Counseling Preconception and Prenatal Women on Environmental Exposures in the Clinical Setting

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Outline

- Introduction to Environmental Health
- PEHSU
- Risk Communication
- Mercury
- Lead
- EDCs

Topics Not Covered: - Cigarette Smoking, Alcohol Consumption, Air Pollution
What is Environmental Health?

Disease Burden

- Genetic
- Economic
- Psychosocial
- Environment
  - Diet
  - Air
  - Water
  - Built/Physical
What is Environmental Health?

Genetic → Economic

Genetic → Psychosocial

Environment → Disease Burden

Disease Burden:

Obesity, Asthma/Allergies,
Neurodevelopmental Outcomes
PEHSU: Pediatric Environmental Health Specialty Unit

- Serve health care providers, public health professionals, communities, and families
- Unique interface of pediatric medicine-toxicology-teratology-epidemiology-exposure sciences
- Evidence-based Consultation and Education
- UW PEHSU: OR, ID, AK, WA
- National network of environmental health specialists including industrial hygienists, practitioners, and epidemiologists (sponsored by ATSDR/EPA)
- Majority of consults end with families/providers wanting to know how chemicals can harm their children and what actions they can take to protect their children from harmful exposures
Environmental Chemicals Pose Risks
- Strongly Agree: 73%
- Agree: 23%
- Neutral: 4%

Consumption of Ecofriendly Foods
- Always: 41%
- Usually: 32%
- Sometimes: 18%
- Rarely: 9%

Study Participants:
“If you think the chemicals could be harmful, then how can I protect myself and my family from exposures?”
Risk Communication

**Clinical Opinion**

**Obstetrics**

Toxic environmental chemicals: the role of reproductive health professionals in preventing harmful exposures

Patrice Sutton, MPH; Tracey J. Woodruff, PhD, MPH; Joanne Perron, MD; Naomi Stotland, MD; Jeanne A. Conry, MD, PhD; Mark D. Miller, MD, MPH; Linda C. Giudice, MD, PhD

**Clinical Opinion**

**Education**

Environmental exposures: how to counsel preconception and prenatal patients in the clinical setting

Sheela Sathyanarayana, MD MPH; Judith Focareta, MEd, RN; Tanya Dailey, MD; Susan Buchanan, MD MPH
Risk Communication: Factors Affecting Risk Perception

Beyond control

Unfamiliar

Potential serious health effects

Fetus affected – potential for long term health impacts

Science about health effects is very limited
Risk Communication: Factors Affecting Risk Perception

Reducing perception of risk

Give strategies for *personal control*

Make risks as *familiar* as possible

Build trust

Use a highly *trusted information source* to transfer credibility

Do not understate or overstate risks

Do not be afraid to say “I don’t know”
Environmental Health History Taking

Where do they live?
- Rural home exposures – well water, CO, radon, agriculture
- Urban – close to industrial area, dirt/dust, mold

Where do they play?
- School yard, friends’ home...

Is anyone else/friend sick?
- Persons playing in the same area, location may also have symptoms

Parental Occupations/Hobbies?
- Heavy metal worker, radiator shop
- Beading, pottery

Smoking/Pets
Elemental Mercury Toxicity

Vaporizes quickly and is well absorbed through inhalation, lipid soluble - can easily cross blood brain barrier, becomes ionized and trapped in CNS → causes direct toxicity to brain tissue

If ingested, very low gut absorption and low toxicity

Acute - fever, chills, shortness of breath, metallic taste, and pleuritic chest pain. Other possible symptoms could include stomatitis, lethargy, confusion, and vomiting

Chronic – intention tremor, memory loss, insomnia, timidity, gingivitis, diarrhea, anorexia, weight loss, delirium – primarily neurologic toxicity
Organic Mercury Toxicity

Clinical Toxicity – nephrotoxic, neurotoxic

Minamata Disease (methylmercury contamination)—death, CNS disturbance

- fetal exposure → MR, limb deformation, dysarthria, growth disorder, primitive reflexes

Pink Disease (acrodynia) –
hypersensitivity reaction, pink skin, rash on soles/palms
Mercury Exposure Messaging

Exposure to mercury can come from eating fish, contact with quicksilver, use of skin-lightening creams, or inhalation of mercury vapors at work.

