

# **Endocrine disruption and pharmaceuticals in surface waters**

**Pete Myers, Ph.D.**  
**Environmental Health Sciences**  
**and**  
**Carnegie Mellon University**



Environmental Health Sciences

# Hormone-related cancers

ADHD

Pre-term birth

Allergies

Learning disabilities

# Infertility

# Endometriosis

Autoimmunity

Degenerative diseases

Fibroids

# Obesity

# Heart disease

Autism

polycystic ovaries

# Diabetes





19 Feb 2013: WHO – UNEP report



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# ENDOCRINE REVIEWS

## Executive Summary to EDC-2: The Endocrine Society's Second Scientific Statement on Endocrine-Disrupting Chemicals

A.C. Gore, V.A. Chappell, S.E. Fenton, E. Flaws, A. Nadal, G.S. Prins, J. Toppari, and R. Zoeller  
Chemical is removed from use, its imprints on the exposed  
Additional information is available at [www.endocrine.org](http://www.endocrine.org)  
The University of Texas at Austin, 107 W. Dean Keeton, C0875, Austin, TX 78712  
. E-mail: [andrea.gore@austin.utexas.edu](mailto:andrea.gore@austin.utexas.edu).

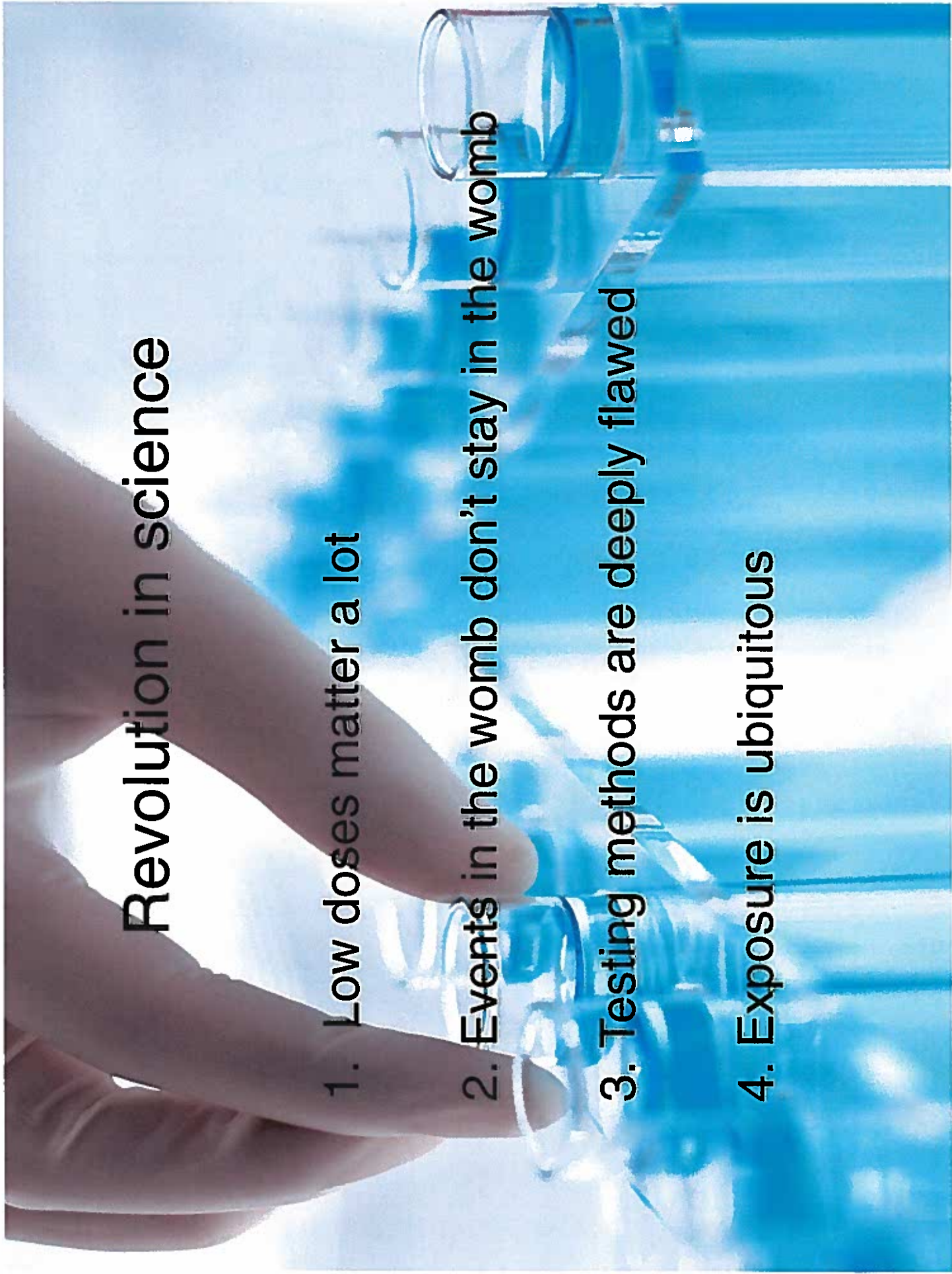


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# Revolution in science

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



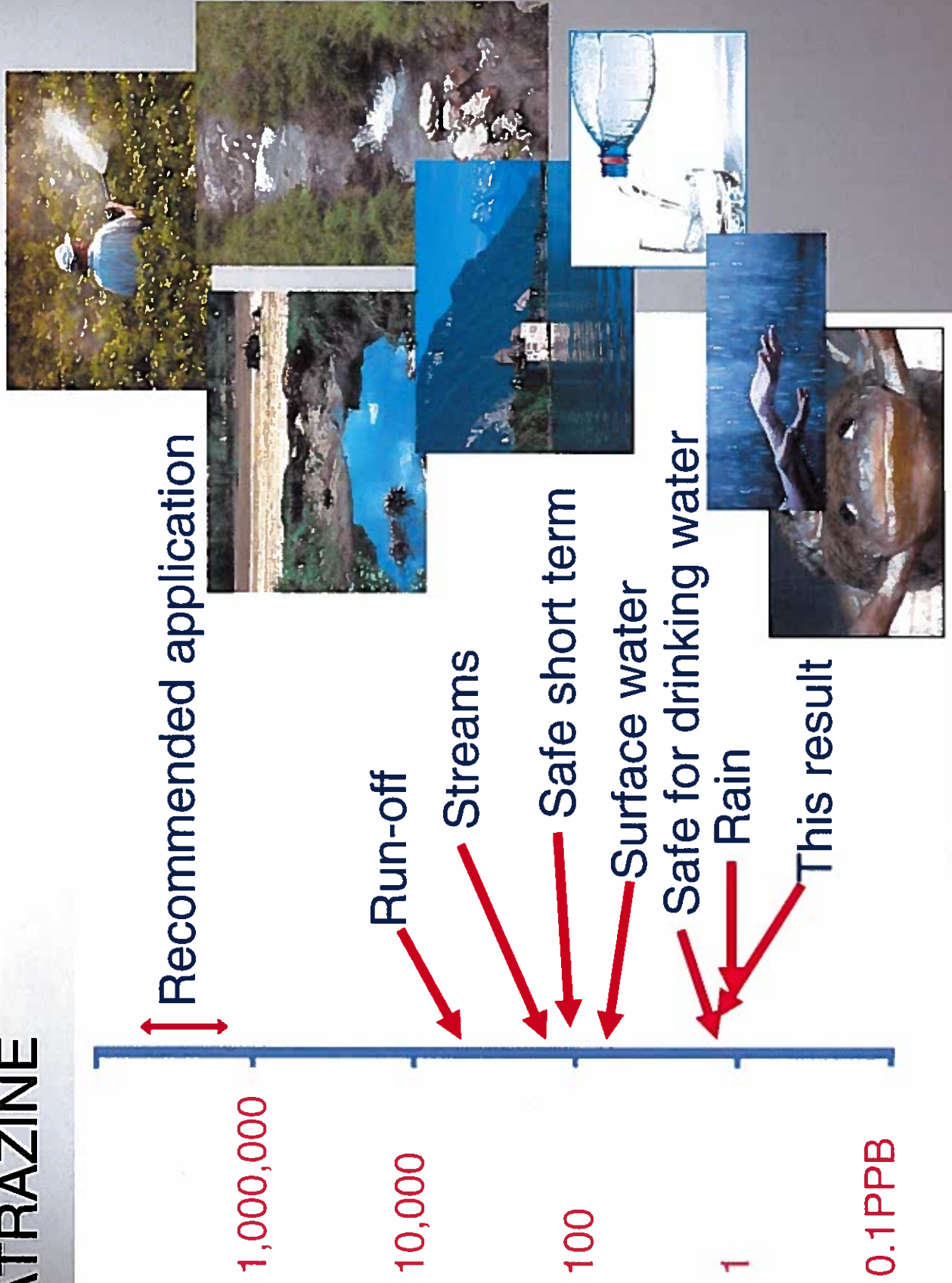
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# ATRAZINE





