# *Pediatric Environmental Health Specialty Units*

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I have no commercial, financial, or other conflicts of interest to disclose.

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# Overview of PEHSUs

- How do you pronounce it?  - “pay-sue”
- Quick review of peds env health topics

- PEHSU mission, vision
- Region 5 PEHSU

- Examples of calls
- Examples of lectures
- Examples of technical assistance

- Additional resources

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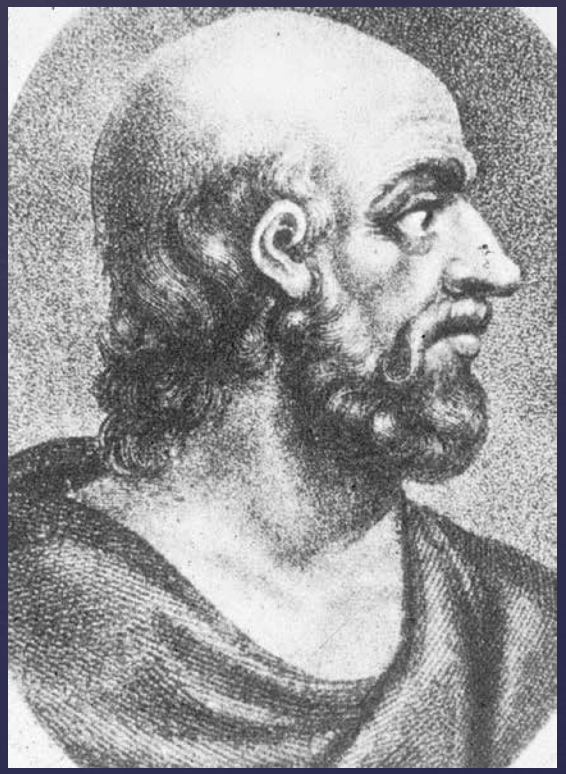
# What is Environmental Medicine?



*" If you want to learn about the health of a population, look at the air they breathe, the water they drink, and the place that they live."*

Hippocrates

*Air, Water, Places*

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# Air, Water, Place, Food

- Particulates
- Ozone
- Sulfur dioxide
- Nitrogen oxides
- Radon

- Microbes
- Chemical contamination

- Organic mercury
- Pesticide residues
- Persistent organic pollutants

- Lead
- Carbon monoxide
- Mold and moisture
- Formaldehyde
- Cigarette smoke
- Asbestos
- Pesticides

# Children as High Risk Population

- Developing brain
- Higher absorbed dose
- Different physiology
- Different diets
- Longer life span
- High risk behaviors
- Don't make their own risk management decisions

*Children are not little adults*

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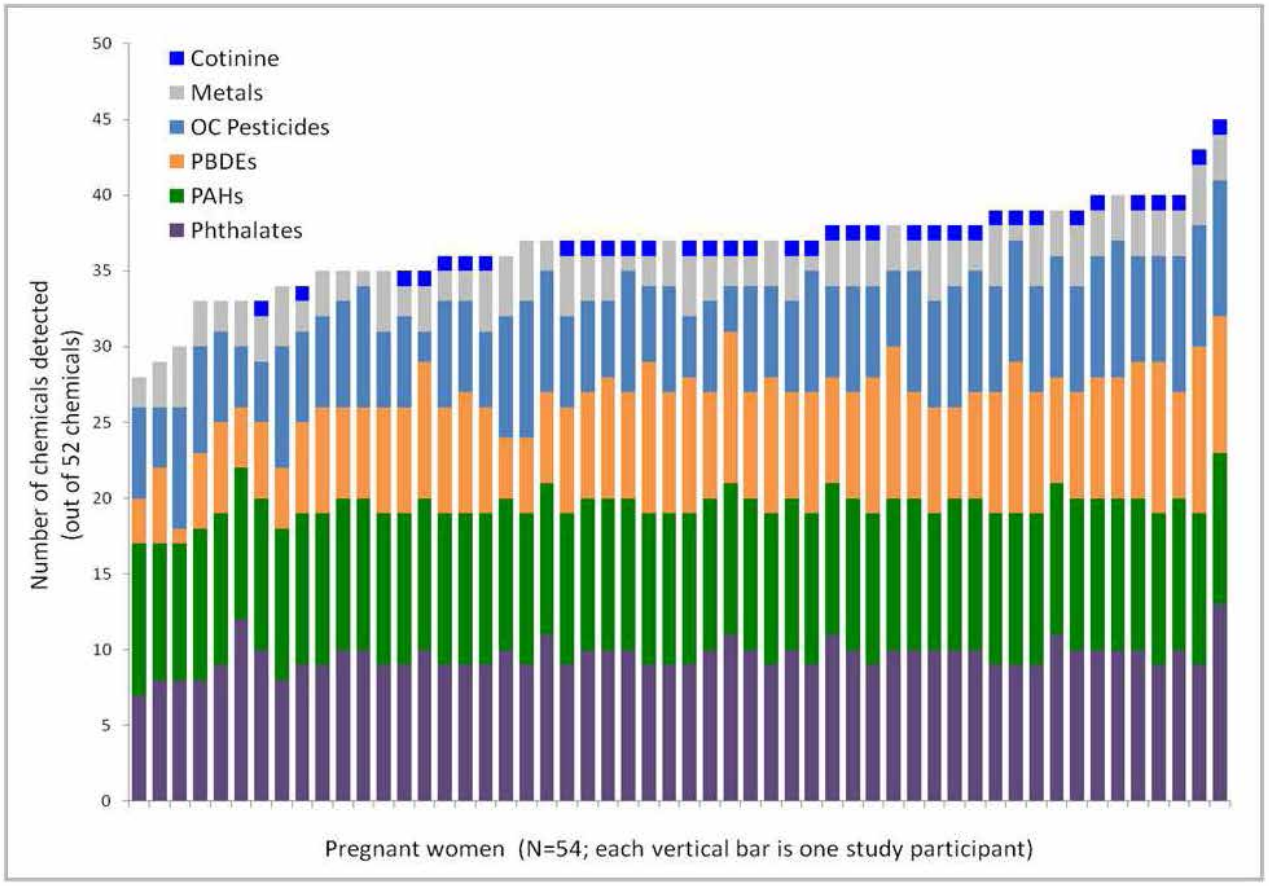
# What are we exposed to?

