

What's in the water? Estrogenic activity documented in fish caught in Pittsburgh's rivers

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A new study from the University of Pittsburgh Cancer Institute's Center for Environmental Oncology suggests that fish caught in Pittsburgh rivers contain substances that mimic the actions of estrogen, the female hormone. Since fish are sentinels of the environment, and can concentrate chemicals from their habitat within their bodies, these results suggest that feminizing chemicals may be making their way into the region's waterways.

The study being presented at the annual meeting of the American Association for Cancer Research, April 14-18, at the Los Angeles Convention Center, also demonstrated that the chemicals extracted from the local fish can cause growth of estrogen-sensitive breast cancer cells cultured in the laboratory. Extracts of fish caught in areas heavily polluted by industrial and municipal wastes resulted in the greatest amount of cell growth.

"We decided to look at piscivorous fish, those that eat other fish, for this project because we know that they bioaccumulate contaminants from water and their prey, which may include toxic metals, farm and industrial runoff and wastes from aging municipal sewer systems," said Conrad D. Volz, Dr.P.H., M.P.H., principal investigator, department of environmental and occupational health, University of Pittsburgh Graduate School of Public Health. "The goals of this project are to use fish as environmental sensors of chemicals in the water and the aquatic

food chain, and to determine the origins of these chemical contaminants," said Dr. Volz. The study examined white bass and channel catfish caught in the Allegheny, Monongahela and Ohio Rivers. These fish are among those commonly caught as a food source by local anglers.

The experiments to determine if estrogenic substances were present in the fish were performed in the laboratory of Patricia K. Eagon, Ph.D., co-principal investigator of the study with the Veterans Affairs Medical Center and the University of Pittsburgh School of Medicine. Dr. Eagon found that extracts from the fish acted like estrogen, a female hormone, by binding to estrogen receptors – the proteins within cells that render the cells sensitive to estrogen.

Of six bass extracts tested for estrogenic activity, four displayed a strong or moderate ability to bind with the estrogen receptors. Of 21 catfish extracts tested, nine displayed a similar ability to bind with the estrogen receptors. The researchers also examined whether the fish extracts could result in growth of breast cancer cells cultured in the laboratory, and they found that two bass extracts produced strong-to-moderate cell growth, as did five catfish extracts.

"We know that there are hundreds, even thousands, of chemicals in the environment that can have estrogenic activity," said Dr. Eagon. "These chemicals usually come from industrial pollution, farm animals, farm chemicals and municipal water treatment plants. What surprised us most in this study was that these estrogenic materials are present in such easily detected levels in local fish."

According to Dr. Volz, the next step in this research is to identify the estrogenic chemicals and their sources in the local water and fish. "These findings have significant public health implications, since we drink water from the rivers where the fish were caught. Additionally, the

consumption of river-caught fish, especially by semi-subsistence anglers, may increase the risk for endocrine-mediated health endpoints like some cancers and developmental problems."

Source: University of Pittsburgh

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