

# Is Breast Feeding Best for the Health of Future Generations?:



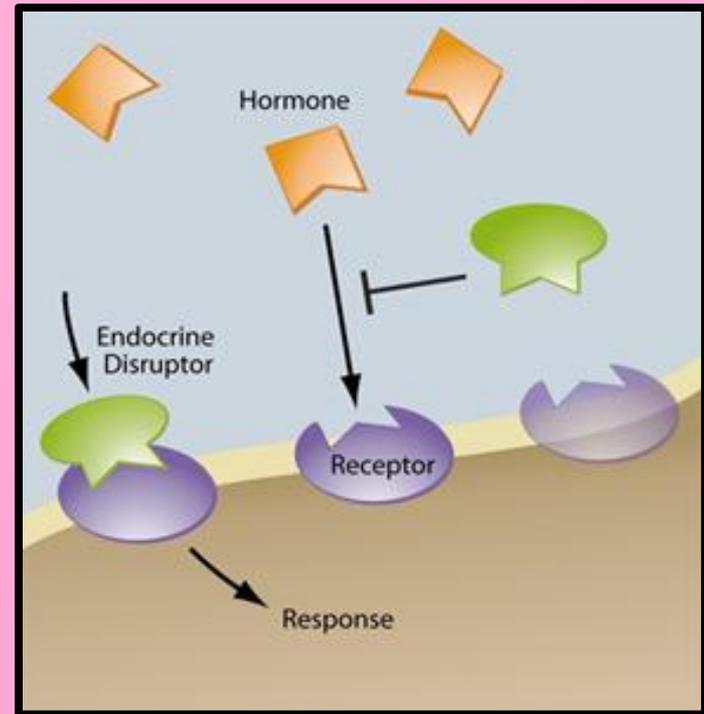
## Endocrine Disruptors in Breast Milk

An analysis of *Human Exposure to Endocrine Disruptors and Breast Milk*, (M. Stefanidou, C. Maravelias, & C. Spiliopoulou), 2009.

Grace Dible  
Marian University  
School of Mathematics and Science,  
Institute for Green & Sustainable Science  
Indianapolis, IN

# What is an endocrine disruptor?

- Any foreign substance in the body that disrupts hormone messaging by blocking, exciting, or mimicking responses
- Interact with hormone receptors either blocking or turning on unnecessary cellular signals
- Xenoestrogens are the endocrine disruptor of most concern in breast milk



# Why would endocrine disruptors be a concern?

- The EPA started testing for possible endocrine disrupting chemicals in 1996
- Screening programs currently measure the amount of chemicals in environments, including drinking water sources; however, the ecological and biological relevance are less known.
- Some scientists have been studying adverse affects of endocrine disruptors well below their “toxic” level



# What is a xenoestrogen?



- Atrazine
- Butylated hydroxyanisole
- Bisphenol A (BPA)
- DDT
- Polychlorinated biphenyls (PCBs)
- Parabens

# Why is breast milk important?

- Benefits for mother include reduced risk for type 2 diabetes and breast and ovarian cancer
- Benefits for the child include protection against gastroenteritis, lower respiratory infections, and necrotizing enterocolitis
- Optimal nutrition for infants



# Why would breast milk be toxic?

“I can’t imagine that if I fill up a cup full of 15 pesticides, 12 persistent organic pollutants, 16 heavy metals, a little Teflon, a little flame retardant and drink all of that at once that it doesn’t have a fairly potent effect on my unborn baby ...Every time we’ve done that, every time we’ve mixed these things together – each one at a level safe by itself – we find they augment each other. Together they’re worse than apart. There’s absolutely no regulation right now that limits how much of those mixtures you are going to give to your baby when you breast feed, which by the way delivers more contaminants to your baby than if you give him tap water. “ – Dr. Paul Winchester

# Why would xenoestrogens be in breast milk?

- It has been known since the 1800s that human milk contains chemical contaminants
- Toxic substances can pass from the mother to a nursing infant
- Toxic substances can pass from cows to people via dairy products



