

Environmental exposure research and public policy

By Deepa Singh

In addition to providing data on the health effects of exposures to harmful chemicals, researchers can help promote policies to reduce or prevent exposures, said Tracey Woodruff, Ph.D., during her Feb. 2 NIEHS Keystone Science Lecture Seminar Series talk. A professor at the University of California, San Francisco School of Medicine, [Woodruff](#) (<http://profiles.ucsf.edu/tracey.woodruff>) studies how exposures affect early human development.

Opening with the success story of phasing out lead from gasoline and paint, Woodruff pointed out that the neurotoxic effects of lead were well known even before Benjamin Franklin wrote about lead in his famous 1786 letter to Benjamin Vaughan. Although earlier identification of risk can improve public health, lead is only one contaminant of concern. “While the production of lead was going down, the production of manufactured chemicals used in many everyday products was going up,” she said.

According to Woodruff, 9.5 trillion pounds of chemicals were produced in 2012, or approximately 30,000 pounds per person in the U.S. However, little is known about the uses and health effects of these chemicals. “Understanding the relationship between exposures and health effects, particularly during the developmental periods, is important to prevent harm,” she said.

Scanning for chemicals in biological samples

Woodruff also addressed the importance of studying mixtures of chemicals. “We wanted to know the status of combined environmental exposures, because early pregnancy is a vulnerable period of development,” she said. In a [study](#)

(<http://www.ncbi.nlm.nih.gov/pubmed/21233055>)

using data from the ongoing National Health and Nutrition Examination Survey ([NHANES](#)),

(<http://www.cdc.gov/nchs/nhanes.htm>)

a program of studies designed to assess the health and nutritional status of adults and children in the United States, Woodruff and colleagues found 43 different industrial chemicals in more than 99 percent of the pregnant women who participated.

There are challenges to scanning biological samples for multiple chemicals, Woodruff noted. One newer method, known as time-of-flight mass spectrometry, enables unbiased detection, or discovery of molecules that were not targeted for analysis.

In a recent study, Woodruff and colleagues analyzed blood samples from 80 pregnant women. They found potential chemical hits for phthalates, pesticides, and phenols in numbers much higher than the 43 chemicals previously reported. NHANES testing addressed only 11 percent of the chemicals identified in these women. “There are lots of chemicals that are measured in almost everyone, and looking at these exposure profiles will help us understand the influence on health outcomes,” she said.

Reducing the gap

“Our goal is to shrink the time between when we have a scientific discovery and when we take an action to limit exposures,” Woodruff continued. “We want to make the science more useful for public health decisions.”

For example, phthalates, which are present in personal care products, were not originally part of NHANES measurements, she said. When the Centers for Disease Control and Prevention initiated a larger scale biomonitoring program in 2000, they [measured phthalates](#)

(<http://www.ncbi.nlm.nih.gov/pubmed/24425099>)

across the whole U.S. population. Notably, the highest levels were found in women of reproductive age.



Woodruff, an NIEHS grantee, directs the program on reproductive health and the environment and is a professor in the department of obstetrics, gynecology, and reproductive sciences at the University of California, San Francisco. (Photo courtesy of Steve McCaw)



Woodruff's talk prompted lively discussion from the audience, including Sue Fenton, Ph.D., left, head of the National Toxicology Program (NTP) Reproductive Endocrinology Group, and Alfonso Latoni, Ph.D., head of the Division of Extramural Research and Training Scientific Review Branch. (Photo courtesy of Steve McCaw)

Since then, use of certain phthalates has decreased. “There was a response in the marketplace because of these data, where an exposure and its source were identified, and then the legislative and nongovernmental groups took action,” Woodruff said. Legislation and market pressure to remove phthalates from beauty products and toys has resulted in lower levels detected in more recent NHANES samples, she said.

Woodruff closed her talk on an optimistic note, saying that physicians have become key partners, by informing not only their patients, but also policymakers in Washington, D.C., about the impact of environmental chemicals on the public’s health.

Citation: Woodruff TJ, Zota AR, Schwartz JM.

(<http://www.ncbi.nlm.nih.gov/pubmed/21233055>)

2011. Environmental chemicals in pregnant women in the United States: NHANES 2003-2004. *Environ Health Perspect.* 19 119(6):878-885.

Citation: Zota AR, Calafat AM, Woodruff TJ.

(<http://www.ncbi.nlm.nih.gov/pubmed/24425099>)

2014. Temporal trends in phthalate exposures: findings from the National Health and Nutrition Examination Survey, 2001-2010. *Environ Health Perspect.* 122(3):235-241.



Woodruff spoke to a room full of NIEHS and NTP scientists. The talk was hosted by Kimberly Gray, Ph.D., who directs the NIEHS and Environmental Protection Agency Centers for Children’s Environmental Health and Disease Prevention Research. (Photo courtesy of Steve McCaw)

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