

MONITORING ENVIRONMENTAL STRESS IN INDIGENOUS BLUE MUSSELS (*MYTILUS SP*) SAMPLED FROM THE LAGOON OF VENICE

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Abstract

The environmental stress of *Mytilus sp.* specimens collected from the mussel populations of four specific sites inside the Lagoon of Venice and from one offshore site nearby, has been investigated by means of an ecotoxicological biomarker. The approach has been applied to the Lagoon of Venice in that it constitutes the drainage basin of a highly industrialized region. The study concerned the genotoxic effects, evaluated as DNA strand breaks by single cell gel electrophoresis, in digestive gland cells and in hemocytes of mussels collected from December 2005 to September 2006. In both tissues mussels collected inside the Lagoon showed higher levels of DNA damage compared to specimens from the offshore site with a damage trend significantly increasing from the Lagoon border towards the inner parts

Keywords : *Bivalves, Ecotoxicology, Monitoring, Pollution.*

The Lagoon of Venice is a complex ecosystem extending over an area of about 550 square kilometers with an average depth of 1 m and a consistent number of navigable channels. It constitutes the drainage basin of a highly industrialized region with a population of about 1.300.000 persons. About twenty years of pollution monitoring through the whole basin and in specific areas of the lagoon, showed the presence of heavy metals, PAHs and PCBs [1-3]. However the chemical based monitoring of this environment has been mainly focused in the identification of xenobiotics while their impact on aquatic life in the natural environment has yet to be determined. The study of biological response to stress in sentinel species presently constitutes a major issue in environmental risk assessment (ERA) and quality evaluation. Among these approaches the evaluation of DNA strand breaks (double and single) and alkali labile sites by means of Comet assay [4] is increasingly studied not only in laboratory experiments but also in field evaluations, due to the high sensitivity and the early response to genotoxic agents [5].

In the present study the environmental stress of *Mytilus sp.* specimens collected in four distinct sites inside the Lagoon of Venice, two of these located in the proximity of the sea side, the other two in inner parts of the lagoon, has been investigated and compared with the response of mussels collected in a offshore site nearby the lagoon. The study concerned the genotoxic effects, evaluated as DNA damage (as double and single strand breaks and alkali labile sites) by single cell gel electrophoresis (comet assay), in: a) digestive gland cells and b) hemocytes, of mussels monthly collected, from December 2005 to September 2006.

In both tissues mussels collected inside the Lagoon showed higher levels of DNA damage compared to specimens collected from the offshore site, with a damage trend significantly increasing from the Lagoon border towards the inner parts. The transplant of mussels collected in the offshore site in Lagoon inner sites showed, after one month, a significantly increased damage, reaching levels similar to those observed in the native inner site specimens. DNA damage levels in digestive gland cells resulted always significantly higher than in hemocytes.

Our data, that will be matched with chemical pollution assessment data, confirm and extend results obtained in a previous field study performed with blue mussels and comet assay in the Lagoon of Venice [6], and suggest a high sensitivity and a remarkable reliability of the comet assay as early biomarker in field ERA studies

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