Autism and Environment

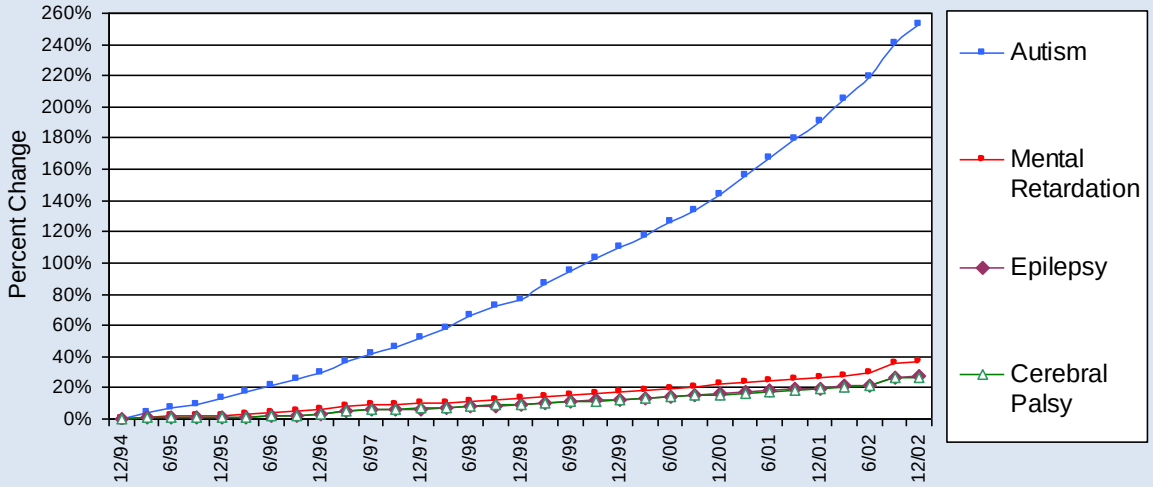
AUTISM SOCIETY

Improving the Lives of All Affected by Autism

Children's Environmental Health
November 15, 2011

Autism Rates: California Data

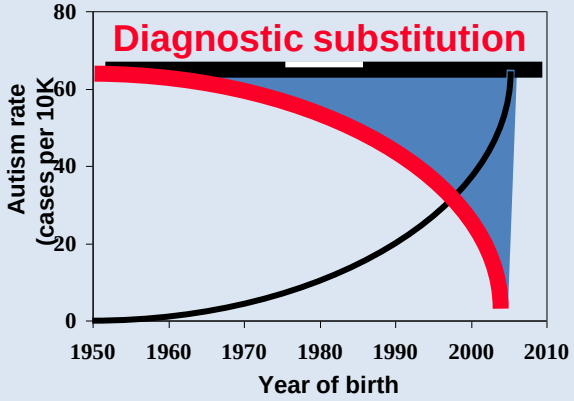
http://www.dds.ca.gov/Autism/pdf/AutismReport2003.pdf

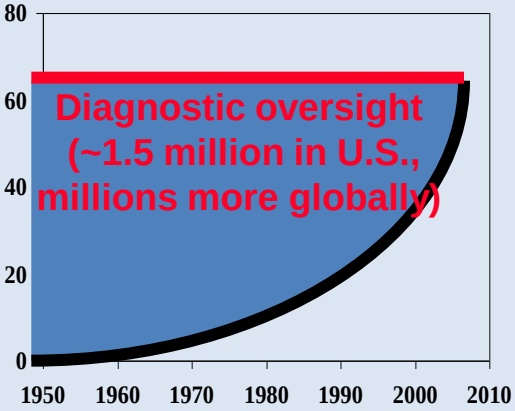


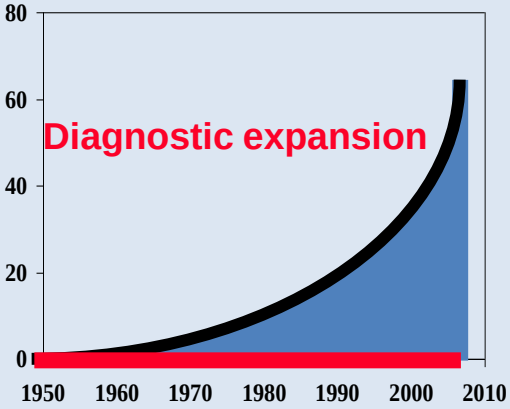
- **Diagnostic substitution: Calling something autism that would previously have been labeled something else**
- **Diagnostic oversight: people we didn't notice due to low awareness**
- **Diagnostic expansion: expanded diagnostic criteria**

