

# Science linking environmental contaminant exposures with fertility and reproductive health impacts in the adult male (respondent)

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During the sessions we have heard about very appropriate issues, including that windows of susceptibility may vary, that interactions of contaminants may cause effects that far exceed the sum of individual effects, that dose–response relationships may not be standard, that genetic polymorphisms that influence individual response exist, and their nutritional supplements may eliminate contaminant effects. We have also heard about endpoint measurements such as hormone levels and gamete. What we did not hear very much about however is the desired outcomes that health care providers and patients would ask about, namely pregnancy outcomes, such as live births, the rates of congenital malformations, and the occurrence of miscarriages.

The explanation for this paradox in large part relates to issues related to the complexity of, and confounding factors related to, conducting human clinical trials. For example, the chronologic age of female partner may vary, which is inversely related to pregnancy outcome, and positively correlated with the risk for miscarriages and the rate of congenital malformations. Another factor is the biologic age of the female partner (e.g., FSH level), whereas other issues to consider are the status of the female reproductive tract (the uterus, tubes, and existence of adhesions/endometriosis), as well as the husband's semen characteristics.

Social issues are also important. The frequency of intercourse may be altered by the effects of stress on relationship with her partner, as well as biologic functions such as the menstrual cycle. Additionally, the effects of infertility can have effects on marriage, and is associated with elevated rates of divorce. A further confounding factor is that women/couples may no longer wish to wait to observe outcome, but may initiate using infertility therapy, including drugs and assisted reproductive technology, and occurrence of multiples, which make outcome difficult to interpret.

Regarding malformations it is important to note that there are differences in requirements of reporting by state, definition (e.g., still birth), qualifications of who does examinations, thoroughness of evaluation, and timing of presentation after birth. The evaluation of clinical outcomes of miscarriages is further confounded by trying to differentiate early miscarriages from menstrual irregularities. Finally, there are difficulties in data interpretation. For example, in our recent studies phthalates levels varied whether results were based on actual concentration, corrected on controlling for urine creatinine, or specific gravity. These have resulted in differing relationships (both crude and adjusted odd ratios) with regard to impact on sperm count, motility, and morphology.

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