

*The study is published in “Revista Internacional de Andrología”*

## **Poor sperm quality is related to the transmission of toxic substances during pregnancy and lactation**

- **An earlier study published in Reproductive Biomedicine Online compared the sperm quality in two different autonomous communities (Catalonia and Galicia) and showed that in the more industrialized area (Catalonia) sperm quality was worse.**
- **The latest results show that these differences also appear in the levels of toxic compounds found in maternal milk: the level of toxins in the breast milk of Catalan women is up to four times higher than for women living in Galicia.**
- **The study suggests that the pollutants gathered in the mother may alter the development of the male genitalia in utero and lead to future subfertility..**

*Barcelona, July 2011* - Oligospermia, or the low concentration of sperm cells in semen, could be related to the exposure of embryos to the so-called [endocrine disruptors or EDCs](#) (chemical compounds that act as estrogens in the human body), has been shown in a study carried out by [Institut Marquès](#)' Investigation Team, [ICRA](#) (Catalan Institute for Water Research) and [CSIC](#), published this month in “*Revista Internacional de Andrología*”.

The “*Bridging exposure to endocrine disruptor compounds during fetal and perinatal life with the rate of oligospermia*” paper makes a comparison between the levels of these chemical pollutants (endocrine disruptors) found in the maternal milk of women from Catalonia and Galicia. It shows that these levels are much higher in Catalonia, an area that has undergone enormous industrial development in the past 50 years, and where it has also been shown that sperm quality is poor. Dr. Marisa López-Teijón, head of the Assisted Reproduction Service at Institut Marquès and director of the study, explains that “*we have corroborated the hypothesis that the transmission of environmental toxic elements from mother to son during pregnancy and lactation is a key factor in male infertility.*”

Drs. Marinella Farré and Damià Barceló, from the ICRA (Catalan Institute for Water Research) and CSIC, found a total of 38 different endocrine disruptors

proceeding from 68 different milk samples - 34 from catalan and 34 from galician women. According to Dr. López-Teijón, “we measure these disruptors in maternal milk because its high levels of fat makes it an ideal vehicle for finding the compounds stored in adipose tissue.”

### 94% of the milk samples contained toxic elements

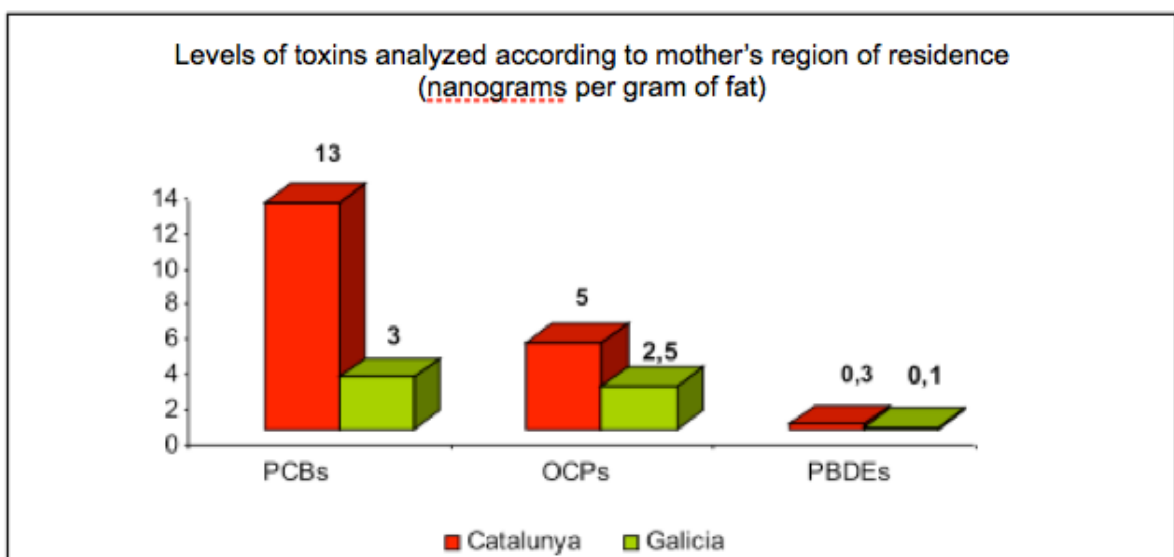
All milk samples were collected in the 40 days following the birth of the baby. The CSIC team then analyzed them and found that the milk of only 4 of the 68 women (about 6%) was toxin-free, and all of these women were Galician.

