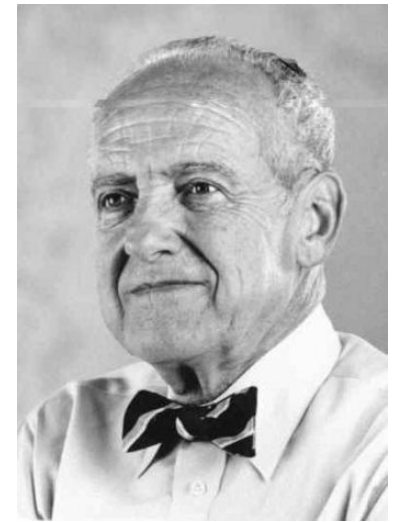


Healthy Food Packaging, Healthy Children: **glass vs plastics**

Dr. Jane Muncke, PhD
September 2013

Dr. Leonard Sax, MD PhD:

“Plastic packaging is linked to disruption of normal development in girls and boys. Therefore choose glass.”



1967: invention of PET bottle



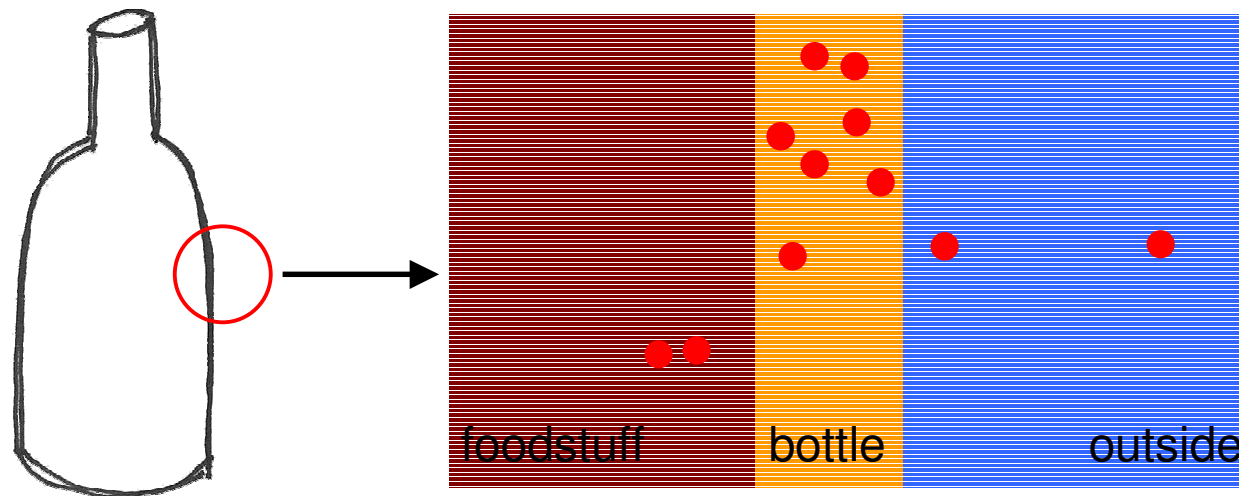
2009: the PlantBottle



1978: 2L PET bottle



Migration of plastic chemicals



heat → higher temperature increases leaching

time → long storage time increases leaching

fatty foods, acidic foods, aqueous foods.. → **it depends on food stuff what chemicals leach from the packaging**

