MTs - potential biomarkers used in well-designed environmental monitoring programs

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The use of stress indices has been recently proposed to evaluate the effects of pollutants, such as heavy metals on marine organisms. This contaminant can produce alterations of biochemical and physiological processes that can be quantified by estimating biological parameters (often reported as stress indices or biomarkers) whose variations may be related to the physiological status of the animals. Whereas general stress indices reveal a stress syndrome characteristic of the response of the organism to a wide range of environmental stressors, specific stress indices are those which mainly reflect responses to particular classes of contaminants.

Metallothionein are low molecular weight, cysteine- rich (20-30 %), metal binding proteins whose neosynthesis represents a specific response of the organisms to pollution by heavy metals. SF procedure takes into account precautions to obtain a complete metallothionein precipitation and to avoid the oxidation of sulphydryl groups (SH), the contamination by soluble low molecular weight thiols and enzymatic protein degradation which can occur during sample preparation. In the extract the concentration of MTs, denatured by low pH and high ionic strength, was quantified spectrophotometrically utilizing Ellman's SH reagent (DTNB-5,5 dithiobis-2-nitrobenzoic acid) reagent.

Bioindicator organisms that have been commonly employed in the application of MTs as biomarkers are mollusks. Mussels has been collected from three coastal areas: Butrint, Qeparo and Shengjin. In conclusion, this spectrophotometric method allows the simple, repeatable and low-cost detection of minimal concentration (nmol) of metallothionein in biological samples.

Keywords: mussel, metallothionein, digestive glands, biomarker of exposure

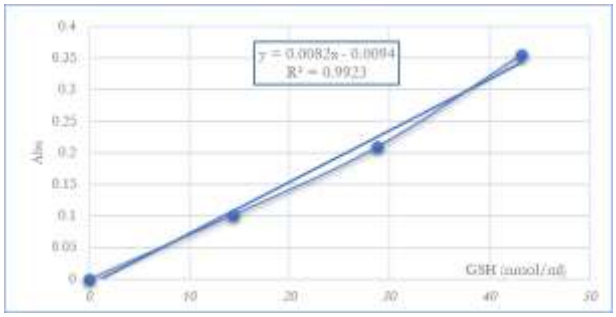

Figure 1. Standard curves obtained by spectrophotometric evaluation of equimolar -SH concentration of GSH from rabbit liver- in 0.5 N HCl, 2Mm EDTA; DTNB – in 2 NaCl, buffered with 0.2 M Na-phosphate.

References

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