Mercury is a potent neurotoxin; exposure during pregnancy can lead to adverse neurodevelopmental outcomes that include lower IQ and poor language and motor development.

Fish is an excellent source of protein and omega-3 fatty acids, which have been shown to improve visual acuity and scores on the Denver Developmental Screen.
Mercury Exposure Reduction

Pregnant, preconception, and breastfeeding patients should follow US Environmental Protection Agency and state-specific fish consumptions guidelines.

To maximize the benefits of fish consumption, eat fish twice per week.

Choose a variety of fish; avoid shark, swordfish, king mackerel, and tile fish.

If you eat recreationally caught fish, access local fish advisories and follow the recommendations for consumption.

Do not use skin-lightening creams or home remedies that might contain mercury
Chunk Light Tuna

Women of childbearing age
Limit the amount of canned chunk light tuna they eat to two cans of chunk light tuna per week (one can = six ounces, two cans = twelve ounces) based on your body weight. If you weigh 135 pounds you can eat one can (six ounces) per week, plus another fish meal low in mercury. This second fish meal can include another serving of chunk light tuna that week.

Canned Albacore (White) Tuna

Women of childbearing age
Limit the amount of canned albacore (white) tuna to one can per week. If you weigh 135 pounds you can eat up to one can (six ounces) per week, but no other fish should be eaten that week.
History Taking Questions

How often do you eat fish?

What types of fish do you eat?

Do you eat recreationally caught fish?

Do you use skin lightening creams or other personal care products that contain mercury?

Do you have a mercury thermometer at home?

Do you work with mercury?
Lead Exposure
WA State Lead Exposure and Health Impacts

Historically – low prevalence of poisoning but only approximately 1-3% screened each year – several high BLL are still reported each year

Major historical sources of exposure:
- ASARCO Smelter
- Lead Arsenic - insecticide in eastern Washington

Health Impacts – impairs fetal growth and child neurodevelopment, gestational hypertension, birth defects, spontaneous abortion
Lead Exposure in Pregnancy

Lead is neurotoxic to the developing fetus.

Risk factors for lead exposure include recent immigration to the United States, pica practices, occupational exposure, culturally specific practices that include the use of traditional remedies, imported cosmetics, the use of lead-glazed pottery, and renovating or remodeling a home that was built before 1970.

Women at high risk for lead exposure should be screened with a venous blood lead level test.

A maternal blood lead level as low as 10 g/dL and under is associated with an increased risk of impaired fetal growth and neurodevelopment; higher blood lead level concentrations are associated with birth defects, spontaneous abortion, and gestational hypertension.

A pregnant woman with a blood lead level of 5 g/dL should be counseled to reduce exposure and have follow-up testing.

A pregnant woman with a blood lead level of 10 g/dL should be counseled to reduce exposure, to have follow-up testing, and be referred to a local health
Lead Exposure Reduction

Never eat or mouth nonfood items (such as clay, soil, pottery, or paint chips) because they may be contaminated with lead.

Avoid jobs or hobbies that may involve lead exposure and take precautions to avoid take-home lead dust if a household member works with lead (eg, construction or home renovation/repair in pre-1978 homes and lead battery manufacturing or recycling).

Stay away from repair, repainting, renovation, and remodeling work being done in homes built before 1978 to avoid exposure to lead-contaminated dust from old lead-based paint; avoid exposure to deteriorated lead-based paint in older homes; have water tested if you suspect lead contamination from wells or solder in pipes.

Eat a balanced diet with adequate intakes of iron and calcium.

