Several new studies indicate that common industrial chemicals called phthalates (pronounced tha-lates) in food and water may be interfering with development of the reproductive system in both boys and girls.

** For 20 years, large numbers of baby girls in Puerto Rico between the ages of six months and 2 years have been experiencing premature breast development, a condition called precocious thelarche (pronounced thee-larky). Since 1970, there have been 4674 cases of precocious thelarche recorded in Puerto Rico, where the condition is now occurring in 8 out of every 1000 baby girls, or just under 1%. Compared to a group of baby girls studied in Minnesota, precocious thelarche in Puerto Rico is 18 times as prevalent.

For 20 years, scientists have tried to link the alarming epidemic in Puerto Rico to artificial hormones in meat, pharmaceutical manufacturing wastes, and infant formula containing high levels of phytoestrogens (plants that contain natural estrogen-like chemicals), but no satisfactory explanation has emerged. Now researchers have found evidence linking precocious thelarche to common phthalates.[1,2]

Blood samples from two groups of girls in Puerto Rico -- 41 baby girls with precocious thelarche and 35 with normal development -- were examined for pesticides and phthalates. Pesticides were not found in either group. Phthalates were present in the blood of 68% of the precocious thelarche group and 14% of the control group. Phthalates tend not to bioaccumulate, so phthalates measured in blood are likely to reflect current exposures, not past exposures.

Phthalates are common industrial chemicals used in building materials, food packaging and food wrap, toys and other children's products, medical devices, garden hose, shoes, shoe soles, automobile undercoating, wires and cables, carpet backing, carpet tile, vinyl tile, pool liners, artificial leather, canvas tarps, notebook covers, tool handles, dishwasher baskets, flea collars, insect repellents, skin emollients, hair sprays, nail polish, and perfumes.

Brock tested for and found seven phthalate metabolites in human urine. The four phthalate metabolites found at the highest levels came from DEHP, DEP (diethyl phthalate), BzBP (butyl benzyl phthalate) and DBP (di-N-butyl phthalate). “From a public health perspective, these data provide evidence that phthalate exposure is higher and more common than previously suspected,” Brock and his colleagues concluded.[6] They offered additional reasons for concern:

** The highest phthalate levels were measured among women of child-bearing age (20 to 40) -- about 50% higher than among groups of different age and gender.

** DEHP, DBP and BzBP are known to cause birth defects in laboratory animals. (Note that BzBP is sometimes known as butyl benzyl phthalate, or BBP.)

** DBP is toxic to the testicles.

** The metabolites of BzBP and DEHP that Brock measured are toxic to sertoli cells (the cells that produce sperm). Next month a new study will conclude once again that for three decades there has been a steady (1.5% per year) decline in the quantity of sperm produced by men living in industrialized countries.[8] No one knows if exposure to phthalates is involved in the decline.

The estimated daily consumption of DEHP by children in the U.S. is calculated to be 5.8 milligrams per day.[1] The most important source of DEHP exposure is contaminated baby formula, food and water contaminated by contact with plastic containers and food wrap, and plastic toys and pacifiers made soft by the addition of DEHP. Because Puerto Rico is an island, above-average quantities of prepared foods are shipped there packaged in phthalate-containing plastics.

This small study does not prove that phthalates are causing premature sexual development among baby girls in Puerto Rico, but, combined with what is known about phthalates from laboratory animal studies, it provides a strong suggestion that phthalates may be contributing to the epidemic.

To maintain current awareness of phthalates and other endocrine-disrupting chemicals, check back regularly at http://www.ourstolenfuture.org.

** A very recent study reveals that phthalates are present in the blood of adult Americans “at levels we are concerned about,” according to John Brock, a chemist with the federal Centers for Disease Control (CDC) in Atlanta. Brock and his colleagues studied phthalates in the blood of 289 adults and found levels “higher than we anticipated.”[6,7]

Many laboratory products (such as plastic tubing) contain phthalates. As a consequence, phthalates are often found in samples analyzed in laboratories because lab equipment contaminates the samples. For the past decade, scientists have been finding phthalates in human tissue samples, but they have assumed they were measuring lab contamination. Consequently, no one has raised an alarm about phthalates in adult humans, until this month.

