

# **Environmental Threats to Children's Health - Science, Policy and Precaution**

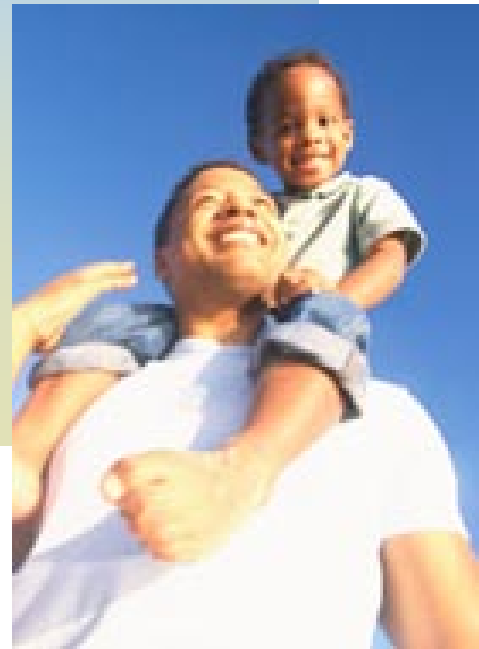
*Growing Up Organic Conference*  
*Canadian Organic Growers*  
**February 17, 2007**

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**Senior Researcher**  
**Canadian Environmental Law Association**



# Presentation Overview

- Overview of evidence about greater risks to children.
- Large numbers of children potentially affected.
- Which exposures matter the most?
- Focus on food
- Personal and policy responses
- To begin: show of hands



# Comprehensive Review of Evidence

## Environmental Threats to Children

Understanding the Risks, Enabling Prevention



## CHILD HEALTH AND THE ENVIRONMENT—A PRIMER

canadian partnership for  
  
children's  
health & environment

Summary Report

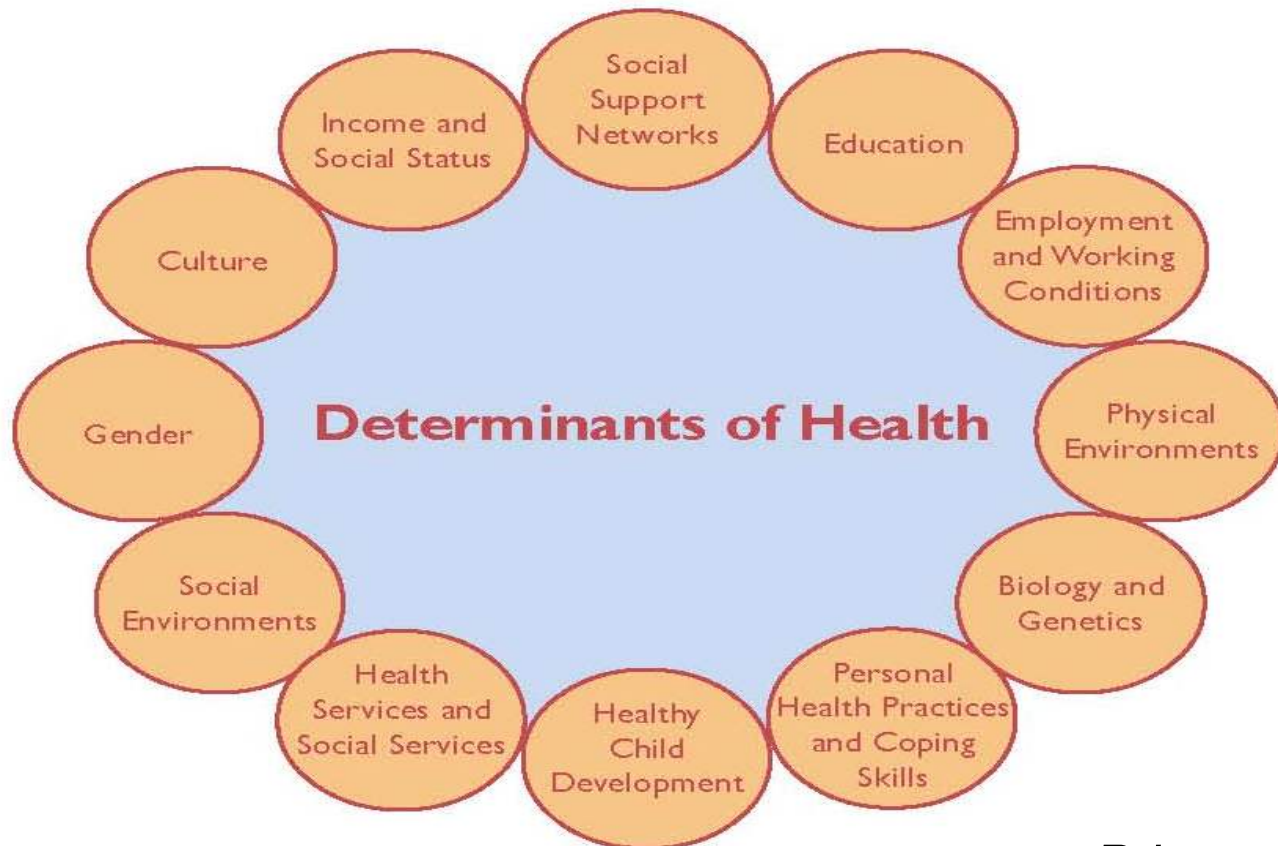
Dr. David McKeown  
Medical Officer of Health

