

The Pacific Forestry Centre Chapter of the NRCAN Women's Network

invites you to another brown bag session

Goods Gone Bad

12:00 to 1:00

Wednesday, June 10, 2009

Dilbert Boardroom

Baffled by bisphenol A? Phthoughtful about phthalates? Can't even pronounce polybrominated diphenyl ether?

You and everyone else.

We breathe, eat, lather ourselves with, and just plain stew in these chemicals, 24/7/365. They are everywhere and in everything.

Join the PFC Women's Network for a discussion that explores environmental toxins, their effects and your exposure to them.

*Please bring your ideas and lunch (and coffee mug),
and we will provide coffee, tea and cookies.*

**All employees of NRCAN are welcome to attend.
Please invite a friend or co-worker.**

Goods gone Bad

Everyday items affecting our
health and wellbeing



Patricia Hunt

Meyer Distinguished Professor, Genetics
Centre for Reproductive Biology
School of Molecular Biosciences
Washington State U, Pullman

DES baby
Breast-cancer survivor

In 1998, she uncovered the effects of bisphenol-A (bp-A) on reproduction in mammals--

--completely by accident.



1

2: DES: (diethylstilbestrol), a nonsteroidal synthetic estrogen; once prescribed for some women during pregnancy to prevent miscarriages. In common use in N.American from the late-40s to 1971, when this use was banned.

Daughters born to mothers who took this drug have abnormally high rates of estrogen-related cancers.

If you were born after 1971, and therefore your mother wasn't injected whilst pregnant with you, well good for you. But don't stop worrying: we'll get to that in a bit.

3: And very possibly as a result of the DES in-utero exposure, Patty did develop breast cancer. No family history.

4 But her relationship with estrogen mimics continued, this time on a professional level...

The white mouse: model for humans in the lab

40% of the **control population** had egg defects.



1. She'd been researching chromosomal abnormalities in human women, and the high rate of miscarriages and birth defects in humans, which is very high 40-50%. She had a hunch the abnormalities were tied to hormones.

Can't experiment on humans, so scientists studying human health in the lab use models – either rats or mice. In this case, Patty was working with mice.

This strain.. Very stable chromosomes; few miscarriages; few birth defects: 1-5% vs 40-50% humans.

2. A paper outlining the results of her experiments on the hormone levels of female mice was ready for publication. Hunt just needed to ensure that her control population, the mice not meddled with during the study, remained normal.

3. Instead, she found that 40% of the control population had egg defects—a number approaching that found in humans.

What happened?



It was the janitor...

In the lab...

With the floor cleanser



1. It took 4 months to finger the culprit.

2

3: A temporary janitor confused the cleaning solutions used in the lab

4. He used a high-powered, abrasive floor cleanser to wash out the mice' s cages and water bottles.

The acidic solution scarred the hard, polycarbonate surface of the plastic, and caused one single chemical culprit to leach into the mice' s food and water and environment.

That chemical was...

Bisphenol-A

- First synthesized in 1891.
- Came into use as a synthetic estrogen in the '30s.
- Later, chemists discovered that, combined with phosgene (a gas used in WWI) and other compounds, bp-A yields clear, shatter-resistant polycarbonate plastic.
- Under “normal” circumstances, bp-A is stable in this kind of plastic (does not leach out).
- Under certain conditions, it does leach.
 - Exposure to UV or heat (sunlight, dishwasher, microwave...)
 - Exposure to acids and bases (cleansers, detergents, tomatoes; OJ; OH...)
 - Being physically stressed, battered, scratched...



1: Bisphenol-A – also known as BPA

2: a bit of history about BPA

3: the problem with BPA

4: in other words, it leaches under lots and lots of conditions

Bisphenol-A

Scientists around the globe have since linked bp-A to many health effects in rodents

- Mammary and prostate cancers
- Genital defects in males
- Early onset of puberty in females
- Obesity, type II diabetes, and associated health issues
- ADHD

Bisphenol-A is one of the subjects in the developing field of Environmental endocrinology/toxicology.



1: Scientists around the globe have since linked bp-A to many health effects in rodents (lab-based human models):

2

3

4: Lots of effects dealing with reproduction, indicating just from this list, an estrogen-type hormone effect or something similar

5: But other conditions controlled by other non-reproductive hormones, as well: from this list, ?? thyroid and pancreas

6: Oh, and mental health effects: so, maybe thyroid and hypothalamus ?? Studies on other chemicals like BPA show relationships with Parkinson's and Alzheimer's...

