



Webinar Highlights

Endocrine disruptors and hormone levels during pregnancy

Hormone levels during pregnancy regulate fetal growth and development. Over the course of a pregnancy, these hormone levels naturally change, guiding functions such as implantation, placental angiogenesis, and immunological and metabolic adaptations. During this time, both child and maternal health are very sensitive to changes in hormone levels.

In this webinar, **Brad Ryva** and **Dr. Diana Pacyga** discussed their recent study investigating whether endocrine disrupting chemicals (EDCs) can influence a mother's hormone levels during pregnancy. Their study investigated known EDCs, including DEHP and bisphenol A (BPA), as well as chemicals used as replacements, such as DiNCH, DEHTP, and bisphenol S (BPS).

Featured Speakers: Brad Ryva, MS, Department of Pharmacology and Toxicology at Michigan State University College of Osteopathic Medicine and Diana Pacyga, MS, PhD, Postdoctoral Trainee in the Department of Epidemiology at the University of North Carolina Chapel Hill, speaking May 07, 2024.

This fact sheet has been created by CHE based on information presented in an EDC Strategies Partnership webinar. The webinar was co-sponsored by the Healthy Environment and Endocrine Disruptor Strategies ([HEEDS](#)) Mentoring Working Group as part of the Young EDC Scientists Showcase (YESS) webinar series. Selected quotes in bold are from the webinar speaker(s). For the full set of resources provided by the webinar presenters, see the [webinar page](#), where you'll also find associated slides and resources.

The Problem

A variety of EDCs are found in consumer products. As a result, pregnant women are ubiquitously exposed to EDCs, with virtually all women having detectable concentrations of EDC biomarkers in their urine, despite rapid metabolism and excretion from the body.

Classes of chemicals that are known for having endocrine disrupting properties include phthalates and phenols. Many previous studies have investigated individual chemicals from these classes for endocrine disruption. Because women are exposed to complex EDC mixtures during pregnancy,

this study's primary objective was to evaluate both individual and joint associations of multiple classes of EDC biomarkers with early- to-mid pregnancy sex-steroid and thyroid hormones.

The study used plasma samples from 302 pregnant women, who were enrolled in the Illinois Kids Development Study (I-KIDS). Plasma was collected at median 17 weeks. The plasma samples were measured for levels of sex-steroid hormones (progesterone, testosterone, and estradiol) and thyroid hormones (total thyroxine (T4), free thyroxine (T4), and thyroid stimulating hormone (TSH)). EDC concentrations were measured in pools of 5 first morning urine samples collected across pregnancy. Thirty-one urinary biomarkers were measured, reflecting exposure to 22 EDCs.

Key findings:

The study found that exposure to the mixture of EDCs during pregnancy was associated with altered maternal hormone levels.

“Our main finding was that a 10% increase in the EDC mixture was associated with a 5.65% decrease in testosterone levels.”

Testosterone at normal levels regulates key processes of pregnancy and birth.

In addition, in women carrying females, the EDC mixture was associated with an increase in total T4. In women carrying males, the EDC mixture was associated with a decrease in TSH. It is important to measure and understand the sex-specific effects of EDCs, because hormone levels differ depending on whether a woman is carrying a male or female fetus.

The study also analyzed which chemicals in the mixture were the major contributors to associations between the EDC mixture and hormone level changes. Associations between the EDC mixture and lower testosterone levels were driven by the following chemicals (listed in order of contribution):

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|-----------------------|-----------------------|
| 1. Triclosan | 4. Bisphenol S |
| 2. Propylparaben | 5. 2,4-dichlorophenol |
| 3. 2,5-dichlorophenol | 6. DEHP |

The study also looked for non-linear relationships between the EDC mixture and hormone levels because some chemicals can have non-linear dose-response relationships, where a higher dose does not necessarily equate to a stronger effect. In women carrying females, the study identified a non-linear association of the EDC mixture with estradiol. The mixture was associated with a decrease in estradiol at both lower and higher exposures, but with no change at moderate exposures. This highlights the importance of investigating low-dose response relationships.

Recommendations

Since hormone levels guide growth and development of the fetus and have effects that can last throughout life, these findings are critically important. Future studies should investigate how these associations relate to pregnancy outcomes.

The study highlights the issue of regrettable substitutions, where problematic chemicals are replaced with unknown hazards. Both bisphenol S and DEHTP, which were found to be significant contributors to associations between the EDC mixture and lower testosterone levels, are regrettable substitutes for older chemicals. It is important that we understand the hazards of new chemicals before releasing them into the environment.

As the speakers discussed, pregnancy is a sensitive time window. Interventions that focus on reducing pregnant women's EDC exposures during that window could be very effective at protecting child and maternal health. Brad pointed out the need for more studies to identify such interventions.

To Find Out More

- Watch the May 07, 2024 webinar: [Endocrine disruptors and hormone levels during pregnancy](#)
- Read the presentation slides: [Endocrine disruptors and hormones in pregnancy](#)
- Read the study: [Associations of urinary non-persistent endocrine disrupting chemical biomarkers with early-to-mid pregnancy plasma sex-steroid and thyroid hormones](#)

About the Speakers



Brad Ryva, MS is a DO/PhD Candidate in the Department of Pharmacology and Toxicology at Michigan State University College of Osteopathic Medicine. His research focuses on non-persistent endocrine disrupting chemicals from common, daily-use products and their relationship with women's health during pregnancy.



Diana Pacyga, MS, PhD is a Postdoctoral Trainee in the Department of Epidemiology at the University of North Carolina Chapel Hill. Her research thus far has focused on pregnancy, early life, and midlife as critical periods with the goal of understanding how chemical and non-chemical stressors during these sensitive windows are associated with maternal and child health.