NO PROOF that any of these *exhaustively* explains the numbers

Arguments against rate increases







Blaxill

Rise in Autism Prevalence v. Other Major Chronic Conditions in US

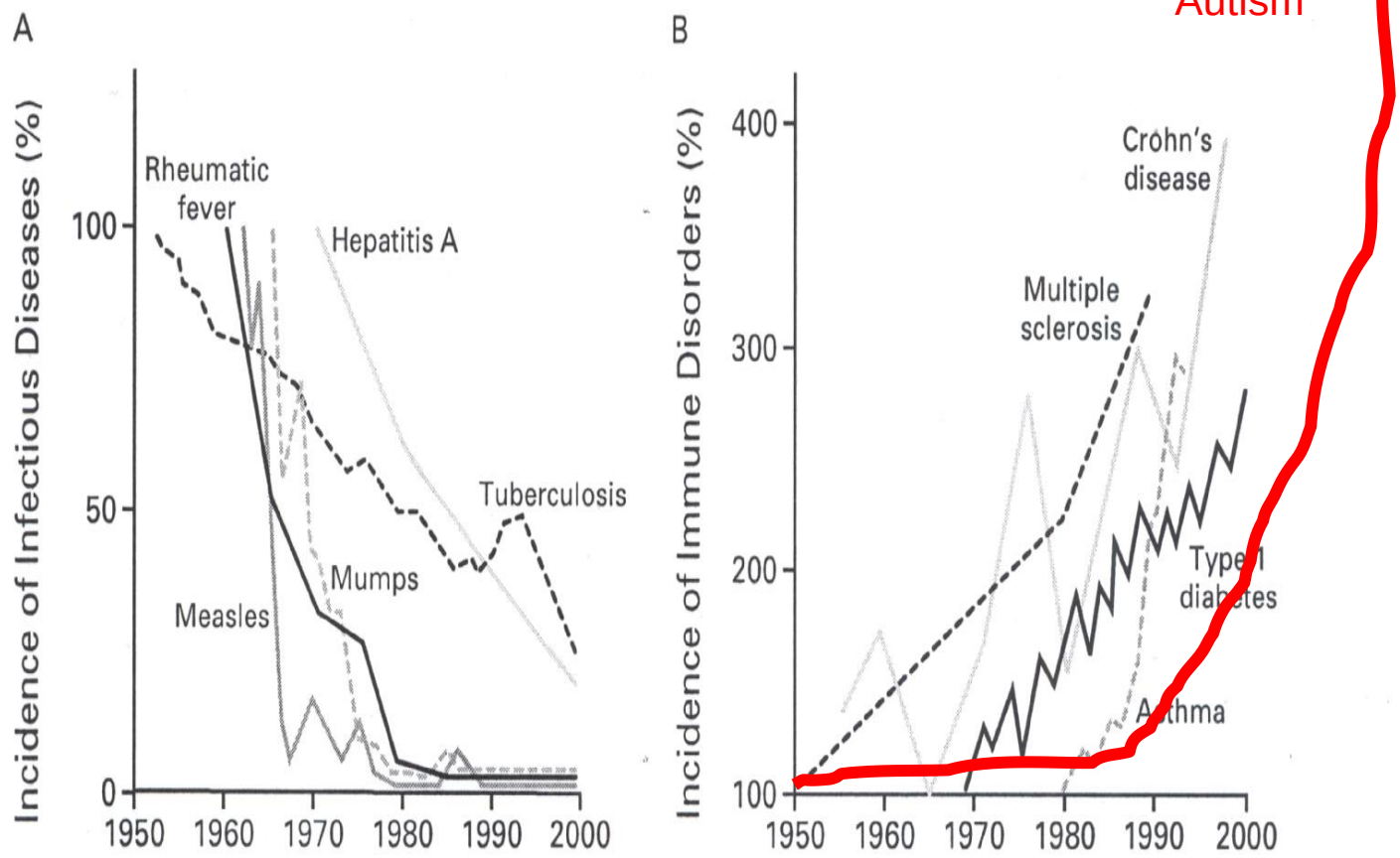


Figure 1. Inverse Relation between the Incidence of Prototypical Infectious Diseases (Panel A) and the Incidence of Immune Disorders (Panel B) from 1950 to 2000.

In Panel A, data concerning infectious diseases are derived from reports of the Centers for Disease Control and Prevention, except for the data on hepatitis A, which are derived from Joussemet et al.[12] In Panel B, data on immune disorders are derived from Swarbrick et al.,[10] Dubois et al.,[13] Tuomilehto et al.,[14] and Pugliatti et al.[15]

The Role of Environment

The exponential rise in autism cases with in one generation points away from a purely genetic origin and more towards a gene x environment interaction with a heavy contribution of environment. -Hertz-Picciotto and Delwiche

Hertz-Picciotto and Delwiche

Study authors advocate a nationwide shift in autism research to focus on potential factors in the environment to which babies and fetuses are exposed, including pesticides, viruses and chemicals in household products.(Environmental Health News, January, 2009).

What is the Effect?

- Toxins before birth and after birth can affect the way we think, learn, process information, sleep and handle stress.
- People with autism problems with chemicals and allergens throughout life, not just in the sensitive period of brain development

Environmentally responsive genes

high frequency, low penetrance modulation of vulnerability

http://www.niehs.nih.gov/envgenom/egp6.htm

- cell cycle
- cell division
- cell signaling
- cell structure
- DNA repair
- gene expression
- homeostasis
- metabolism
- immune and inflammatory response
- hormone metabolism
- nutrition
- oxidative metabolism and stress
- membrane pumps and/or drug resistance
- signal transduction

Brain effects may be downstream of *genetic vulnerabilities* or *gene-environment interactions* that affect other organs or the whole system

High-confidence Conclusions

Alcohol
Lead
Mercury
PCBs
PBDEs ManganeseArsenicSolvents
PAHs
Pesticides
Endocrine disruptors
Fluoride
Food additives
Nicotine environmental tobacco smoke

Where Are These?

