EPA Science Forum 2003
Partnering to Protect Human Health and the Environment

Development of DNA Microarrays for Ecological Exposure Assessment

Emerging Technologies

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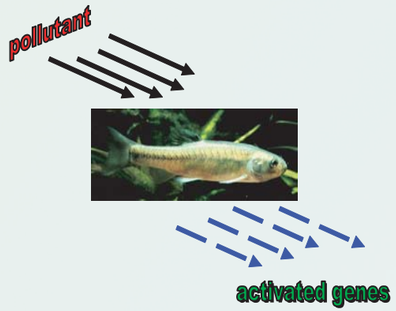
The Problem

- *How do environmental stressors impact our aquatic resources?*
- *Can we develop a tool to rapidly screen environmental water samples for contaminants?*

Can we use fish to monitor the environment?

A specific toxicant or pollutant will initiate a specific reaction by influencing which genes are activated.

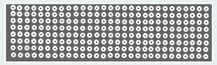


Why the Fathead Minnow?

- *EPA use for over 30 years as a toxicity model for aquatic exposure*
- *easy to culture and maintain*
- *easy to sort sexes by visual inspection*
- *hardy, found throughout the continental US*

Which genes can we use?

Gene microarrays represent hundreds to ten thousands of genes

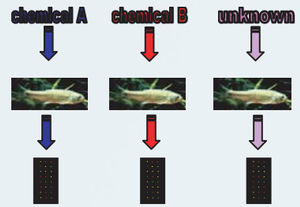


Development of fathead minnow microarrays will allow rapid screening of many pollutants

Each pollutant will generate a specific pattern of activated genes

Patterns will result in a diagnostic tool for detection and monitoring in the environment

Utility of Microarrays as a Screening Tool



- *Known chemicals will generate a specific gene expression pattern as indicated for chemical* **A** and **B**
- *Comparison of an unknown environmental sample with profiles of known chemicals can be used to determine the effects of a specific chemical* **unknown** = **A**

Impacts

- *Integration of gene expression data for aquatic exposures in computational toxicology*
- *Better understanding of processes from exposure to effect*
- *Reduce uncertainties is assessing risk of pollutants in the environment*

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