



Make vampire food safe for vampires, again.



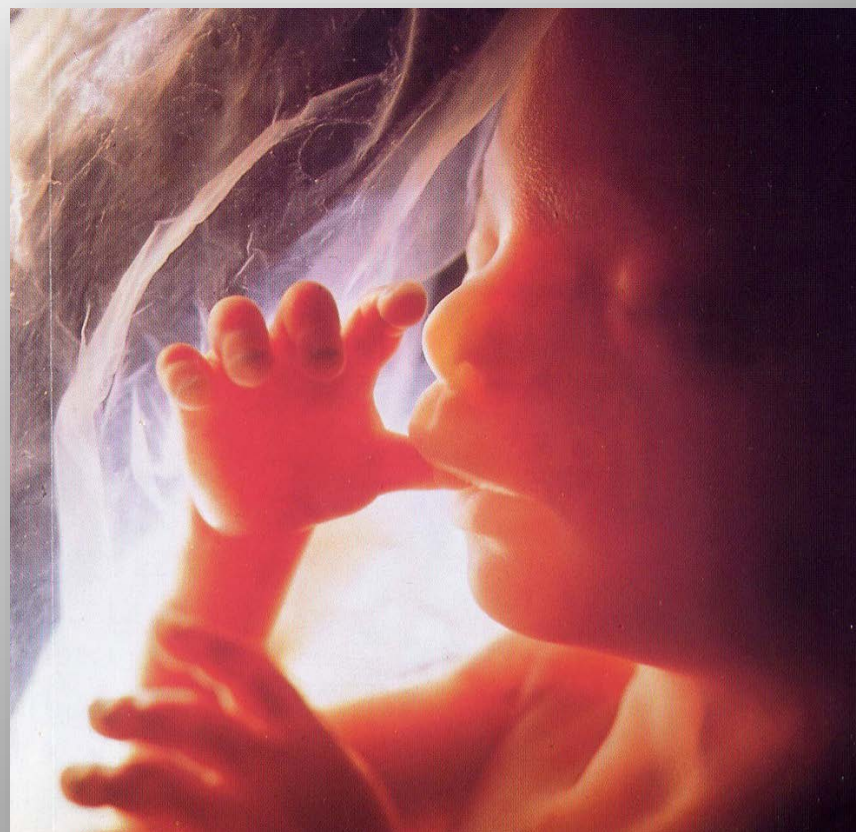
Hormone-related cancers

ADHD
Pre-term birth
Learning disabilities
Allergies
Endometriosis
Infertility
Heart disease
Diabetes
Autoimmunity
Degenerative diseases
Autism
Fibroids
Obesity
Asthma
polycystic ovaries