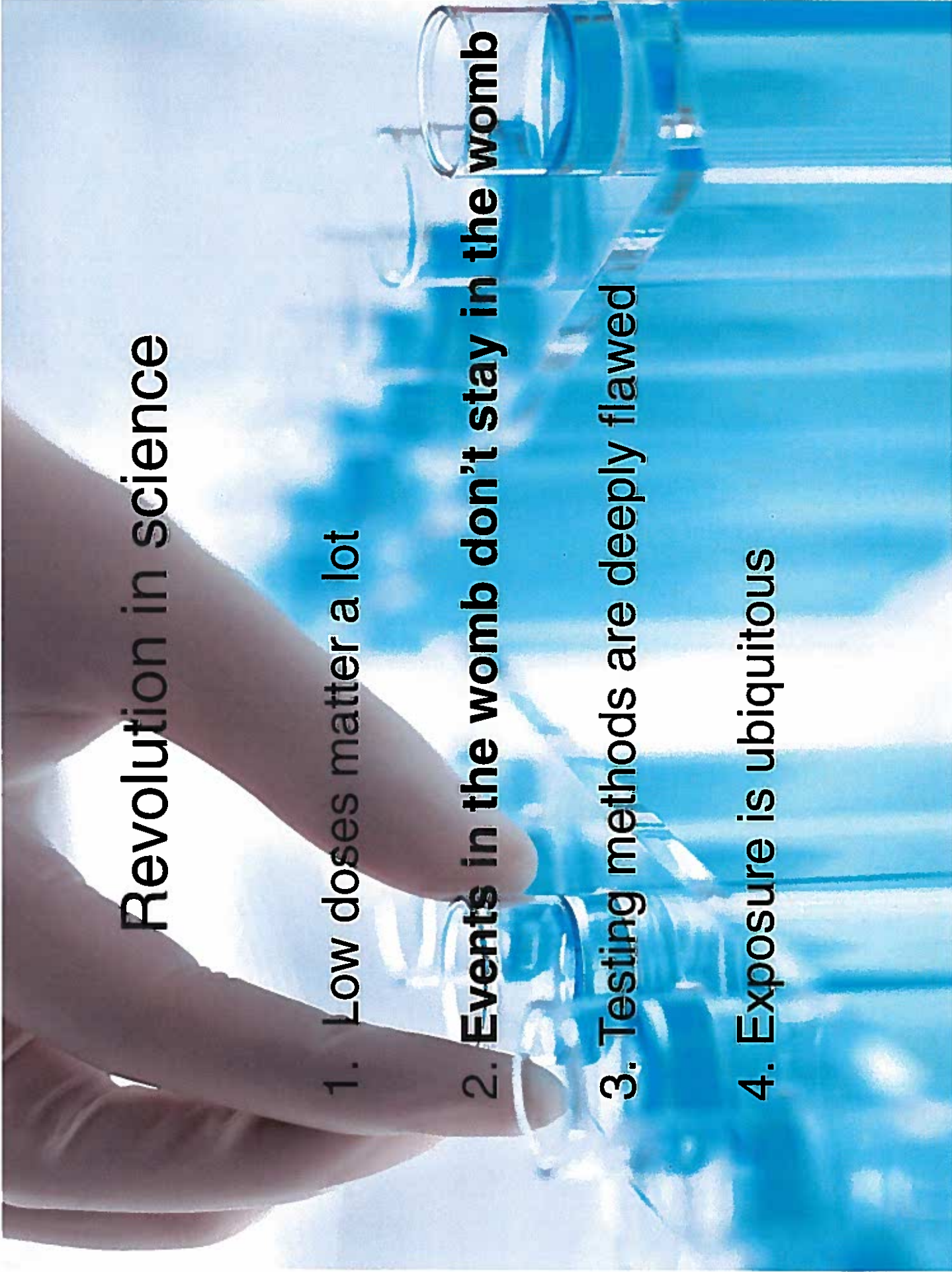
# Revolution in science

1. Low