

Adaptation of the mussel (*Mytilus edulis* L.) to pollution – biological responses of mussels from clean and polluted environment towards benzo[a]pyrene

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The use of biomarkers in monitoring environmental stress has received increasing attention in recent years. By measuring biological responses it is possible to see and evaluate how organisms respond towards pollutants, and thus assess their environmental conditions.

PAH's (Polycyclic aromatic hydrocarbons) are a large group of organic compounds widely distributed in the environment. They are mainly of anthropogenic origin, found in oil and in emissions from uncomplete burning of biological material. One member of the PAH group is benzo[a]pyrene (B[a]P). This is among the most carcinogenic compounds in the environment. In Iceland, elevated levels of B[a]P have been reported in and around harbour areas.

The aim of the study was to evaluate the first responses of mussels towards B[a]P, and to compare responses of mussels from clean and polluted environments. Do mussels from polluted environment recognise and respond differently to B[a]P, or are they somehow adapted to the compound? Mussels were collected from clean site (Hvassahraun) and polluted site (Faxagarður, Reykjavík harbour) in SW-Iceland. Ten mussels from each site were directly taken for analysis of DNA single-strand breaks (Comet assay) in order to assess environmental impact. After depuration for 4 days in clean seawater, mussels from each location were placed for 3 hours in feeding chambers holding clean seawater (control) or seawater holding $96 \mu\text{g B[a]P l}^{-1}$. The following biomarkers were measured: Cardiac activity, clearance rate and DNA single-strand breaks.

There were no differences in heart rate between control and B[a]P groups from the clean site (Hvassahraun), but both groups showed slower heart rates than mussels in either group from the polluted site (Faxagarður). On the other hand, mussels from Faxagarður exposed to B[a]P had increased heart rates compared to the control group from the same site. Mussels from Faxagarður had slower clearance rates than the ones from Hvassahraun, irrespective of groups. No differences in clearance rates were detected among groups within sites. Following the depuration for 4 days in clean seawater, the short exposure to B[a]P did not exert DNA single-strand breaks in mussels from either site.

The results show that mussels from a polluted site respond differently to B[a]P when compared to mussels collected at a clean site. The mussels seem to recognise the pollutant previously exposed to, and their physiological responses indicate adaptation to polluted environment.