# Why would xenoestrogens be in breast milk?



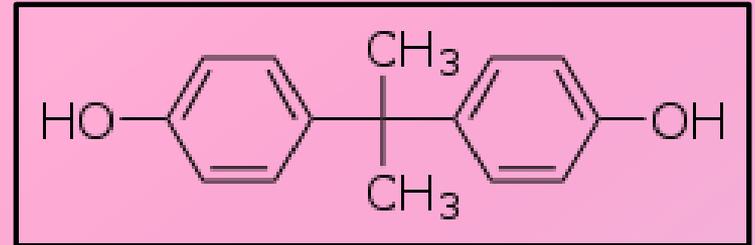
- “Certain lipophilic non-nutritional chemicals accumulated in the mother’s tissues may be transferred during breast feeding.”
- Basic compounds may also move from the less acidic blood to the more acidic milk
- These include PCBs, DDT, & maybe even BPA

# BPA in breast milk?

“One of the profound estrogenizing endocrine disrupting agents today, that is, bisphenol A (BPA), a small (228 Da) estrogenic monomer which is polymerized to produce polycarbonate plastic used in many products, showed also concentrations in colostrum that were much higher than the blood sera of mothers.”

# What is BPA?

- Normally used to make plastics and epoxy resins
- Originally invented in 1891 to synthesize plastics, but in the 1930s it was used as a pharmaceutical hormone
- Diethylstilbestrol (DES) was used instead but later found to cause reproductive cancers

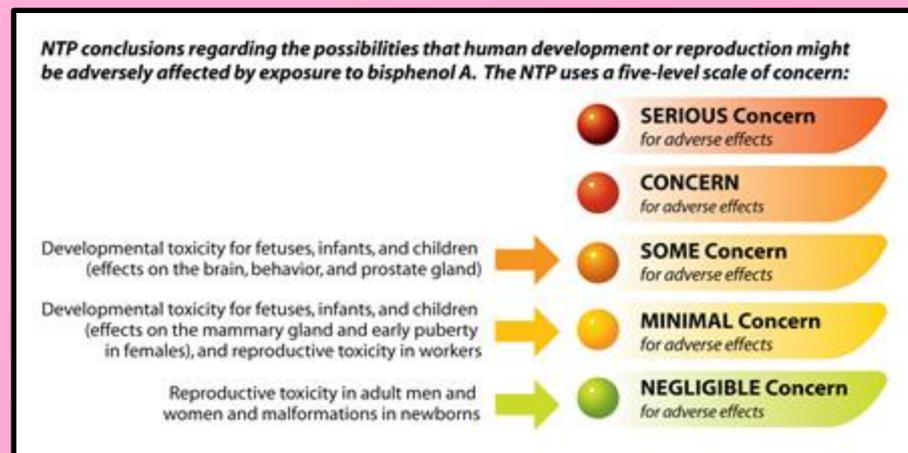


# What does Polycarbonate/BPA Global Group have to say?

1. BPA is not carcinogenic and does not selectively affect reproduction or development. The No-Observed-Adverse-Effect-Level (NOAEL) for BPA, confirmed in multiple laboratory animal tests, is 50 mg/kg body weight/day;
2. The estimated dietary intake of BPA from polycarbonate plastic and epoxy resin food contact applications, based on the results of multiple migration studies with consistent results, is less than 0.000118 mg/kg body weight/day; and
3. This potential human exposure to BPA is more than 400 times lower than the maximum acceptable or "reference" dose for BPA of 0.05 mg/kg body weight/day established by the U.S. Environmental Protection Agency, which is derived from the NOAEL.

# ...And National Institute of Environmental Health Sciences says...

“In the case of BPA, the NTP and our expert panel expressed “some concern” for potential exposures to the fetus, infants and children. There are insufficient data from studies in humans to reach a conclusion on reproductive or developmental hazards presented by current exposures to bisphenol A, but there is limited evidence of developmental changes occurring in some animal studies at doses that are experienced by humans. It is uncertain if similar changes would occur in humans, but the possibility of adverse health effects cannot be dismissed.”



John Butcher & Mike Shelby. Since you asked: bisphenol A. National Institute of Health and Environmental Sciences. 2008.

<<http://www.niehs.nih.gov/news/media/questions/sya-bpa.cfm>>.