doses matter a lot

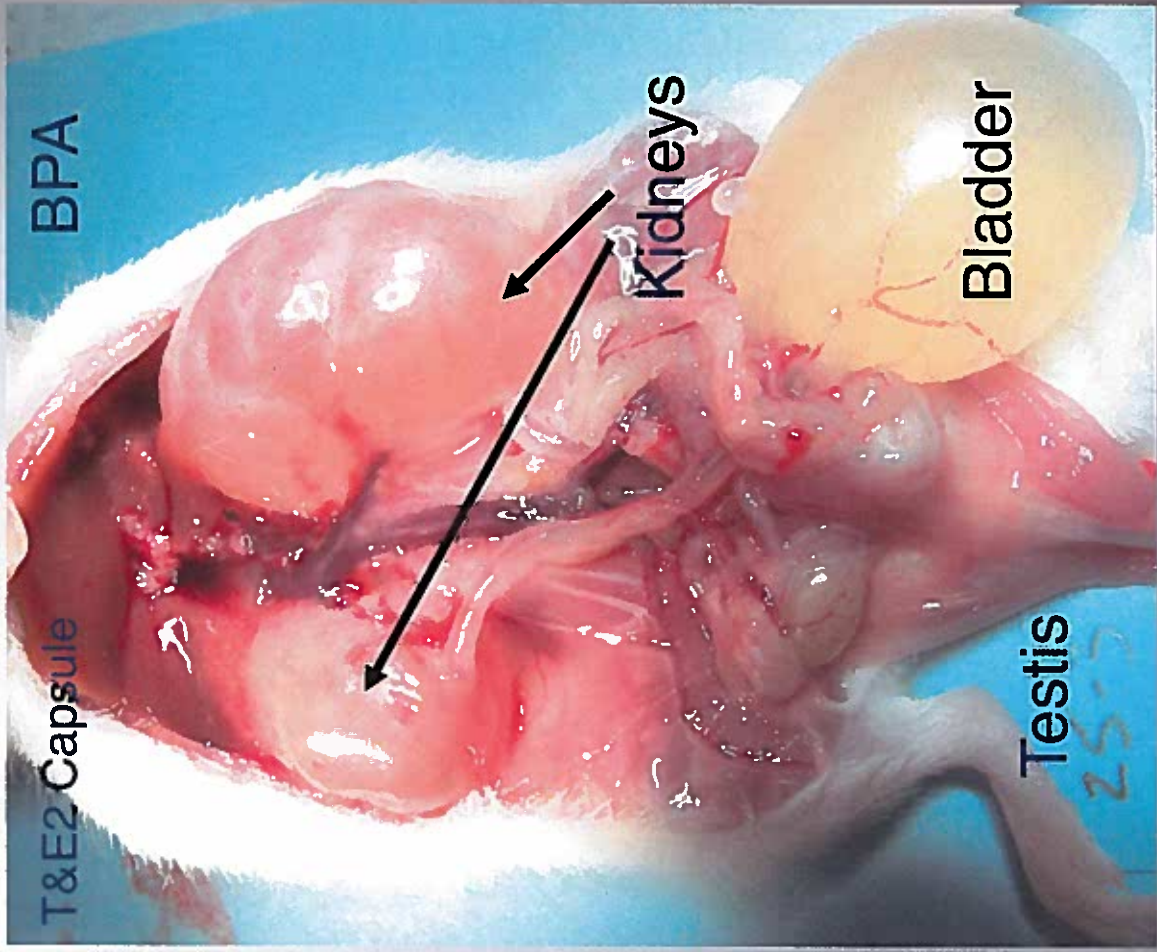
