

Exposure to BPA associated with reduced semen quality

EurekAlert

Oakland, Calif.(October 28, 2010) ? Increasing urine BPA (Bisphenol-A) level was significantly associated with decreased sperm concentration, decreased total sperm count, decreased sperm vitality and decreased sperm motility, according to a Kaiser Permanente study appearing in the journal of *Fertility and Sterility*.

The five-year study recruited 514 workers in factories in China and compared workers who had high urine BPA levels with those with low urine BPA. Men with higher urine BPA levels had 2-4 times the risk of having poor semen quality, including low sperm concentration, low sperm vitality and motility.

This is the first human study to report an adverse association between BPA and semen quality. Previous animal studies found a detrimental association between BPA and male reproductive systems in mice and rats.

This study is the third in a series, published by Dr. Li and his colleagues, that examine the effect of BPA in humans. The first study, published in November 2009 in the Oxford Journals *Human Reproduction*, found that exposure to high levels of BPA in the workplace increases the risk of reduced sexual function in men. The second study, published in May 2010 in the *Journal of Andrology*, found that increasing BPA levels in urine are associated with worsening male sexual function.

Funded by the U.S. National Institute of Occupational Safety and Health, this new study adds to emerging human evidence questioning the safety of BPA, a chemical created in the production of polycarbonated plastics and epoxy resins found in baby bottles, plastic containers, the linings of cans used for food and beverages, and in dental sealants.

"Compared with men without detectable urine BPA, those with detectable urine BPA had more than three times the risk of lowered sperm concentration and lower sperm vitality, more than four times the risk of a lower sperm count, and more than twice the risk of lower sperm motility," said the study's lead author. De-Kun Li, MD, PhD, a reproductive and perinatal epidemiologist at Kaiser Permanente's Division of Research in Oakland, Calif. He added that urine BPA was not associated with semen volume or abnormal sperm morphology.

"Similar dose-response associations were observed among participants with only environmental BPA exposure at levels comparable to men in the general United States population," said Li.

Despite a markedly reduced sample size in this group of men exposed only to low environmental BPA sources, the inverse correlation between increased urine BPA

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level and decreased sperm concentration and total sperm count remain statistically significant, the researchers explained.

"The consistency of the findings between the current and the previous two studies, despite different exposure measurements (urine BPA levels vs. BPA exposure in the workplace) and end points (semen quality vs. sexual function), strengthens the validity of these findings," said Dr. Li. "The finding of the adverse BPA effect on semen quality illustrates two points: first, exposure to BPA now has been linked to changes in semen quality, an objective physiological measure. Second, this association shows BPA potential potency: it could lead to pathological changes of the male reproductive system in addition to the changes of sexual function."

The researchers explained that BPA is believed by some to be a highly suspect human endocrine disrupter, likely affecting both male and female reproductive systems. This new epidemiological study of BPA's effects on the male reproductive system provides evidence that has been lacking as the U.S. Food and Drug Administration and various other U.S. government panels have explored this controversial topic.

These findings, Dr. Li also points out, may portend adverse BPA effects beyond the male reproductive system. Semen quality and male sexual dysfunction could be more sensitive early indicators for adverse BPA effects than other disease endpoints that are more difficult to study, such as cancer or metabolic diseases.

For this study, workers in participating factories with and without BPA exposure in the workplace were identified and deemed eligible for the study. Among 888 eligible workers, 514 (58 percent) agreed to participate in the study. Of them, 218 participants provided both urine and semen specimens and were included in the final analyses. Through an in-person interview, participants provided information on demographic characteristics; potential risk factors that may influence semen quality including smoking, alcohol use, chronic diseases, history of sub-fertility, exposure to other chemicals and heavy metals; and recent exposure to heat sources such as a steam bath, as well as occupational history.

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