packaging size → smaller packaging leaches more per volume of food

Migration from plastic

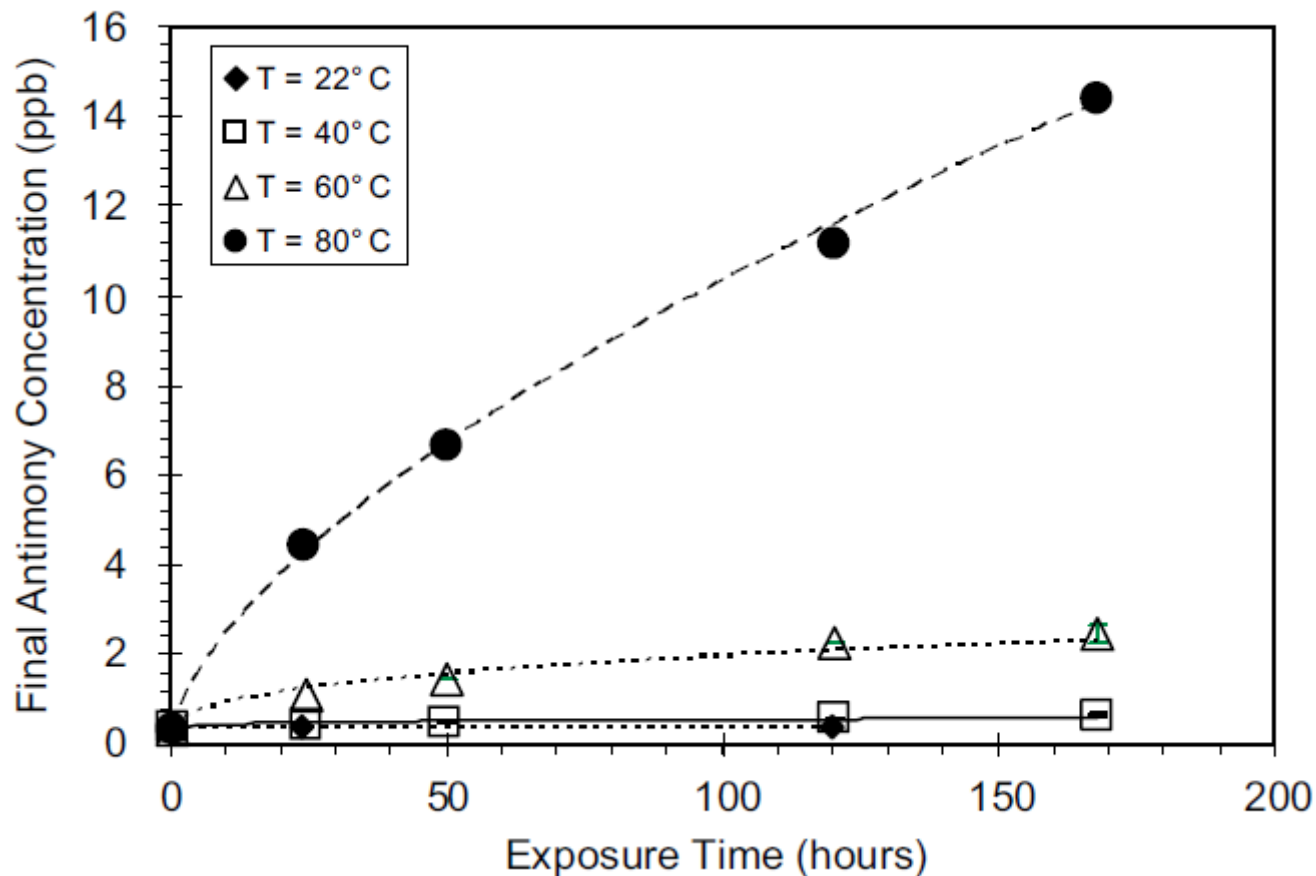
- Acidic foodstuff leads to increased leaching from plastic: vinegar, carbonated sodas, tomato sauce
- Plastics contain UV filters
- PET contains antimony → possible carcinogen, EDC
- PET leaches formaldehyde → well-known carcinogen
- No safety assessment of oligomers, reaction by products

Sax 2009

Mutsuga et al. 2006 Food Additives and Contaminants **23**(2): 212-218.

