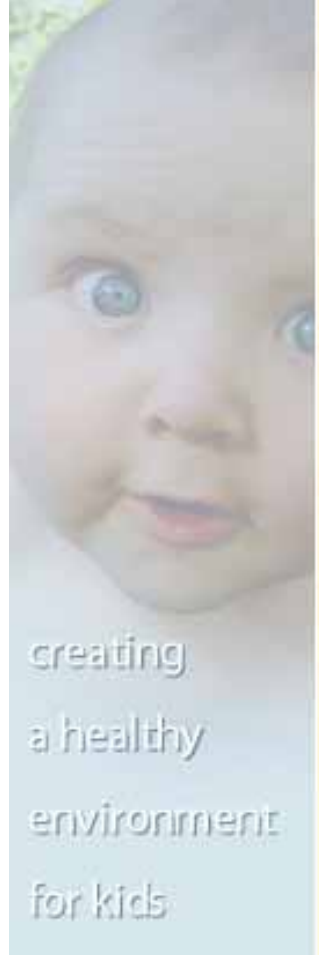


Children and the Environment

Presentation to *Best Start* Annual Maternal, Newborn and Child Health Conference, January 27-28, 2004

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Canadian Environmental Law Association

current to: January, 2004



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Presentation Overview

- Children are not “little adults”
- More susceptible and more exposed to contaminants
- Context of vast ignorance but troubling information and high stakes risks
- Criteria for, and approaches to, setting priorities among 10s of 1000s of chemicals
- Personal and political responses



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Children are different

Proportionality

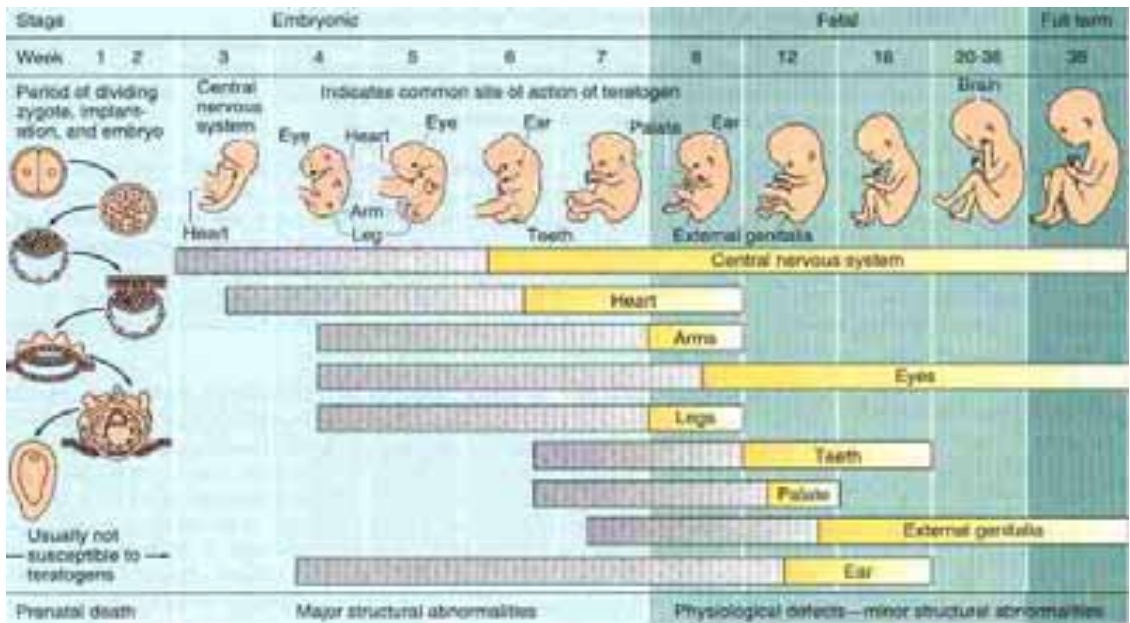
- Smaller size
 - ↑ relative surface area
- More food, water, air ingested

Physiology

- Faster breathing
 - Immature detoxification systems
- ⇒ Greater intake of contaminants



Critical Windows of Vulnerability



Source: Moore, 1998

Children's exposures

- More than 80% of time spent indoors
- More active outdoors
- Frequent hand-to-mouth behaviour
- Mouthing objects (and Pica)
- Crawling, lying on floor
- Food preferences, dietary composition
- Curiosity, exploratory behaviour
- Longer "shelf-life"

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Additional Risk Factors

- Poverty
- Poor Nutrition
- Genetic Differences
- Cultural Differences
- Complacency, “dread” and lack of information
- [Inadequate regulation and massive backlog of untested substances]



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Health Concerns for Children