TORONTO  
Public Health

September 2005

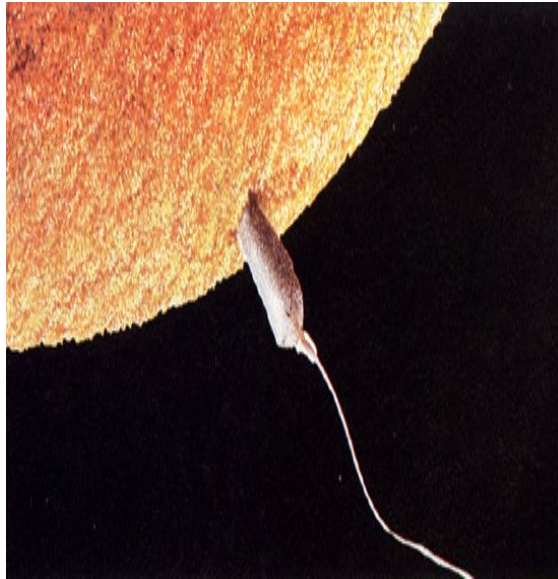
# Children's Environmental Health in Context

**Figure 1: Determinants of Health**



Source: World Health Organization, undated.

# Mother's Body: The First Environment



**Exposures in early life and prior to conception are key determinants...**

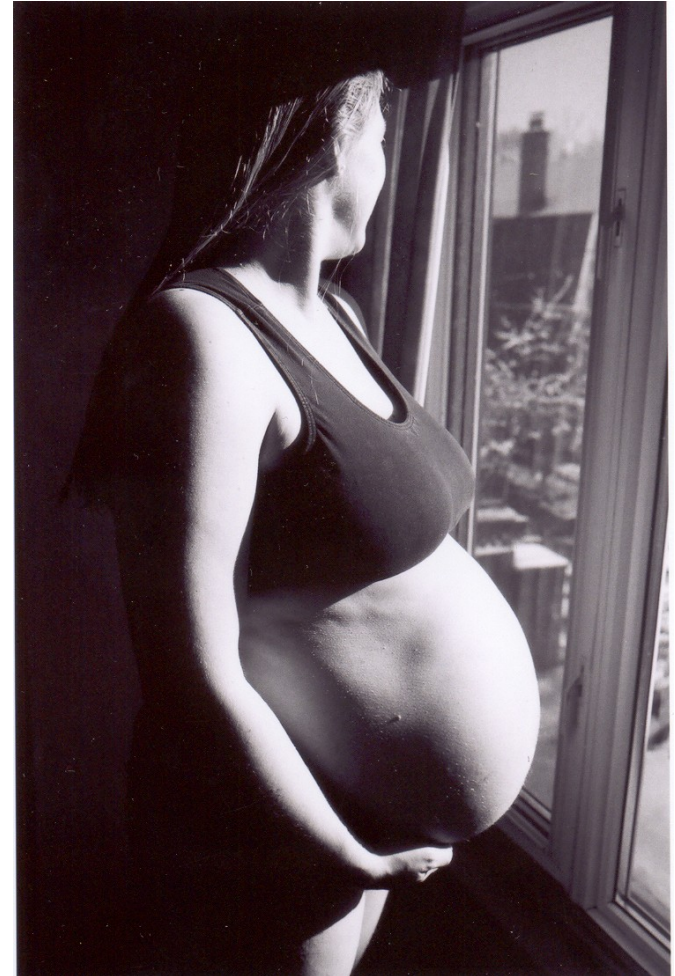


Photo courtesy of Mark & Tonya Surman

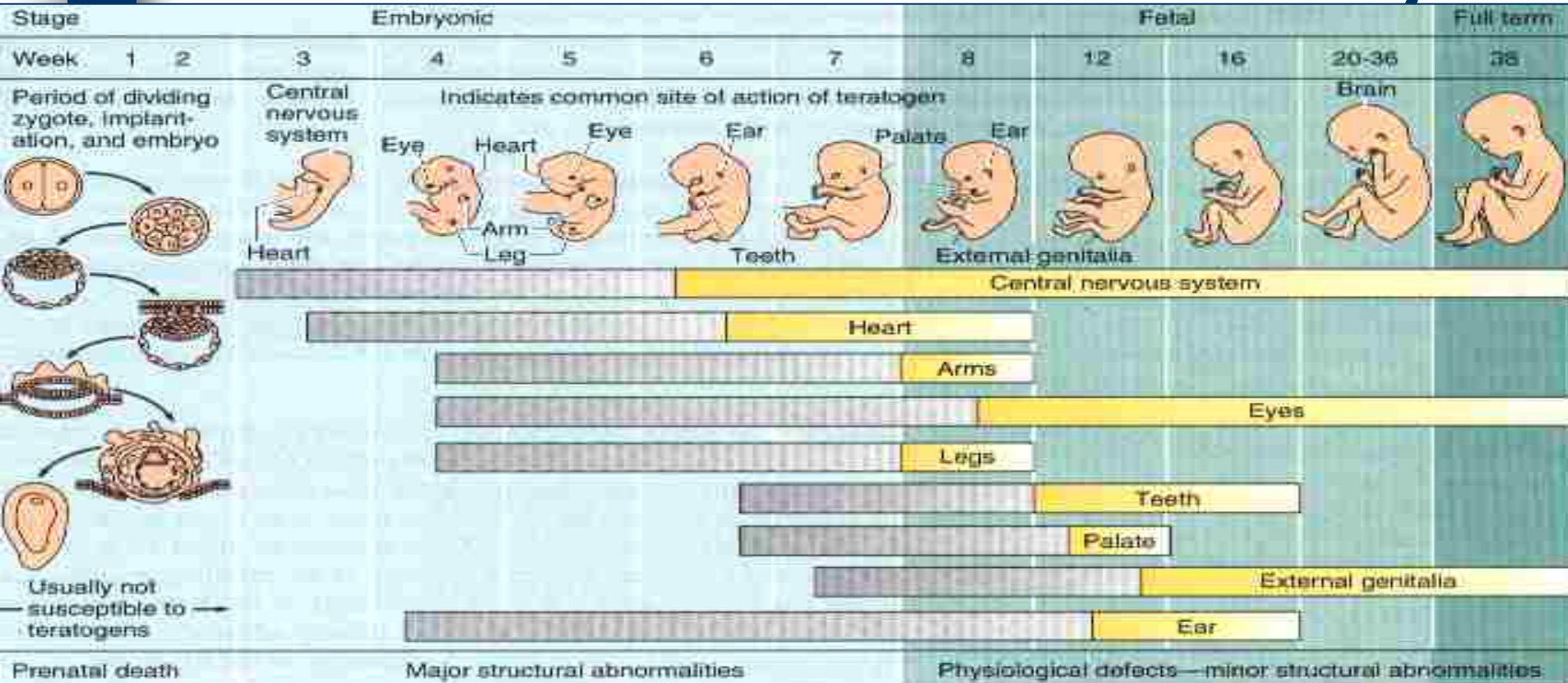
# Children are not “Little Adults”