Westerhoff et al. 2008 Water Research 42(3):551-556

Antimony migration from PET

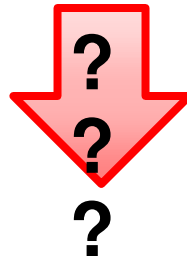


→ Migration increases with increasing temperatures

Westerhoff et al. 2008 Water Research 42(3):551-556

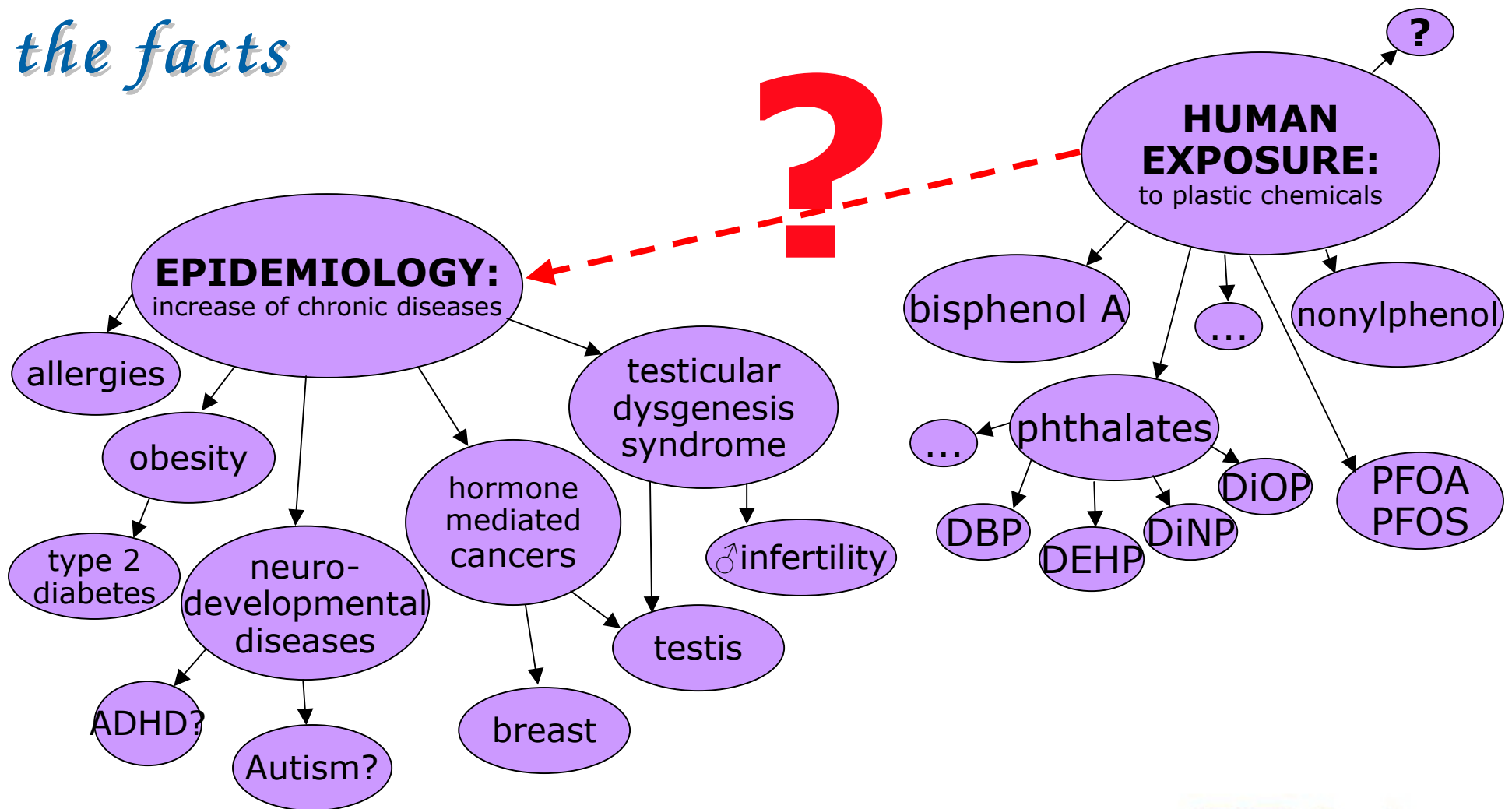
Is plastic harmful to health?

1. Today most food and drink is packaged in plastic
2. Plastic releases its components into foodstuffs
3. Unknowingly we ingest plastic chemicals every day
4. People's bodies contain numerous plastic chemicals



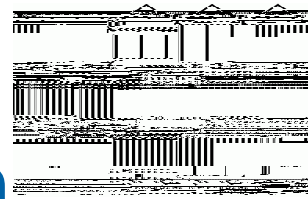
5. Children today increasingly have chronic diseases and medical conditions, like allergies, asthma, early onset of puberty, diabetes, autism, cancer

