

We are pleased to send you our first newsletter for the Environment and Reproductive Health (EARTH) Study! Over the last 10 years, we have studied the impact of the environment and diet on fertility and pregnancy among couples recruited from the Massachusetts General Hospital (MGH) Fertility center. The funding for our study is from the National Institute of Environmental Health Sciences (NIEHS). In 2014, we received an additional 5 years of NIEHS funding to continue our research and to extend it in new directions! In this newsletter, we describe a few of our recent findings 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. Petrozza, Sabatini, Schiff, Shifren, Souter, Styer, Tanrikut, Toth, and Wright) and the entire MGH Fertility Center staff that make this study so successful and productive. 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, Jennifer Ford, Myra Keller, Patricia Morey and Ramace Dadd!

Sincerely,



Dr. Russ Hauser, M.D., Sc.D., MPH
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WHAT WE'VE LEARNED FROM THE EARTH STUDY

PLASTICS AND OVARIAN FUNCTION

The number of eggs measured by ultrasound at the start of the menstrual period is the ovarian pool, known as the Antral Follicle Count (AFC). It is an important predictor of infertility treatment success. The number of follicles decline with age and there is concern that environmental chemicals may accelerate this process. EARTH researchers studied the relationship between AFC and bisphenol A (BPA), a chemical commonly found in plastic containers and bottles, coating of cans, thermal receipts, and other sources. We found that on average women with the highest level of BPA had about a 17% decrease in AFC compared to women with the lowest level of BPA. While this decrease likely only results in a difference of about 2 eggs, more work in this area could help us understand what role BPA and other environmental chemicals have on fertility. (Souter et al., Reproductive Toxicology 2013)

PLANT ESTROGENS AND INFERTILITY TREATMENT OUTCOME

Isoflavones, a type of plant estrogen which is mainly found in soy milk and tofu, have been shown to bind to hormonal receptors and may modify the reproductive capacity of animals. These findings have led to an extensive lay literature suggesting that soy consumption may hamper female fertility. In the EARTH Study, we found that women who consumed soy, had a higher probability of having a live birth during an in vitro fertilization (IVF) treatment, compared with women who did not consume soy. While these results are at odds with the common wisdom that has arisen from the lay literature, they are consistent with a growing number of studies showing that soy may prove beneficial to female fertility (Vanegas et al. Fertility and Sterility 2015).

ORGANIC FRUITS AND VEGETABLES AND MALE FERTILITY

Studies among farmers have shown that on the job exposure to pesticides can harm sperm production. Most men do not handle pesticides on a daily basis but nearly all the population is exposed to pesticide residues in fruits and vegetables. We evaluated whether consuming fruits and vegetables known to have more pesticide residues had an impact on sperm production among men participating in EARTH. Total fruit and vegetable intake had no impact on semen quality. However, men who consumed more pesticide residue-rich fruits and vegetables had significantly lower sperm counts and fewer morphologically normal sperm. We continue to investigate the implications of this relation on treatment outcomes. Does this mean you should be switching to organic produce? We do not know at this moment. However, there are useful resources that could guide produce selection (see, for example, <http://www.ewg.org/food-news/list.php>). (Chiu et al. Human Reproduction 2015).



WHAT'S NEW IN THE EARTH STUDY

ELECTROMAGNETIC FIELD STUDY (EMF)

We recently received funding from the Electric Power Research Institute to study whether magnetic fields are associated with fertility. Magnetic fields are generated by electricity and are commonly found in and around our homes and workplaces. We are all exposed to magnetic fields and examples of common sources include power lines, hair dryers, lamps, televisions, computers, and electric blankets. Magnetic fields can penetrate the human body where they may cause health effects. In our study, we provide participants with a small meter that they wear to measure their EMF exposure throughout the day. These data will be used to determine if higher EMF exposure is associated with measures of fertility in both men and women. If you want more information on EMF, please visit the U.S. National Institutes of Health webpage on electric and magnetic fields and download a copy of EMF: Electric and Magnetic Fields Associated with the Use of Electric Power.

FLAME RETARDANTS

Flame retardants are chemicals added to many consumer products, including upholstery backing, thermoplastics used in electronics (e.g. televisions, computers), and products containing polyurethane foam (e.g. upholstered furniture). They leach out of these products, into our environment and get into our bodies. Once in our bodies they can disrupt the balance of hormones important for reproductive function such as estrogen, androgens and thyroid hormone. The National Institute of Environmental Health Sciences (NIEHS) recently approved funding that will allow us to measure flame retardants in couples from the EARTH study and assess additional aspects of reproductive health.

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 before and 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. One of our research nurses, Jennifer Ford or Myra Keller, will contact you after the birth of your child(ren) to explain the study and ask if you are interested in participating.

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