Special Cmte on Cosmetic Pesticides
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#4

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A Pattern of Pathology

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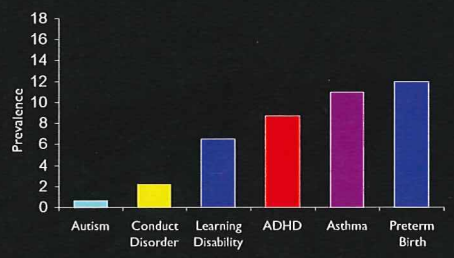
"Thalidomide and pesticides -- they represent our willingness to rush ahead and use something new without knowing what the results are going to be."

Rachel Carson

Protecting Children from Toxicants

New Morbidities of Childhood



Boyle C, et al. Pediatrics 1994;93:399-403. Braun AM, et al. Paediatr Perinat Epidemiol 2002;16:8-15. Hedley AA, et al. JAMA 2004;291:2847-50. Lanphear BP, et al. Pediatrics 2001 e98. Froehlich T, et al. Arch Ped Adolesc Med 2007;161:857-864. Braun J, et al. Environ Health Perspect 2008;116:956-962.

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Organophosphate Pesticides

- Developed in 1940s for biological warfare
- Designed to be neurotoxic – interfering directly with acetylcholine breakdown and nervous system functioning
- <10% of OPs have been tested for developmental neurotoxicity
- 50% of pesticides used are OPs
- 70% of use is in agriculture

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Animal Studies

- Disruption of brain development and function
  - Cholinergic hyperstimulation
  - Interference with neural cell replication & differentiation
  - Disruption in axogenesis
- Effects in animals:
  - Impaired balance
  - Deficits in maze perfromance
  - Impaired motor skills

Effects of prenatal exposure persist into adulthood and appear to be permanent

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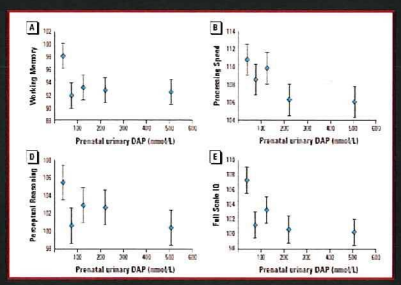
Prenatal Urinary OP Pesticide Exposure and Cognitive Abilities in Children, The CHAMAKOS Study



Bouchard M, et al. EHP 2011;119:1189-1195.

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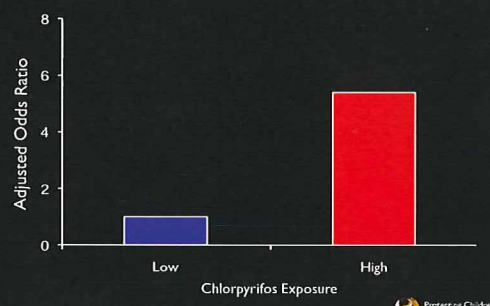
Prenatal Chlorpyrifos Exposure and Pervasive Developmental Disorder in 3-year old Children



Rauh V, et al. Pediatrics 2006,www.pediatrics.org/cgi/doi/10.1542/peds.2006-0388

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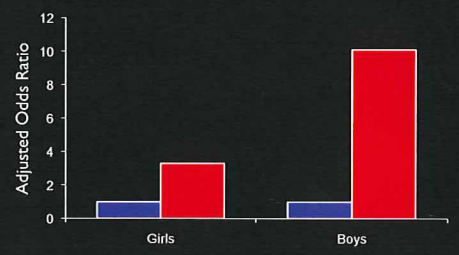
Risk of ADHD in 7-year old Children from Prenatal OP Pesticide Exposure, The CHAMAKOS Study



Marks A, et al. EHP 2010;118:1768-1774.

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Association of Organophosphate Pesticides with ADHD in US Children, NHANES

TABLE 3 ORs for Any ADHD Subtype for 10-Fold Increases in Urinary DAP Metabolite Levels ($N = 1139$)

	OR (95% CI)			
	Cases Identified With DISC-IV ($n = 119$)		Cases Identified With DISC-IV or ADHD Medication ($n = 148$)	
	Unadjusted	Adjusted[a]	Unadjusted	Adjusted[a]
DEAPs	1.02 (0.74–1.41)	0.94 (0.69–1.28)	0.83 (0.66–1.18)	0.80 (0.60–1.05)
DMAPs	1.66 (1.24–2.22)	1.55 (1.14–2.10)	1.87 (1.42–2.47)	1.72 (1.31–2.26)
Total DAPs	1.31 (1.05–1.63)	1.21 (0.97–1.51)	1.48 (1.20–1.82)	1.35 (1.10–1.67)

[a]Adjusted for gender, age, race/ethnicity, PIR, fasting duration, and log-and-ethnically transformed urinary creatinine concentration

Bouchard M, et al. Pediatrics 2010; 125:e1270-1277.

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Failure of Toxicity Testing

- Of the nearly 3,000 high production volume chemicals, 75% lack even the most basic toxicity tests. [1]
- Of the 140 registered pesticides EPA considers to be neurotoxic, the majority have not been tested for developmental neurotoxicity. [1]
- Animal testing may not be sensitive enough to protect humans. [2]

1. Claudio L. Toxicol Appl Pharm 2000;164:1-14.
2. Rice D. Env Health Persp 1996;104:205-215.

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The Impact of Chemicals on Human Health

- Increasing evidence that environmental chemicals are toxic at levels previously thought to be safe or innocuous
- Subtle shifts in cognition, behavior, birth weight or physiologic parameters in children are antecedents of disease and disabling disorders in older children and adults
- The effects of environmental toxicants are systemic
- Disease and disability associated with environmental chemicals are preventable

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