Epidemiology & Human Biomonitoring: *the facts*



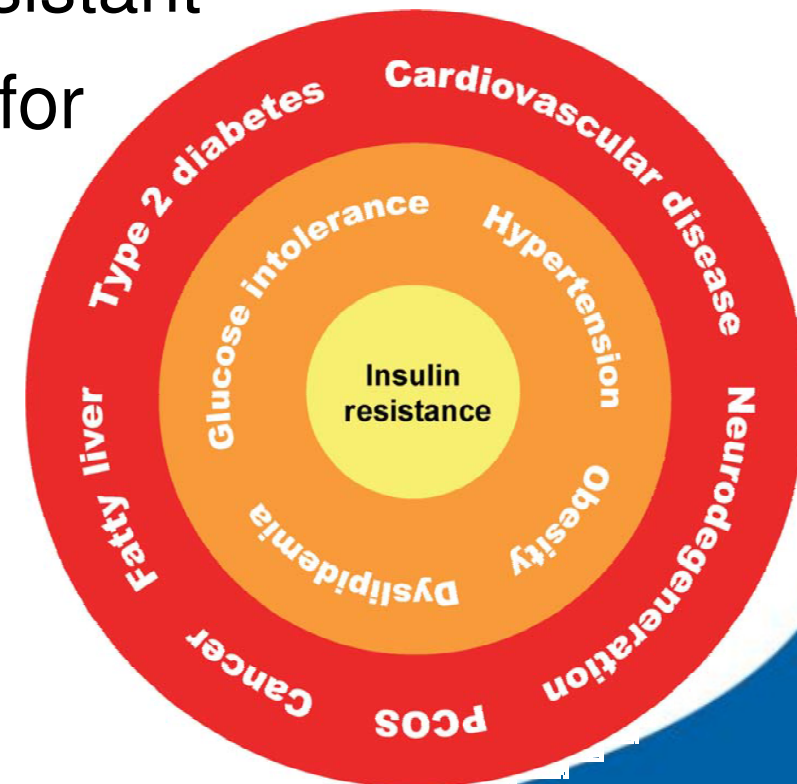
Hormones and plastic

- Humans and animals are extremely sensitive to hormones
- Minute concentrations are sufficient to cause effects
- At higher levels hormones can have opposite effects than at low levels
- During pregnancy and childhood humans are exquisitely sensitive
- Plastic contains hormone mimics
- Effects can persist across generations



DEHP, PET bottles and health

- Diethylhexylphthalate DEHP
- Phthalate DEHP leaches from PET bottles
- Children with higher DEHP levels in urine had increased risk of being insulin resistant
- Insulin resistance is a risk factor for many other chronic diseases of concern
- 63% of worldwide deaths are due to chronic disease
- 25% are under age 60



Sax 2009 doi:10.1289/ehp.0901253

Trasande et al. 2013 doi:10.1542/peds.2012-4022

WHO http://www.who.int/topics/chronic_diseases/en/

Figure from Biddinger and Kahn 2006. doi:10.1146/annurev.physiol.68.040104.124723