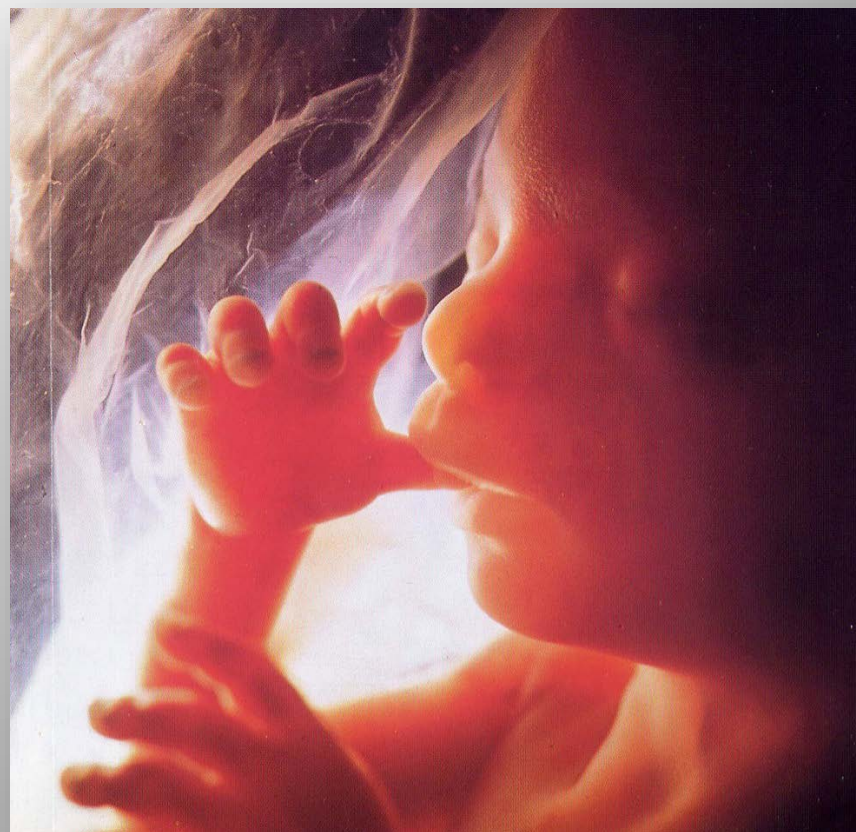
Hormones guide gene expression

EDCs hack the system



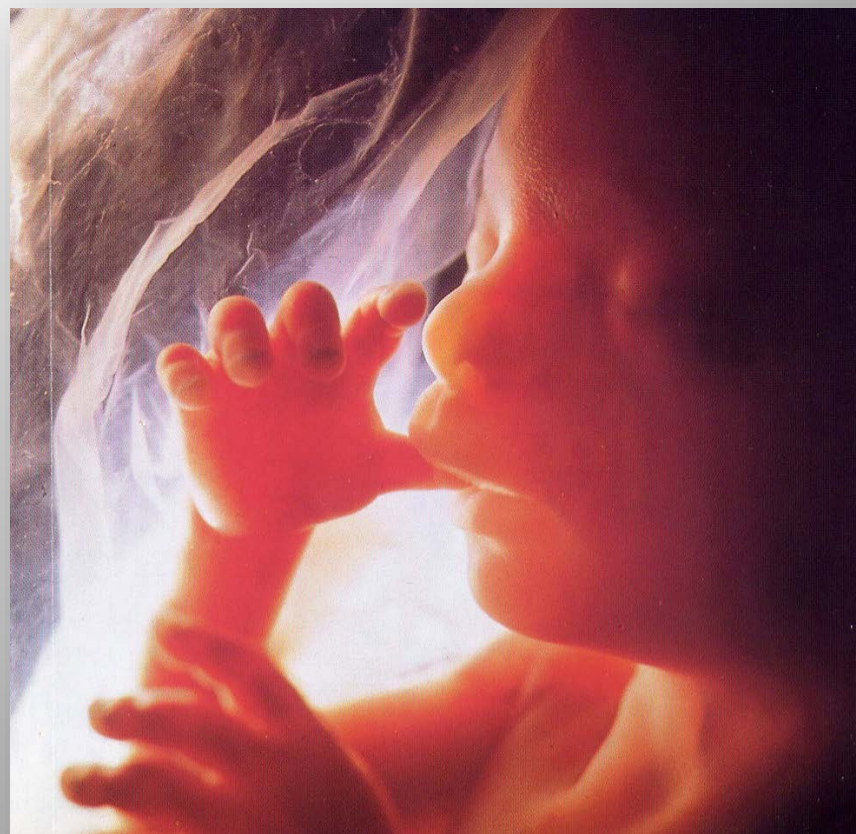
Hormones guide gene expression

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Hormones guide gene expression

EDCs hack the system



Two ways to think about genes

Heredity: What we get from our parents

Gene behavior : Chemical manufacturing machines... nature's nanotechnology



What changes gene expression?

“Classic Genetics”

Heredity

Other genes and
signals they send

“Classic Environment”

Diet

Stress

Experience

Environmental
contaminants



Low level exposures affect gene expression

Bisphenols

PFAS compounds

Phthalates

Different generations of flame retardants

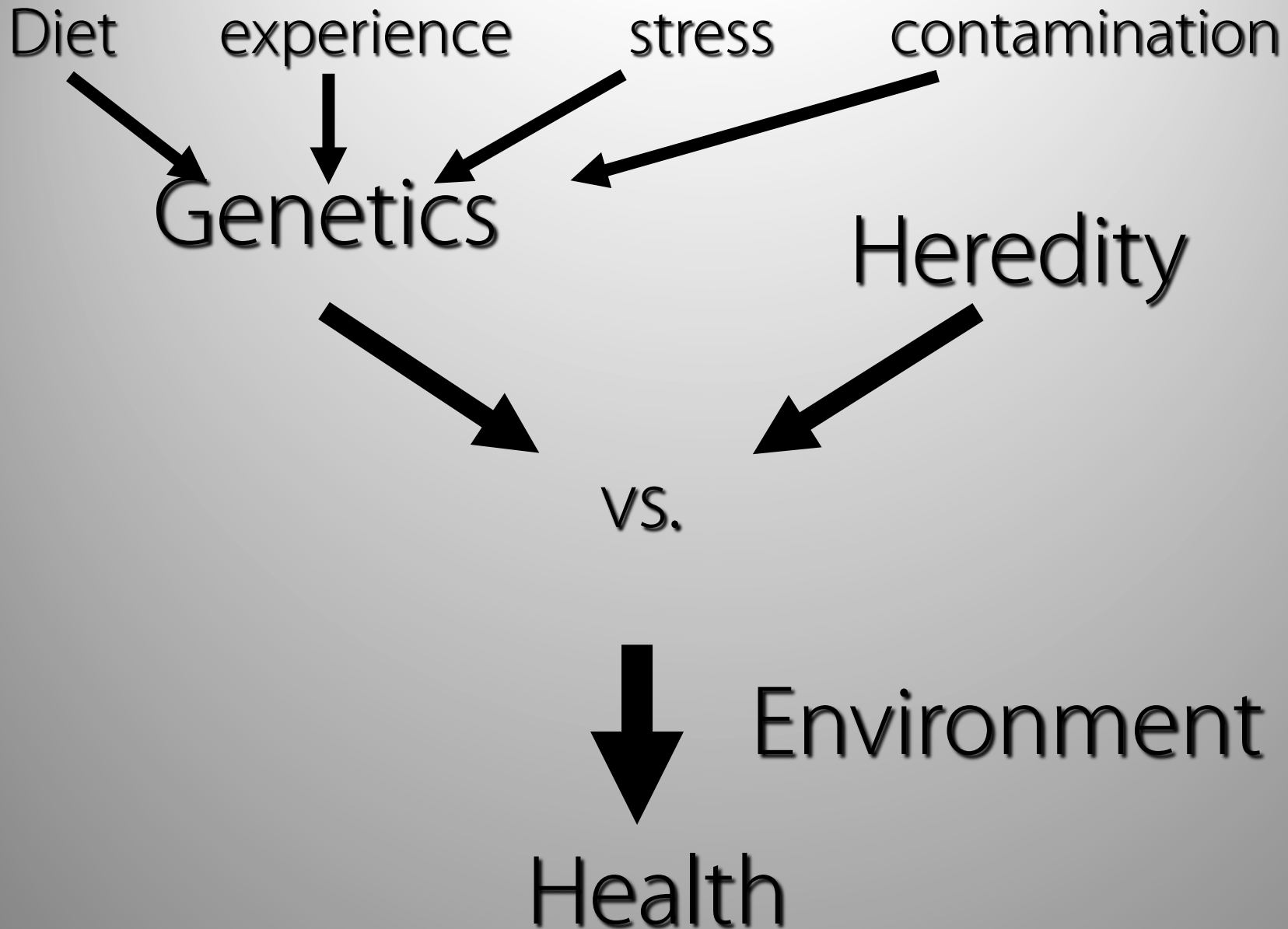
Dioxins, PCBs, DDT

Uranium, arsenic, cadmium

Soy phytoestrogens

etc.





