

## **Biomarkers for exposure to environmental estrogens.**

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Pollution by estrogenic compounds can be devastating in that they can disrupt reproduction and therefore jeopardize the continuation of the affected life forms. Estrogenic compounds warrant concern because they are ubiquitous and lipid soluble, and therefore can accumulate in the food chain. Also, the additivity of several estrogenic compounds can reach a threshold for toxicity even when the separate components are insufficient to quantify in environmental samples. Thus, a relatively quick and reliable bioassay is needed whose endpoints can be used as biomarkers of environmental exposure to estrogenic substances. We have developed such an assay.

Estrogens upregulate a number of proteins produced in the liver, including ceruloplasmin (CPN) and angiotensinogen (ANGI). Because CPN and ANGI are secreted into plasma where their concentrations increase directly in response to estrogens, they can be used as biomarkers of estrogen exposure both in wildlife and humans. When this assay was tested using diethylstilbestrol (0.05 mg/kg sc for 14 days), a 2-3 fold increase in uterine weight, CPN and ANGI plasma levels was observed. Similar results were seen with ethinyl estradiol (100 µg). This project was funded by the Illinois Department of Natural Resources.