- Developmental differences
- Behavioural differences
- Greater exposure
- Greater uptake of contaminants
- Longer “shelf-life”



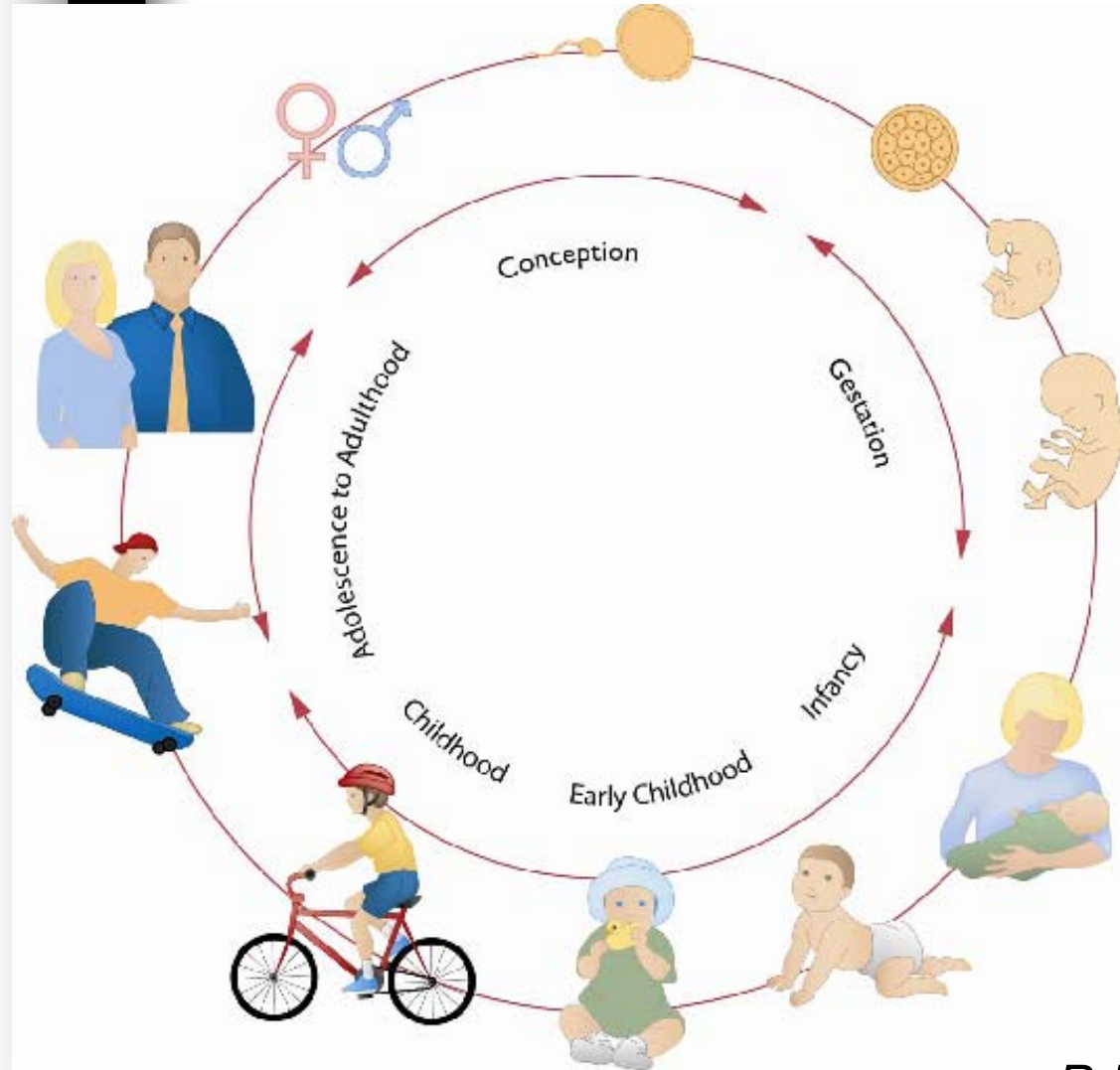
# Critical Windows of Vulnerability



(Figure originally from Moore & Persaud, 1973 – *Primer*, page 26)