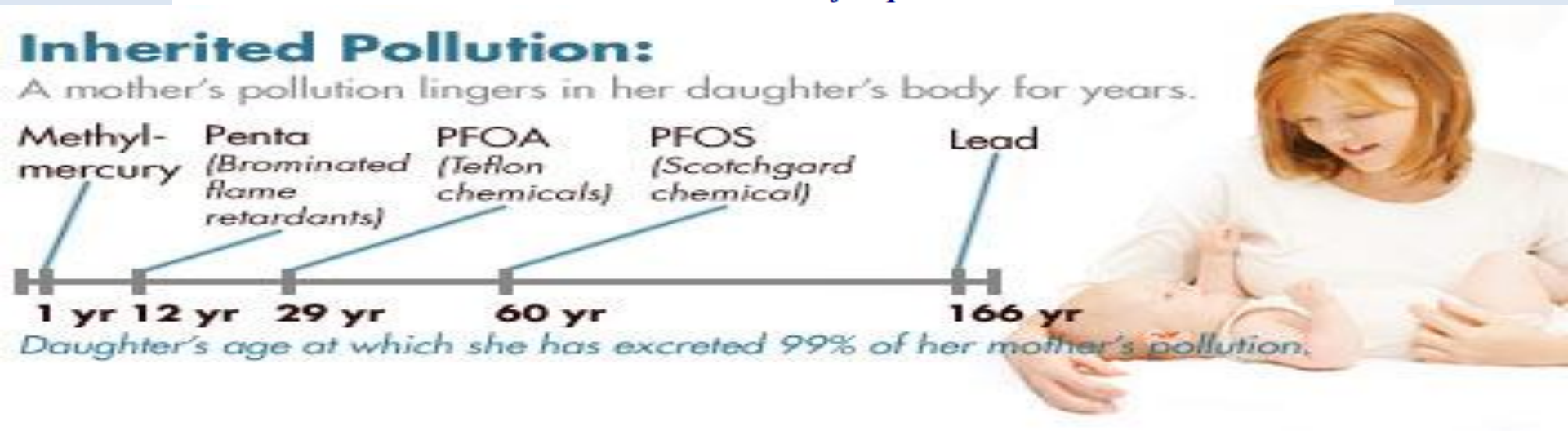
- Heavy metals – air and water, lead paint, toys
- PVCs- baby products, electronics, plastics
- BPA – toys, baby bottles, water bottles
- PFCs – Teflon, Scotchguard, Stainmaster, GoreTex
- PAHs- from burning fuel
- Phthalates- baby toys, cosmetics
- Formaldehyde- plywood, some home interior woods, FEMA trailers

http://www.iceh.org/pdfs/LDDI/LDDIStatement.pdf

Scientific Consensus Statement on Environmental Agents Associated with Neurodevelopmental Disorders

Developed by the Collaborative on Health and the Environment's Learning and Developmental Disabilities Initiative
November 7, 2007

Given the established knowledge, protecting children from neurotoxic environmental exposures from the earliest stages of fetal development clearly is an essential public health measure if we are to help prevent learning and developmental disorders and create an environment in which children can reach and maintain their full potential.




BodyBurden
The Pollution in Newborns
A benchmark investigation of industrial chemicals, pollutants, and pesticides in human umbilical cord blood

Body Burden — The Pollution in Newborns

A benchmark investigation of industrial chemicals, pollutants and pesticides in umbilical cord blood

Environmental Working Group, July 14, 2005
10 newborns, $10,000/baby for study

Chemicals and pollutants detected in human umbilical cord blood

- **Mercury (Hg) -** tested for 1, found 1
- **Polyaromatic hydrocarbons (PAHs) -** tested for 18, found 9
- **Polybrominated dibenzodioxins and furans (PBDD/F) -** tested for 12, found 7
- **Perfluorinated chemicals (PFCs) -** tested for 12, found 9
- **Polychlorinated dibenzodioxins and furans (PBCD/F) -** tested for 17, found 11
- **Organochlorine pesticides (OCs) -** tested for 28, found 21
- **Polybrominated diphenyl ethers (PBDEs) - tested for 46, found 32**
- **Polychlorinated Naphthalenes (PCNs) -** tested for 70, found 50
- **Polychlorinated biphenyls (PCBs) -** tested for 209, found 147

Of the 287 chemicals detected in umbilical cord blood:

- **180 cause cancer in humans or animals**
- **217 are toxic to the brain and nervous system**
- **208 cause birth defects or abnormal development in animal tests**

http://www.ewg.org/reports/bodyburden2

See also: Centers for Disease Control and Prevention. (2005) Third National Report on Human Exposure to Environmental Chemicals. Atlanta (GA): CDC Available at: http://www.cdc.gov/exposurereport/report.htm

