

We are excited to send you our 2nd annual newsletter for the Environment and Reproductive Health (EARTH) Study!

Our study continues to make great progress in understanding the impact of the environment and diet on fertility and pregnancy outcomes among couples recruited from the Massachusetts General Hospital (MGH) Fertility center. In this newsletter, we describe a few of our findings during the past year and provide examples of future directions of research.

We want to also take this opportunity to thank all of you for your willingness to participate in our research study and we look forward to continuing to work together. We are also grateful to the MGH faculty (Drs. Bormann, Ecker, Petrozza, Rein, Sabatini, Schiff, Shifren, Souter, Styer, Tanrikut, and Toth) and the entire MGH Fertility Center staff that make this study so successful. In addition, we want to recognize the excellent work performed by our research team at Harvard T. H. Chan School of Public Health, specifically Dr. Jorge Chavarro, Dr. Joe Braun, Dr. Tamarra James-Todd, Jennifer Ford, Myra Keller, Patricia Morey, and Ramace Dadd. We also welcome new members of our research team, George Christou and Tairmae Kangarloo!

Sincerely,  
Dr. Russ Hauser, M.D., Sc.D., MPH  
Professor, Harvard T.H. Chan School of Public Health and Harvard Medical School



## PHTHALATES AND INFERTILITY TREATMENT OUTCOMES



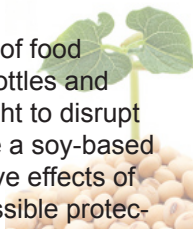
Phthalates are a family of chemicals commonly found in personal care products

**HUMAN EXPOSURE TO PHTHALATES**, a family of multifunctional chemicals frequently used in personal care (e.g., body lotions, cosmetics, shampoos, deodorants) and consumer products (e.g. flooring and wall coverings, and found in foods), is widespread and may be associated with adverse reproductive outcomes. Among women enrolled in the EARTH Study we determined whether a women's urinary phthalate concentration, was associated with reproductive outcomes following infertility treatment. In the first paper, we found that higher urinary concentrations of some phthalate metabolites was associated with lower oocyte yields and lower probability of clinical pregnancy or live birth following assisted reproduction. In a follow-up paper, we also found that women with higher concentrations of some phthalate metabolites had a higher risk of very early pregnancy loss as well as a higher risk of pregnancy loss before 20 weeks gestation. These results highlight the potential for chemicals such as phthalates to affect reproductive outcomes, even at low general population exposure levels. (Hauser et al. Environmental Health Perspectives 2016; Messerlian et al. Epidemiology 2016).

## SOY AND INFERTILITY TREATMENT OUTCOMES

**BISPHENOL A IS A CHEMICAL** found in a variety of food containers, including polycarbonate plastic water bottles and can linings. BPA can mimic estrogen and it is thought to disrupt fertility. Previous work had shown that feeding mice a soy-based diet protected them against the adverse reproductive effects of BPA. The EARTH Study was the first to show a possible protec-

tive effect of soy intake on BPA exposure in humans. We found that among women who did not eat soy foods, those with higher levels of BPA in their urine had lower rates of embryo implantation, fewer pregnancies that progressed to the point of ultrasound confirmation, and fewer live births than women with lower levels of BPA in their urine. In comparison, BPA concentrations had no impact on IVF outcomes in women who ate soy. (Chavarro JE, et al. J Clin Endocrinol Metab. 2016;101(3):1082-90.PMCID: PMC4803173.)



**WHOLE GRAINS AND INFERTILITY TREATMENT OUTCOMES**

**WHILE IT IS** generally accepted that whole grains are beneficial in preventing most chronic diseases, less is known about their impact on reproductive outcomes. In the EARTH Study, we found that higher whole grain consumption in the year prior to infertility treatment was associated with higher probability of implantation and live birth. Higher intake of bran, whether naturally occurring in foods or added to foods, appeared to be the component of whole grains that was driving this benefit. Our results highlight the importance of dietary influences on fertility and reinforce the recommendation that whole grains should be consumed as part of a healthy diet (Gaskins et al. Fertility and Sterility 2016).



**PARABENS AND INFERTILITY TREATMENT OUTCOMES**

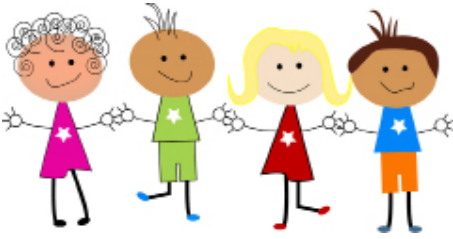
**PARABENS ARE PRESERVATIVES** widely used in personal care products, including lotions, cosmetics and colognes/perfumes. The most common are butylparaben, methylparaben, and propylparaben. Although they are approved as generally recognized as safe (GRAS) chemicals, recent animal studies showed adverse effects of parabens on reproductive health. Thus, several manufacturers of personal care products have started to sell paraben-free products in response to customer concerns. We investigated whether parabens measured in urines were associated with adverse reproductive outcomes in women enrolled in the EARTH Study and undergoing IVF treatments. We did not find associations between any of the parabens and adverse reproductive outcomes. (Mínguez-Alarcón et al., Fertility & Sterility 2016).

**FOLATE AND VITAMIN B12 IN RELATION TO INFERTILITY TREATMENT OUTCOMES**

**FOLATE AND VITAMIN B12** are two vitamins that cannot be produced in the body and must be supplied by the diet. They are required for normal red blood cell formation, repair of tissues and cells, and synthesis of DNA, the genetic material in cells. A growing literature suggests that consumption of folic acid and vitamin B12 is not only important for the prevention of neural tube defects but also for the ability to get pregnant and maintain a pregnancy to term. Using the EARTH Study, we measured levels of folate and vitamin B12 in blood samples taken from women. Although none of the women were folate deficient and very few were vitamin B12 deficient, women with the highest levels of folate and vitamin B12 had substantially higher probability of live birth compared to women with the lowest levels. Moreover, women who had the highest levels of both nutrients seemed to benefit the most. Our results support the importance of preconception folic acid supplementation and suggest the additional intake of vitamin B12. (Gaskins et al. 2015 American Journal of Clinical Nutrition)

**CHILD FOLLOW-UP STUDY**

**WE ARE VERY** excited to launch our new study on children of participants from the EARTH study! More than 500 children have been born to participants in our study. The new study is designed to better understand how your child's growth and health are related to environmental exposures during pregnancy. The EARTH study is unique in that we have detailed information on environmental exposures and diet from both men and women. It will be one of the first studies to explore exposures and diets of both men and women in relation to the health of their children. Our research nurses may contact you if you're eligible to participate.



**Want to learn more information?**

If you have any questions please feel free to contact our research nurses: Jennifer Ford and Myra Keller at 617-643-2505

Check out our website! <http://www.hsph.harvard.edu/earth>

EARTH Publications: <http://www.ncbi.nlm.nih.gov/sites/myncbi/1-mkSAjTZ9mAQ/bibliography/50114510/public/?sort=date&direction=ascending>