- Developing body systems and organs are highly susceptible to harm (e.g. brain, lungs)
- Immature systems don't/can't yet de-toxify harmful contaminants

# “Children” –many life stages from preconception to the end of adolescence



- A window of vulnerability is always open
- Maternal and paternal *preconception* exposure, especially occupational, also relevant

# Some children are more vulnerable than others



Figure reproduced with permission of Priscilla Worswick, ATFE



- Genetic differences
  - Cultural differences
  - Socioeconomic differences (poverty linked to greater exposure)
- 1 in 6 children in Canada lives in poverty



# Environmental exposures are linked to increased risks of....

- Asthma and Respiratory Problems
- Impacts on Brain Development and Brain Functioning
- Cancer
- Impacts on Reproduction, Fetal and Child Development
- Impacts on the Endocrine System and Immune System

# Prioritizing the Issues

## Criteria

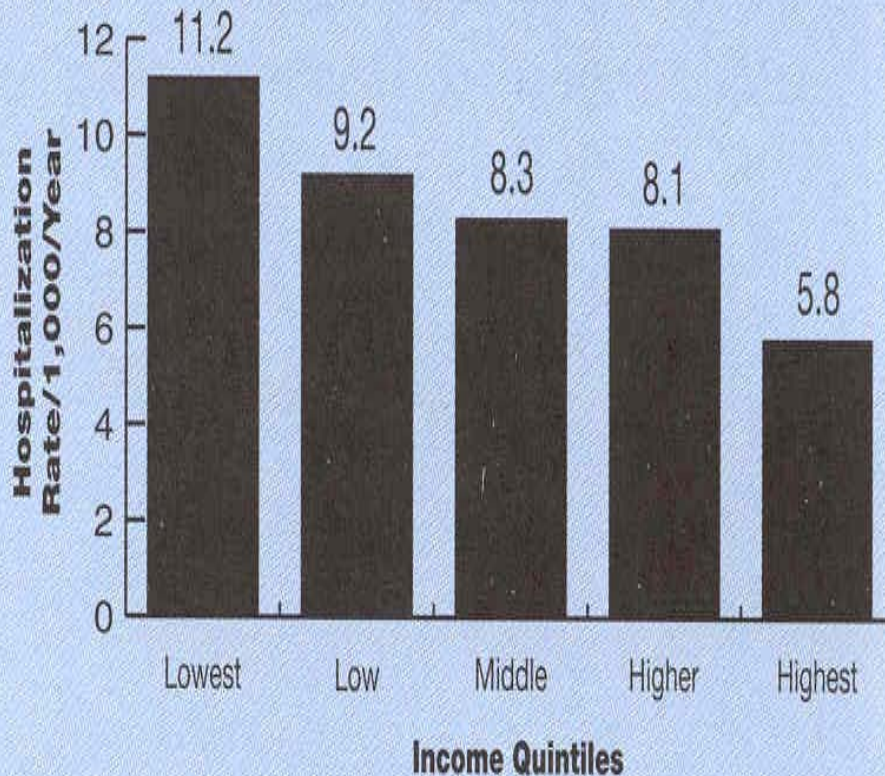
1. Numbers of children affected
2. Severity of outcome
3. Within each of the above – focus on:
  - key contaminants of concern
  - most significant exposure pathways
  - Preventable outcomes



Wallace and Cooper, 1986

# Asthma and Respiratory Problems

**Respiratory Hospitalization, Children 0 - 14  
By Income Quintile, City of Toronto, 1996 - 1999**



Sources: Provincial Health Planning Database, Hospital Inpatient Data, Ministry of Health and Long Term Care; Statistics Canada Census, 1996.

- Most prevalent chronic illness among children
- 11% of Canadian children asthmatic (Statistics Canada, 1998)
- Dramatic increases in prevalence
- Complex etiology; pollution worsens symptoms
- Long-term effects

# Neurodevelopmental Effects



[www.children.cape.ca](http://www.children.cape.ca)

Subtle but permanent effects:

- Developmental delays (motor & cognitive)
- Behavioural problems
- AD/HD
- Learning disabilities
- 26% children (age 6 -11) with one or more learning or behavioural problem (1996 data: NLSCY)

