

Endocrine Disrupting Chemicals in Food Products & Fertility

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Summary of Evidence

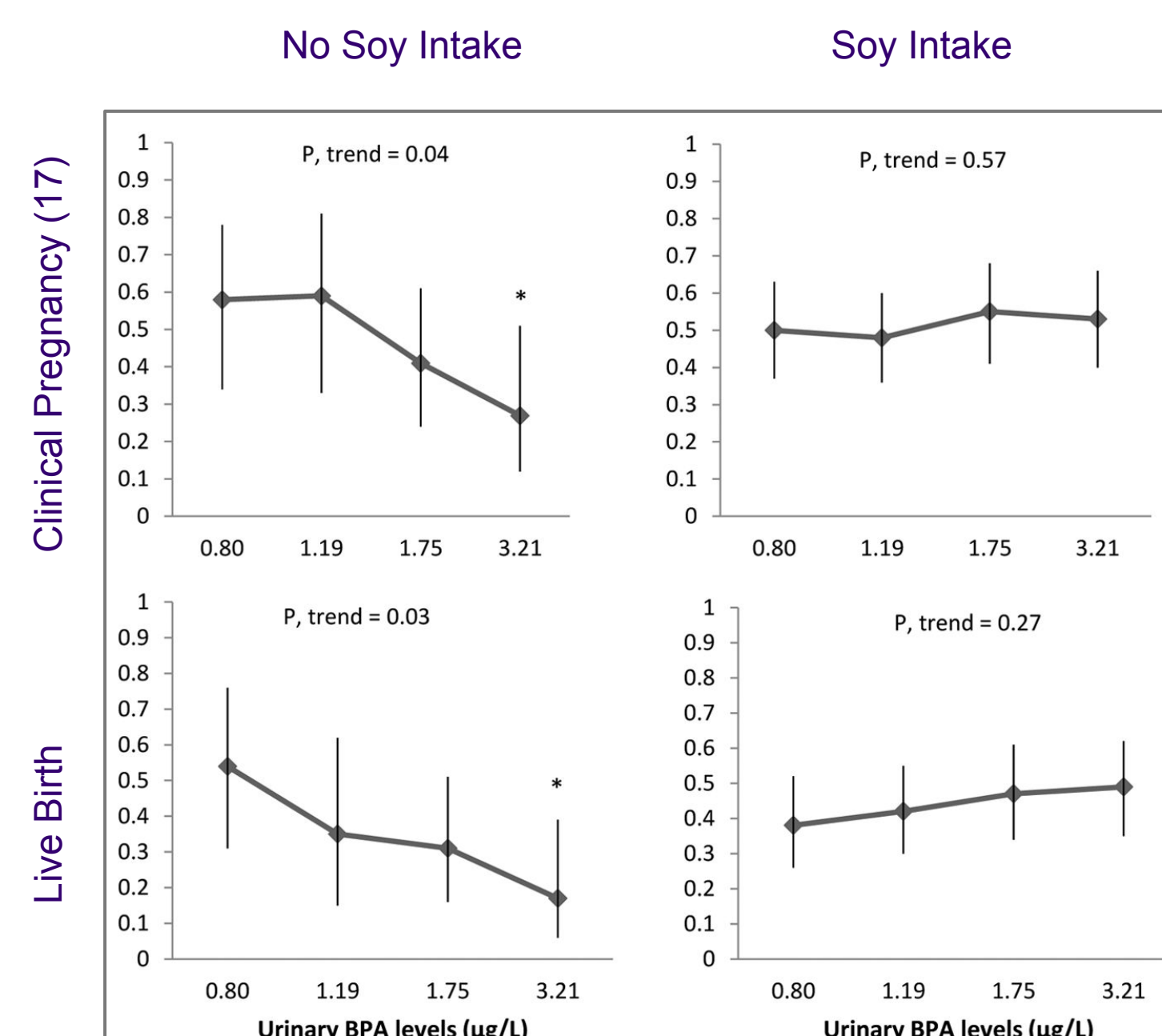
- > Endocrine disrupting chemicals (EDCs) closely resemble endogenous hormones in the body, binding to their receptor sites where they act as agonists or antagonists (1).
- > They come in several different forms: phthalates, bisphenols, parabens, organophosphates and other pesticides (1, 2).
- > These forms are ubiquitous in the food system in food packaging, plasticware and water bottles.
- > Studies have shown that EDCs are associated with:

- ◆ Increased time to pregnancy (TTP)
- ◆ Poorer IVF outcomes
- ◆ Poorer quality sperm
- ◆ Increased infertility
- ◆ Lowered testosterone

QUICK FACTS: Minimizing Exposure

- > Avoid single use plastic water bottles whenever possible - use a stainless steel or glass instead
- > Don't microwave or place plastic in the dishwasher
- > Avoid synthetic fragrance in personal care and home products
- > Limit use of canned goods - buy frozen, in bulk, glass jars or tetra packs
- > Check safety of furniture and home products and avoid those with chemical flame retardants
- > Check safety of personal care products at ewg.org

Effect Modification of Soy Intake on BPA Exposure and IVF Outcomes



Literature Review Highlights

BPA

- > Exposure to BPA affects ~ 90% of the population (1)
- > BPA is used in the lining of cans to create a barrier, in food storage containers and reusable water and baby bottles.
- > Exposure is ~ 1 microgram/kg/day in the general population (2).
- > EPA: exposure > 50 micrograms/kg/day can cause adverse effects (3).
- > Proposed mechanisms are through estrogenic effects (4), anti-androgenic effects & anti-thyroid effects, plus genetic effects (5).
- > Animal models have shown BPA inhibits follicle development and renders the uterus less receptive (5).