Figure 3.

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Woodruff TJ, Zota AR, Schwartz JM, 2011 Environmental Chemicals in Pregnant Women in the US: NHANES 2003-2004. Environ Health Perspect doi:10.1289/ehp.1002727

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# Health effects of environmental exposures

- *Asthma*
- *Cardiovascular disease*
- *Neurodevelopment delays*
  - *Lower IQ*
  - *Behavior abnormalities*
  - *Autism*
- *Cancer*
- *Endocrine effects*
  - *Infertility*
  - *Delayed/early puberty*
  - *Diabetes*
  - *Obesity*

# Patient Questions

***My kids have lead poisoning. Shouldn't you be checking me too?***

***Why did my mother die of lung cancer when she never smoked?***

***Should I avoid fish in pregnancy?***

***Why is my asthma so bad?***

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*My kids have lead poisoning.*
*Shouldn't you be checking me too?*

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# Lead Exposures in Pregnancy

- Pottery use
- Pica– pottery, paint chips
- Geophagia – eating clay or dirt
- Water

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# Sources of Lead in Pregnancy

- Herbal and traditional medicines
- Imported cosmetics
- Imported foods, spices and food products
- Leaded gasoline (Africa, Asia, Middle East)

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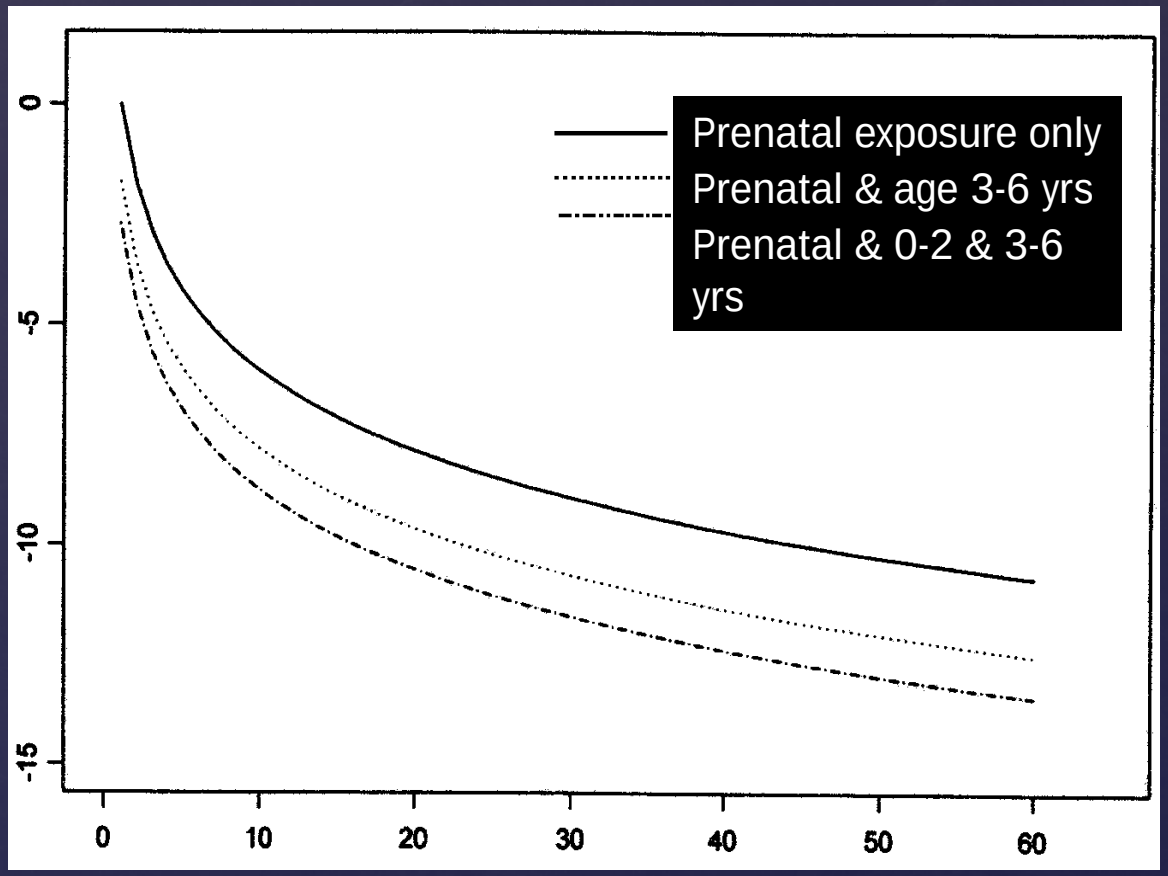
Fetus/Infant blood lead is 1:1 with maternal blood lead

# Decrements in IQ by Prenatal Blood Lead

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Wasserman et al. *Neurotoxicol Teratol*. 2000; 22:811-818