# Cancer: children and young adults



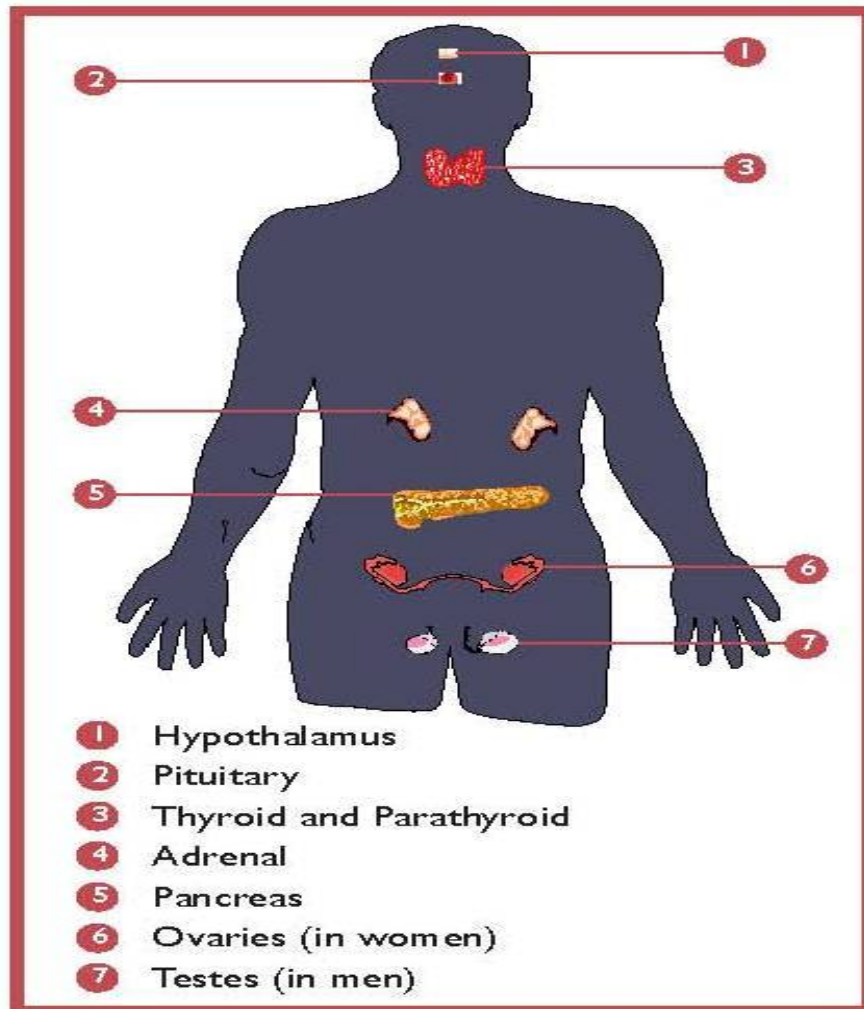
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- Rare among children – similar types of cancer occurring across industrialized nations
- Leading cause of illness-related death in children > age one yr.
- 30-year upward trends in large populations (EU and US); no overall upward trend in Canada
- Young adults – several cancers rising significantly
  - Endocrine sites – breast, thyroid, testicular cancers
  - Brain, lung and Non- Hodgkin's lymphoma (lymph nodes of the immune system)

# Large Numbers of Children?

## Endocrine Disruptors

**Figure 9: The Endocrine System.** The major glands of the endocrine system are shown here, including both the male testes and female ovaries, for illustration purposes only.



- Uncertainty
- Widespread exposures; impacts at very low exposure levels?
- Increasing body burdens and quasi-persistence
- Reproductive and developmental effects mediated through impacts on endocrine system?
- Effects from chemical mixtures?
- Significance of wildlife effects?

*Primer, pp 51-54*

# Greatest Exposure?



- Data are poor but three major areas emerging:
  - Air (indoors and outdoors)
    - indoor dust
  - Food (multiple sources)
  - Consumer products (largely indoors)
    - indoor dust
- Exposure-effect connection → greatest information gap.