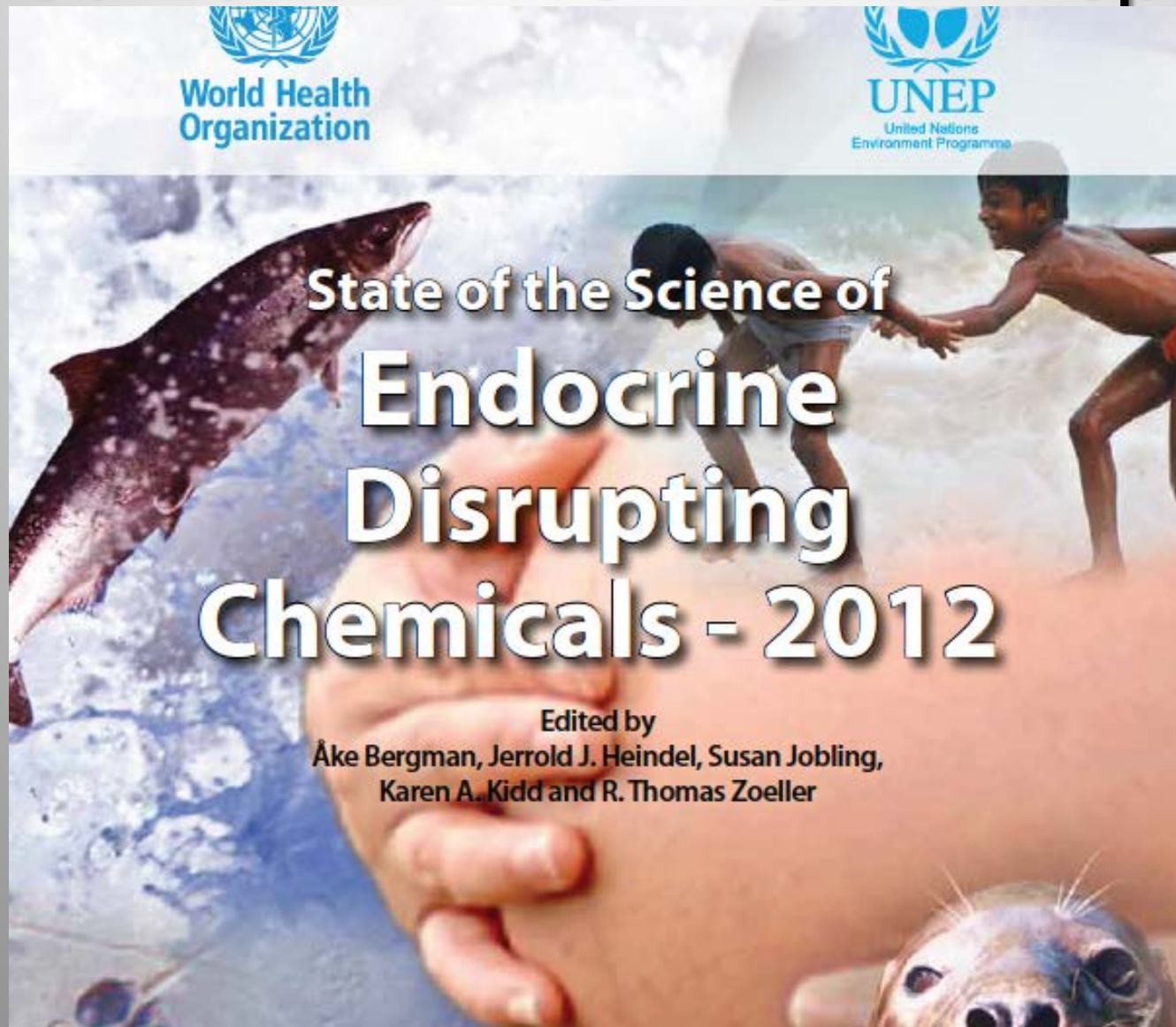
Conceptual shift

Old... a disease that is linked to genes is a disease under hereditary control.

New... a disease linked to genes is one vulnerable to environmental causes.



19 Feb 2013: WHO – UNEP report



State of the Science of
**Endocrine
Disrupting
Chemicals - 2012**

Edited by
Åke Bergman, Jerrold J. Heindel, Susan Jobling,
Karen A. Kidd and R. Thomas Zoeller



Environmental Health Sciences

Science is explored by people



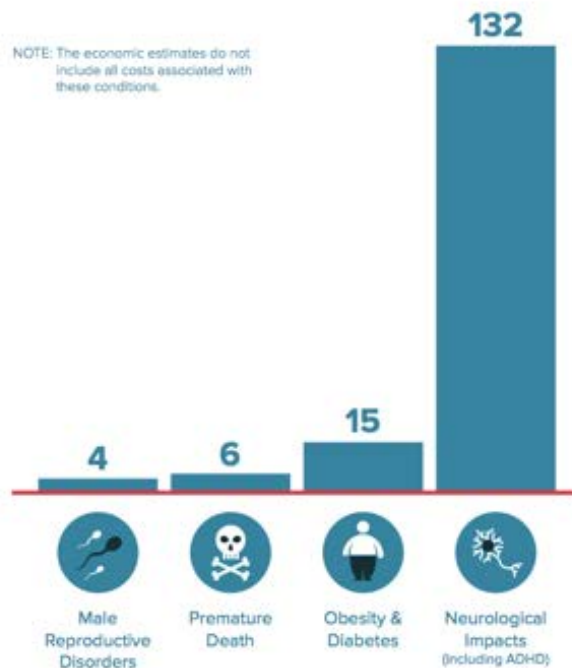
Costly

HEALTH EFFECTS FROM ENDOCRINE DISRUPTING CHEMICALS COST THE EU 157 BILLION EUROS EACH YEAR.

This is the tip of the iceberg: Costs may be as high as €270B.

€157B Cost by Health Effect

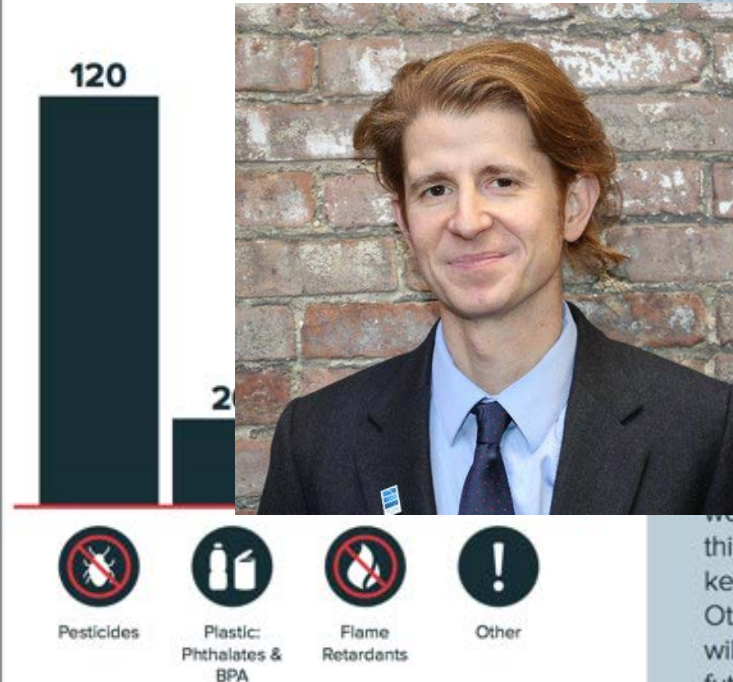
NOTE: The economic estimates do not include all costs associated with these conditions.