# GUIDELINES FOR THE IDENTIFICATION AND MANAGEMENT OF LEAD EXPOSURE IN PREGNANT AND LACTATING WOMEN

National Center for Environmental Health
Division of Emergency and Environmental Health Services

CDC

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# Screening Questions for Pregnant Women

| NYC | Minnesota HD |
|---|---|
| 1. Born/spent time outside of US | 1. Use of pottery or lead crystal |
| 2. Last 12 mos, use imported remedies, spices, foods, ceramics, cosmetics | 2. Home/folk remedies or cosmetics |
| 3. Eat/chew on non-food items | 3. Eat non-food items |
| 4. Last 12 mos, renovation | 4. Renovations if built before 1978 |
| 5. Ever had job/hobby with lead exposure | 5. Occupation<br>6. Hobbies |
| | 7. Water tested and is high |

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# *Should I avoid fish in pregnancy?*

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# Mercury

- Elemental (metallic mercury, ‘quicksilver’)
  - Thermometers, thermostats, sphygmomanometers
  - Folk remedies
  - Dental amalgam
  - Industrial uses

- Organic Mercury (methyl or ethyl mercury)
  - Sediments in lakes and streams convert industrial run-off
  - Used in fungicides; can contaminate food

# Health effects of organic mercury

- Cardiovascular (in adults)
  - Higher MI mortality
  - High blood pressure
- Neurodevelopmental (in fetus, infant)
  - IQ
  - Muscle tone
  - Delayed onset of walking and talking

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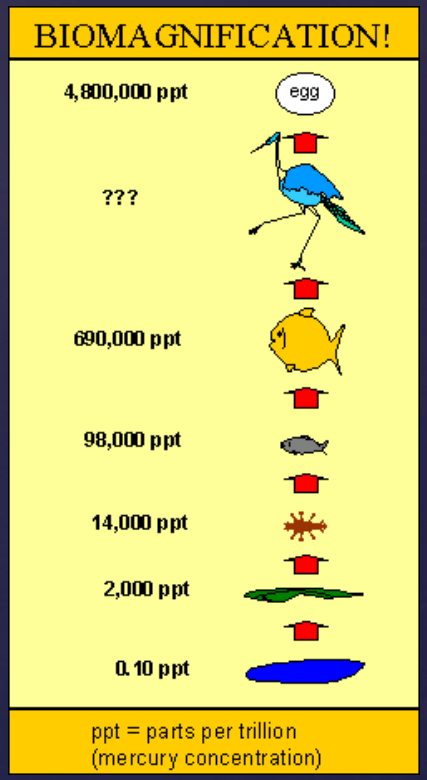
# Critical elements in determining risk

- Mercury exposure depends on:
  - Species of fish
  - Size of fish
- Quantity of fish consumed
- How frequently consumed

*Dietary surveys indicate that 1-3% of women of child bearing age (15-44) eat sufficient amounts of fish to be at risk of methylmercury exposure*




***USEPA Mercury Study Report to Congress 1997***

# EPA Fish Advisory (Mercury)

1. Do not eat Shark, Swordfish, King Mackerel, or Tilefish because they contain high levels of mercury.

2. Eat up to 12 ounces (2 average meals) a week of a variety of fish and shellfish that are lower in mercury.

    - Five of the most commonly eaten fish that are low in mercury are shrimp, canned light tuna, salmon, pollock, and catfish.

    - Another commonly eaten fish, albacore ("white") tuna has more mercury than canned light tuna. So, when choosing your two meals of fish and shellfish, you may eat up to 6 ounces (one average meal) of albacore tuna per week.

3. Check local advisories about the safety of fish caught by family and friends in your local lakes, rivers, and coastal areas. If no advice is available, eat up to 6 ounces (one average meal) per week of fish you catch from local waters, but don't consume any other fish during that week.

Follow these same recommendations when feeding fish and shellfish to your young child, but serve smaller portions.

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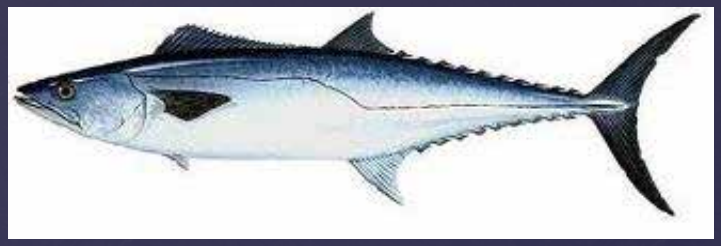
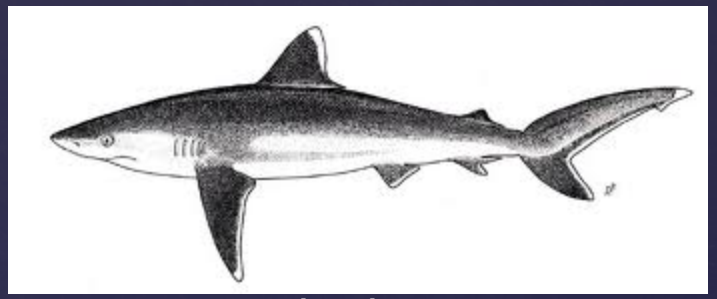
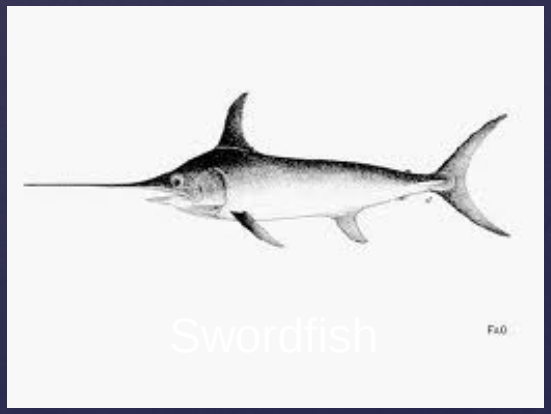
# The Big Four: Vulnerable populations should not eat

