Project TENDR

The Cast of Toxic Chemicals

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Brain-based Disorders in Children

Factors that Impact Brain Development

- Sex
- Nutrition
- Preterm Birth
- Social Stressors
- Built Environment
- Maternal Depression
- Genetic Susceptibility
- Preschool Attendance
- Environmental Toxins
Environmental Disasters
... are just the tip of the iceberg
Percent of children and pregnant women who have detectable levels of toxins in their blood or urine.

- **Lead**: 100%
- **PCBs**: 100%
- **OP Pesticides**: 83%
- **Phthalates**: 100%
- **Mercury**: 89%
- **PBDE**: 100%
Vulnerability of the Developing Brain

• The blood brain barrier isn’t fully formed; it is more permeable to toxins
• Rapidly growing cells are often more vulnerable to toxins than slowly growing cells
• Brain growth occurs over a longer duration than other organs
• The fetus and child may lack enzymes to detoxify contaminants
• Young children often more heavily exposed to contaminants than older children and adults
The Ongoing Search for a Threshold
Lead Toxicity and IQ Deficits

Prenatal OP Pesticide Exposure and IQ Scores in 7-year old Children

Prenatal Flame Retardant (PBDE) Exposure and IQ Scores in 5-year old Children

Chen A, et al. EHP (in press)
Risk of Autism by Exposure to Traffic-Related Air Pollution during Pregnancy

No Acceptable Level?
Little Shifts Matter

Distribution of Intellectual Abilities in US Children

- 6 Million Challenged
- Most of Us
- 6 Million Gifted

IQ Scores:
- 70 IQ
- 130 IQ
Little Shifts Matter

Distribution of Intellectual Abilities in Lead-Exposed US Children

9.5 Million
CHALLENGED

70 IQ

130 IQ

2.4 Million
GIFTED

MOST OF US
$1= $17 to 220

The System is Broken
Recommendations

• Overhaul our framework to developing and assessing evidence on toxic chemicals

• Take into account special vulnerabilities of developing fetus and children, exposures to multiple chemicals and lack of thresholds

• We call on businesses to eliminate toxic chemicals from their supply chain and products

• We call on health professionals to integrate knowledge of toxic chemicals into practice