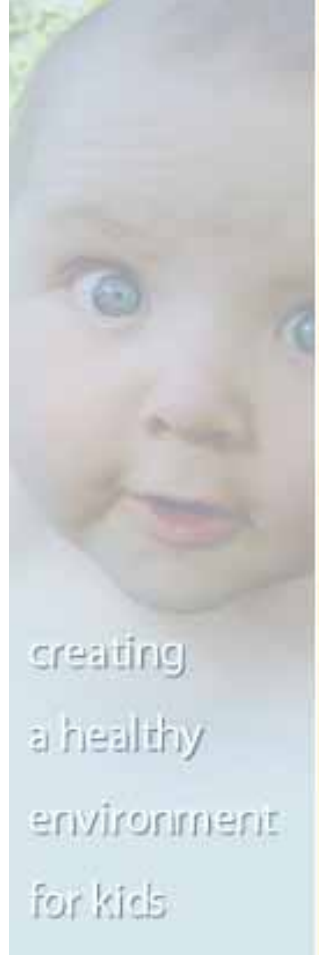
- Congenital Defects
- Effects on Growth
- Brain Development
- Asthma & Respiratory Health
- Reproductive, Endocrine Effects
- Immunological Effects
- Cancers (children and young adults)



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Contribution of Contaminants?

- Complex and multifactorial diseases
- Context of vast ignorance and scientific uncertainty
- “Backlog” of 23,000 substances – little data on exposure/effects; constant flow of new substances (another 10,000 since 1994)
- Concern is justified and prudent (past mistakes – thalidomide, DES, Hg, Pb)
- Growing evidence for current problems (low level exposures to pesticides, etc.)



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Prioritizing the Issues

- Numbers of children affected (respiratory, neurodevelopmental, birth defects)
- Severity of outcome (cancer, neurodevelopmental)
- Substances associated with health effects of concern (“lists” exercise)
- Greatest potential for exposure (limited data; focus on air, food, and consumer products)



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Health Effect Trends

Large numbers affected

- Respiratory stats (12% with asthma)
- Brain development and behaviour (stats for ADHD, autism, learning, behaviour, vocabulary)

Rare but severe outcomes

- Birth defects (poor data; 4% in US)
- Cancer (rare but #1 cause of death in children > 1 yr; some cancers rising in young adults)

Emerging and troubling

- Immune, Endocrine



Results of Lit. Review

- Convergence on “known” substances and effects of concern
- Similar recognition of “emerging issue” (esp. in consumer products)
- Recurring themes:
 - Problem of “data gap”; need for indicators and biomonitoring; still evaluating chemical-by-chemical despite complex mixtures; need for a precautionary approach; and, children in poverty disproportionately affected.



Key Findings: substances of concern

“Known”/Suspected:

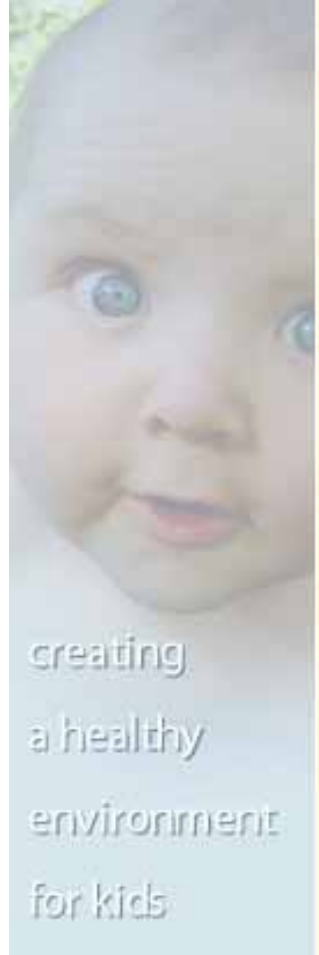
- Metals (Pb, Cd, As, CrIV, Hg,), Pesticides (OPs, Carbamates, etc), POPs, DBPs, VOCs, PAHs, phthalates, NPEs and solvents
- “Criteria” Air Pollutants (SO₂, NO₂, CO, Ozone, PM₀₁, PM_{2.5}, PM₁₀)
- ETS, Radiation

Emerging:

- Additional metals, pesticides, POPs, VOCs, PAHs, phthalates, NPEs
- Alkylphenols (detergents and personal care)
- Brominated Flame Retardants (PBDEs)
- Perfluorochemicals (PFCs) (non-stick/stain surfaces)
- Organotins (plastics, pesticide)
- Short Chain Chlorinated Paraffins (SCCPs) (rubber, plastic, paints, etc.)

High Potential for Exposure

- “known” contaminants – reasonably good information
- Emerging issues – still big gaps
- Recurring themes – focus on air, food, and consumer products
- “shortlist” of 597 substances
- “dirty six dozen” of greatest concern



Respiratory Effects and Brain Development

- Highest proportion of contaminants of concern are suspected respiratory toxins and suspected neurotoxins
- These are the same health effects affecting large numbers of children
- **Cannot** draw relationship but very provocative finding and should prompt further focused research and policy responses
- Cancer is third effect most commonly associated with high exposure contaminants



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Policy Responses

Lead – The Cautionary Tale

- Industry-controlled information
- Safety assumed despite early warnings of serious effects
- Complex, controversial science and analyses
- Regulation only after millions of children affected
- Still not regulating new sources
- Public health success story; absolute failure of risk assessment in preventing harm