# Key exposures of concern

## “Known”/Suspected:

- Metals (Pb, Cd, As, CrVI, Hg,)
- Pesticides (OPs, Carbamates, etc)
- Persistent Organic Pollutants
- Disinfection By-Products
- Phthalates, solvents, NPEs
- “Criteria” Air Pollutants (SO<sub>2</sub>, NO<sub>2</sub>, CO, Ozone, PM<sub>01</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>)
- Additional hazardous air contaminants – VOCs, PAHs, etc.
- ETS, Radiation

## Emerging:

- Additional in each of: 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.)

# Focus on food – multiple exposures



- Breastmilk – multiple contaminants; multiple benefits
- Fish → ditto; Mercury and POPs
- Most foods (lower burden in fresh or minimally-processed foods)
  - POPs, e.g. PBDEs, PCBs, dioxins, etc. (higher in fatty foods)
  - Pesticide residues (agricultural practices, transport over long distances)
  - Metals (processing, env'l contamination)
  - Phthalates, Bisphenol A (packaging or storage containers)
- Organic food – lower pesticide burden; measurable in kids

# What is needed?



Drawing by Seaña Brennan, age 6

- Awareness
- Advocacy
- Research
- Prevention
- Precautionary policies

# Awareness and Education: Personal Responses

- *Primer* – educational resource for health care providers, child care practitioners, policy makers and parents.
- *Primer* summarized in *Playing it Safe* brochure.



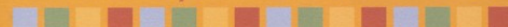
CHILD HEALTH AND THE ENVIRONMENT—A PRIMER

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**PLAYING IT SAFE:**  
*Childproofing for Environmental Health*

[www.healthyenvironmentforkids.ca](http://www.healthyenvironmentforkids.ca)



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# Policy Response to Knowledge Gaps: Risk Assessment and Risk Management

*“Toxicologists know  
a great deal about  
a few chemicals,  
a little about many,  
and next to nothing  
about most.”*

(Rodricks, JV, 1992: 146)

- 30 year history; grounded in much older attitude of powerful industries insisting on proof of harm (lead, asbestos, tobacco, etc.)
- Determination of “safe” levels; manage risks rather than prevent them
- Combination of science, guesswork and questionable ethics



# Federal Regulation of Pesticides

- ~50% of pesticides registered federally were not subjected to current requirements (e.g., to consider risks to children) when they were originally permitted.
- Even with re-evaluation, incomplete information base means that risks remain, especially to children.
- It is *never* correct to say that federal acceptance for registration carries with it a guarantee of safety.
- Federal government registration of a pesticide denotes a level of “acceptable risk” in light of currently available information.



# PESTICIDES

*in the*

## DIETS OF INFANTS AND CHILDREN

NATIONAL RESEARCH COUNCIL

## Elements of Precaution:

- Safety margins, cumulative effects, reverse onus
- New *Pest Control Products Act*
- Pesticide Bylaws
- New chemicals policy? Maybe.

# Playing it Safe: Prudent Responses to Multiple Exposures, Uncertainty, Complexity and High Stakes Risks

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

Dr. Herbert Needleman  
Pediatrician and Psychiatrist  
University of Pittsburgh





# Recap: Recurring Themes Across Literature on Children's Health

- General agreement about small number of well-studied substances and effects.
- Increasing recognition of emerging issues.
- Complexity – multiple exposures, multiple effects.
- Greatest exposure? Data are poor but three major areas emerging: air, food, and consumer products.
- Lack of public awareness about multiple risks.
- Large problem of “data gap”; need for indicators, biomonitoring, more chemical testing.
- Still evaluating chemical-by-chemical despite complex mixtures; new science and diverse health endpoints challenging traditional methods.
- Policy is addressing only worst actors and even then inadequately/slowly.
- Need for a precautionary approach.

# Thanks! Next steps. More Info.

**Thanks to:** CPCHE partners and colleagues at Best Start Resource Centre

## **CPCHE projects/plans:**

- Outreach ongoing: Best Start and Public Health Agency of Canada Population Health Fund
- CPCHE National Policy Consultation – research and policy reform agenda
- OPHA and CIPHI currently seeking funding for outreach program with PHIs, doctor training, etc.

CCME, FPT Committee, Health Canada: strategies under development

## **More content regularly posted:**

- [www.healthyenvironmentforkids.ca](http://www.healthyenvironmentforkids.ca)
- [www.cela.ca](http://www.cela.ca)



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