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Application of Ecotoxicogenomics for Studying Endocrine Disruption in Vertebrates and Invertebrates

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Chemicals released into the environment potentially disrupt the endocrine system in wild animals and humans. Exposure to estrogens/estrogenic chemicals during critical periods of development induces persistent changes in various organs, including persistent molecular alterations. Estrogen-responsive genes and critical developmental windows of various animal species, therefore, need to be identified to understand the molecular basis of estrogenic activity during embryonic development. To understand molecular mechanisms of toxicity in various species, toxicogenomics/ecotoxicogenomics, defined as the integration of genomics (transcriptomics, proteomics and metabolomics) into toxicology/ecotoxicology, need to be established as powerful tools for research. As the initial step toward using genomics to examine chemicals, estrogen receptors and other steroid hormone receptors have been cloned in various species, including reptiles, amphibians and fish, and alterations in the expression of these genes in response to chemicals were investigated. We are identifying estrogen-responsive genes in mouse reproductive tracts using cDNA microarray and trying to establish microarray systems in the American alligator, roach, medaka and *Daphnia magna*. It is too early to define common estrogen responsive genes in various animal species, however, toxicogenomics/ecotoxicogenomics provide powerful tools to help us understand the molecular mechanism of chemical toxicities in various animal species."