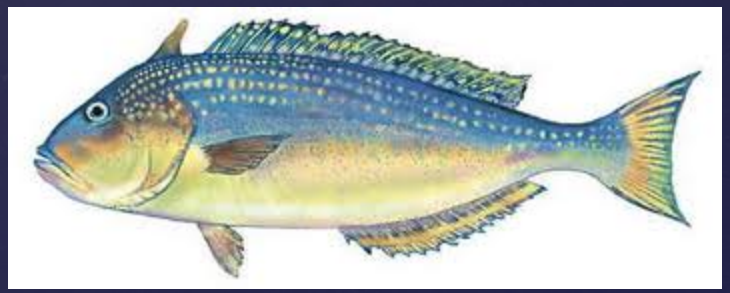


King Mackeral



Shark



Tile fish

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http://www.epa.gov/waterscience/fish/
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Fish Advisories | Water Science | US EPA
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U.S. ENVIRONMENTAL PROTECTION AGENCY

# Fish Advisories

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ish Kids

Fish are a lean, low-calorie source of protein. However, some fish may contain chemicals that could pose health risks. When contaminant levels are unsafe, consumption advisories may recommend that people limit or avoid eating certain species of fish caught in certain places. More information....

**Public Information**

What you need to know about fish consumption.

**Local Fish Advisories**

Learn about the fish where you live.

**Technical Information**

The science of assessing risks and benefits of fish consumption.

Fish Kids

**Top Links**

- What You Need to Know about Mercury in Fish and Shellfish
- 2007 Proceedings of the National Forum on Contaminants in Fish
- One Fish, Two Fish (JPG image) (Order this Poster)
- Mississippi Delta Study

Internet 100%

# *Why is my asthma so bad?*

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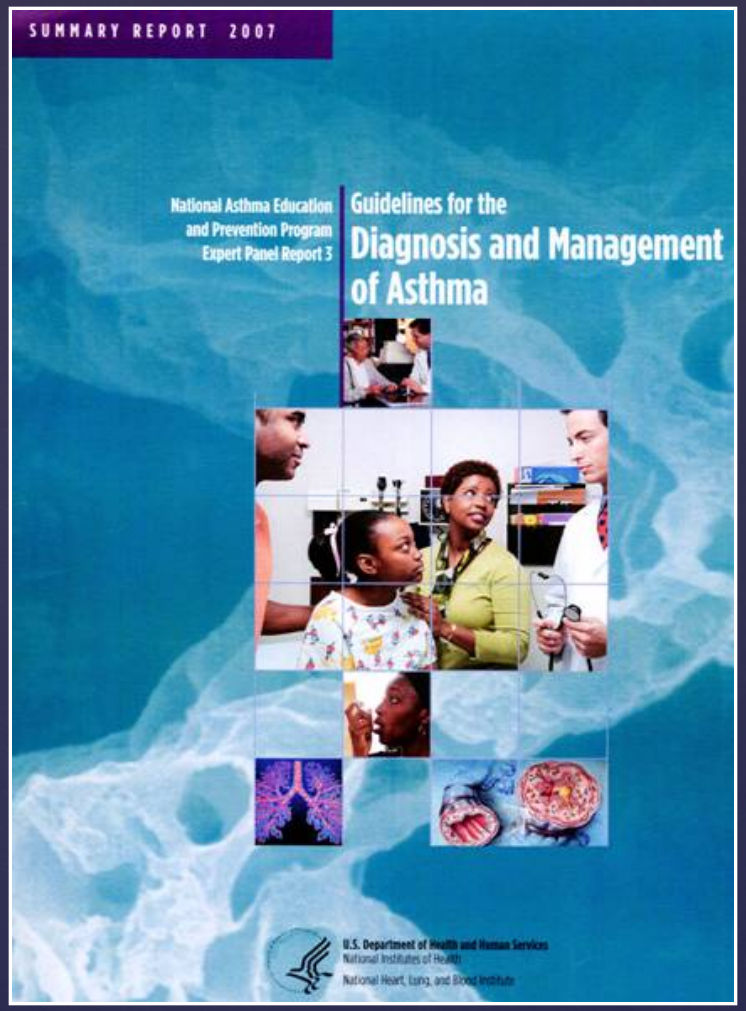


# National Asthma Education and Prevention Program Expert Panel Report-3: Guidelines for the Diagnosis and Management of Asthma

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http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm

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# Six Priority Messages

1. Use inhaled corticosteroids
2. Use a written asthma action plan
3. Assess asthma severity
4. Assess and monitor asthma control
5. Schedule periodic asthma visits
6. Control environmental exposures

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# Environmental asthma triggers

**Indoor Pollutants**
Americans spend more than 90% of their time indoors (home, work, school, daycare)

- **Biologic allergens**
  - Dust mites
  - Cockroaches
  - Pets
  - Mold
- **Irritant chemicals** (cleaners)
- **ETS**
- **Particulate matter** (combustion: gas stove, wood stove, kerosene heaters)
- **Ozone**

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# Clearing the Air
## Institute of Medicine

- Sufficient evidence of Causal Relationship
  - Cats
  - Cockroaches
  - Environmental Tobacco Smoke (preschoolers)
  - Household dust mites
- Sufficient evidence of an Association
  - Dogs
  - Mold
  - Oxides of nitrogen
- Limited evidence of Association
  - Formaldehyde, fragrances

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Committee on the Assessment of Asthma and Indoor Air; Division of Health Promotion and Disease Prevention; Institute of Medicine, 2000.