SOME EDC-RELATED HEALTH OUTCOMES NOT INCLUDED:

- Breast Cancer
- Prostate Cancer
- Immune Disorders
- Female Reproductive Disorders
- Liver Cancer
- Parkinson's Disease
- Osteoporosis
- Endometriosis
- Thyroid Disorders

€157B Cost by EDC Type



SOME EDCs NOT INCLUDED:

- Atrazine
- 2, 4-D
- Styrene
- Triclosan
- Nonylphenol
- Polycyclic Aromatic Hydrocarbons
- Bisphenol S
- Cadmium
- Arsenic
- Ethylene glycol



Endocrine Disrupting Chemicals (EDCs)

interfere with hormone action to cause adverse health effects in people.

THE TIP OF THE ICEBERG"

The data shown to the left are based on fewer than 5% of all EDCs. Many EDC health conditions were not included in this study because key data are lacking. Other health outcomes will be the focus of future research.

See Trasande et al. The Journal of Clinical Endocrinology & Metabolism
<http://press.endocrine.org/edc>



Revolution in science

1. Low doses matter a lot
2. Events in the womb don't stay in the womb
3. Testing methods are deeply flawed
4. Exposure is ubiquitous





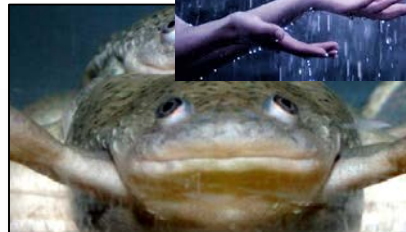
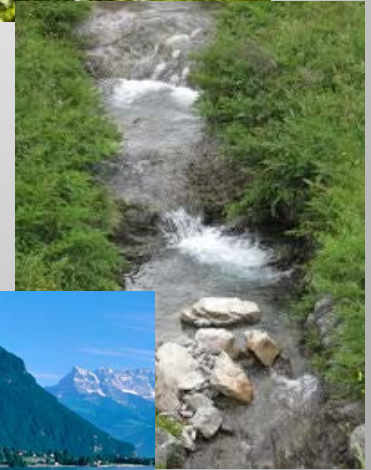
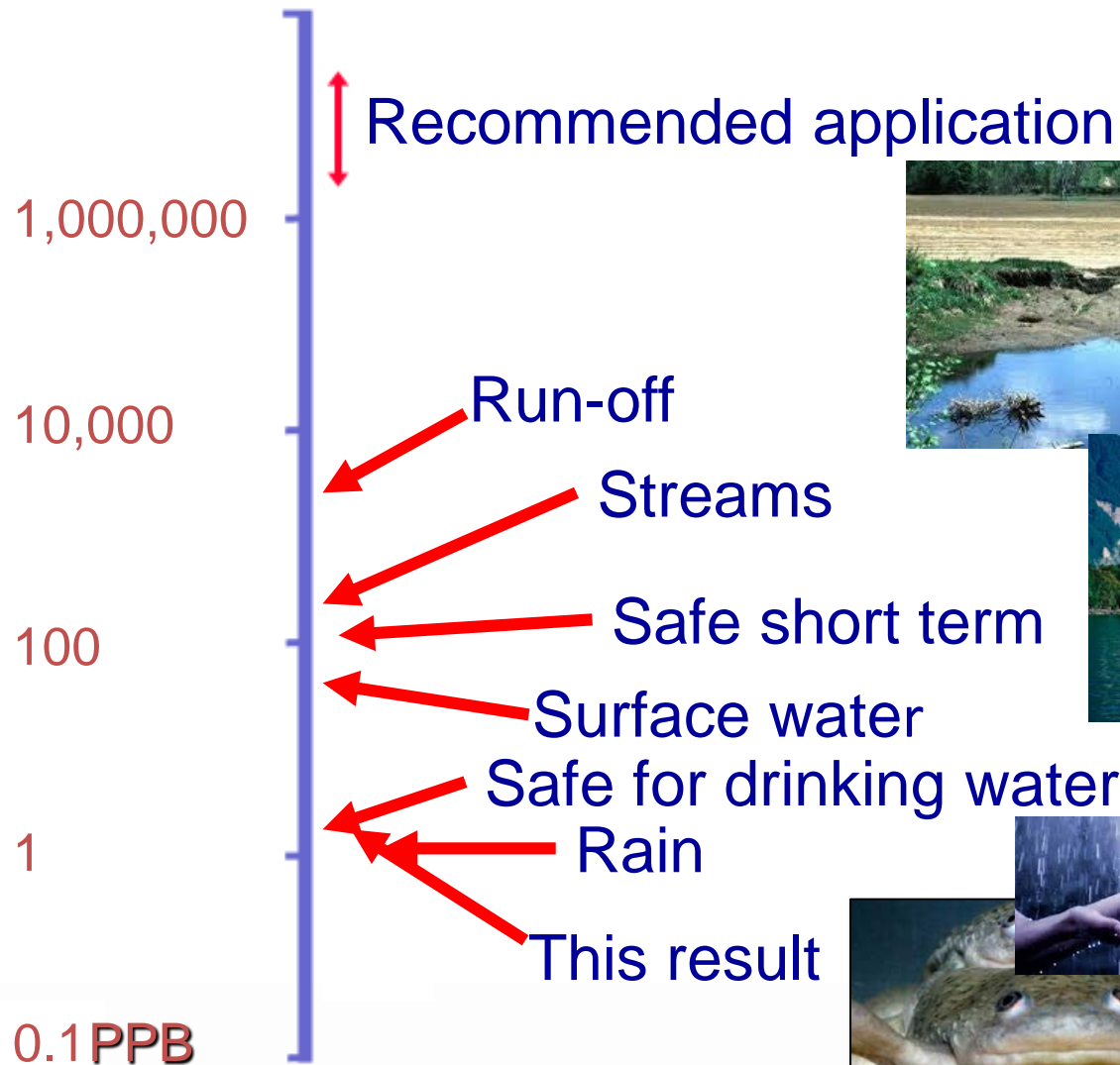
2.5 parts per billion of atrazine