# Going back to breast milk...



- “Breast milk has been chosen as a surrogate biomarker of previous maternal exposure to many persistent substances in the environment, the toxic substances among them are the EDCs, since they accumulate in lipid-rich tissues and thereby in breast milk.”
- So, breast milk could help biomonitor toxic accumulation
- May also determine toxins fetus exposed to in utero

# Why should we be concerned?

- Adverse health effects on reproductive organs
- Undescended testis
- Lower sperm counts
- Increase in testicular, prostate, and breast cancer

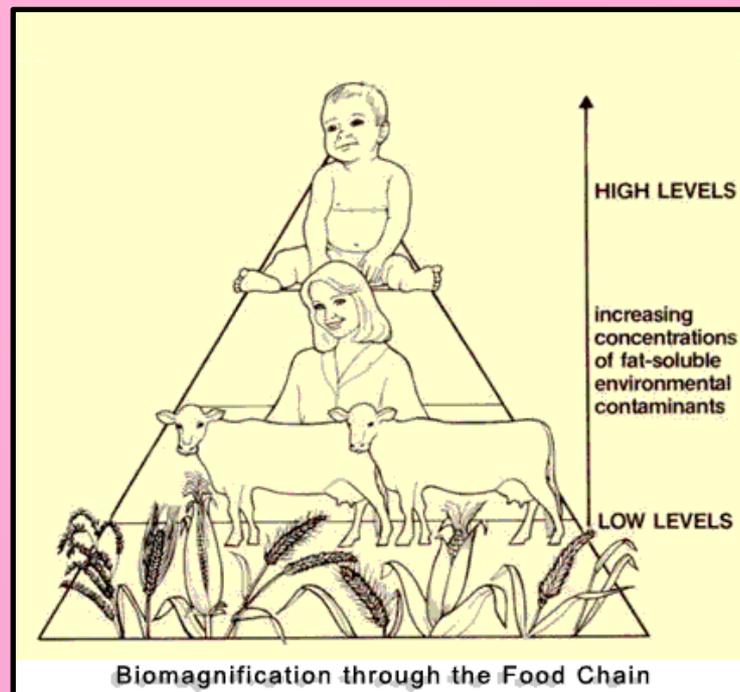


# Why should we be concerned?

“Furthermore, the role of environmental chemicals in the etiology and progression of allergy and autoimmune diseases is recently beginning to be understood. Growing evidence suggests that certain environmental chemicals can modulate the immune system function and cause disease progression. The effect of exposure to chemicals on the initiation or exacerbation of allergy and autoimmune diseases is an important emerging area needing further research emphasis.”

# Caveats...

- “These chemicals can show hormone activity at concentrations many orders of magnitude below the concentration at which toxicity occurs”
- What happens with increased bioaccumulation over generations?
- What happens later on in life if somebody is exposed in early infancy?



# How did we determine these concerns?

- Collect breast milk samples from mothers
- Have mothers answer questionnaire about development of infant
- Use chemical analysis of breast milk to determine presence of known endocrine-disrupting chemicals



# Evidence that xenoestrogens cause these problems...



- *Country-specific chemical signatures of persistent environmental compounds in breast milk*
  - Study done comparing Denmark and Finland
  - “The levels of persistent compounds were significantly higher in samples from Denmark, where higher incidences of testis cancer, cryptorchidism, hypospadias, and poor semen quality are present.”

# Poisoning the Future?

“Persistent chemicals which have accumulated in a woman’s body during her lifetime decrease in the mother’s body as they pass to her breastmilk, and hence to her nursing infant. It has been estimated that if a child is breastfed for one year, it will accumulate 4-12% of the total amount of dioxins which it would be expected to accumulate during its whole lifetime in just its first year (US EPA 1994). Other estimates suggest that for dioxins and PCBs which are known to bioaccumulate, a woman reduces her body levels of these chemicals by over 50%, by breast feeding for 6 months. Most of this will pass to her baby via breastmilk (Lindstrom *et al.* 1994).”

# And remember, breast milk is important!

- Most people around the world breastfeed children
- 3 out of 4 new mothers start breastfeeding in the United States
- Added health benefits for both mother and child



QUESTIONS???



**BREASTFEEDING**

It Rocks!