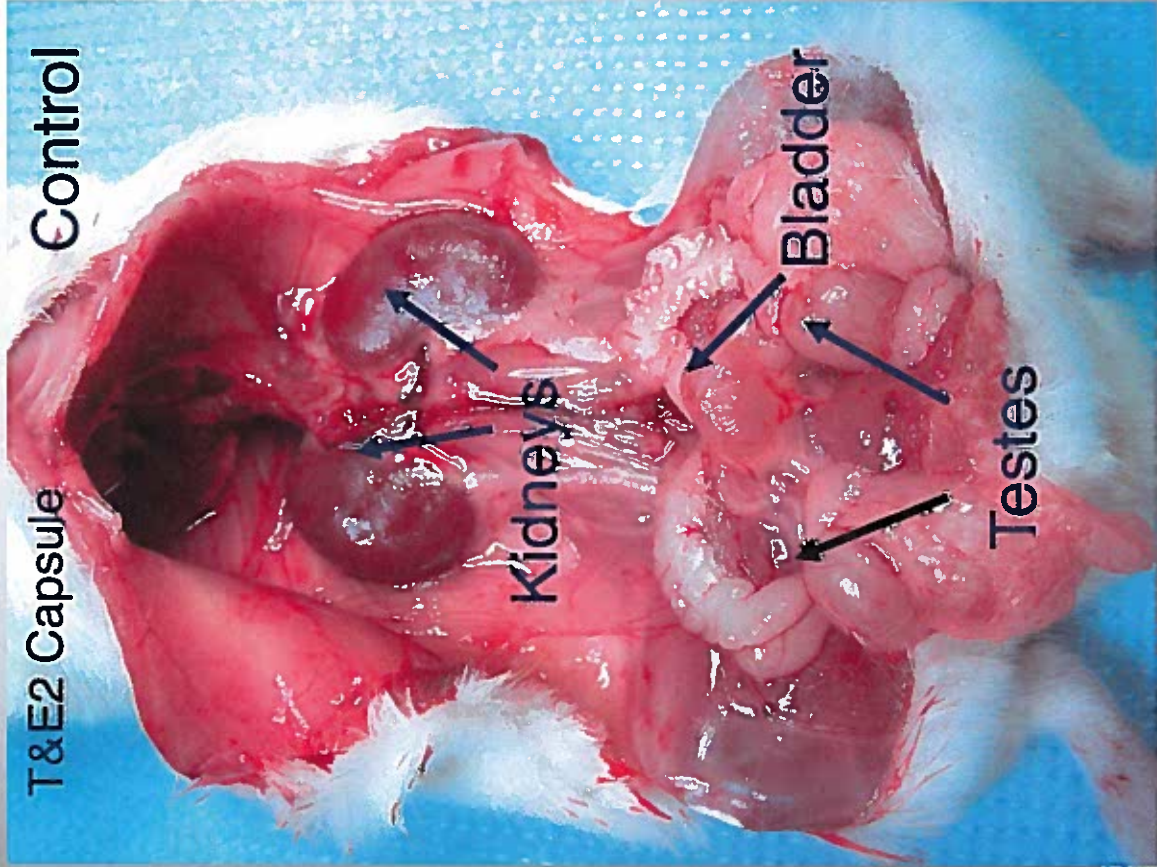
2. **Events in the womb don't stay in the womb**