Environmental Health Sciences



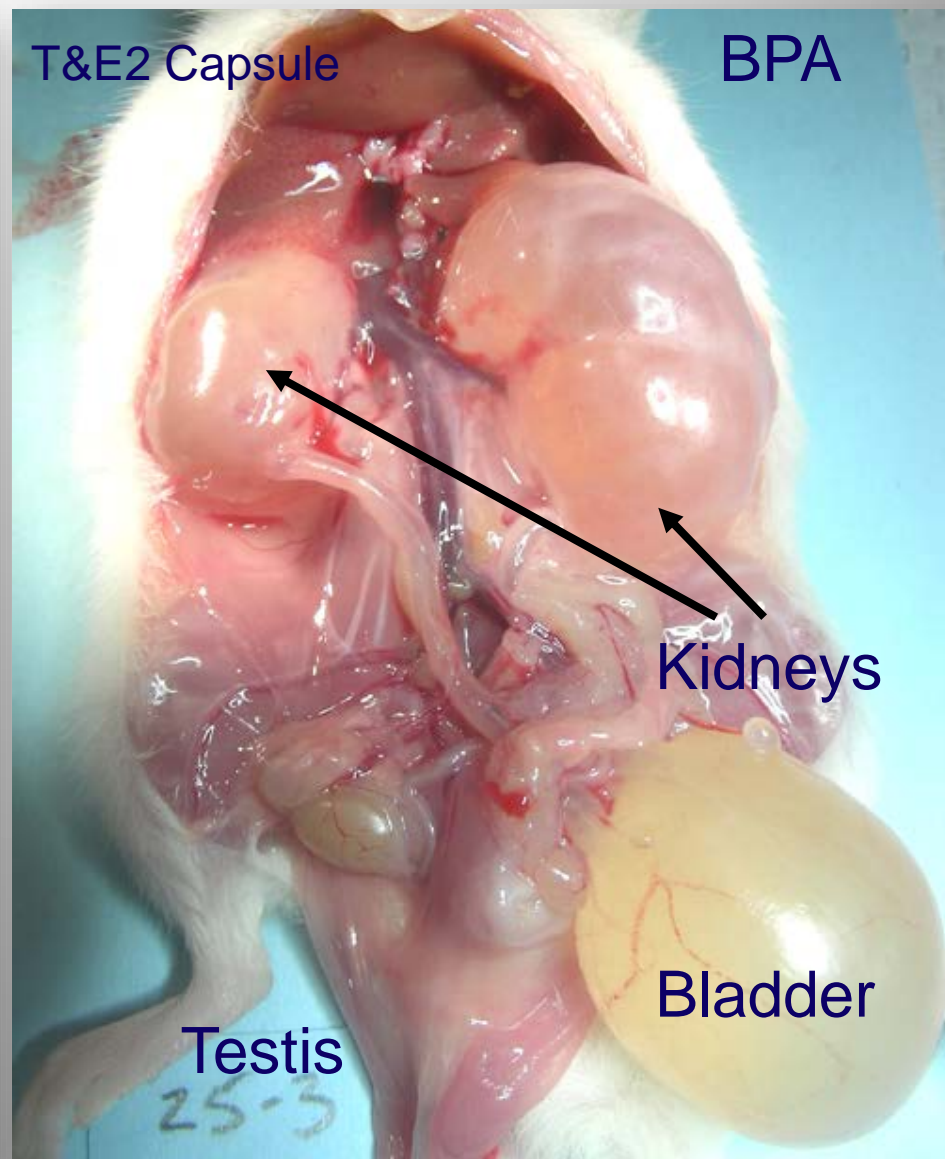
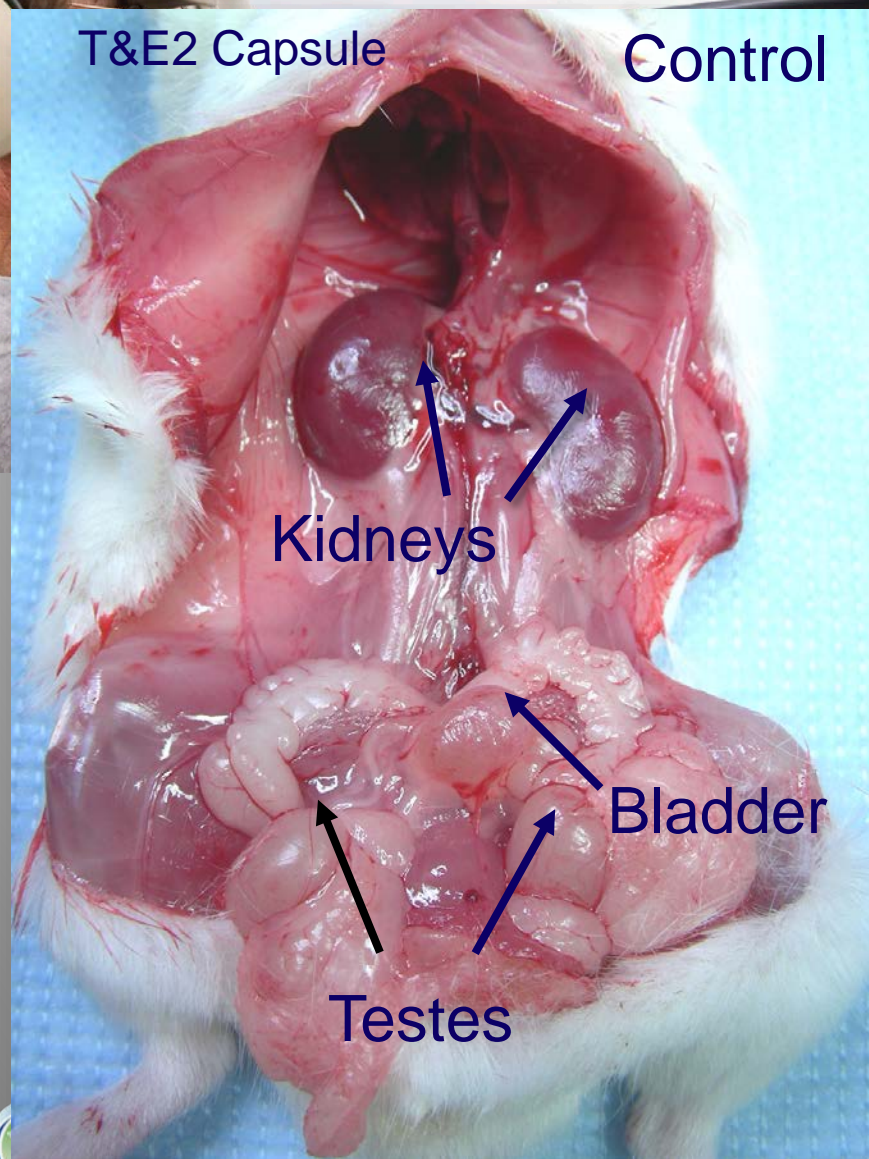
ATRAZINE