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# Cockroach exposure prevention: Integrated Pest Management (IPM)

- Seal cracks and holes
- Meticulous sanitation
- Remove clutter
- Monitor for pests: set insect sticky traps
- Use traps and bait stations, specialized vacuum

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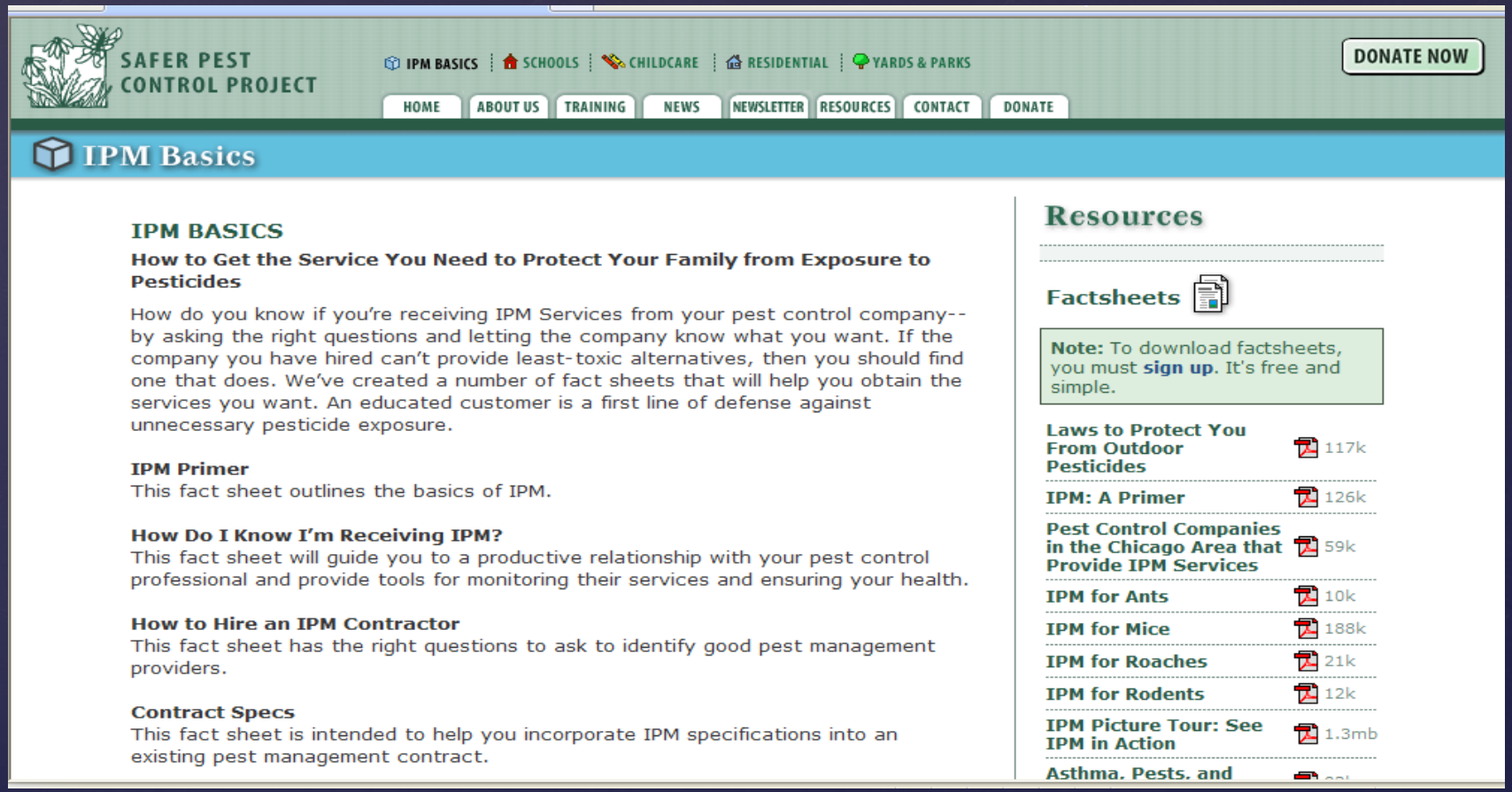
# Integrated pest management

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# Endocrine Disrupting Chemicals

**EPA 1997 definition**: "*An exogenous agent that interferes with the synthesis, secretion, transport, metabolism, binding action, or elimination of natural blood borne hormones that are present in the body and are responsible for homeostasis, reproduction, and developmental process.*"

Or in simpler terms:

"**A substance which interferes with natural hormones**."