Avoid alternative cosmetics, food additives, and medicines that were imported from overseas.
History Taking Questions

Do you or others in your household have an occupation that involves lead exposure?

Sometimes pregnant women have the urge to eat things that are not food. Do you have these urges?

Do you live in a house built before 1978 with ongoing renovations that generate a lot of dust (for example, sanding and scraping)?

Do you use any traditional folk remedies or cosmetics that are not sold in a regular drug store or are homemade?

Do you use non-commercially prepared pottery or leaded crystal? Do you or others in your household have any hobbies or activities likely to cause lead exposure?”
Emerging: Endocrine Disrupting Chemicals

Endocrine disruptors
- chemicals that mimic/antagonize normal hormones and can have permanent effects in organisms as well as progeny

Examples: DES – diethylstilbesterol, DDT, Phytoestrogens – soy, OCPs
- Phthalates - anti-androgenic/pro-estrogenic
- Bisphenol A - pro-estrogenic (similar to estradiol)
Emerging Chemicals: Endocrine Disrupting Chemicals: Phthalate and Bisphenol A Exposure:
Sources of Phthalate and Bisphenol A Exposure: Current
Phthalates – anti-androgens

• Prenatal exposure associated with male reproductive tract abnormalities including smaller anogenital distance, smaller penile width, reduced testicular descent

• Prenatal exposure associated with neurodevelopmental changes in young children

Bisphenol A – estrogen

• In animal studies, low dose prenatal BPA exposure associated with development of tumors in the breast/prostate, obesity/metabolism changes, significant impacts on neurodevelopment

• In humans, prenatal BPA exposure associated with neurodevelopmental changes in children
Overall, the health impact of phthalates, bisphenol A, and polybrominated diethyl ethers on the developing fetus are not well understood; current research studies will continue to elucidate potential health impacts.

Animal studies suggest that prenatal exposure to bisphenol A are associated with obesity, reproductive abnormalities, and neurodevelopmental abnormalities in offspring.

Human prenatal phthalate exposure is associated with changes in male reproductive anatomy and behavioral changes primarily in young girls.

Human prenatal polybrominated diethyl ethers exposure is associated with changes in prenatal thyroid hormone concentrations, neurodevelopmental abnormalities, and male reproductive tract abnormalities in infancy.
Phthalates and BPA Exposure Reduction

We encourage providers to counsel families to prevent endocrine disrupting chemicals exposure to reduce the potential risk of harm.

Overall, women can reduce exposure to phthalates and bisphenol A by (1) reducing the consumption of processed foods, (2) increasing fresh and/or frozen foods, and (3) reducing consumption of canned foods.

Avoid the use of plastics with the recycling codes (often found on the outside bottom of containers) #3 and #7 because they can contain phthalates and/or bisphenol A.

For polybrominated diethyl ethers, foam items that were bought before 2005 should be inspected; anything that is ripped or breaking down should be replaced.

Be careful when removing old carpet because the padding may contain polybrominated diethyl ethers.

Use a vacuum machine that is fitted with a HEPA filter to get rid of dust that may contain endocrine-disrupting chemicals.

When purchasing new products, ask the manufacturers what type of fire retardants were used.
History Taking Questions

What percentage of your diet is made up of fresh foods?

Processed foods? Canned foods?

Do you use plastic utensils or plastic food preparation tools?  Do you heat up plastics in the microwave consistently?

How many cosmetic products do you use on a daily basis?
Resources

Env Working Group (pesticide in foods)

Env Defense Fund (safe seafood)

Clean Indoor Air (American Lung Association)

UCSF Program In Reproductive Health

Pediatric Environmental Health Specialty Units
Future

• Environmental Exposures increasingly being recognized as important during pregnancy

• Can create more trust in patient/provider relationship if you are knowledgeable on these issues

• Federal Regulation – may be the only manner to completely control contaminants

• Recommendations – in the setting where government regulation does not exist
  1. Evidence based recommendations
  2. Practical
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