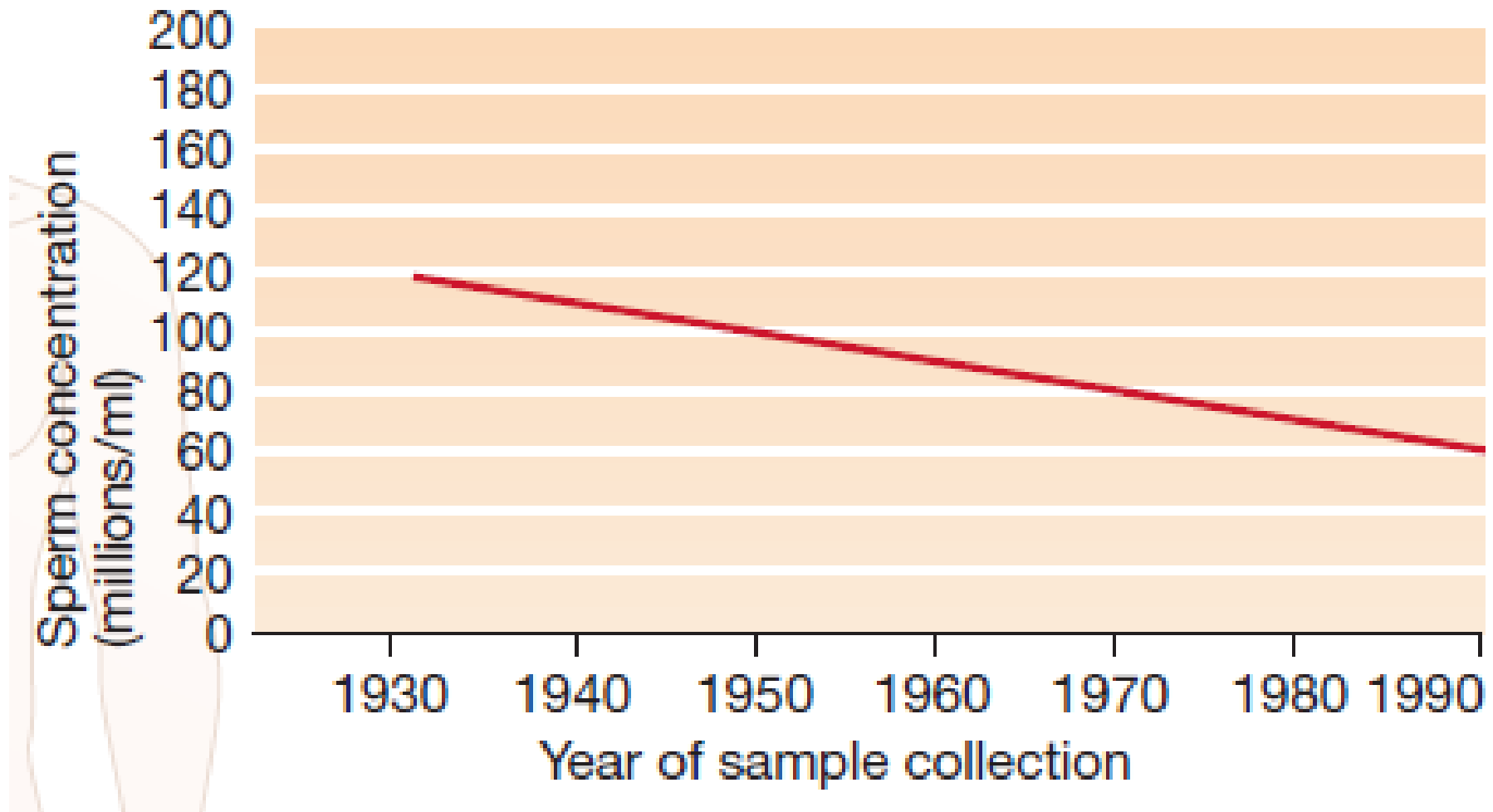
Phthalates and children's health

- Childhood exposure to DEHP, BBzP may increase allergies, asthma, eczema
- Phthalates in pregnancy associated with abnormal toddler physical development and autistic-like behavior
- Gestational phthalate exposure also correlates with demasculinization in baby boys

Health trends in children

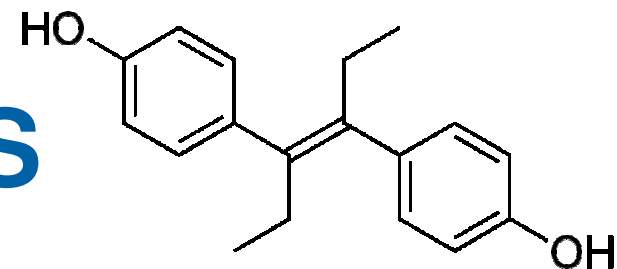
- Increase in testicular dysgenesis syndrome in boys:
 - Decline in sperm number and quality (infertility risk)
 - Undescended testicles (infertility risk)
 - Hypospadias (birth defect, opening not on tip of the penis but underneath, requires operation)
 - Testicular cancer in adolescence
- Earlier onset of puberty in girls:
 - increased risk of adult breast cancer, more aggressive breast cancers
 - Psychological issues, learning

Declining sperm counts



Sharpe 2012, www.sciencemediacentre.org/wp-content/uploads/2012/12/Sharpe12-EMBO-Reports.pdf

Key example: DES



- From 1940s to 1970s millions of pregnant women treated with diethylstilbestrol DES against miscarriage
- Offspring with increased risk to develop cancers, prostatic disease later in life
- Effects in people mirror effects in test animals
- DES pharmaceutical use banned in 1970s
- The “fragile fetus” concept
- Protecting children’s health *starts* with protecting their parents’ health