Mind Disrupted: LDDI

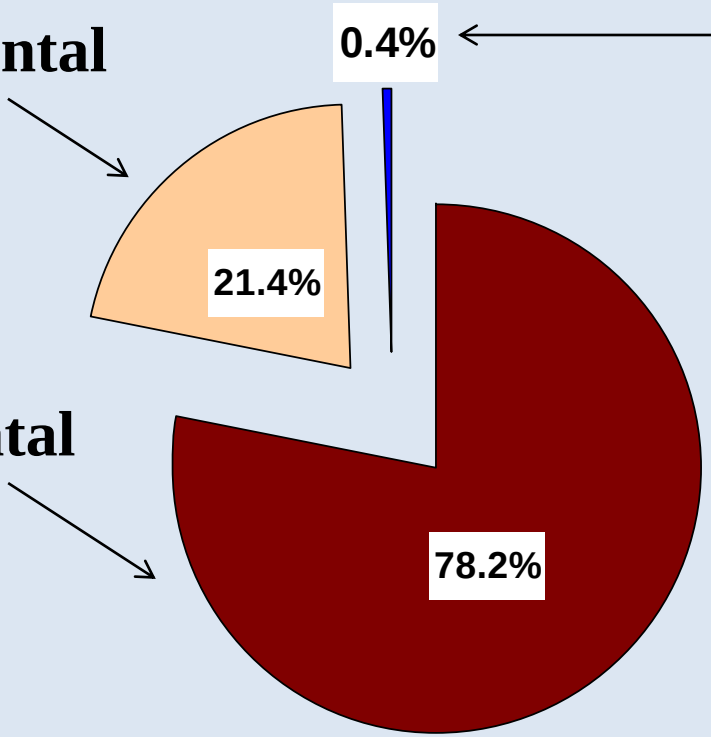
- In January 2010, LDDI published the Brain Burden report, of 12 leaders in learning disabilities organizations will be tested for body burden, ages 29-65

- Unacceptably high levels of toxins harmful to neurodevelopment have been found in these professionals living in urban and suburban areas with no known neighborhood contaminants

Status of Developmental Toxicity Testing for the 2,863 Chemicals

Produced *Above 1 million pounds/year*

Some Data On Developmental Toxicity



12 Tested for *Neuro*developmental Toxicity According to EPA Guidelines

No Data On Developmental Toxicity

- 85,000 chemicals in the Federal inventory
- 2,000-3,000 new chemicals introduced each year

In Harm's Way, www.preventingharm.org

How toxic is your bathroom?

- On average, we each use nine personal care products a day containing 126 different ingredients.
- “Safety" testing looks for reactions like skin redness, rashes or stinging
- ***No study of potential long-term problems for either humans or the environment.***

The “Cocktail Effect”

- The daily mixing of many different types of toxins in and on the body
- How this might damage health over the longer term?

Synergies

The pesticides *paraquat* and *maneb* together increase risk of ***Parkinson’s Disease***

1+1=3

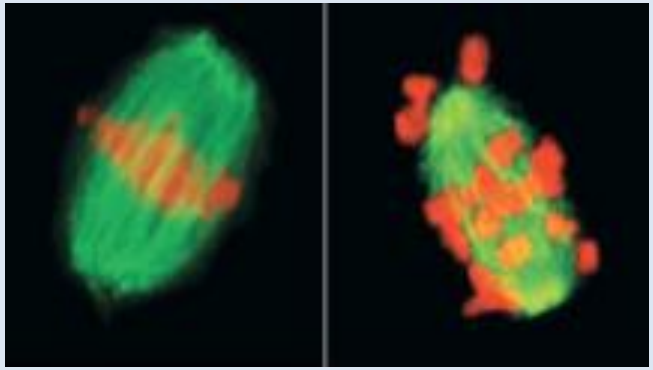
Biomimesis

Chemicals hijack body control processes

- e.g. ***“endocrine disruption”*** –chemicals act like hormones
  - ***Breast cancer***
  - ***Fibroids***

Bisphenol A Causes Chromosomes to Sort Incorrectly During the Development of Egg Cells P.A.

Hunt et al, "Bisphenol A Exposure Causes Meiotic Aneuploidy in the Female Mouse," Current Biology 13:546-553, 2003.



The Dose Does Not Make the Poison

For decades, scientists in the field of toxicology have assumed that the higher the dose of a chemical the greater the harm. Decades of studies of hormones by endocrinologists, and recent application of methods used to study hormones to the study of hormone-mimicking chemicals such as bisphenol A, invalidate this prediction that the dose makes the poison. Numerous studies show that bisphenol A and other hormone-mimicking chemicals result in great harm at very low doses that is not predicted by studies with only very high doses. Rather than having a linear dose-response curve, the dose-response curve for bisphenol A appears more like an inverted "U" in which lower doses of exposure cause greater harm than higher doses. The standard tests used in toxicology to set health standards have assumed that the dose makes the poison, thereby ignoring the low-dose impacts of chemicals that mimic hormones. The implications of this fact are stark: the health standards set by the government may not in reality be protecting human health.

Linear Response Curve

Inverted U-Shaped Curve

ENVIRONMENT CALIFORNIA
RESEARCH & POLICY CENTER

Environmental Exposures

Old Thinking—safe below threshold:

- Single agent, threshold of toxicity- “no evidence of significant toxicity at levels found in this study...”