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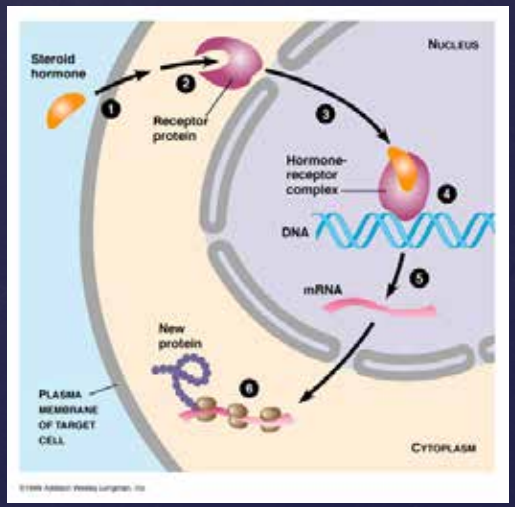
# Endocrine disrupting chemicals-EDCs (Hormonally Active Agents-HAAs)

Mechanisms

- Interference with estrogen receptor pathways
- Antiandrogen activity
- Progesterone blockage
- Thyroid hormone interference

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# Endocrine Disruptors

- Pharmaceuticals (DES)
- Pesticides (DDT, methoxychlor)
- Pollutants (PCBs, dioxins)
- Plastics (BPA, phthalates)
- Flame retardants (PBDEs)

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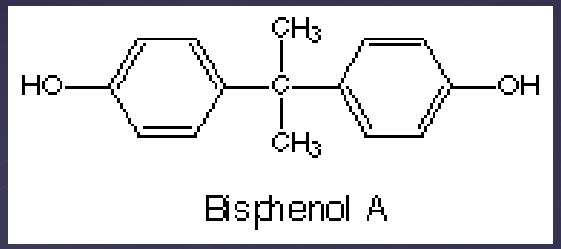


# Bisphenol A

- Over 6 billion pounds produced each year
- Developed as estrogenic drug 1930s
- Building block of polycarbonate plastic

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# Exposure to BPA
# Health effects

- 2003-2004 NHANES data: BPA detected in 92.6% of urine samples (n=2,517 > 6yo)
- Breast milk, amniotic fluid, cord blood

- Neural and behavioral effects
- Obesogen/Insulin Resistance
- Prostate hyperplasia
- Mammary cancer- DCIS

Calafat AM, Ye X, Wong L-Y, Reidy JA, Needham LL 2008. Exposure of the U.S. Population to Bisphenol A and 4-*tertiary*-Octylphenol: 2003–2004. Environ Health Perspect 116:39-44. doi:10.1289/ehp.10753

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# Phthalates

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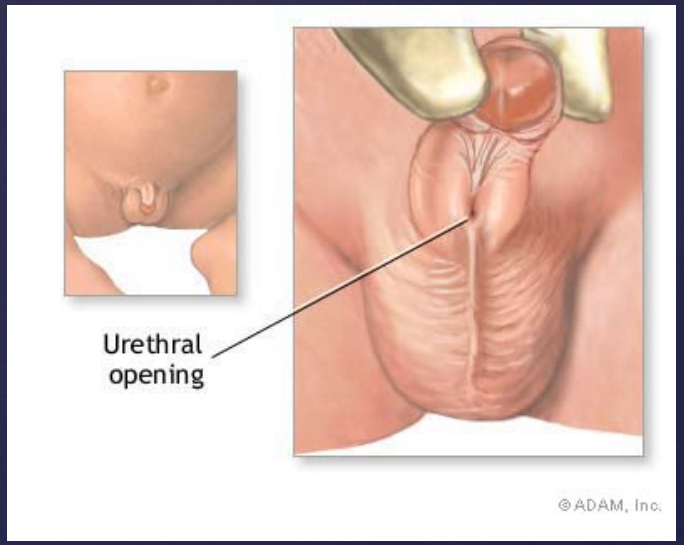
# Phthalates: Anti-Androgens

## “Phthalate Syndrome”

- Absent testes, prostate gland, seminal vesicles
- Testicular atrophy
- Decreased sperm count
- Decreased fertility
- Cryptorchidism
- Hypospadias – decreased AGD




Fisher, J. Reproduction.127:305-15, 2004

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# Endocrine Disruption – triclosan

- Thryoid disruptor, decreases thyroxine levels (Crofton, 2007)
- Interferes with testosterone synthesis, decrease sperm counts (Kumar, 2009)
- Decrease testosterone (Zorilla, 2009)

# Pediatric Environmental Health Specialty Units (PEHSU)

- Funded by federal EPA, ATSDR
- Staffed by:
  - Occupational/Environmental Med physician
  - Peds or Family Med physician
  - Medical toxicologist
  - Pediatric health nurse
  - Industrial hygienist

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**Mission:** *Improve the environmental health of children by:*

- *Enhancing educational and consultative services to clinicians, health professionals and the community.*
- *Providing evidence-based information from a network of experts in environmental health.*

**Vision:** *The PEHSU network is the globally recognized GO TO resource for PEH expertise for clinicians, health professionals and communities.*

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# PEHSU Services

- Provide clinical consultations
  - Telephone consults to health care providers and families
  - Clinic visits at UIC, Stroger Hospital, Cincinnati Children's Hospital, Lurie Children's Memorial
- Consult to public health and environmental agencies
- Train physicians, nurses, and other health professionals in children's environmental health

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# Region 5 PEHSU

- **University of Illinois at Chicago** (Drs. Susan Buchanan, Dan Hryhorczuk, Peter Orris)
  - UIC School of Public Health Great Lakes Center
  - University Health Service (Occupational Medicine Clinic)
  - Residency in Occupational and Environmental Medicine

- **John H. Stroger, Jr. Hospital of Cook County** (Drs. Mark Mycyk, Steve Aks, Ann Naughton, RN)
  - Division of Toxicology, Department of Emergency Medicine
  - Toxikon Consortium (Dr. Jerrold Leiken)

- **Cincinnati Children's Hospital**
  - Center for Children's Environmental Health (Dr. Nicholas Newman)

- **Lurie Children's Memorial Hospital**
  - Lead Clinic (Dr. Helen Binns)

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# Great Lakes Center for Children's Environmental Health

Region 5 Pediatric Environmental Health Specialty Unit (PEHSU)

**(312) 636-0081 or (866) 967-7337**

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# Phone call/email clinical contacts, examples

- From Wisconsin MD: 4 year old with ASD, respiratory symptoms at home – is it due to antimony in blown-in insulation?
- From Wisconsin MD: Pregnant patient third trimester - can she swim in pond treated with fungicides and other pesticide?
- From Illinois patient: History of miscarriage - lives near industrial plant with emissions. Did exposure cause pregnancy loss?
- "The chicken and the lead" - Illinois pregnant woman with chickens in back yard in soil with 115ppm - 160ppm lead. Should she eat the eggs?