Wang et al. (7): Women in the highest quartile of urinary BPA had a 30% decrease in fecundability compared to women in the lowest quartile.

Zhout et al. (8): 268 infertile women with PCOS - each unit increase in BPA exposure was associated with lowered antral follicle count

EARTH study (9) - 256 women undergoing IVF - found no significant associations between BPA exposure and fertility outcomes.

EARTH Study (Chavarro et al., 17) - found that soy may mediate the relationship between BPA exposure and IVF outcomes (see figure above).

Phthalates

- > Phthalates are used to impart flexibility and durability in plastics (3).
- > Found in food packaging, detergents, lubricants and pharmaceuticals, plus personal care products (3).
- > Most people in the US have detectable levels of phthalates in their urine (3).
- > Phthalates have anti-androgenic effects and weak estrogenic effects (1).
- > Certain phthalates have been banned in children's products (4, 5)

Wang et al. (6): Systematic review found that those with phthalate exposure had 52% higher risk of abnormal sperm.

Cai et al. (7): Systematic review found exposure to certain metabolites increased risk 160% for reduced sperm concentration.

Al-Saleh et al. (9): Certain metabolites associated with poor sperm quality

Thomsen et al. & Machtinger et al. (11, 12): Certain metabolites associated with higher TTP and lower oocyte yield.

Al-Saleh et al.: Certain metabolites associated with increased risk of failed clinical pregnancy and lowered live birth rates.

EARTH Team (Hauser et al., 14): highest quartile of urinary phthalate metabolites had lower oocyte yield and were 19% less likely to have clinical pregnancy and live birth.

Organophosphates

- > Organophosphates are found in insecticides used in agriculture as well as in flame retardants and polyurethane (1).
- > They resemble sex steroid hormones and may cause similar effects and sometimes block gene transcription (1).
- > The EPA provides information on potential toxicity (26).
- > Studies have shown that people who eat organic foods have significantly less exposure than people who eat conventional produce (27).

Hu et al. (28): Highest quartile of exposure had 32% lower fecundability ratio (longer TTP) and 117% greater risk of infertility.

EARTH Study (Chiu et al. 2015, 29): Men in highest quartile of exposure had 49% lower total sperm count & 32% fewer sperm with normal morphology.

EARTH Study (Chiu et al. 2018, 30): Women in highest quartile of exposure 18% less likely to achieve clinical pregnancy & 26% less likely to achieve live birth.

References Available at: <https://tinyurl.com/y4vfdjqd>

New Protocol & Implementation

Food for Fertility is a group education class for women who are interested in diet and lifestyle strategies for improving fertility outcomes.

- > Each class includes a check-in, a lecture & interactive cooking demo, plus physical activity component.
- > Students are motivated to go above and beyond usual diet and lifestyle changes.
- > The below handout will be added to the course to provide simple, easy to follow guidance to make further changes to improve fertility outcomes.
- > It will be included in a packet distributed to students along with a brief lecture on the evidence.

Patient Education Handout

ENDOCRINE DISRUPTING CHEMICALS & FERTILITY
EDCs are chemicals found in everyday products that resemble the hormones in your body. This allows them to mimic those hormones and sometimes cause harm to your reproductive system at high levels of exposure.

PHTHALATES

Found in: Personal care products, plastic packaging, synthetic fragrance, home products and detergents.

How to Avoid: Limit use of plastic packaging for food & avoid heating or freezing plastic. Limit scented personal care and home care products. Avoid synthetic air freshener and candles. Check personal care products at www.ewg.org.

Why: Shown to be associated with abnormal sperm and lower sperm concentration. High exposure is linked to poorer IVF outcomes, lower ovarian reserve & increased time to pregnancy.

BISPHENOL A (BPA)

Found in: Plastic water bottles and containers, lining of aluminum cans, food packaging, receipt paper.

How to Avoid: Use fresh or frozen foods instead of canned. Rinse canned foods. Limit use of plastic food packaging and water bottles (don't heat or freeze). Try stainless steel or glass instead. Avoid plastic labeled with #7 and avoid thermal paper receipts.

Why: Linked to longer time to pregnancy and higher risk of infertility. May be detrimental to sperm, oocytes and may lower testosterone.

Tip: Whole foods sources of soy (tempeh, tofu, soy milk) may mitigate these effects.

ORGANOPHOSPHATES

Found in: Pesticides used on commercial fruit & vegetables, in flame retardants & polyurethane plastics.

How to Avoid: Buy organic, avoid buying furniture with lots of flame retardants and limit plastic use.

Why: Linked to longer time to pregnancy, greater risk of infertility, poor sperm quality and less successful IVF.

Further info: pnwfertility.com, ewg.org, greenopedia.com