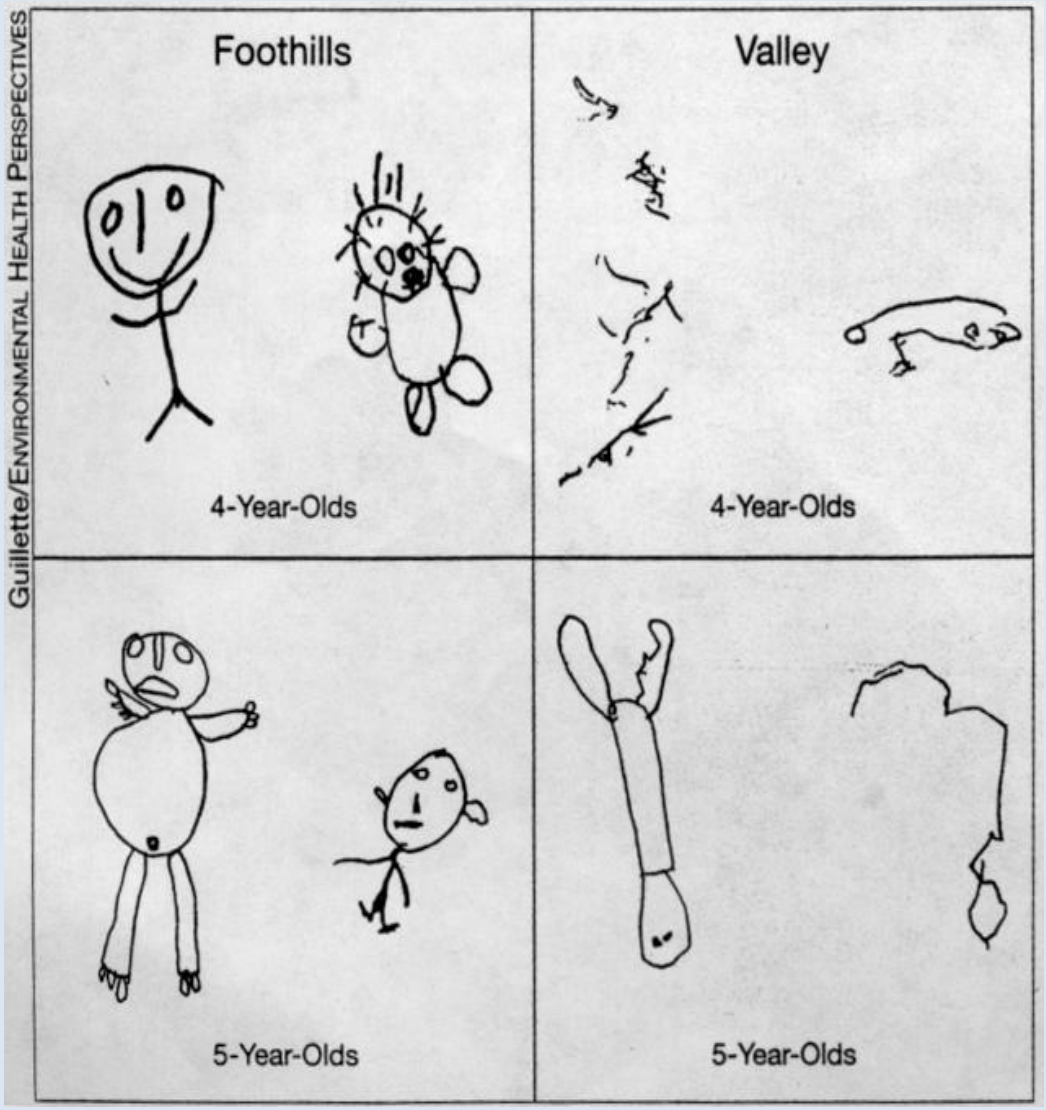
New Thinking—even low doses can be dangerous:

- Very low doses can have multiple effects from
  - altered gene expression
  - disruption in cell signaling
  - hormone mimics
- Real life exposures are complex mixes of chemicals that interact with questionable results
- Genetic variations-more susceptible subgroups
- Children not little adults, more susceptible

www.ourstolenfuture.org

Canary in a Coal Mine

CHILDREN ARE VERY VULNERABLE



Finding the fortitude for facing our evolutionary challenge

www.cheforhealth.org

"**The Age of Extinction and The Emerging Environmental Health Movement**"