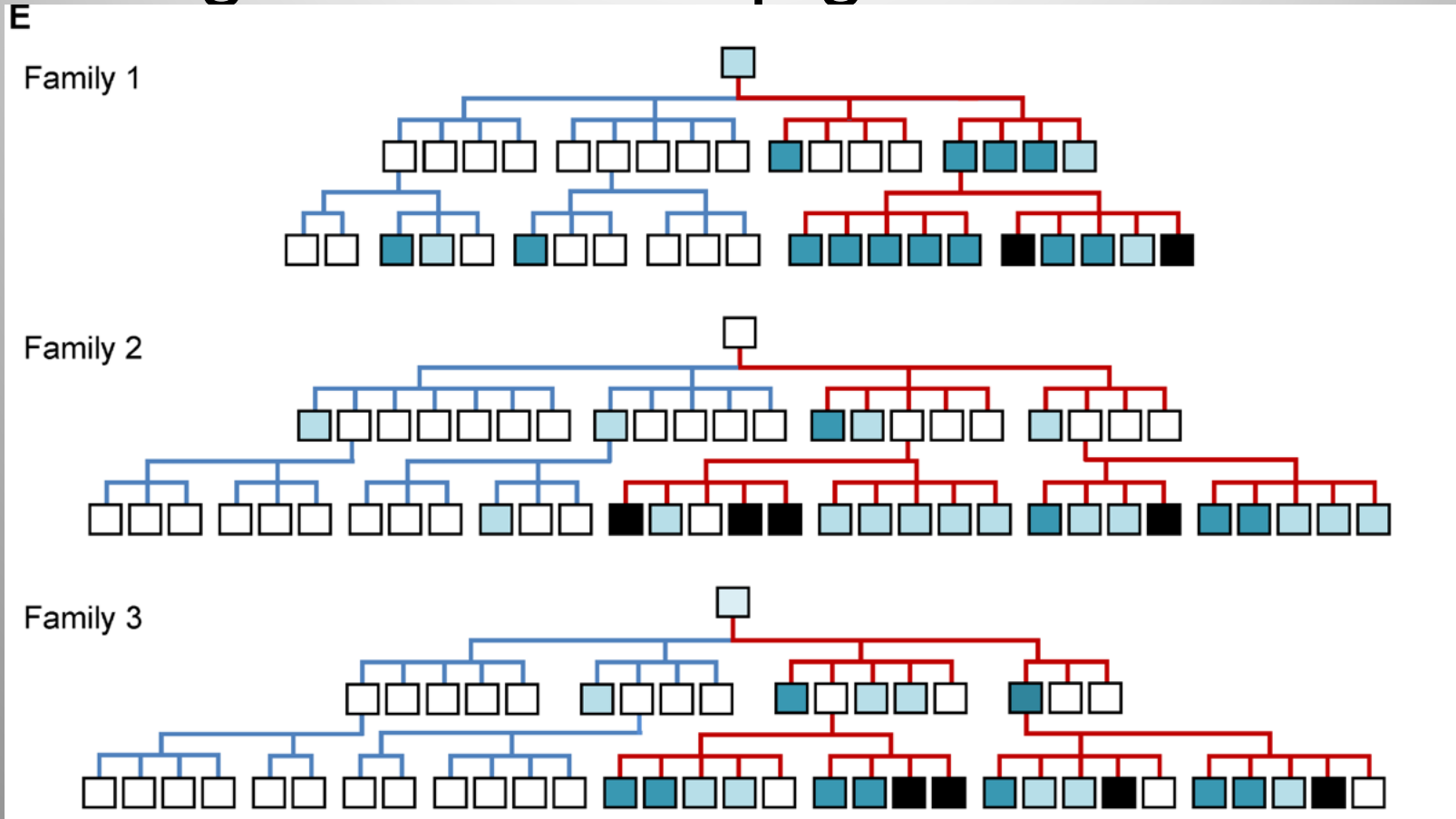
Revolution in science

1. Low doses matter a lot
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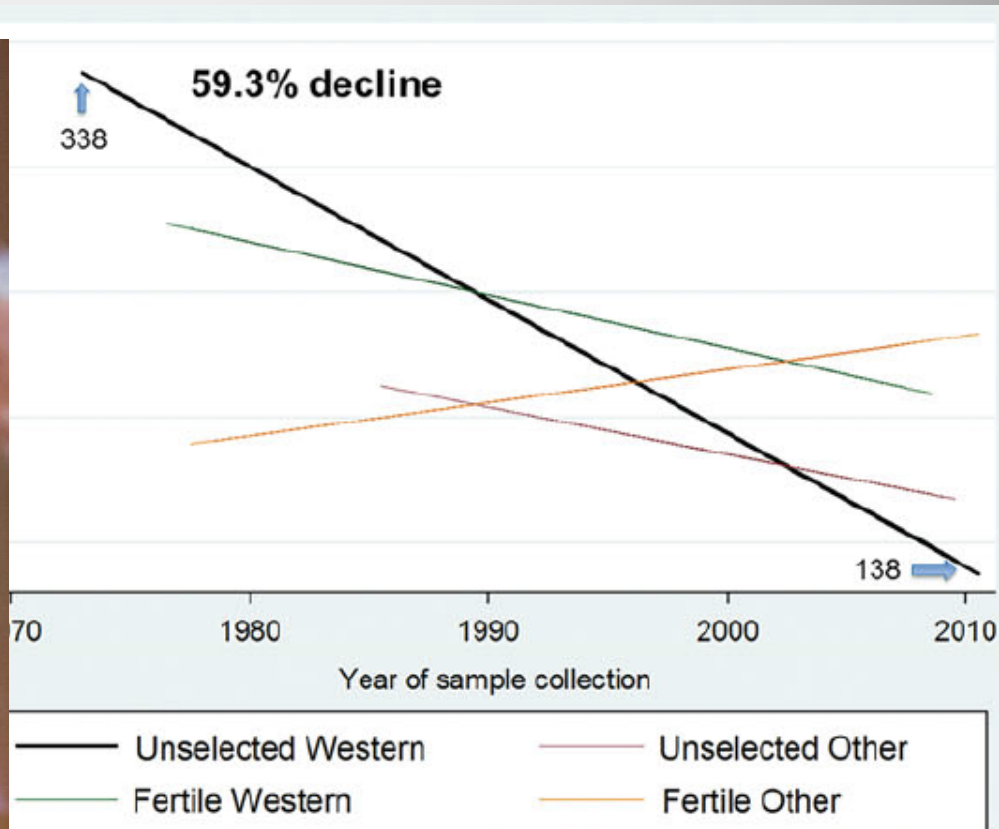
Transgenerational epigenetic inheritance



