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Uranium, the Newest 'Hormone'

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## ENVIRONMENT

**Can phthalates subtly alter boys?**

To identify a young rodent's gender without doing an elaborate test, biologists measure the distance from the animal's anus to its genital opening. This anogenital distance is slightly, but reliably, longer in males than in females—unless those males were exposed in the womb to pollutants, such as phthalates, that can alter fetal sex-hormone production. When that happens, a male's anogenital distance can become more similar to that of a female. Preliminary data suggest a similar trend in boys whose mothers were exposed during pregnancy to elevated amounts of some phthalates.

Phthalates, chemicals used in making many cosmetics, plastics, and other products, have become ubiquitous pollutants.

Epidemiologist Shanna H. Swan of the University of Missouri in Columbia and her colleagues collected urine samples from pregnant women in four U.S. cities. Tests for phthalate-breakdown products indicated that all the women had been exposed to phthalates, Swan reported. However, the amount of exposure varied from city to city. For instance, residues from certain phthalates were 40 to 90 percent higher in the women from Columbia than in those from Minneapolis.

The researchers then measured genital features in the infants, including anogenital distance, and correlated them with their moms' prenatal phthalate values.

In girls, subtle changes in anogenital distance appeared to be associated with phthalate residues in the mothers' urine. In boys, the relationship was far stronger and "highly significant," says Swan. In fact, sons of women with the highest phthalate-residue concentrations were seven times as likely to have a short anogenital distance as were boys whose mothers had the lowest phthalate exposure in the study.

No one knows whether the anatomical changes are important in the boys' reproductive lives, notes Swan. In male rodents, however, fetal-phthalate exposures have been shown to severely disrupt the development of reproductive organs (*SN*: 9/2/00, p. 152), and last year researchers linked phthalate exposures

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in men to aberrant sperm (*SN*: 5/31/03, p. 339) and in women, to shortened pregnancies (*SN*: 9/13/03, p. 173). —J.R.

## BIOMEDICINE

**Uranium, the newest 'hormone'**

The incidence of several cancers is especially high on the Four Corners Navajo Reservation, which straddles the Arizona–New Mexico border. Because the region hosts more than 2,000 abandoned uranium mines, many of which release dust into the air and water, area researchers wondered whether mine pollution might partially explain the high rate of reproductive-organ cancers in teenage Navajo girls—a rate 17 times that of U.S. girls generally.

New animal studies led by Cheryl A. Dyer and Stefanie R. Whish of Northern Arizona University in Flagstaff support that suspicion.

The researchers exposed young female mice to a soluble form of uranium similar to what enters groundwater from mines. To limit the animals' production of natural estrogens, the researchers removed the ovaries—the hormones' main source—from all the mice in the study. Estrogens are known to be a leading cause of many reproductive cancers.

For 1 month, most mice received drinking water laced with uranium or diethylstilbestrol (DES), an estrogen-mimicking drug. Concentrations of the uranium were half the amount that the Environmental Protection Agency permits in drinking water and roughly one-tenth the concentration found in some water wells on the reservation.

Mice getting DES- or uranium-treated water showed classic markers of heavy estrogen exposure, but mice receiving plain water didn't, Whish notes. In animals drinking the spiked water, for instance, the external opening of the vagina developed early, cells lining the vagina were bigger than normal and exhibited protein changes akin to those that produce nails and corns, and the uterus weighed significantly more than normal. In related test-tube experi-

ments, uranium exposure increased the proliferation of breast-cancer cells, just as estrogen does.

None of these changes accompanied uranium exposure if the animals also received injections of a chemical that blocks estrogen's access to cells. This evidence strongly suggests that "uranium is acting as an estrogen," says Whish. —J.R.

## ENDOCRINOLOGY

**DDT linked to miscarriages**

Although production and use of DDT have been banned throughout most of the world for decades, people continue to carry the pesticide's residues in their bodies. That's a concern because animal studies have shown that DDT can mimic the action of some hormones and derail the normal development of reproductive tissues (*SN*: 2/5/00, p. 87). A new study conducted in China's rural Anhui province indicates that at DDT concentrations present in young women there, the pesticide can not only affect menstrual cycles, but also can foster miscarriages in the first few weeks of pregnancy.

Scott A. Venners of the Harvard School of Public Health in Boston and his colleagues studied 388 newly married, non-smoking textile workers who were attempting to get pregnant. Blood tests of each woman indicated how much of DDT and its breakdown products were stored in her body. Each woman also submitted a daily urine sample for analysis of human chorionic gonadotropin (hCG), a hormone whose concentration in urine rises sharply within a week or so after conception. In some women, hCG concentrations rose only to plummet a few weeks to a month later, signifying a miscarriage.

After stratifying the women into three groups on the basis of blood DDT concentrations, the researchers found that each additional 10 nanograms of the pesticide per gram of serum increased a woman's chance of early miscarriage by 17 percent. Women in the highest-exposure group—with a mean concentration of 53 ng of DDT per gram of serum—were twice as likely to miscarry within the first 6 weeks of pregnancy as were women in the lowest group, with a mean serum DDT concentration of only 16 ng/g. However, Venners notes, among women who were far enough along to know they were pregnant, no difference in miscarriage rates emerged among the different DDT-exposure groups. —J.R.



## GLOSSED OVER?

Cosmetics, including nail polishes and perfumes, contain phthalates.