by Michael Lerner, http://www.commonweal.org/pubs/lerner/article_extinction.html

Institute for Children's Environmental Health

www.iceh.org

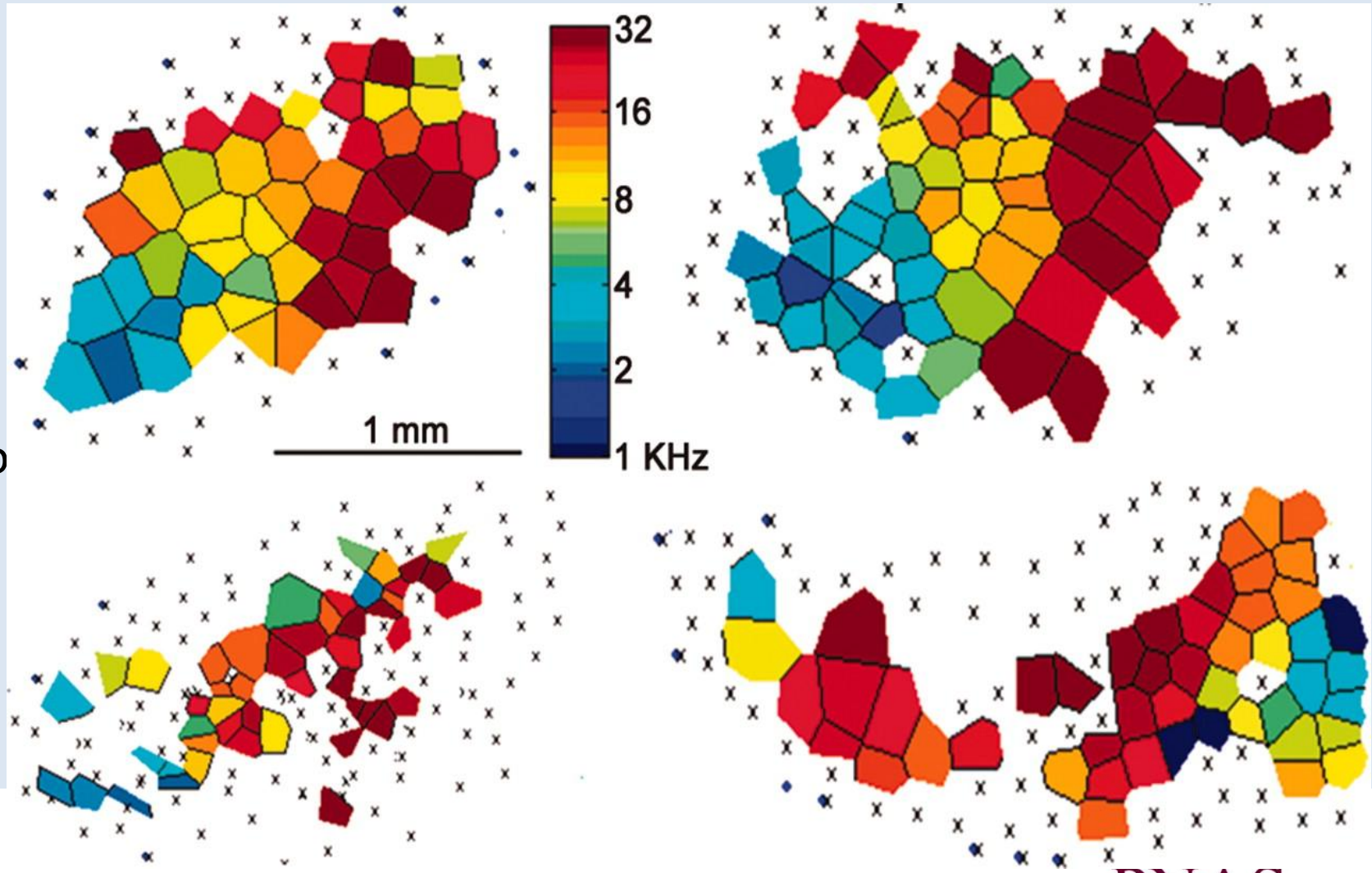
Children's Brains and Air Pollution

- Lilian Calderon, M.D., Ph.D. found Alzheimer's like changes in the brains of 9 year olds exposed to extreme air pollution in Mexico City
- Damage to the prefrontal cortex
- Problems with fluid cognition, memory, executive function, especially when the task also involved visual-spatial abilities

Perinatal Exposure to Low Level PCB's Alters Wiring of Primary Auditory Cortex

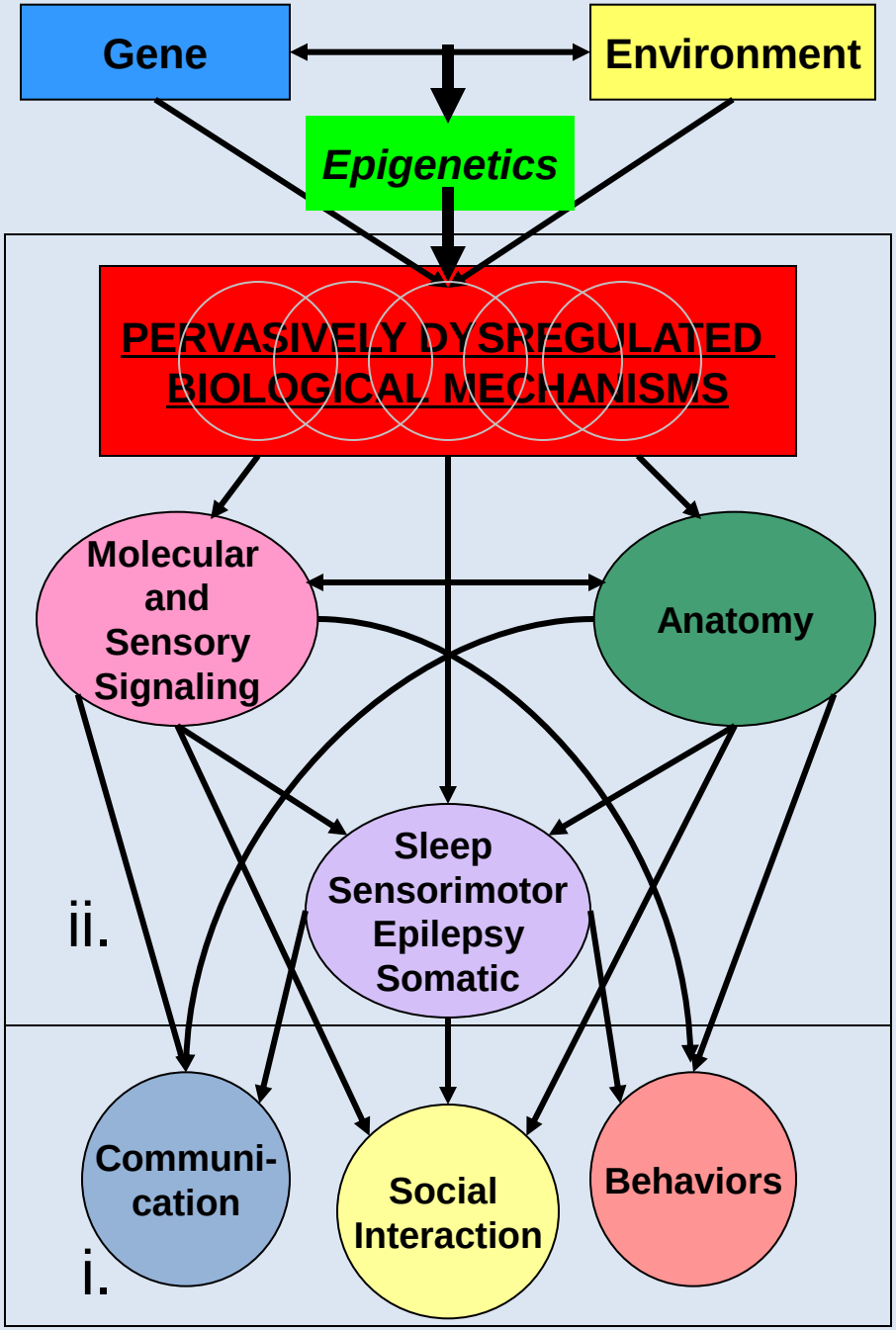
Kenet, T. et al. (2007) Proc. Natl. Acad. Sci. USA 104, 7646-7651

