

ENDOCRINE- DISRUPTING CHEMICALS



Sperm counts are sliding and testicular disorders—including cancer—are on the rise in some parts of the world. No one has determined why.

Researchers have evidence that these trends occurred throughout the latter half of the 20th century. Studies have also revealed the increasing prevalence of environmental contaminants during the same time period, particularly

BEHIND SPERM DECLINE?

BY MARGIE PATLAK*

certain pesticides and industrial byproducts that can affect hormonal functions (endocrine-disrupting chemicals). These results have raised the question of whether these two developments might be linked.

Among the most recent research into this connection is a study by an international team of pediatric endocrinologists, Katharina Main, M.D., and Niels Skakkebaek, M.D., from Rigshospitalet in Copenhagen, Denmark, and Jorma Toppari, M.D., from University Hospital in Turku, Finland.¹ The team was intrigued by why testicular cancer, hypospadias, and cryptorchidism are significantly more common in Denmark than in Finland, even though the two countries have similar degrees of industrialization. Furthermore, healthy Danish boys on average have smaller testes than Finnish boys, and healthy Danish men have lower sperm counts than their Finnish counterparts.

The researchers explored whether exposure to different types or amounts of chemicals during prenatal development could explain these phenomena. Using breast milk as a surrogate marker for chemical exposure, they looked for the amounts and types of more than 100 persistent endocrine-disrupting chemicals. Compared with the Finnish samples, the Danish milk had a significantly different chemical signature, and significantly higher levels of certain endocrine-disrupting chemicals, including various pesticides, dioxins, and polychlorinated biphenyls (PCBs).

The three main types of chemicals that were more concentrated in Danish breast milk have been shown, singly or in small combinations, to impair fetal testis development

or to play a role in testicular cancer in other human epidemiology or in vitro studies on human fetal tissue.^{2,3} A particular strength of the international study was that it used sophisticated analyses to assess the impact of a multitude of endocrine-disrupting chemicals—what the researchers called the “pollution cocktail.” Recent rat studies suggest that combined low-dose exposures to such chemicals can wreak havoc on male reproductive system development, whereas single-chemical exposures might have no impact.⁴

“For the first time, we showed impressive national environmental chemical signatures,” said Dr. Skakkebaek. “We Danes we showed impressive national environmental chemical signatures. We Danes generally have an environment more polluted with persistent chemicals than the Finns, who have a much lower incidence of testicular cancer and reproductive problems.”

While working on the puzzle of why the Danes have more of these cancers and reproductive anomalies than the Finns, the researchers ran into another puzzle—why do Danish women have more endocrine-disrupting chemicals in their breast milk? Differences in the regulation of environmental chemicals do not appear to explain this, the researchers note. Dr. Skakkebaek suspects the culprit is as yet undetected environmental differences between the two countries. Support for this comes from one study, which found that when Finns move to a country with a higher incidence of testicular cancer, their children have the higher cancer rate. Genetic differences, including influences affecting the metabolism of organic chemicals, might also play a role.

In the meantime, these recent findings reinforce current thinking on the benefit of limiting how much exposure people have to endocrine-disrupting chemicals, the researchers point out in their journal article.¹ “It’s generally recognized that the persistent chemicals we measured are unhealthy for humans,” Dr. Skakkebaek said. “The causal link between endocrine-disrupting chemicals and testicular cancer and male reproductive problems has been clearly established in animal experiments. Why should the same chemicals not have similar effects in humans as well?” ■

* Margie Patlak is a free-lance science writer living in the Philadelphia region.

References:

1. Krysiak-Baltyn K, Toppari J, Skakkebaek NE, et al. Country-specific chemical signatures of persistent environmental compounds in breast milk. *Int J Androl*, 2009 Sep 24. [Epub ahead of print]
2. Fowler PA, Abramovich DR, Haites NE, et al. Human fetal testis Leydig cell disruption by exposure to the pesticide dieldrin at low concentrations. *Hum Reprod*, 2007;22:2919–2927.
3. Hardell L, van Bavel B, Lindström G, et al. Increased concentrations of polychlorinated biphenyls, hexachlorobenzene, and chlordanes in mothers of men with testicular cancer. *Environ Health Perspect*, 2003;111:930–943.
4. Kortenkamp A. Low dose mixture effects of endocrine disruptors: implications for risk assessment and epidemiology. *Int J Androl*, 2008;31:233–240.