Bisphenol-A is an endocrine disruptor, one of a whole group of chemicals now being examined for their effects on health. That field of research called environmental endocrinology/toxicology/epidemiology.

We live in a plastic world



full of ...



Goods gone Bad



Goods gone bad. Goods we have adopted and taken for granted for decades and integrated into our daily lives.

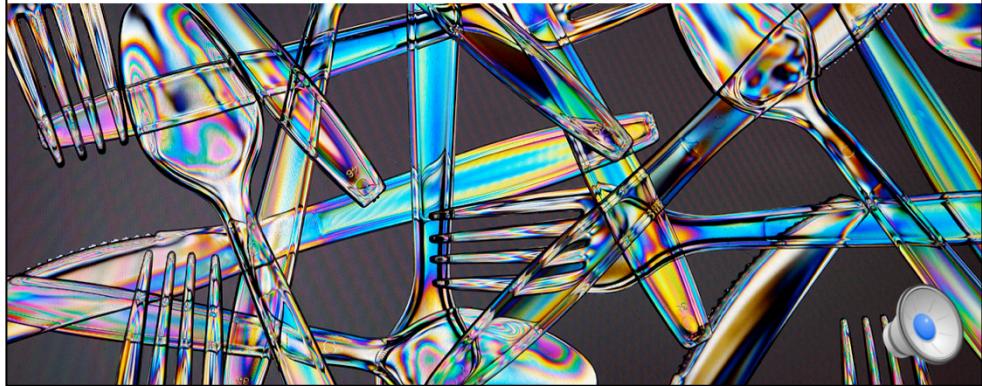
These goods contain chemicals that only recently are we finding are not so good afterall. In fact – downright baddies.

They're in our food, our personal care products, our homes, vehicles, offices.

Some of these chemicals are...

Goods gone Bad

Bp-A – hard plastics



1: Bisphenol-A, which is found in hard plastics.

2: Not all hard plastics contain BPA.

Goods gone Bad

Bp-A – hard plastics

- Not all hard plastics contain bp-A
- Not all bp-A-containing plastics contain the same amount of bp-A, or leach the chemical to the same degree (e.g., food-can linings)



Goods gone Bad

Phthalates – **soft plastics**

...air fresheners, cosmetics, fragrance, personal care products

In-utero exposure causes boys to have developmental problems with their equipment



1. Another Big Baddie are the Phthalates: a group of chemicals with many desirable attributes. They keep plastic soft and malleable.
2. They also carry fragrance really really well, and so are found in thousands of products we lather on, rub on, paint on, spritz on everyday. The average N. American adult woman applies 150 separate chemicals to her skin every day; The average adult Nam male applies ~ half that.
3. Pregnant women who work in salons have been found to have higher than usual numbers of boys born with reproductive problems.

Once again: beauty at a price.

Goods gone Bad

PBDEs (polybrominated diphenyl ethers) – **flame retardants**

- Used in upholstery; carpets; curtains; mattresses; kid's pjs; home electronics...
- Found in blood of 100% of the N. Am. population
- Known thyroid poison
- Potential effect on fetal brain development, resulting in possible altered behaviour, motor control and memory, hyperactivity, impaired sperm production (male offspring)



Used to reduce risk of ignition and spread of fire

Up to 30% of product weight = PBDEs

Thyroid disruption during fetal development may be associated with: ADHD; Autism; Poor motor skills; learning disorders; reduced IQ, reading ability and language development

Goods gone Bad

PFCs (polyfluorinated chemicals)
water, stain and grease repellants



- Found in 100% of the population
- Known thyroid toxicant
- Potential effect on fetal brain development



1

2. Also found in 100% of population, known thyroid toxic, with potential effect on fetal brain dev.

Personal care products

Microwave popcorn bags (that's what the smell is)

Fast-food containers

Non-stick cookware

Cleaning products

Gore Tex clothing, and other waterproof/water resistant brands

carpets; upholstery

Shoe spray

Goons gone Bad

Triclosan

– antibacterial agent...

...and pesticide



1. This is the last chemical I've singled out today – but believe me the list is by no means complete

Triclosan is an antimicrobial agent.

Found in many household cleansers, including dish soap and hand soap.

Manufacturers are required to id Triclosan in product ingredients ONLY IF they are claiming the product is “anti-microbial.”

Two common a-ms for cleansers: OH and Triclosan. OH is other; Triclosan isn't, because...