No

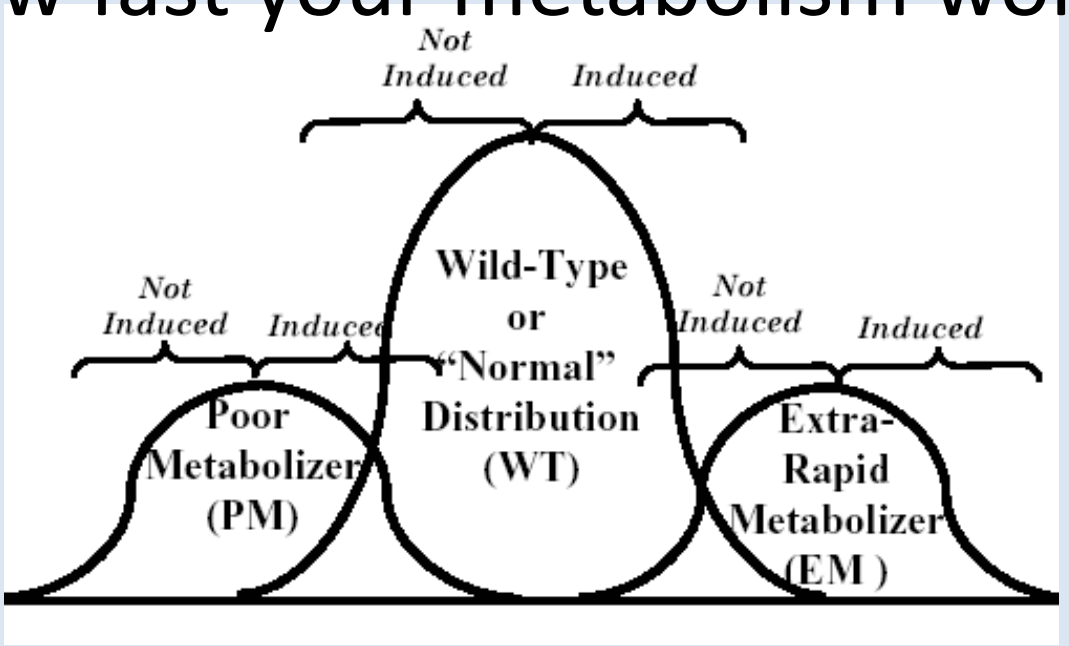


Emerging
Systems
Approach

What Happens Downstream?



