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Editorial Open Access

Biomarkers as New Monitoring Method of Coastal Pollutants

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Editorial

The measurement of various contamination of costal water by classic chemical monitoring of few pollutants is possible, but also through examination for indicators of adverse effects of pollution on organisms is more effective. Selected biochemical parameters, so called biomarkers in an indicator fish, can be used for this purpose [1]. Application of biomarkers in environmental monitoring of coastal areas may resolve many challenges by providing a measure of availability of an environmental chemical to an aquatic organism by providing a direct measure of the response of an organism to chemical exposure. One of the benefits of the biomarker approach is the identification of early-onset changes, which predict increased risk of adverse effects following exposure to environmental chemicals [2]. There are many definitions of biomarkers e.g.: "A biomarker is a xenobiotically induced variation in cellular or biochemical components or processes, structures, or functions that is measurable in a biological system or sample". Peakall suggested the term Biomarker to indicate effects relating to individual organisms and bioindicator to indicate effects measured at the population or community levels of biological hierarchy [3].

The IPSC has three classes of biomarkers identified: biomarkers of exposure of the organism to the toxic substance, biomarkers of response of the organism to that exposure, and biomarkers of susceptibility of the organism to the chemical [4].

Biomarkers of exposure: Measurement of the dose is determination of the amount of chemical administered or the amount to which the animal is exposed. The level of a chemical in the blood approximates to the concentration in organs and a tissue is a true biomarker of exposure. Biomarkers of exposure are relatively transient and generally only detectable for about three months after exposure [5].

Biomarkers of response: Living organisms can show many kinds of toxic or adverse response to a chemical exposure, ranging from biochemical or physiological to pathological. Consequently there are many biomarkers of response, which can be measured. These include markers such as enzymes, which appear in the blood when an organ is damaged and pathological changes (Figure 1).

Biomarkers of susceptibility: These biomarkers cover a range of types from deficiency in metabolic enzymes to variation in repair systems. These would typically be measured in individual members of a population (Figure 1).

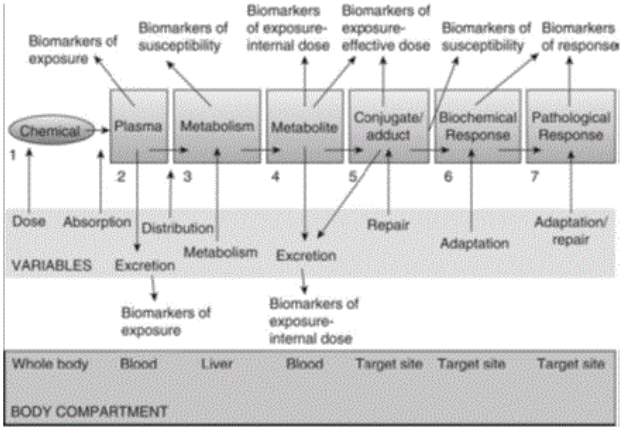

Figure 1: Type of biomarker and their relationship to the exposure-diseas model of toxicity [5].

Indeed, a biomarker of response could be almost any indication of altered structure or function. However, although the new technologies (genomics or transcriptomics, proteomics and metabonomics) have an increasingly important role, interpretation of the often large amount of data generated is a significant task requiring bioinformatic techniques such as pattern recognition. Furthermore, all biomarkers of response must be validated in relation to certain criteria. It cannot be assumed, because a gene is switched on or off. Biomarkers of response are necessary for determination of the no observed adverse effect level (NOAEL) and the dose-response relationship [5].

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