



Endocrine Disrupting Chemicals and EU public health protection

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European Parliament, Members' Salon

Breakfast Briefing

Prof. Shanna Swan (Mount Sinai School of Medicine, USA)

"Impacts of endocrine disrupting chemicals on human health"

Professor Swan presented epidemiological evidence on impacts of a group of endocrine disrupting chemicals known as phthalates, and in particular diethyl hexyl phthalate (DEHP), dibutyl phthalate (DBP), and butyl benzyl phthalate (BBP), including a range of human health effects.

Reproductive Effects

There are alterations of infant genitalia. Dr. Swan's own studies showed a greater likelihood for those women who had higher exposure to phthalates during pregnancy to bear boys with a shorter 'ano-genital' distance (AGD) and other genital tract changes, which are markers of biological 'incomplete masculinization'. **These provide evidence of a so-called 'phthalate syndrome' in human males, a syndrome that has previously been established in laboratory animals (rodents).**

Behavioral and Neurological (brain) Development

Endocrine disruptors tend to show 'sexually dimorphic' effects (effects differing between the sexes). The exposure to phthalates during critical windows pre- and post-natally can alter the amount of testosterone available to the developing organism. The studies discussed showed a variety of effects, including impacts on orientation and alertness of baby girls; delays in mental and psychomotor development; greater aggression, depression and conduct disorder in 4-9 year olds; poorer vocabulary in boys. In most studies that saw significant exposures, exposure

occurred prenatally. However, **these studies still need to be better sorted, as it is not yet clear what ages, endpoints and sex are the most affected.**

Infertility and Pregnancy Loss / Effects on Gestation

Studies on exposure to phthalates (as measured by urinary metabolites in the mother) shows conflicting associations with the length of pregnancy (some studies finding a shorter and others a longer pregnancy in women with higher DEHP exposure.). One study showed a greater risk of unscheduled caesarians. Another saw a doubled loss of pregnancy associated with higher pre-pregnancy exposure. **The evidence is tantalizing, but not conclusive. However, the implications are potentially serious.**

Semen quality & adult exposure.

On balance we don't yet know from epidemiological studies, but there are some initial associations with some phthalates. **It seems that some male hormone levels are related to adult exposure to phthalates, and this needs to be pursued.**

Thyroid Function

Exposure to DEHP is affecting thyroid function in men already being seen for fertility issues, according to one study.

Delayed Puberty

There are studies indicating delay in puberty with exposure to phthalates.

Responses in Discussion

How many studies are needed in order to make clinical recommendations for measures to reduce exposure? Approximately 2-3 robust and consistent studies are needed in order to justify being incorporated into standard of care. For adult exposures we are not there yet.

Multigenerational effects: Epigenetics show the potential of EDCs to affect up to 7 generations (currently a study on multiple chemicals in rats).

On identifying EDCs: A simple test to give a first indication of ED properties is whether effects are sexually dimorphic, because hormones are different for males and females.

Concluding Remarks

The science in the last 7 years has grown with enormous rapidity (e.g. when compared to the development of science on smoking and cardiovascular effects).

We are seeing a tidal wave of research because we have measurements of chemicals in everyone (human biomonitoring), and we are faced with an epidemic of chronic diseases. We need to better understand exactly how these are related.

One study found that babies are born with an average of 200 synthetic chemicals in their bodies (as measured in umbilical cord blood). **We are obligated to find out what these chemicals are doing to their health, and to those of future generations, especially for persistent 'legacy' chemicals (which don't break down, or effect subsequent generations).**

The restrictions on certain chemicals in products to which children are exposed is good, but does not address the exposure of women in pregnancy and their children developing in utero. **Given the acute sensitivity of the foetus to EDCs, it is critical that we deal with this sensitive exposure window**

We have a lot more research to do, but we certainly have enough indications to take action to reduce people's exposures, particularly that of pregnant women and couples desiring pregnancy.