3. Testing methods are deeply flawed

4. Exposure is ubiquitous









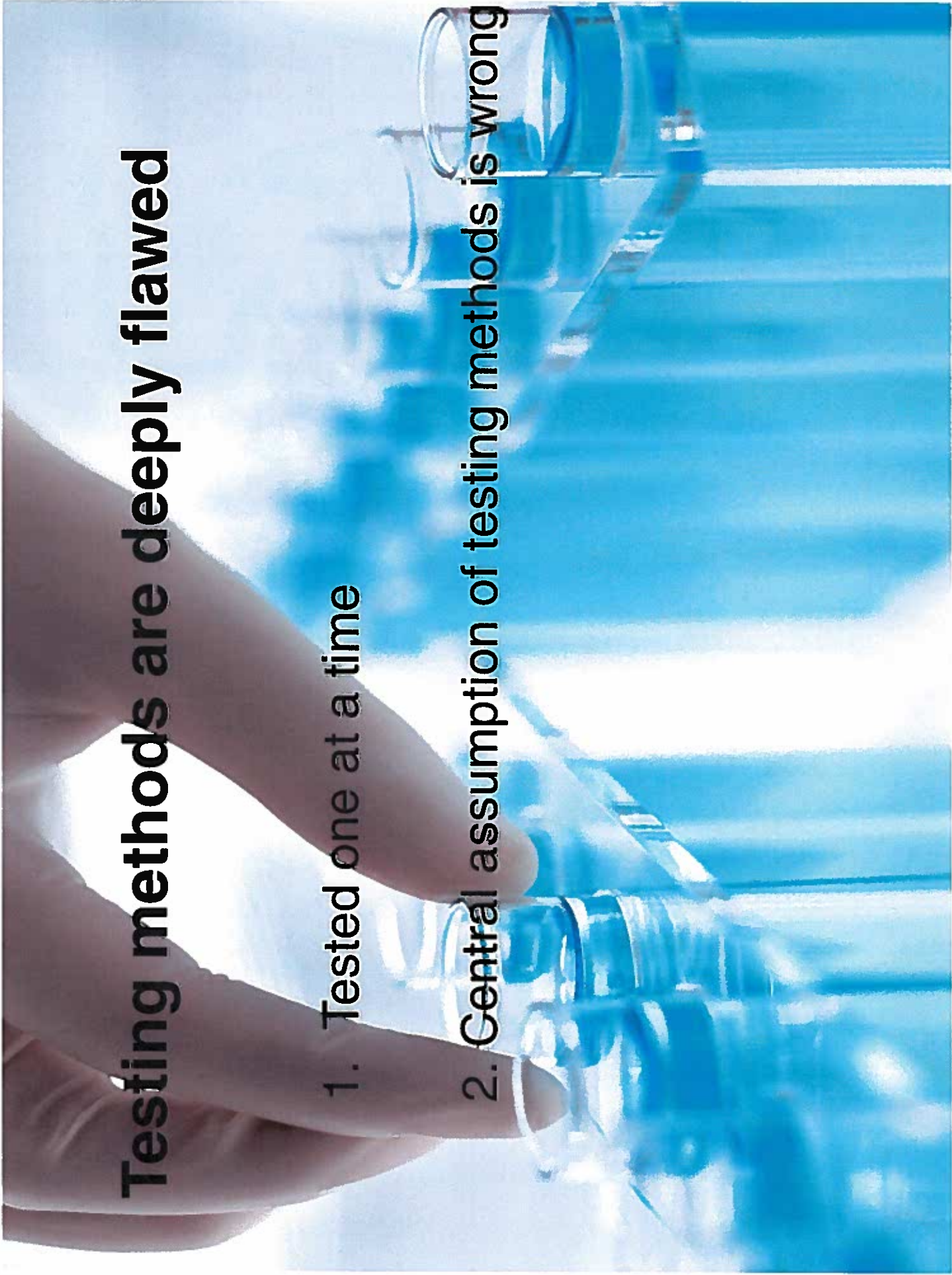
# Revolution in science

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# Testing methods are deeply flawed

1. Tested one at a time

2. Central assumption of testing methods is wrong





1 part per billion



**Same strain of mice**  
**Same caloric intake**  
**Same activity levels**



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Newbold et al. 2005, 2007

1 part per billion

What about 1000 ppb?