PET bottles and endocrine disruption

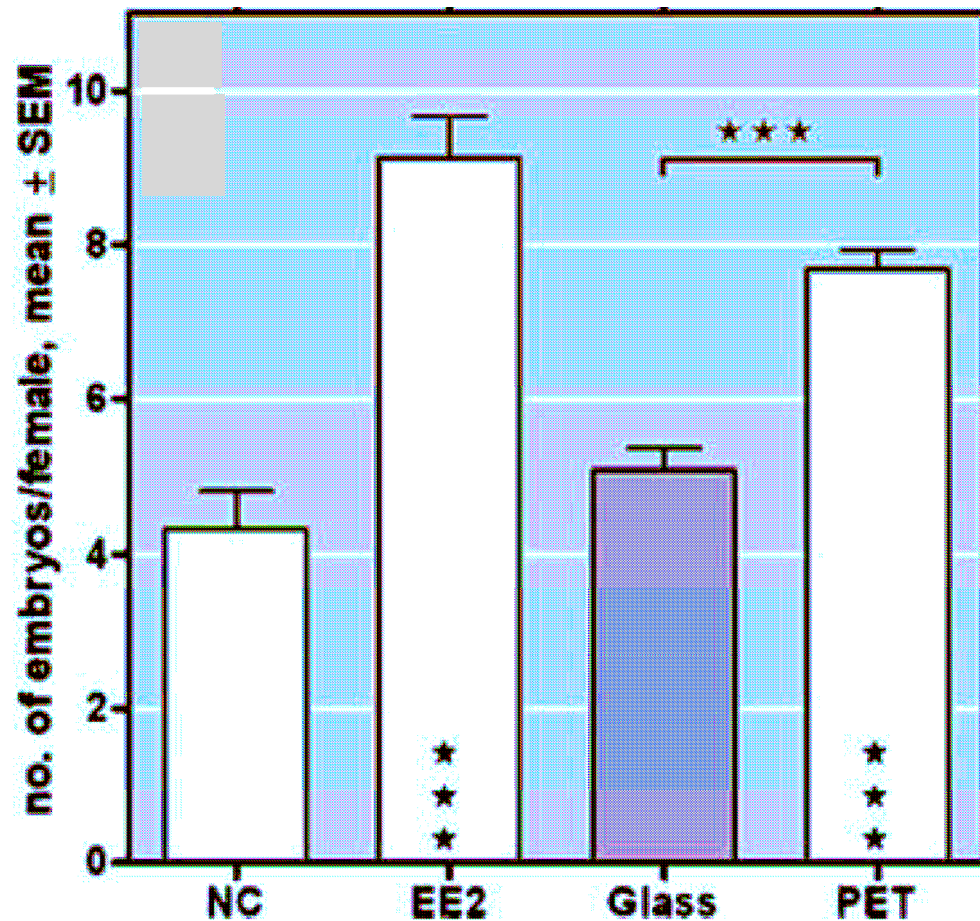
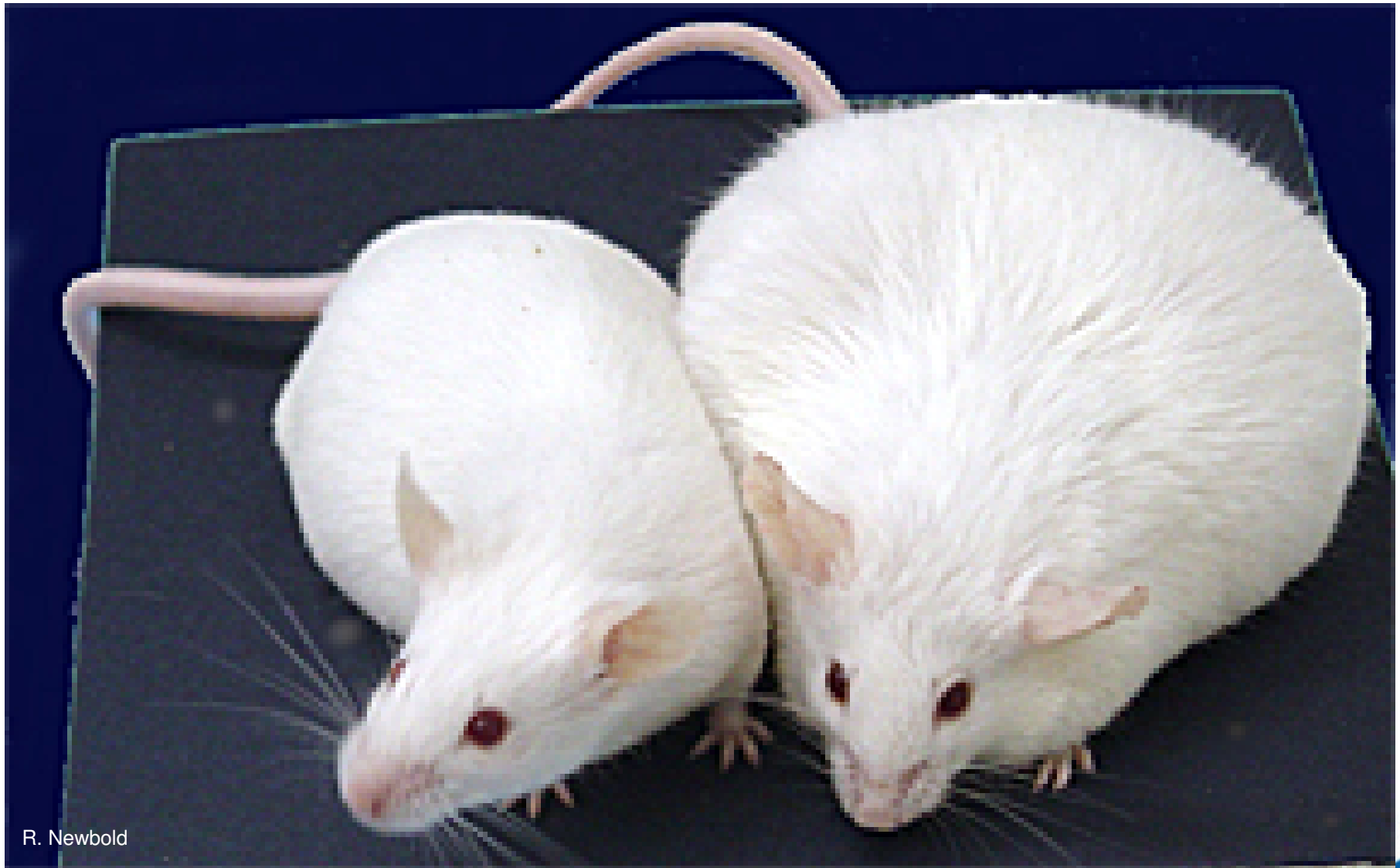


