LINKAGES BETWEEN POLLUTANTS AND PHYSIOLOGICAL PROCESSES IN FISH EXPOSED TO TYPICAL URBAN WATERS

Ignacio Rodriguez-Jorquera[1], K. J. Kroll[2], G. S. Toor[3] & N. D. Denslow[2].

[1]Interdisciplinary Ecology Program, School of Natural Resources and Environment, Soil and Water Science Department, University of Florida.

[2] Department of Physiological Sciences & Center for Environmental and Human Toxicology, University of Florida, Gainesville, USA

[3] Soil & Water Quality Laboratory, Gulf Coast Research & Education Center, Institute of Food & Agricultural Sciences University of Florida, Gainesville, USA.

Urban waters may contain a mixture of pollutants potentially toxic to aquatic biota. Because fish are indicators of the effect of water pollution on other vertebrates, information about the toxicity effects of pollutants on fish can be used to develop practices to protect water quality and aquatic biota. The fact that toxicity is preceded by gene expression alteration allows the use of approaches like microarrays for early detection of toxic effects. Here, we show the gene expression profiles of male fathead minnow liver exposed to three urban waters collected from (1) streamwater downstream of a wastewater treatment plant, (2) treated wastewater from a wastewater treatment plant, and (3) stormwater from an urban lake. These three types of waters were used as whole effluents in a 48-hour fish exposure study. Microarray analysis was conducted to assess changes in gene expression of exposed fish and historic and present analytical chemistry data were used to make linkages with observed effects in fish. The statistical significant differences in gene expressions compared to controls (LOESS normalization and ANOVA $p \leq 0.05$) were 588 genes altered for streamwater, 800 for stormwater, and 384 for treated wastewater exposed fish**.** About 10 biological processes including lipid biosynthesis, electron transport, and carbohydrate metabolism were affected in fish exposed to streamwater, stormwater, and treated wastewater, respectively. The microarray results suggest that within the diversity of chemicals present in these waters, the main influence over the normal physiological processes in fish liver was appeared to be caused by cholesterol-lowering drugs (statins) and plasticizers such as perfluorochemicals.