To measure phthalates in human urine, Brock and his colleagues developed specialized techniques for identifying metabolic byproducts of phthalates; in other words, they learned how to measure the chemicals that are produced when phthalates are processed by a human liver and kidney. By this means, Brock could be sure his team was measuring human exposures to phthalates and not merely contamination introduced into samples from laboratory equipment.

The National Research Council (NRC) (of the National Academy of Sciences) discussed two phthalates (pronounced thee-larky) in its July, 1999, study of endocrine-disrupting chemicals (see REHW #665 ). The NRC noted that female rats exposed to BBP in water prior to mating produced male offspring with significantly smaller-than-average testicles, and reduced sperm counts.[10,pg.21] A subsequent attempt to reproduce this experiment failed to achieve the same results, for reasons that remain unknown.

The Environmental Health Network in California has petitioned the U.S. Food and Drug Administration to require labeling of perfumes that contain toxic phthalates, such as Calvin Klein's Eternity. See http://users.lanminds.com/~wilworks/FDApetition/bk grinfo.htm.)

One particular phthalate -- di-(2-ethylhexyl) phthalate, or DEHP -- accounted for 88% of the total phthalates measured in the precocious thelarche group and 80% of the total phthalates in the control group. The average levels of DEHP in the control group were 70 ppb and in the precious thelarche group 450 ppb -- more than six times as great.

Some phthalates mimic estrogen (female sex hormone) and others interfere with androgen (male sex hormone).[3,4,5] In laboratory animals, some phthalates can cause birth defects and can disrupt hormones, leading to altered sexual development. Regarding reproductive and developmental effects in laboratory animals, phthalates vary in potency, with DEHP being about 10 times as potent as the other phthalates.[6] The average daily consumption of DEHP by children in the U.S. is estimated to be 5.8 milligrams per day. The most important source of DEHP exposure is contaminated baby formula, food and water contaminated by contact with plastic containers and food wrap, and plastic toys and pacifiers made soft by the addition of DEHP. Because Puerto Rico is an island, above-average quantities of prepared foods are shipped there packaged in phthalate-containing plastics.

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Administration of DBP and DEHP to pregnant rats interferes with the fetal development of male rats. DBP is widely used in perfumes, nail polishes, and hair sprays, allowing for efficient absorption through the lungs.

Phthalates were recently measured in baby food and infant formula.[9]
The NRC also noted that DBP has been shown in several animal studies to cause atrophy of the testicles, and destruction of sertoli cells (the cells that produce sperm). A multigenerational study concluded that "DBP is a reproductive and developmental toxicant to both adult and developing rats and that DBP had greater effects on the second generation than [on] the first generation."[10,pg.122] A different study showed that pregnant rats dosed with DBP at a particular time during pregnancy produced offspring with significant incidence of undescended testicles.[10,pg.123] In humans in industrialized countries, the occurrence of undescended testicles (a condition called cryptorchidism) has been increasing in recent decades.

Dr. Louis Guillette, a University of Florida zoology professor and a member of the NRC committee that studied hormone-disrupting chemicals, says that Brock's study of phthalates in adults "is going to rewrite how we look at phthalates.... Phthalates have been something of concern up to this point. Basically they're going to leap upward in terms of concern."[7]

In the U.S., the National Institutes of Health (NIH) has created a new Center for the Evaluation of Risks to Human Reproduction (CERHR). In June of this year, a CERHR panel of experts concluded its evaluation of seven phthalates. Although the CERHR study has not yet been published, CERHR issued a press release July 14 in which they acknowledged that the panel of experts had expressed "concern" that exposure of pregnant women to DEHP might adversely affect the development of their offspring.[11] DEHP is the chemical measured in baby girls with precocious breast development in Puerto Rico. As scientific and medical evidence accumulates, linking phthalates to reproductive disorders in humans, the chemical industry is digging in its heels for a 50-year fight. The industry produces a billion pounds of phthalates every year and has no intention of acknowledging that its products may cause birth defects, infertility or hormone disruption.

Because the chemical industry is so wealthy and donates huge quantities of cash to election campaigns (a perfectly legal form of bribery), in the U.S. there is almost no way to get rid of chemicals, says that Brock's study of phthalates in adults "is going to rewrite how we look at phthalates.... Phthalates have been something of concern up to this point. Basically they're going to leap upward in terms of concern."[7]

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--Peter Montague (National Writers Union, UAW Local 1981/AFL-CIO)


