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Male, interrupted

As more genital birth defects are seen in boys, attention turns to phthalates, chemicals found in a variety of consumer products.

By Faye Flam

Inquirer Staff Writer

At Children's Hospital of Philadelphia, surgeon Howard Snyder says he and his colleagues repair the genitalia of roughly 300 baby boys every year - about double what they did when he started his practice 30 years ago.

He's not the only doctor who's noticed an increase in this kind of birth defect.

The most common of them, hypospadias, nearly doubled in the United States between the late 1960s and early 1990s, according to researchers from the Centers for Disease Control and Prevention.

Snyder suspects that while in the womb, some of these boys may have been affected by hormone-disrupting chemicals called phthalates, found in dozens of consumer products.

These chemicals give plastics flexibility, prevent perfumes from losing their scents, and keep nail polishes from chipping.

But in lab rats and mice, doses comparable to those we humans absorb from the environment can disrupt the formation of male genitals and otherwise feminize male animals. One small study from the University of Rochester also linked these chemicals to irregularities in male genital development.

Despite that, phthalates are added to numerous products ranging from deodorants to shower curtains to IV tubing in hospitals.

While the European Union has banned one type of phthalate in nail polishes and several others in children's toys, the U.S. Environmental Protection Agency is "assessing the toxicity of several phthalates," and awaiting results of a National Research Council study, expected next year, a spokesman said.

The specific problem that concerns Children's Hospital's Snyder - hypospadias - is considered an incomplete development of the male organs, causing a boy's urethra to exit the underside of his penis. In most cases, surgeons can reroute the urethra, but it can take several difficult operations.

While there's yet no direct link between this defect and phthalates, the dramatic increase in cases and the animal data have many doctors concerned.

The American Chemistry Council, a trade group, defends the compounds, saying that the animal data may not apply to humans.

Chris Bryant, a council spokesman, cited a council news conference, stating that dozens of studies found no link between phthalates and adult diseases.

Industry and federal toxicologists also questioned the validity of the one human study, he said, because it was small and flawed in its methods.

But the animal data alone should prompt concern, said Theodore Schettler, a physician and science director of the Science and Environmental Health Network, an environmental advocacy group.

"There's a huge animal database showing how exposures to phthalates during development can have effects at levels hundreds of times lower than these needed to show any impact on an adult," he said.

Timing of the exposure matters, and the most harm may occur between the eighth and 15th weeks of pregnancy, when a fetus' sexual differentiation starts, he said.

"If my testosterone dropped by 20 or 30 percent for a couple of days, it wouldn't matter," he said. "But for a developing fetus, it could matter a whole lot if there was a substantial drop in testosterone."

Phthalates fall into a group of chemicals called endocrine disruptors because they either mimic or block the action of human hormones. Phthalates interfere with the synthesis of testosterone.

Bisphenol A, another controversial chemical that is found in plastics, can mimic female hormones. Consumers' concerns about bisphenol A, which has been used for years to make plastics stiff, have prompted some producers and retailers to announce in recent months that they would stop using and selling it.

The attorneys general of New Jersey, Delaware and Connecticut sent letters to 11 manufacturers two weeks ago, urging that the chemical be eliminated from baby bottles and other children's products. A U.S. Food and Drug Administration advisory committee is scheduled to discuss conflicting reports about bisphenol A on Friday.

Phthalates affect males more than females, at least in animals, because of the way sex organs grow. Developmental biologists say that up until eight weeks, fetuses have the rudiments of both male and female sex organs. After that point, those with a Y chromosome develop gonads that are supposed to secrete testosterone, after which the male hormone starts turning the fetus into a male.

Testosterone starts the construction of male genitalia. As part of that, the opening of the urethra migrates from a position near the testicles to the end of the penis. Hypospadias is thought to result from incomplete masculinization.

No studies so far have directly connected hypospadias to phthalate exposure, but one study by University of Rochester researcher Shanna Swan suggested a link to anatomical variations.

Swan, a professor of environmental medicine and obstetrics/gynecology, collected urine samples from several hundred pregnant women and tested them for nine compounds known to come from metabolizing phthalates.

Then she asked pediatricians to conduct a standard genital exam on 134 boys born to these women.

She found that boys whose mothers were most exposed to certain phthalates were more likely to have undescended testicles and to have smaller penises.

More pronounced was a feature known to indicate feminization in lab animals - a shortened distance between the genitals and the anus. This so-called anogenital distance, or AGN, is normally twice as long in boys as in girls, as it is in male rats compared with females. Swan found that boys of mothers with the highest phthalate levels during pregnancy were much more likely to have relatively short AGNs.

Not all phthalates affected boys in the study. A common one that did was called DBP, or dibutyl phthalate, an ingredient in nail polish, hair sprays, perfumes, and other personal-care products.

The chemistry council said the study was too small to be considered valid.

University of California San Francisco urologist Larry Baskin said he was trying to get grant money for a larger study to check these findings. In the meantime, he said, "I think there's enough animal evidence that it's reasonable to have a warning label for pregnant women."

The problem is that no one is quite sure how people are getting exposed, said the Environmental Health Network's Schettler. The human body can clear out phthalates in a day or two, but many people seem to continue picking it up from the environment.

Another common phthalate, DEHP, is used to make plastic flexible in shower curtains, vinyl flooring, and IV bags and tubes. Some pregnant women and their babies may get a harmful dose of DEHP in the hospital, he said.

Pregnant women may also be absorbing DBP from personal-care products and cosmetics, Schettler said. "You'll almost never find it on the label," he said. Because it's often used as a solvent for fragrances, companies are allowed to simply list "fragrance" on the label of DBP-containing products.

He said that a few years ago he participated in a study along with the group Health Care Without Harm. They bought dozens of common personal-care products from supermarkets and pharmacies and analyzed them for phthalates. "We found them in one form or another in 70 percent of the products we tested," he said.

Unfortunately, he said, regulatory agencies are swamped with untested substances. "You're being exposed to a series of chemicals that have not undergone safety testing because our regulatory system is nonfunctional."

Snyder, at Children's Hospital, said he became concerned about phthalates 15 years ago when he noticed the number of hypospadias cases seemed to be rising.

And while hypospadias can be corrected, he said, it still can be traumatic for patients.

"It's a very tricky surgery," Snyder said. Though his specialty is officially urology, he said, "you have to be well-versed in plastic surgery to be able to handle these delicate tissues in boys between 6 and 9 months old." Some children need to come back for several surgeries.

"It bothers kids to have genitalia that don't look standard," he said. "Boys should be able to stand up and write their names in the snow."

About Phthalates

Who is at risk?

Doctors are most concerned about exposures among pregnant women between their eighth and 15th weeks. During that period, a delicate balance of hormones directs the development of sex organs in the fetus.

Spotting phthalates

Experts say phthalates can be hard to find on labels, because they are often used as a solvent for fragrances, and companies can simply list "fragrance."

Common sources

Types of phthalates, and where they are found:

DEP (diethyl phthalate): deoderant, fragrance, hair gel, hair mousse, hair spray, hand and body lotions

DBP (dibutyle phthalte): nail polish, deoderant, fragrance, hair spray.

DEHP (diethylhexyl phthalate): fragrance

SOURCE: Environmental Working Group

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