photo: University of Frankfurt, Germany

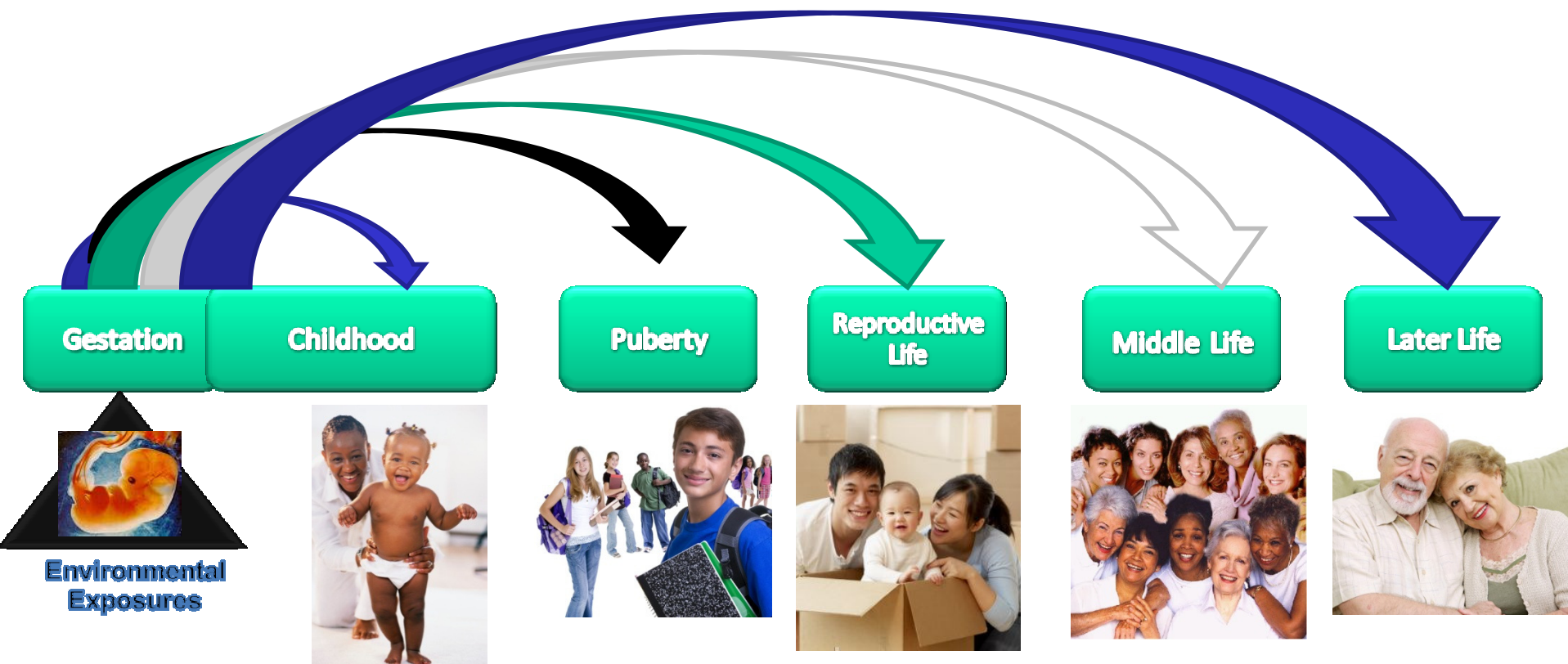
Wagner and Oehlmann (2009) Env Sci Pollut Res 16:278–286

