of chemical. Besides that previous Works contributed that the GST is suitable markers for monitoring environmental contamination because it is a major enzyme involved in phase II detoxification.

References

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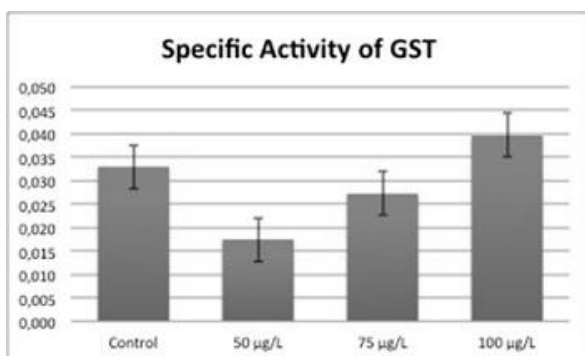


Fig. 1. The activity of GST in digestive gland