# Consult to public health and environmental agencies, community groups- examples

- Clyde Cancer Cluster - Peter Orris, expert advisor to Region 5 EPA

- Arsenic in infant cereal – Susan Buchanan evaluated levels in infant cereals tested by Illinois Attorney General's office

- Toxic metals in lake sediment - Dan Hryhorzuk assisted the Village of Depue and Northwestern University Law Clinic in review and comments on risk assessment for recreational use of Depue Lake

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# Lecture Titles

- *Applying Environmental Medicine Principles to Primary Care Practice*
- *Male reproductive health effects from occupational exposures*
- *Environmental Asthma Triggers*
- *Lead Poisoning Update*
- *Health Effects of Pesticides*
- *Environmental Obesogens*
- *Endocrine Disruptors: phthalates, BPA, flame retardants*

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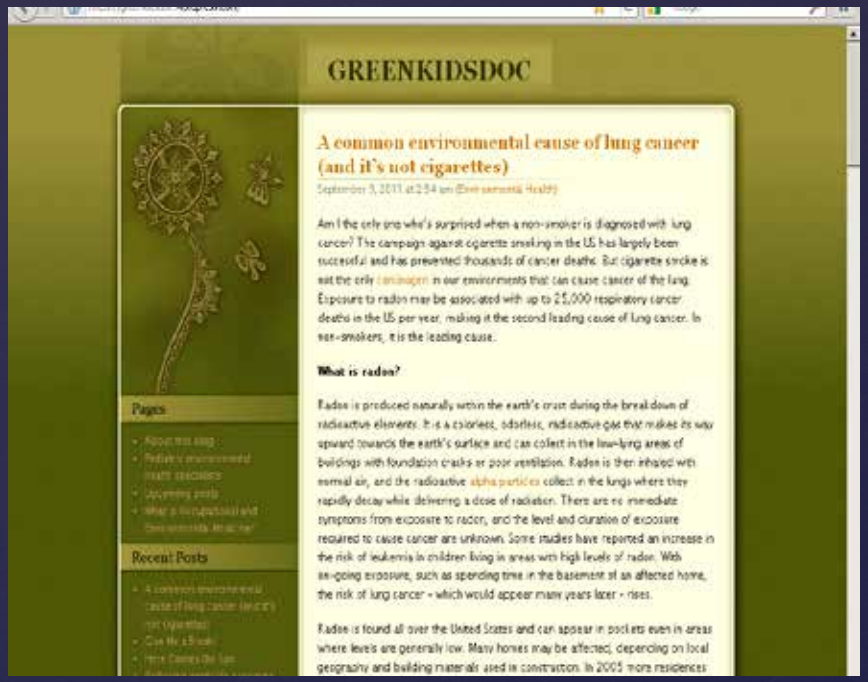
# GreenKidsDoc blog

## Topics :

- Cleaning chemicals
- Arsenic in infant formula
- Triclosan
- Eating local
- Lead
- Mercury (organic, elemental)
- Fluoride
- Radiation
- Sun screens
- Radon
- Artificial turf
- Pesticides

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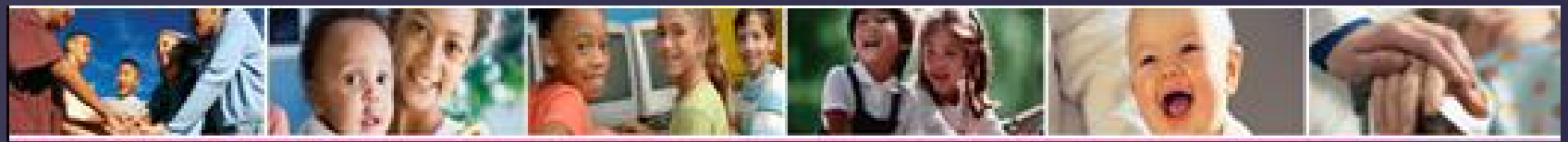

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A network of experts in children's environmental health

# Great Lakes Center for Children's Environmental Health

## University of Illinois at Chicago School of Public Health

- For clinical questions, consultations, call: 312-864-5526 or 866-967-7337
- Follow us on Facebook: https://www.facebook.com/glakes.kids
- Subscribe to our blog: https://greenkidsdoc.wordpress.com
- Website: http://www.uic.edu/sph/glakes/childrenshealth

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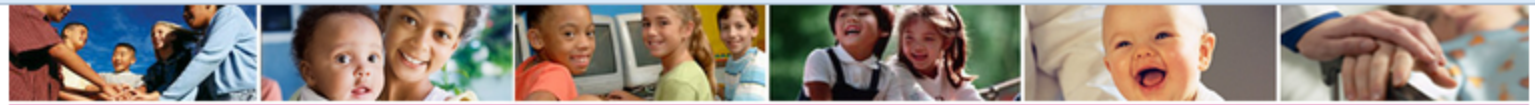

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A network of experts in children's environmental health




- Find PEHSU Experts
- Children's Environmental Health Information
- FAQs and Resources
- Resources for Health Professionals
- Fact Sheets and Publications


# Welcome to the Pediatric Environmental Health Specialty Units

The Pediatric Environmental Health Specialty Units (PEHSU) form a respected network of experts in children's environmental health. The PEHSU were created to ensure that children and communities have access to, usually at no cost, special medical knowledge and resources for children faced with a health risk due to a natural or human-made environmental hazard. Read more about the Pediatric Environmental Health Specialty Units.