Long-term trends in human sperm



(b) 8



Revolution in science

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3. **Testing methods are deeply flawed**
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Testing methods are deeply flawed

- 1. Tools agencies use for establishing safety are outdated, mostly irrelevant and based on false assumptions**
2. Laws and regulations outdated
3. They stay that way because of the financial stakes and the effectiveness of manufactured doubt



1 part per billion

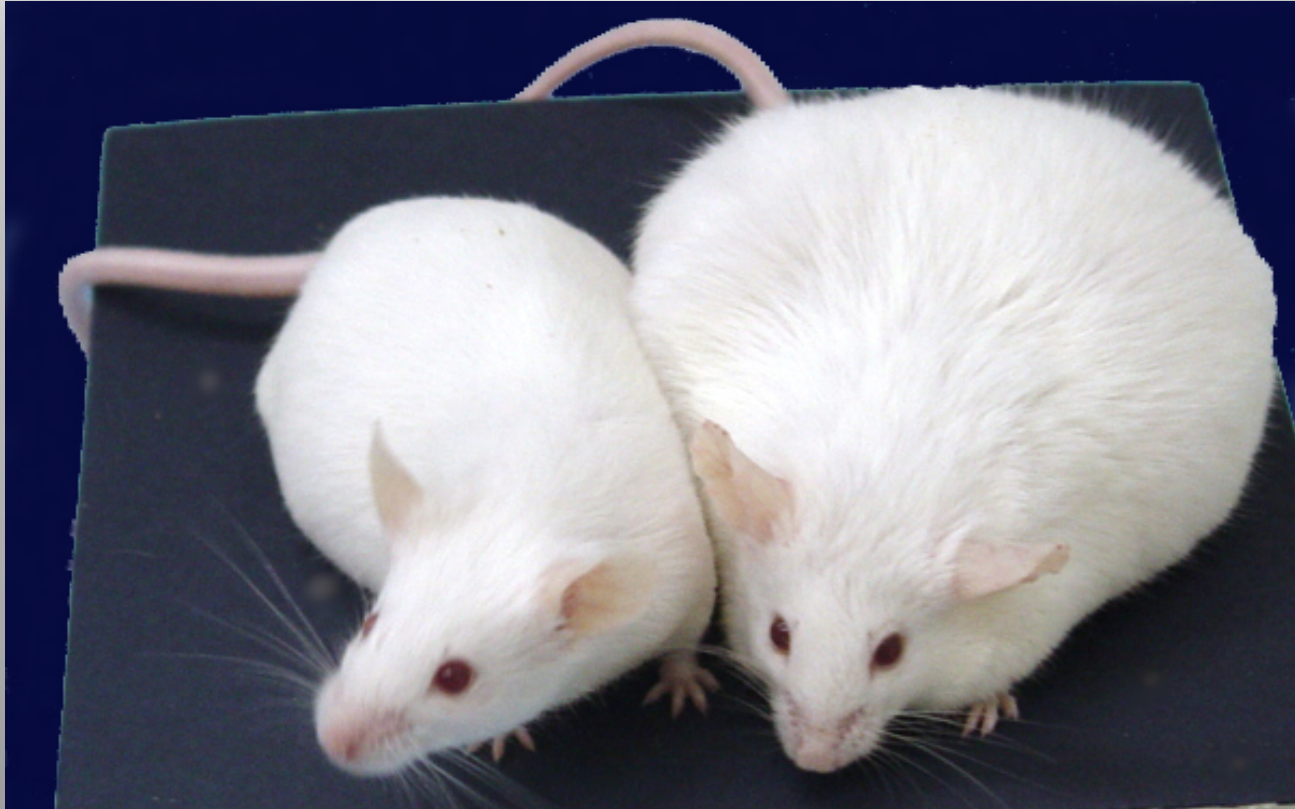


Same strain of mice
Same caloric intake
Same activity levels



1 part per billion

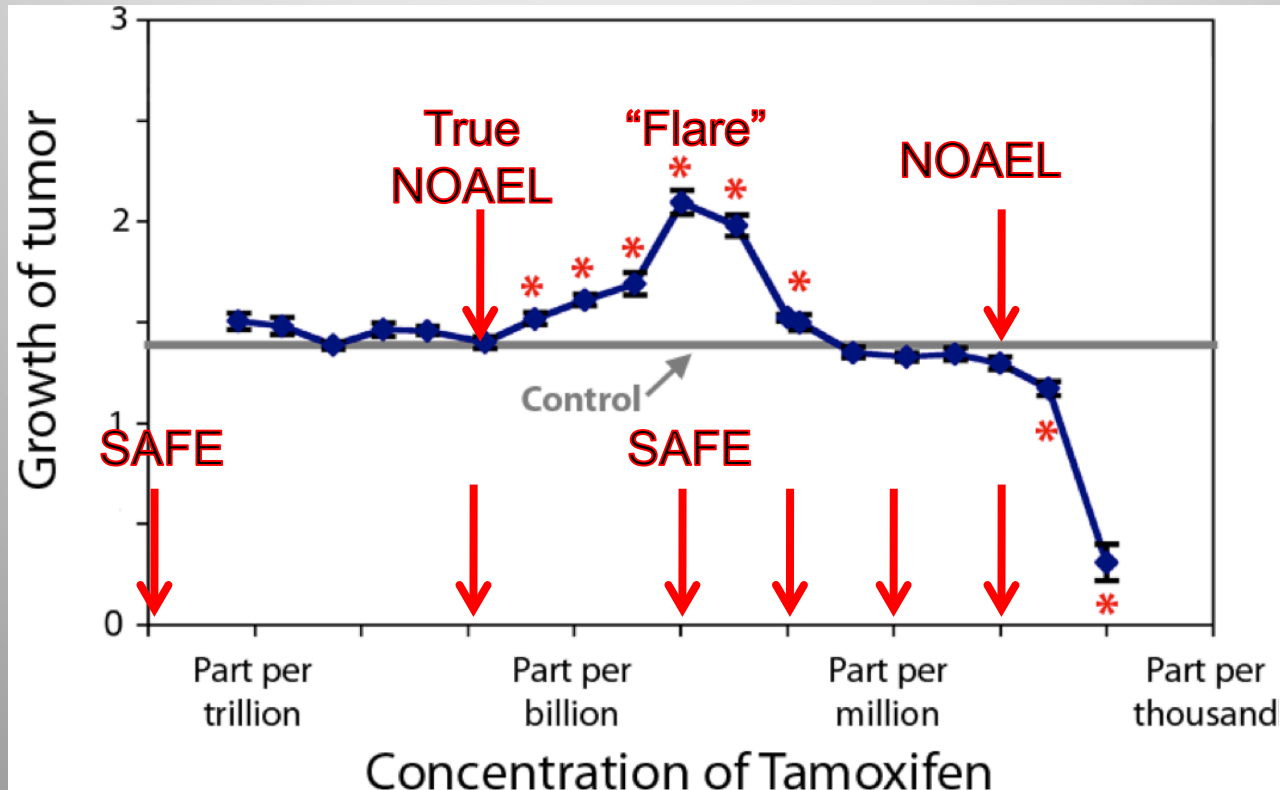
What about 1000 ppb?



Same strain of mice
Same caloric intake
Same activity levels



Non-monotonicity of tamoxifen



Welshons, in Vandenberg et al. 2012



Non-monotonicity: Laura Vandenberg



Hormones and Endocrine-Disrupting Chemicals: Low-Dose Effects and Nonmonotonic Dose Responses

Laura N. Vandenberg, Theo Colborn, Tyrone B. Hayes, Jerrold J. Heindel,
David R. Jacobs, Jr., Duk-Hee Lee, Toshi Shioda, Ana M. Soto, Frederick S. vom Saal,
Wade V. Welshons, R. Thomas Zoeller, and John Peterson Myers

Endocrine Reviews. March 14, 2012 as doi:10.1210/er.2011-1050





What's wrong with that picture?

1. Tools agencies use for establishing safety are outdated, mostly irrelevant and based on false assumptions
- 2. Laws and regulations outdated**



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Nick Kristof last autumn (NYT):

“These days we spew fewer toxins into our air and rivers, and instead we dump poisons directly into our own bodies.”





We assume that products