Estrogens during pregnancy



R. Newbold

Childhood chemical exposure can lead to chronic disease later in life



from Jerry Heindel, NIEHS

Developmental Origins of Disease Hypothesis (DOHAD)

Consumer choice can affect health

December 2011 study „Canned Soup Consumption and Urinary Bisphenol A: A Randomized Crossover Trial”

<http://jama.ama-assn.org/content/306/20/2218.2.short>

March 2011 study „Food Packaging and Bisphenol A and Bis(2-Ethylhexyl) Phthalate Exposure: Findings from a Dietary Intervention“

<http://ehp03.niehs.nih.gov/article/info%3Adoi%2F10.1289%2Fehp.1003170>

March 2011 study „Most Plastic Products Release Estrogenic Chemicals: A Health Problem That Can Be Solved”

<http://ehp03.niehs.nih.gov/article/ehpArticle.action?articleURI=info%3Adoi%2F10.1289%2Fehp.1003220>

May 2009 study „Polycarbonate Bottle Use and Urinary Bisphenol A Concentrations“

<http://ehp03.niehs.nih.gov/article/ehpArticle.action?articleURI=info%3Adoi%2F10.1289%2Fehp.0900604>

More:

<http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2011/04/15/HOHG1IPORH.DTL&type=homeandgarden>

http://www.myfoxchicago.com/dpp/news/national/foxnews/Eliminating-Packaged-Foods-Can-Lower-BPA-Exposure_93496779

<http://news.discovery.com/human/children-bpa-chemical-exposure-110609.html>

7 May 2012, Safety and Environmental Technology Group, ETH Zurich



Are plastics safe?

- This cannot be answered with confidence today because plastics ALWAYS contain UNKNOWN CHEMICALS
- Our current chemical risk assessment methods only work for known chemicals
- They ignore mixture toxicity
- They ignore endocrine disruption
- They work with decades old hypotheses that have been shown to be outdated by modern science

What evidence do we need?

- Smoking is not banned – but we know it's unhealthy
 - No final scientific proof of causality for smoking and lung cancer yet
 - Effects in test animals mirror effects in people
 - Children exposed to smoke in the womb develop obesity, asthma, etc.
- To prove that plastics are unhealthy beyond any doubt is scientifically impossible
- Likewise, plastics cannot prove they are safe

Dr. Leonard Sax, MD PhD:

WHAT TO DO?

- Don't get stuck in the details
- Educate consumers about the risks of plastic
- ...and separate this issue from other “Green” concerns
- If glass manufacturers do not step up and make the case FOR glass and AGAINST plastic, who will?
- If not NOW, WHEN?

Thank you!

www.foodpackagingforum.org
jane.muncke@fp-forum.org