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Genomic tools for bio-monitoring of pollutant coastal impact

Results in Brief

Novel biomarker for coastal water pollution

Pollution of marine ecosystems often poses detoxification problems for the inhabitants. Based on this, a protein from fish liver has been modified so that it can be used as an effective biomarker for organic pollution.



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The pollution of our oceans and rivers is of increasing concern. The concentrations and content of the biological and chemical components of our water systems are dynamic and constantly changing. To be able to determine levels of pollution on an ongoing basis with a reliable yet easily applied test is therefore crucial. The overall aim of the European project GENIPOL therefore was to develop genomic-based tools to identify and quantify organic pollutants in coastal waters.

The assays were developed on the assumption that organisms living in a habitat express certain genes according to the pollutant they encounter and hence detoxify. Scientists at the Oceanographic and Limnological Research laboratory in Israel investigated the detection and quantification of the protein cytochrome P4501A in the liver of the striped sea bream. This protein is a sensitive indicator of organic pollution and can therefore be used to detect low levels of pollutants.

The analytical method selected was the enzyme-linked immunosorbent assay, ELISA which is based upon the production of an antigen-antibody complex. The procedure involved is simple but the problem was that cytochrome P4501A is a membrane protein and therefore unsuitable in its original form for the ELISA test. The team therefore produced a modified version of the protein that was soluble and therefore could be targeted in the first part of the test. The native protein could then be used in the second part of the test when its concentration is determined.

There is considerable scope for biomonitoring using biomarkers of this nature. By supplying the modified protein and antibodies necessary for the tests, commercial kits can be produced for specific pollutants.

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[Project website](#) 

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