in the market have been
tested for safety



But the vast majority of
chemicals have barely been
tested at all





Chemosphere. 2014 Jan;95:124-30. doi: 10.1016/j.chemosphere.2013.08.049. Epub 2013 Sep 17.

Presence of the Corexit component dioctyl sodium sulfosuccinate in the Deepwater Horizon oil spill.

Gray JL¹, Kanagy LK, Furlong ET, Kanagy CJ, McCoy JW, Mason A, Lauenstein G.

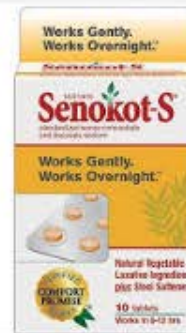


Environ Health Perspect; DOI:10.1289/ehp.1409672

Effects of Crude Oil/Dispersant Mixture Components on PPAR γ Activity *in Vitro* of Dioctyl Sodium Sulfosuccinate (DOSS) a Probable Obesogen

Alexis M. Temkin,^{1*} Robert R. Bowers,^{2*} Margaret E. Magaletta,³ Steven Holshouser,⁴ Adriana Maggi,⁵ Paolo Ciana,⁵ Louis J. Guillette,^{1,6} John A. Bowden,^{7,8} John R. Kucklick,^{7,8} John E. Baatz,^{7,8,9} and Demetri D. Spyropoulos^{1,2,7,8}





twinkl supplies

twinkl supplies

alamy stock photo

alamy stock photo



Environmental Health Sciences

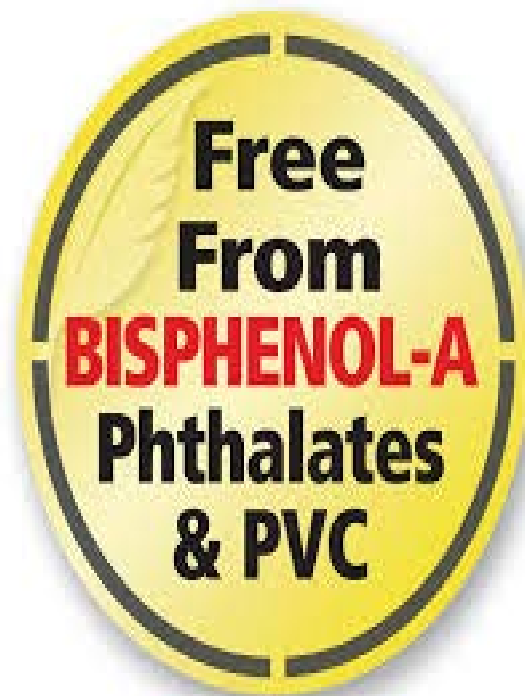
Where's the good news?

1. The science grows ever stronger
2. The medical community is getting on board
3. Consumers are demanding safer materials
4. We have the science to help chemists make those safer materials
5. The states are improving policies; so is Europe





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BABY BOTTLE SAMPLER



The People's
Chemist

BPA FREE. FAMILY SAFE



Environmental Health Sciences



Hormone-related cancers

ADHD
Pre-term birth
Learning disabilities
Allergies
Endometriosis
Infertility
Heart disease
Diabetes
Autoimmunity
Degenerative diseases
Autism
Fibroids
Obesity
Asthma
polycystic ovaries