Located throughout the U.S., Canada, and Mexico, PEHSU professionals provide quality medical consultation for health professionals, parents, caregivers, and patients. The PEHSU are also dedicated to increasing environmental medicine knowledge among healthcare professionals around children's environmental health by providing consultation and training. Finally, the PEHSU provide information and resources to school and community groups to help increase the public's understanding of children's environmental health.

## Why is this Work Important?

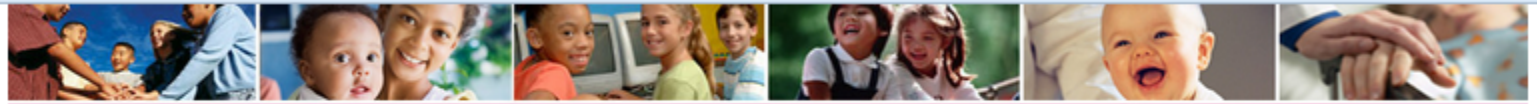
This work is important because children are uniquely vulnerable to environmental toxicants, such as lead, mold, pesticides, and many other sources. Children's environmental health is the study, prevention and treatment of the effects of these toxicants on the health and development of children. Read more about children's environmental health. It is also important because most healthcare professionals do not receive training to prevent, recognize, manage and treat environmentally-related conditions.

## A Network of Experts in Children's Environmental Health

Through this website you have access to experts who can provide advice and care in the area of children's environmental health. This website connects you to specialists, resources, and information that will assist you in helping the children you care for and care about.

**FEATURES**


- Find Expert Help
- About the PEHSU
- National Partnership
- Frequently Asked Questions



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# Fact Sheets

Information on Arsenic in Food (October 2012)

Chelation Therapy – Guidance for the General Public (July 2012)

Advisory about Chinese Drywall (April 2011)

Recommendations Regarding Return of Children to Areas Impacted by Flooding and/or Hurricanes (August 2011)

Advisory about Gulf Oil Spill, for health professionals (August 2010)

Advisory about Gulf Oil Spill, for patients (August 2010)

Advisory about Gulf Oil Spill, for health professionals, Vietnamese (August 2010)

Advisory about Gulf Oil Spill, for patients, Vietnamese (August 2010)

Information on Natural Gas Extraction and Hydraulic Fracturing for Health Professionals (August 2011)

Information on Natural Gas Extraction and Hydraulic Fracturing Information for Parents and Community Members (August 2011)

Advisory about Melamine, for health professionals (October 2009)

Advisory about Melamine, for health professionals (Chinese) (November 2009)

Advisory about PBDE, for health professionals (May 2010)

Advisory about Phthalates and BPA, for patients (October 2009)

Advisory about Phthalates and BPA, for patients (Spanish) (June 2008)

Advisory about Phthalates and BPA, for health professionals (October


FEATURES

Fact Sheets for patients and providers

Publications in the Scientific Literature

# Additional Resources

SCHOOL OF PUBLIC HEALTH
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# Toxic Matters

## Protecting Our Families from Toxic Substances

Some toxic substances build up in our bodies. This build-up can affect our health and future pregnancies long after we have been exposed. This is why the recommendations here are designed for women, men and children. They apply to all of us, whether or not we have children, are pregnant or want to have children in the future.

## 5 Things To Do

Prevent exposure at home
Prevent exposure at work
Prevent exposure in your community
Become a smart consumer
Make the government work for you

Endorsed by:

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN

***Safe and Healthy Children curriculum addresses environmental health in farmworker children***

The children of migrant farmworkers are at risk for toxic chemical exposures and other environmental hazards. PSR has released a new train-the-trainer curriculum and education packet on preventing harm to this vulnerable population. Targeting staff and community health workers of the Head Start Seasonal and Migrant Farmworker program, the curriculum augments PSR's Pediatric Environmental Health Toolkit. It includes hands-on activities for parents, brief anecdotes about chemical exposures, information on chemical policy, and principles of participatory education.

Funded by a grant from the W.K. Kellogg Foundation, PSR worked with partner organizations Academy for Educational Development and Health Outreach Partners to provide training for Migrant and Seasonal Head Start workers on the unique vulnerability of children, exposures to environmental hazards, and prevention strategies.

View the Safe and Healthy Children curriculum

***What is the Toolkit?***

The Toolkit is a combination of easy-to-use reference guides for health providers and user friendly health education materials on preventing exposures to toxic chemicals and other substances that affect infant and child health. The materials are visually appealing, practical and easy to use. The Toolkit is endorsed by the American Academy of Pediatrics (AAP).

The Toolkit fills the need for environmental health education and information. The Greater Boston (GBPSR) and San Francisco Bay Area chapters of Physicians for Social Responsibility, in partnership with the Pediatric Environmental Health Specialty Unit at the University of California, San Francisco, and a team of pediatricians from around the country, developed the Pediatric Environmental Health Toolkit.

***Order a Hard Copy of the Toolkit***

Individuals may order hard copies of the Toolkit.

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# Questions?

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