

Embargoed: 00.01 hrs London time Thursday 13 October 2005

EU research suggests that PCBs do damage sperm – but finds no dramatic effect on male fertility

Research by an EU-supported international team of scientists has shown that polychlorinated biphenyls (PCBs)¹ - synthetic organic chemicals found widely in the environment and absorbed in the diet – may damage sperm. ([full-text article](#))

But, lead author Dr Marcello Spanò, of the Italian National Agency for New Technologies, Energy and the Environment (ENEA), stressed that the study had found no dramatic effects on human fertility and had not revealed any serious public health threat. However, the findings were a warning and further research was needed.

The study, reported on line today (Thursday 13 October) in Europe's leading reproductive medicine journal *Human Reproduction*², also looked at dichlorodiphenyldichlorethylene (DDE) – a breakdown product of DDT³ – but found that it did not appear to damage sperm DNA.

The impact of persistent organochlorine pollutants (POPs)⁴, of which PCBs and DDT are two, on human fertility is still unknown and there are limited and contradictory findings so far as to whether PCBs and DDT/DDE damage human sperm. This study, which is part of a wide-ranging project known as INUENDO⁵, set out also to see whether these two POPs damage sperm by altering its chromatin integrity. (Chromatin is the DNA and associated proteins that make up a chromosome).

The research, which is the first to collate data about reproductive effects of POPs from a general population, involved over 700 men – 193 Inuits from Greenland, 178 Swedish fishermen, 141 men from Warsaw in Poland and 195 men from Kharkiv in Ukraine.

The scientists used Sperm Chromatin Structure Assay (SCSA)⁶ to test the integrity of sperm samples from the majority of the volunteers and assess the level of DNA damage – the DNA fragmentation index (DFI). They measured blood serum for levels of hexachlorobiphenyl (CB-153), which is a marker for total non dioxin-like PCBs in the body. The men also answered questionnaires on their lifestyle, occupations and reproductive history.

The results produced an intriguing and puzzling finding: among the European men overall, the DFI rose in concert with rising levels of PCBs in the blood, with sperm DNA fragmentation reaching a 60% higher average level in the group exposed to the highest levels of POPs. But, no such significant association was found among the Inuit men.

"The results from the Inuit cohort are surprising and reassuring. As usual, we wanted a simple answer and instead we found a lot of new questions," said Dr Spanò, who is Group Leader, Reproductive Toxicology, Section of Toxicology and Biomedical Sciences at ENEA in Rome. "We can only speculate, at this stage, that genetic make-up and/or lifestyle factors seem to neutralise or counterbalance the pollutants in this group."

It could be, he said, that the profile of the pollutants played a role. PCBs are a class of compounds that include around 200 toxic by-products (congeners). "We measured only two important POPs as it would be a Herculean task to consider them all, so we are seeing only the tip of the iceberg."

Dr Spanò said it was important to keep the results in perspective. The median level of damaged sperm DNA was 10% and the large majority of men in the study were fertile. The probability of fathering a child starts to decrease when the proportion of damaged sperm reaches about 20% and becomes negligible from 30-40% onwards. "PCB exposure might negatively impact reproductive capabilities especially for men who, for other reasons, already have a higher fraction of defective sperm," he said.

Research priorities now include time-to-pregnancy studies (already underway) and regional differences. "But what we badly need are data on exposure of unborn babies, as the endocrine disruption hypothesis suggests that foetal and peri-natal exposure could be more relevant as far as health and reproductive consequences are concerned," he said.

He added that there were few epidemiological studies of the reproductive effects of POPs and population studies were imperative for better risk assessment. This research paper was the first of many that would report the overall findings of the project. INUENDO was a major undertaking only made possible by the skill and enthusiasm of the international research teams and the thousands of people who had contributed information and biological samples, said Dr Spanò. "We are indebted to them."
(ends)

1 PCBs – synthetic organic chemicals that have been used in hundreds of industrial and commercial applications.

2 **Exposure to PCB and p,p'- DDE in European and Inuit populations: impact on human sperm chromatin integrity. Human Reproduction. doi:10.1093/humrep/dei297.**

3 DDT – a pesticide once widely used for insect control, banned in most western countries in the 1970s, but still used in some sub-tropical countries.

4 POPs – Under the 2001 Stockholm Convention on POPs, signed by nearly all countries under the auspices of UNEP (the global treaty to protect human health and environment from POPs), there is a binding commitment to reduce and ultimately, where feasible, eliminate a range of chemicals, including PCBs, with PCBs being totally eliminated by 2025. The convention also restricts production and use of DDT, which is now acceptable only for disease vector control where no effective alternatives exist.

5 INUENDO (INUit-ENDOcrine): Acronym for "Biopersistent organochlorines in diet and human fertility. Epidemiological studies in time to pregnancy and semen quality in Inuit and European populations". INUENDO is an EU cost shared research project undertaken between 1 January 2002 and 30 June 2005. Co-ordinated by Prof. Jens Peter Bonde, Århus University Hospital, Denmark and undertaken by nine European research teams. **Website: www.inuendo.dk**

6 Sperm Chromatin Structure Assay (SCSA): A technique for assessing sperm quality invented by Prof. Don Evenson, University of South Dakota, USA.

Notes:

1 PDF version of this press release and full embargoed text of the paper with complete results can be found from 09:00hrs London time Tuesday 11 October at: <http://www.oxfordjournals.org/eshre/press-release/oct05.pdf> or is available immediately from Margaret Willson.

2 Human Reproduction is a monthly journal of the European Society of Human Reproduction and Embryology (ESHRE). Dr Helen Beard, Managing Editor. Tel: +44 (0) 1954 212404. Email: beardh@humanreproduction.co.uk

Please acknowledge Human Reproduction as a source

3 ESHRE's website is: <http://www.eshre.com>

4 Abstracts of other papers in ESHRE's three journals: Human Reproduction, Molecular Human Reproduction & Human Reproduction Update can be accessed post embargo from <http://www.oxfordjournals.org/eshre> Full text of papers available on request from Margaret Willson.

Contact (media inquiries only)

Margaret Willson: Tel: +44 (0)1536 772181. Mobile: +44 (0)7973 853347.

Email: m.willson@mwcommunications.org.uk