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Health Effects of Low Level Lead Exposure

Observed associations at $\geq 10 \mu\text{g}/\text{dL}$ (would fit on the head of a pin)

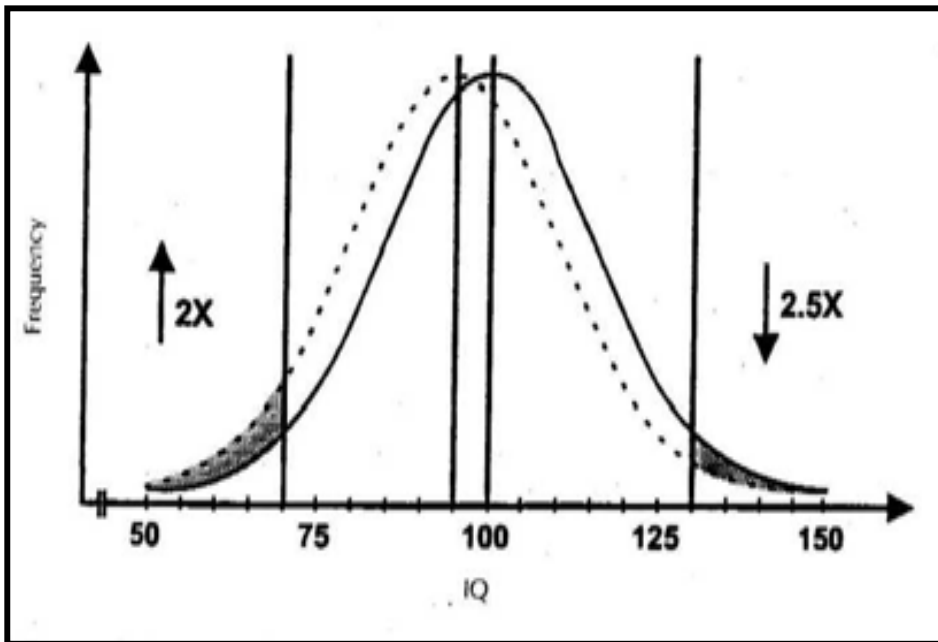
- Deficits in: IQ; speech and language processing; perceptual-motor function and integration; reaction time; attention span; reading, spelling and math scores
- non-adaptive classroom behaviour, poorer handwriting
- higher risk for: learning disabilities; failure to complete high school; antisocial and delinquent behaviour with effects following a developmental course
- poorer vocabulary and grammatical reasoning scores and hand-eye coordination

Recent data – likely no safe level (all of the above is culmination of >30 years of research)



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Impacts across a population



Source: Rice (1998),
as adapted from Weiss (1990)

Experimenting on children

“We are conducting a vast toxicological experiment in our society, in which our children and our children’s children are the experimental subjects”

Dr. Herbert Needleman



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Personal Responses



BE INFORMED and EDUCATED

- Apply personal precaution and demand precautionary policies
- Our children are no longer available for the experiments



Personal Choices

Weighing good and bad in fish

When people eat fish, the methylmercury in it can harm brain cells, but the fish oils contain Omega-3 fatty acids good for the heart. The American Heart Association recommends that people with heart disease consume about one gram of the fatty acid daily.



Methylmercury advisory level

● High ● Middle ○ Low

| FISH TYPE | OMEGA-3 OUNCES PER SERVING | METHYL-MERCURY LEVEL |
|--------------|----------------------------|----------------------|
| Salmon | 0.68-1.83 | ○ |
| Sardines | 0.98-1.70 | ○ |
| Oysters | 0.37-1.17 | ○ |
| Halibut | 0.40 - 1.00 | ● |
| Shark | 0.90 | ● |
| Tilefish | 0.80 | ● |
| Tuna, white* | 0.73 | ● |
| Swordfish | 0.70 | ● |
| Lobster | 0.07-0.41 | ● |
| Crabs | 0.34-0.40 | ●○ |
| Pollack | 0.46 | ○ |
| Mackerel | 0.34 | ● |
| Shrimp | 0.27 | ○ |
| Clams | 0.24 | ○ |
| Tuna, light* | 0.26 | ○ |
| Scallops | 0.17 | ○ |

*Canned; serving is three ounces.

SOURCES: American Heart Association; Food and Drug Administration

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Implications for CPCHE Work

- Well-known substances – trace path from RA to RM – much still to be done
- Emerging issues – ditto, even more work to do but opportunity to insert precaution
- Focus on sources/exposures of greatest concern
- Push for policy, regulatory and industry action - priority setting for federal legislative review and research agenda
- Public information re: avoiding exposure, safer alternatives, and lobbying for action/change



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Acknowledgements, Thanks and More Information

- Colleagues at CELA and among CPCHE partners
- www.cela.ca
- www.healthyenvironmentforkids.ca
- www.cape.ca/children/index.html

More useful websites

- www.greenpeace.org.uk/Products/Toxics/index.cfm
- www.ewg.org/cosmetics/index.php



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