Endocrine disruptors threatens semen quality

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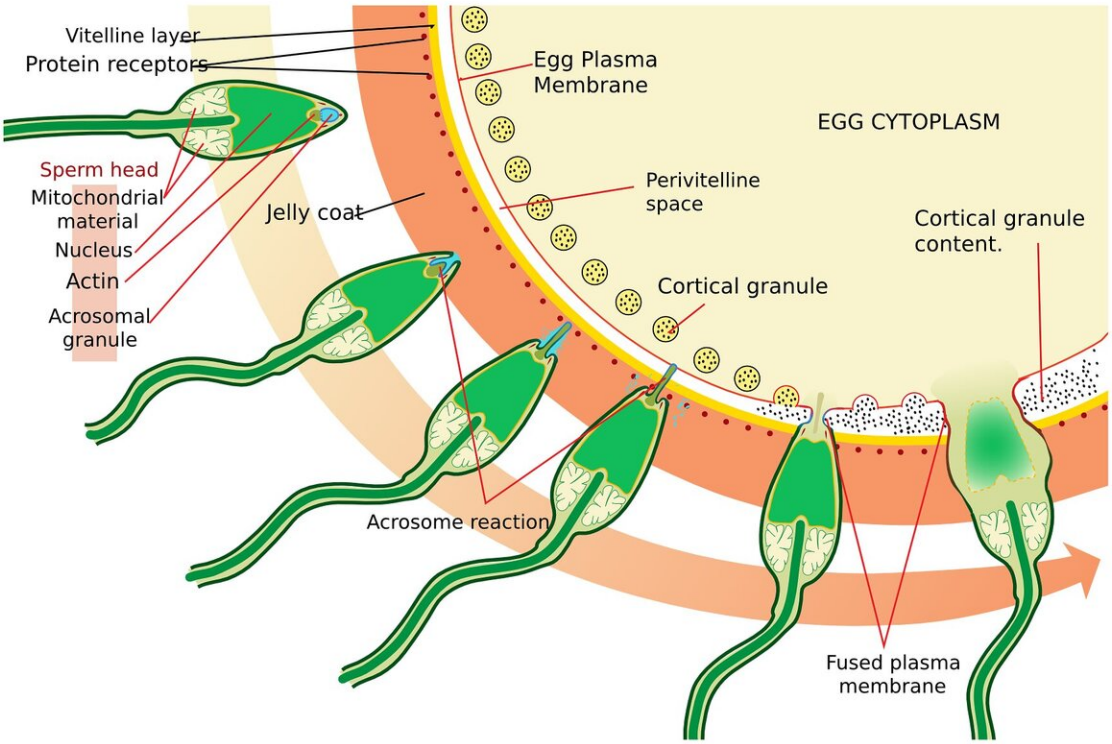

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A growing number of studies show that the environmental factors and lifestyle habits of pregnant women play an important role in the health of their child. But how about the semen quality of young men? Researchers at the University of Geneva (UNIGE), Switzerland, showed two years

ago that only 38% of Swiss men had semne parameters above the thresholds set by the World Health Organisation (WHO) for fertile men. Epidemiologists from the Institut de recherche en santé, environnement et travail (IRSET, Rennes, France), in collaboration with the UNIGE team analyzed the potential impact of endocrine disruptors on semen quality of men whose mothers were working at the early stages of their pregnancy. Their results, published in the journal *Human Reproduction*, show that men who have been exposed in utero to products known to contain endocrine disruptors are twice more likely to have semen volume and total sperm count per ejaculation below the reference values set by the WHO.

Endocrine disrupters are chemical substances of natural or synthetic origin which can interfere with the endocrine system and causes adverse health effects in an organism, or its progeny, according to the World Health Organization (WHO). "Several animal studies have already shown that gestational exposure to certain endocrine disruptors can influence the development of the male reproductive system, as well as the sperm production and semen quality in adulthood," explains Ronan Garlantézec, a researcher at the IRSET, the Rennes University Hospital Centre (CHU) and University of Rennes 1. "In view of the results obtained by Serge Nef's team on the semen quality of young Swiss men, we were interested in studying the potential effect of exposure to endocrine disruptors during pregnancy as one out of many possible reasons behind the observed trends," he continues.

The semen of more than 1000 conscripts analyzed

The team of Serge Nef, professor at the Department of Genetic Medicine and Development of the UNIGE Faculty of Medicine, has evaluated semen quality of around 3000 conscripts, 1045 out of which had their mother working during pregnancy. "For each of them, a semen quality analysis was carried out to determine the semen volume, as well

as the sperm concentration, motility and morphology," explains the Serge Nef. "A detailed questionnaire was also sent to the parents before the semen analysis was carried out, covering in particular the maternal jobs exerted during the conscripts' pregnancy period."

This allowed for the analysis of semen parameters of men whose mothers were employed during their pregnancy. "The maternal jobs were classified according to the International Classification of Occupations (ISCO-88 of the International Labor Office of the WHO)," explains Luc Multigner, research director at the IRSET. "Exposure to products containing endocrine disruptors during pregnancy has been defined using a job-exposure matrix, which makes it possible to attribute the maternal exposure a probability score." This has enabled epidemiologists to establish probabilities of exposure to one or more categories of products that may contain endocrine disruptors according to the mother's occupation.

Endocrine disruptors associated with poorer sperm quality

The results of this study show that young men exposed in utero to endocrine disruptors are twice as likely to have values below the reference values established by the WHO, both in terms of the semen volume (threshold at 2 ml) and the total number of spermatozoa per ejaculation (40 million). "In our study, the products most associated with these anomalies were pesticides, phthalates and heavy metals," notes Ronan Garlantézec.

"These observations do not determine the future fertility of young men, and only a follow-up over time will make it possible to assess the consequences. Nevertheless, the results could explain, at least in part, the low semen quality of some young Swiss men," Serge Nef continues. An

additional study is already planned in this same population to study the link between maternal occupational exposure to endocrine disruptors and changes in sexual hormones during adulthood.

Preventing exposure to endocrine disruptors

The results of this study suggest an association between the mother's occupational exposure to endocrine disruptors and a decrease in several semen parameters in their children during adulthood. "It therefore appears necessary to inform women planning to conceive and during their early stages of pregnancy of the potential hazards of exposure to these substances, which could alter their children's fertility," underlines Luc Multigner. "Similarly, it would be interesting to carry out a similar study in women, in order to evaluate whether the impact of endocrine disruptors is the same on the female reproductive system, although this is much more complex to carry out," explains Ronan Garlantézec. Finally, the data concerns mothers 25 years ago. Since then, the professions exerted by women have greatly evolved, as has the presence of endocrine disruptors in the products used. "Hence the crucial preventive role of this study," concludes Serge Nef.

More information: M Istvan et al. Maternal occupational exposure to endocrine-disrupting chemicals during pregnancy and semen parameters in adulthood: results of a nationwide cross-sectional study among Swiss conscripts, *Human Reproduction* (2021). DOI: 10.1093/humrep/deab034

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