One pathway: Genes relate to how fast your metabolism works



Burning up necessary nutrients too fast

OR

Getting rid of toxins too slowly

→ **PROBLEMS**

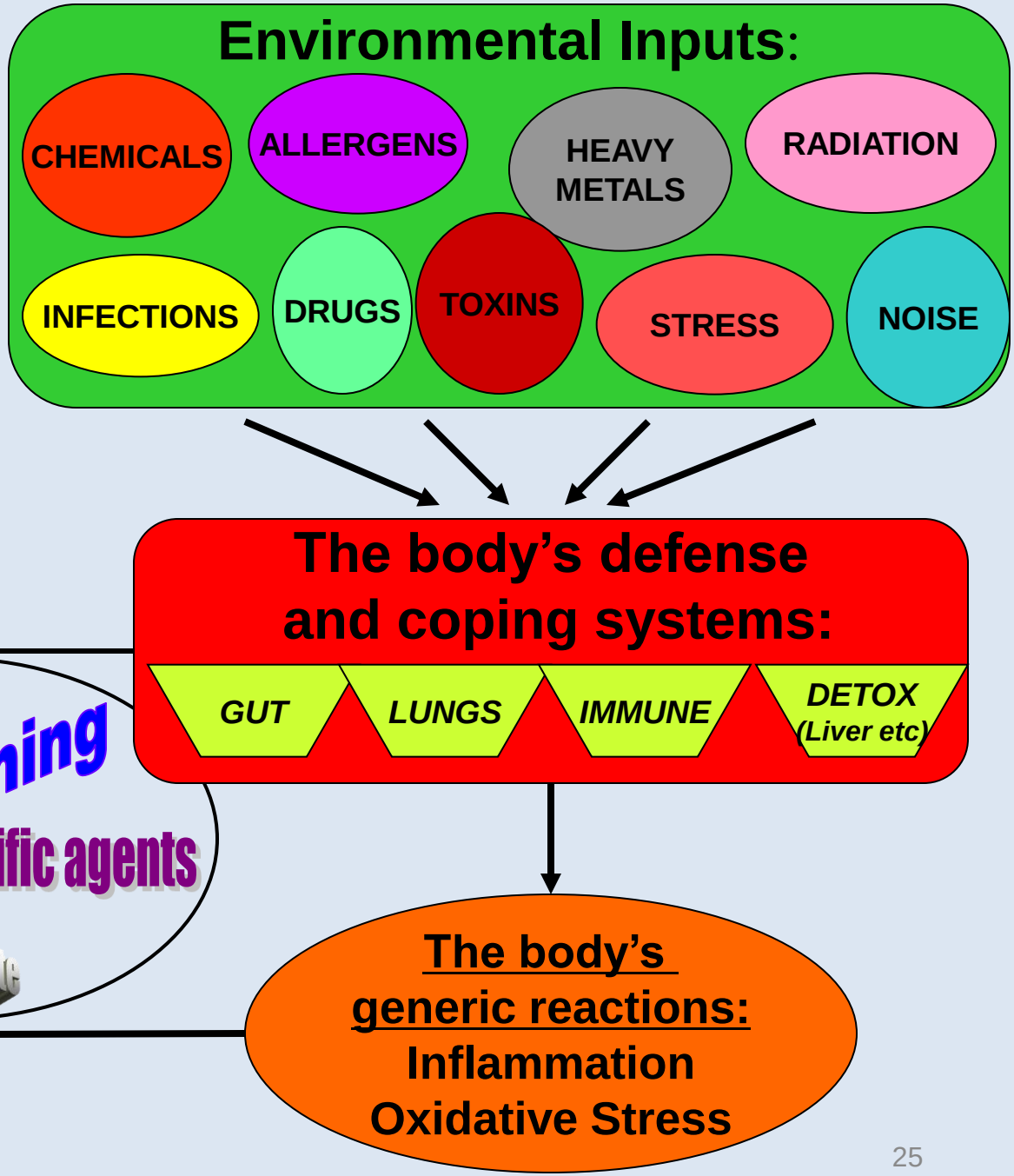
BOTH

→ ***BIGGER PROBLEMS***

Ames, B. 2002. High dose vitamin therapy. *Am Jnl Clin Nutr.*

FINAL COMMON PATHWAYS

Overflowing the Levees



Taking Charge and Keeping Hope: Government Policy

- Test toxic chemicals at true doses
- And in combination
- Advance environmental science
- Vote! Safer Chemicals Act for TSCA reform

Autism Society and Safer Chemicals Coalition

- **Who we are**
- Our coalition includes nurses, parents, cancer specialists, conservationists, and concerned citizens from across the nation.
- **What we want**
- We want Congress to create common sense limits on toxic chemicals.

Lessons from the War on Cancer

Research on environmental cause of cancer has been limited by low priority and inadequate funding

There are over 80,000 chemicals used in the US. **Only a few hundred have been tested for safety.**

Current testing relies heavily on animal studies that utilize high doses of toxins

Studies fail to take into account harmful effect that may occur only at low doses

Studies are typically done on adolescent animals

Studies fail to assess the impact of in utero, childhood and lifelong exposures.

Studies focus on single agents rather than in combination

2008-2009 Annual Report President's Cancer Panel

"The American people-even before they are born-are bombarded continually with myriad combinations of these dangerous exposures. The Panel urges you most strongly to use the power of your office to remove the carcinogens and other toxins from our food, water, and air that needlessly increase health care costs, cripple our Nation's productivity, and devastate American lives."

"With nearly 80,000 chemicals on the market in the United States, many of which are used by millions of Americans in their daily lives and are understudied and largely unregulated, exposure to potential environmental carcinogens is widespread."

Taking Charge at Home

- Learn the substances
- Read product labels and food labels
- These websites will guide you

  www.healthylegacy.org

  www.healthandenvironment.org - toxics

  saferchemicals.org- great resources
- You can reduce chemical exposures just like you monitor for casein or gluten

Taking Charge In Government

- Senator Frank Lautenberg: Safer Chemicals Act of 2011
- Over 250 health, fertility, workers rights, environmental justice, clean water groups working to increase awareness of Toxic Chemical Substance Act reform. No changes since 1976!
- Email your Congresspeople to support the Safer Chemicals Act.

Additional Sources of Information

- *Changing the Course of Autism,* Bryan Jepson MD
- *Healing the New Childhood Epidemics,* Ken Bock MD
- *Children with Starving Brains*, Jaquelyn McCandless MD
- *Special Diets for Special Kids*, Lisa Lewis
- *Evidence of Harm*, David Kirby
- Paper: What Causes Autism, Phil Landrigan MD
- Paper: The Rise of Autism and Age of Incidence, Hertz-Picciotto, PhD

www.autism-society.org

AUTISM AND THE ENVIRONMENT 101

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