**Same strain of mice**  
**Same caloric intake**  
**Same activity levels**

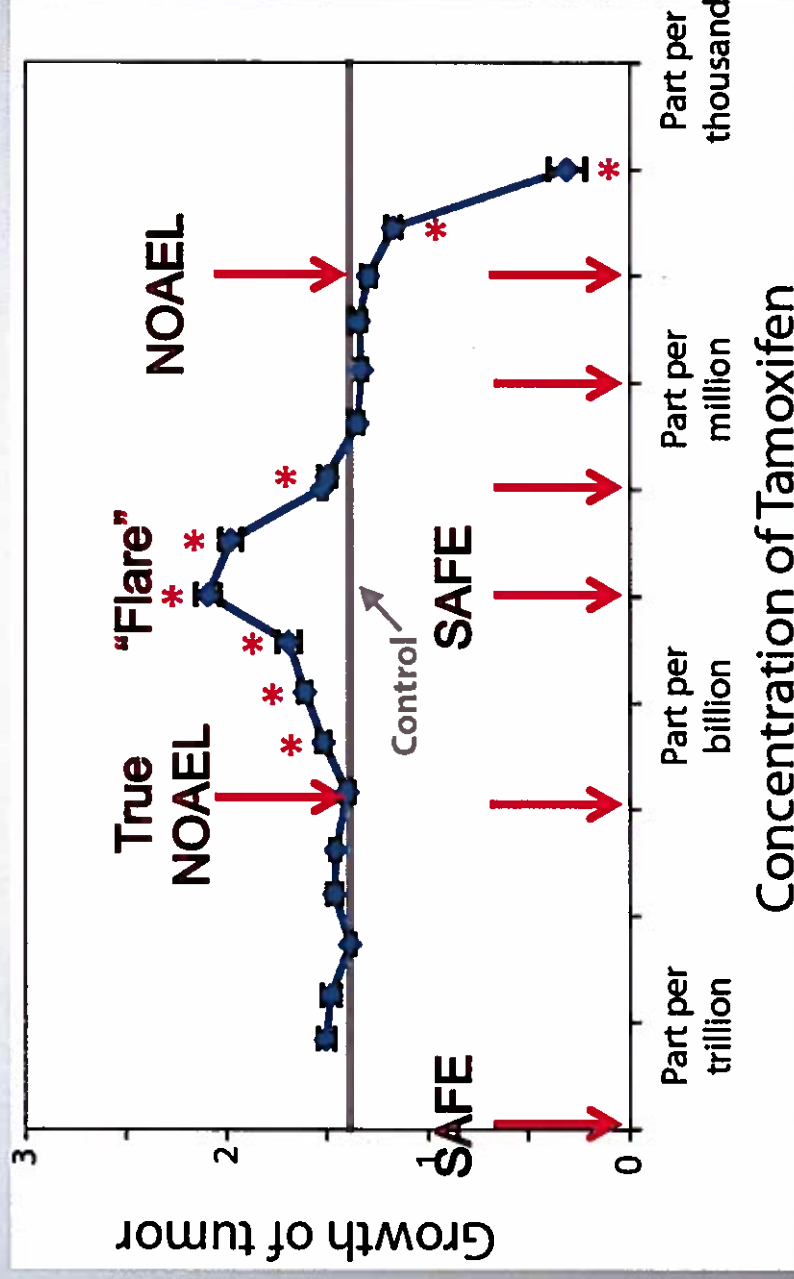


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Newbold et al. 2005, 2007

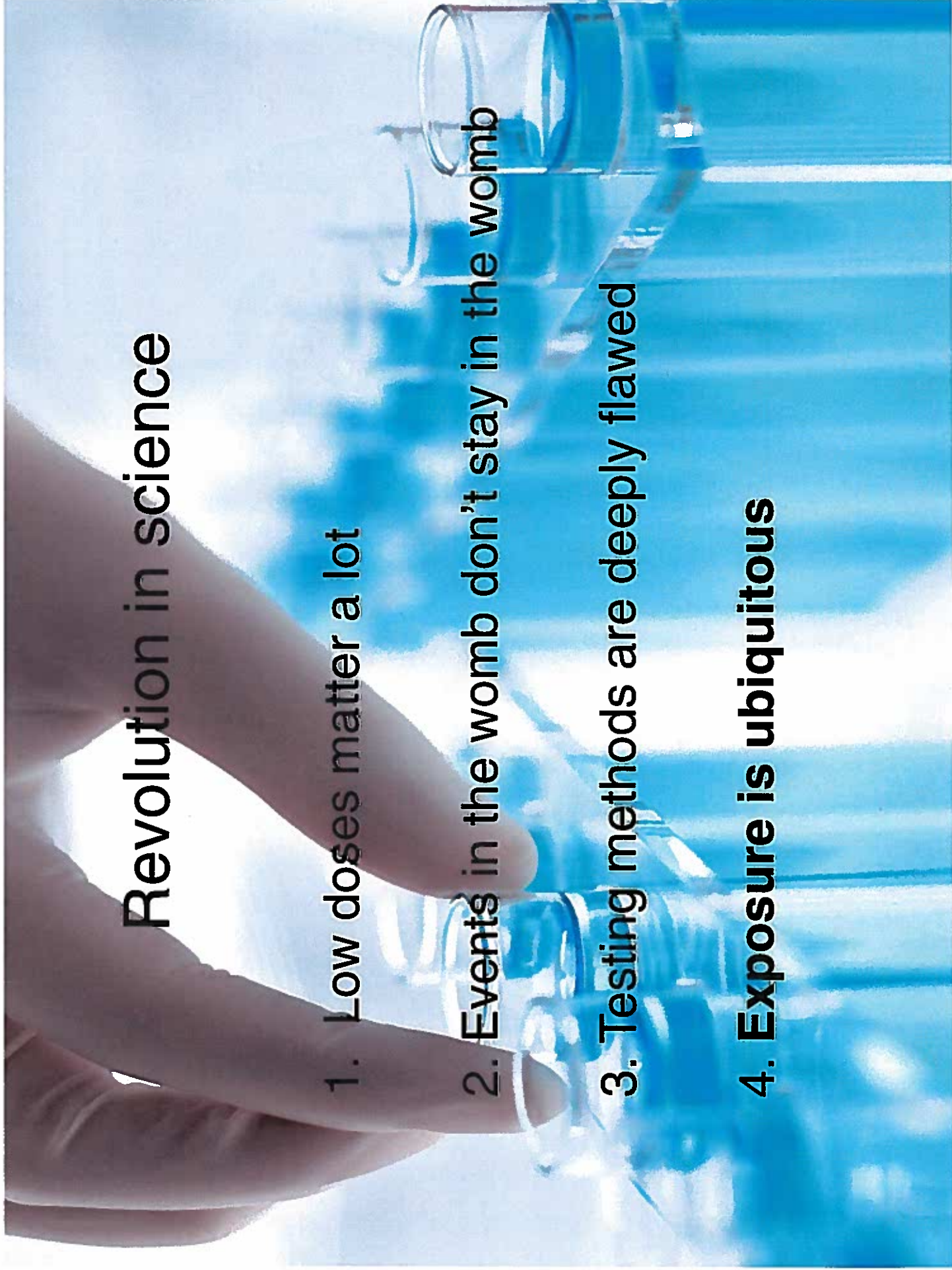


# Non-monotonicity of tamoxifen



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# 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. New technologies to clean water are coming to market. TAML: Terry Collins, Carnegie Mellon





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### Designing endocrine disruption out

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A new voluntary testing protocol to aid chemists in the design of safer materials. Created by scientists, for scientists, TiPED is a dynamic tool to facilitate efficient and early identification of potentially problematic chemicals.

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