

Adverse effects of phthalates on ovarian response to IVF

July 8 2013

Phthalates are among a group of industrial chemicals shown in some studies to have adverse effects on reproductive health and development, particularly in the male. As such, they have been collectively defined as "endocrine disruptors", and proposed as one of several possible environmental exposures responsible for a decline in fertility. They are classified in two groups - high molecular weight phthalates are used in the production of plastics, while low molecular weight phthalates are frequently used in the manufacture of cosmetics.(1) Human studies increasingly report associations of phthalates with various adverse reproductive outcomes, including altered semen quantity and quality. Their effect, however, has been less well studied in women, and, despite widespread human exposure to phthalates, little is known about the effects of low-level, daily exposures to phthalates on ovarian function - and hence on women's reproductive health.

A new study reported at this year's annual meeting of ESHRE by Dr Irene Souter of Massachusetts General Hospital and Harvard Medical School in Boston, USA, now suggests that exposure to phthalates - as measured by levels of [phthalate](#) metabolites in urine - is associated with reduced fertility when defined as a response to IVF treatment. " Our data support the hypothesis that exposure to specific phthalates might lead to adverse female [reproductive outcomes](#)," said Dr Souter.

The study followed the progress of 231 women (in 325 fresh treatment cycles) scheduled for IVF at the Massachusetts General Hospital between 2004 and 2012; [urine samples](#) were taken at the start of and

throughout treatment and analysed for metabolites of four primary phthalates.

The association of levels of urinary metabolites was then explored with three markers of response to IVF: the number of eggs produced following ovarian stimulation, [embryo development](#), and implantation failure.

Results first showed that urinary phthalates were detected in almost all the women, reflecting the widespread level of exposure. Results also showed:

- The odds of implantation failure increased with each rising quartile of two of the urinary phthalate [metabolites](#). For example, for DEHP (used in vinyl plastic products) the odds of implantation failure in the highest quartile (Q4) was twice that of the lowest (Q1).
- There was also an escalating decrease of 4.17% (Q2), 6.19% (Q3) and 11.4% (Q4) in the number of oocytes retrieved with each DEHP phthalate quartile when compared with Q1 (the lowest reference quartile).

The results thus showed that urinary concentrations of some commonly used phthalates were "dose-dependently" associated with a lower yield of IVF oocytes, and an increased risk of implantation failure. However, the results did not detect any association between levels of urinary phthalates and rates of fertilisation or embryo development.

Commenting, Dr Souter believes the results "support the hypothesis" that phthalates are widespread in the environment and may well have an adverse effect on female fertility, particularly when tested in the model of IVF.

"We are all primarily exposed to phthalates through inhalation and ingestion," she explained. "It is extremely difficult if not impossible to avoid exposure to phthalates, since they are in so many products."

However, she added, exposure can be reduced by the following:

- Limit the use of personal care products with fragrances in them (including many of the modern baby care products and air fresheners).
- Limit use of plastic food storage containers and plastic wraps (certainly do not heat food in them).
- Read the labels and avoid children's toys made of plastics (vinyl) that contain phthalates.

Provided by European Society of Human Reproduction and Embryology

Citation: Adverse effects of phthalates on ovarian response to IVF (2013, July 8) retrieved 27 April 2024 from

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