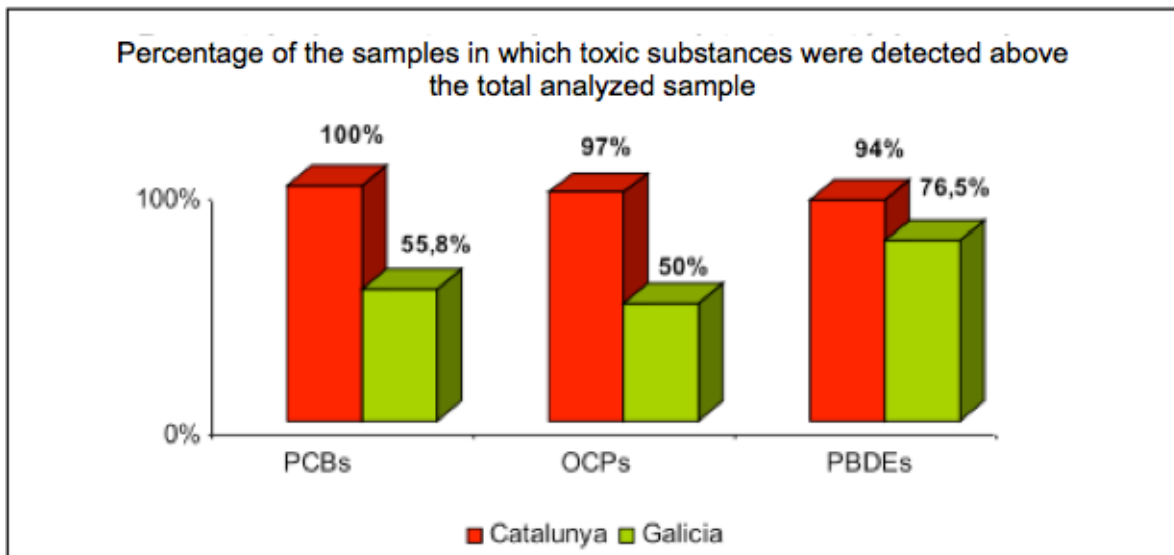
According to Damià Barceló, Director of ICRA and deputy director at IDAEA-CSIC, “in the study, a clear difference between the populations can be appreciated. This is related to higher industrialization in Catalonia and to certain life habits such as the intake of packaged food. In recent years studies looking at the impact of pollution upon human health are being taken more seriously: parallel studies to the one presented, where maternal milk is used as a tracer of pollution rates, are currently being carried out in USA, Japan, and Europe.”

Likewise, it was noted that [DDT](#), a pesticide banned more than thirty years ago, was present in all catalan samples except one.

The 38 analyzed toxic substances were divided into 3 groups: PCBs, OCBs, and PBDEs.

As observed in the following chart, the concentration of polychlorinated biphenyl ([PCBs](#)) in catalan women was found to be four times higher than in galicians (13 nanograms per gram of fat versus 3 ng/g), while the level of organochlorine pesticides ([OCPs](#)) and polybrominated diphenyl ethers ([PBDEs](#)) appeared to be double the amount (5 ng/g and 0,3 ng/g of fat versus 2,5 and less than 0,1 ng/g of fat respectively).





### Differences in sperm quality between two autonomous communities with different levels of industrialization

In 2007, *Reproductive Biomedicine Online* published a comparative [study](#) by Institut Marquès where semen samples from two Spanish provinces, Barcelona and Coruña, were contrasted. The average sperm cell concentration appeared to be 59.3% million/ml in Barcelona and 91.7% mill/ml in Coruña.

The report was extended in 2008 with a new multicentred [study](#) published in *Andrology* and the findings were confirmed: 22.7% of young Catalan males' sperm cell concentration was lower than normal while in Galicia, the percentage was of only 8.5%.

According to Dra. López-Teijón, *“the highest levels of oligospermia lay in communities that had undergone the greatest industrialization in the past 50 years, and we believe it is due to the exposure of the embryo to chemical pollutants.”*

### Pollutants that remain in our organism for decades

Apart from being resistant to natural degradation, the quantities of certain organic pollutants are magnified by the food chain. Some of these compounds, such as PCBs and organochlorine pesticides, have endocrine disrupting properties. Endocrine disruptors, or EDCs, are chemical substances that act as female hormones or pseudo-estrogens in the human organism. They are obtained via the diet, water, or the daily intake of industrial products. They act in small doses, accumulating in the organism and remaining in it for decades. They gather in fat and are abundant in maternal milk. During pregnancy, EDCs found in the mother's

blood cross the placenta and enter the fetus' circulatory system, occasionally affecting sensitive organs such as the testicles.

As stated by the authors of the study, this would explain why the incidence of oligospermia and congenital testicular abnormalities is higher in regions where exposure to these contaminants is higher.

Following on from these hypotheses, several studies have been carried out on animals during the last few years to demonstrate that when supplied in small quantities during pregnancy, endocrine disruptors can cause oligospermia, genital malformations, and testicular damage.

*"Pollution affects our organism; all the environmental toxic substances a woman accumulates throughout her lifetime can interfere with the correct development of her son during gestation and result in a future fertility problem. Since these toxic substances accumulate in areas of fat, there is a greater amount of them in maternal milk, so she will also pass them to her son during lactation,"* remarks Dr. López-Teijón.

However, a [study](#) published in Environment International by the same authors shows that formula milk and children's cereals also contain perfluorinated compounds from the packaging, cartons, and containers used during the processes of production, transportation, and storage, even though these levels are lower than those accepted by EFSA (European Food Safety Authority).

The researchers consider the further study of the effect of endocrine disruptors found in water and diet on health to be extremely necessary. *"This important public health issue requires more attention from us all"*, concludes the report.

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