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High plasticizer levels in males linked to delayed pregnancy for female partners

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(Medical Xpress)—Women whose male partners have high concentrations of three common forms of phthalates, chemicals found in a wide range of consumer products, take longer to become pregnant than women in couples in which the male does not have high concentrations of the chemicals, according to researchers at the National Institutes of Health and other institutions.

The researchers assessed the concentrations of phthalates and Bisphenol A (BPA) in couples trying to achieve pregnancy. Phthalates, sometimes known as plasticizers, are used in the manufacture of plastics, to make them more flexible. BPA is also used in plastics, including in some food and drink packaging.

According to the U.S. Centers for Disease Control and Prevention, pthalates are used in hundreds of products (PDF - 176KB) , such as fragrances, shampoos, nail polish, plastic film and sheets. For the most part, people are exposed to phthalates by eating and drinking foods that have been in contact with containers and products containing the compounds. BPA is used to make some types of plastic containers, in the protective lining of food cans, and other products.

The study authors measured urine concentrations of BPA and 14 phthalate compounds in couples trying to achieve pregnancy. The study authors explained that many phthalates are often broken down and chemically changed before they are excreted from the body.

Pregnancy took the most time to achieve in couples in which the males had high concentrations of monomethyl phthalate, mono-butyl phthalate, and monobenzyl phthalate. Neither male nor female exposure to BPA was associated with pregnancy rates.

Because the researchers examined only the time it took to achieve pregnancy, the study could not determine precisely how the compounds might affect fertility. Future studies, the authors wrote, would be needed to determine if the compounds affected particular aspects of reproductive health, such as hormone levels.

"Our study shows that exposure to certain phthalates can reduce the chance of conception for otherwise healthy couples," said the study's first author, Germaine M. Buck Louis, Ph.D., Director of the Division of Intramural Population Health Research at NIH's Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD). "Many people have been exposed to these compounds, so it's important to continue to investigate whether they have any health effects.

The study was published online in the journal *Fertility and Sterility*. In addition to Dr. Buck Louis and her colleagues from the NICHD, the study also included researchers from the Texas A&M School of *Public Health* in College Station, the New York state Department of Health, and the University at Albany of the State University of New York.

In their article, the authors cited previous studies by other researchers who found high concentrations of BPA and other phthalates among couples seeking treatment for infertility. One study found that men with a high BPA level had decreased testosterone levels. Another found that men with a high BPA concentration had a reversal in the ratio of testosterone to estradiol, an estrogen-related hormone. Numerous studies found that, compared to infertility patients without high BPA levels, women seeking treatment for infertility had lower estradiol levels, fewer

egg cells, lower rates for the implantation of the fertilized egg, and lower pregnancy rates. Similarly, the authors wrote, studies in lab animals suggest that BPA and other phthalates can hinder the maturation of egg cells, impair the production of reproductive hormones, and alter the development of reproductive organs.

For the current analysis, the researchers studied couples who were not being treated for infertility, but who were trying to conceive a child. The researchers enrolled 501 couples from four counties in Michigan and 12 counties in Texas from 2005 to 2009. The couples were part of the Longitudinal Investigation of Fertility and the Environment (LIFE) study, established to examine the relationship between fertility and exposure to environmental chemicals and lifestyle. Previous analyses from the LIFE study found that high levels of PCBs as well as of lead and cadmium also were linked to pregnancy delay.

The women taking part in the study ranged from 18 to 44 years of age, and the men were over 18. Couples provided urine samples that were analyzed for BPA and the 14 other phthalate compounds. Women kept journals to record their monthly menstrual cycles, intercourse and the results of home pregnancy tests. The couples were followed until pregnancy or for up to one year of trying.

The researchers calculated the probability that a couple would achieve pregnancy by using a statistical measure called the fecundability odds ratio (FOR). The measure estimates couples' probability of pregnancy each cycle, based on their urinary concentration of the compounds. A ratio less than one suggests a longer time to pregnancy, while a ratio greater than one suggests a shorter time to pregnancy.

BPA concentrations were not associated with a longer time to pregnancy However, male urinary concentrations of the three metabolites of phthalates were associated with approximately a 20 percent increase in

the time it took for the couples to achieve pregnancy:

Female urinary concentrations of these three metabolites were not associated with a delay in pregnancy.

"The delays in pregnancy we saw were comparable to those seen for cigarette smoking or with obesity," Dr. Buck Louis said.

Dr. Buck Louis added that the findings demonstrate that it's important to study both partners when assessing the effects of environmental substances on pregnancy outcomes. If the researchers had only studied the female partners, she added, they would have missed the association between these three phthalates and a delay in the time the couples took to achieve pregnancy.

"Clearly, in studies of this kind, males matter," she said.

According to the CDC, monomethyl pthalate is excreted in the urine of people exposed to dimethyl phthalate, which is used in manufacturing rocket propellant and consumer products such as insect repellents and plastics. Mono-n-butyl phthalate , excreted in the urine of people exposed to the dibutyl phthalates, is used as additives to personal care products such as nail products and cosmetics, and in printing inks, pharmaceutical coatings, and insecticides. Mono-n-benzyl phthalate , excreted in the urine of people exposed to benzylbutyl phthalate, is used in products such as adhesives, vinyl tile, sealants, car care products, and some personal care products. People exposed to benzylbutyl phthalate also excrete small amounts of mono-n-butyl phthalate in their urine.

The study authors noted that earlier studies had found that men with high concentrations of monomethyl phthalate had abnormalities in their semen and that men with high concentrations of mono-n-butyl phthalate had diminished sperm motility and reduced sperm count.

More information: Details of the ongoing longitudinal study are available online: www.nichd.nih.gov/about/org/di … es/longitudinal.aspx

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