2. Oh, look, Triclosan is actually a pesticide.

Vince's talk about Gypsy Moth a couple of weeks ago: DDT was a pesticide, that caused/still causes ecological problems around the world today by interfering with the reproduction of wildlife, etc., even though its use in N.Am was banned 4 decades ago.

Goods gone Bad

Bp-A
Phthalates
PBDEs
PFCs
Triclosan
(and others)
...are endocrine disruptors



Goods gone Bad

- They affect normal endocrine (hormonal) function.
- Can affect reproduction, growth, immune function, behaviour and development

Youtube video: <http://www.youtube.com/watch?v=uowbWm4GbwQ>

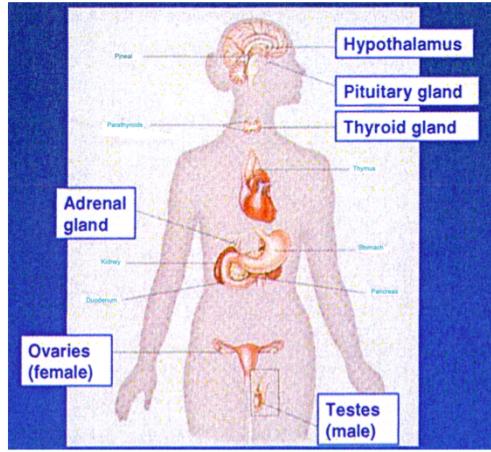


1: endocrine disrupter

2: Hormones are more than just puberty, PMS and menopause.

3: Everything we do is made possible by hormones. Our bodies function because of hormones.

Endocrine system



Hypothalamus

- Hormone release from the pituitary
- Behaviour and cognition
- Motor activity

Pituitary

- Hormone release from the thyroid
- Follicle development
- Lactation
- Growth

Thyroid

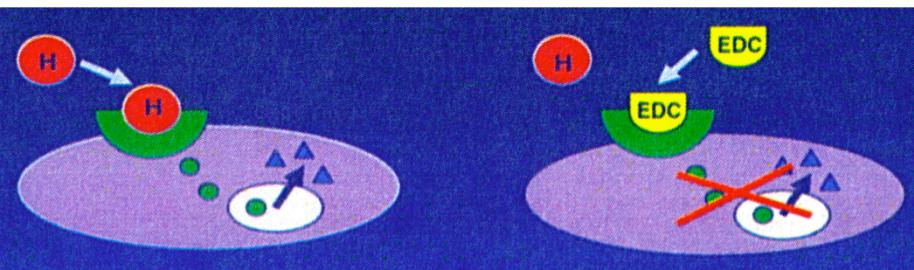
- Body temp.
- Growth; heartrate
- Fetal brain development

Ovaries

- Puberty (girls)
- Ovulation, menstruation, pregnancy
- Menopause



How endocrine-disrupting chemicals affect cell function



Hormones bind to cell receptors and induce a response

EDCs bind to receptor and

- mimic hormones
- block hormones

Interfere with hormone synthesis, transport or degradation



Exposure

Dosage
Length of exposure
Timing of exposure



Adults

Immune system allows body to clear out these chemicals within a couple of weeks after exposure.

Adults with deficient immune systems are at greater risk.

Psychological stress exacerbates effects of endocrine disruptors.



Children

Increased exposure

- across the placenta; through breast milk
- High contact with house dust
- Lots of hand-to-mouth activity
- **Eat, drink and inhale more / kg bodyweight**

Increased susceptibility

- Organs are developing
- Immune system not yet developed
- Even small exposures lead to effects



Timing of exposure matters

Critical windows of development

Most sensitive life stages are

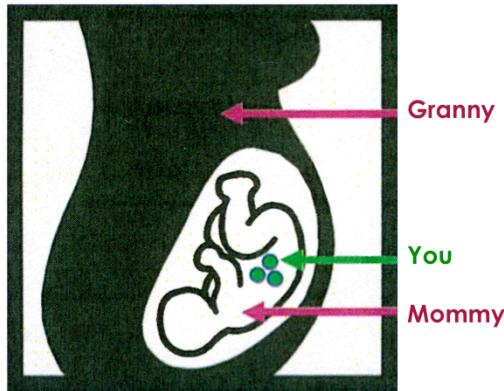
- » Fetus
- » Infancy
- » Childhood
- » Puberty?
- » Menopause?



Prep Granny effect

The grandmother effect

(The really scary bit...)



All girls are born with all the eggs they will ever have.

(exposures that occur while **your mother** was in the womb will affect
your development and fertility, chances for cancer, Type II diabetes
and cognitive health, etc., throughout your life.)



1: Here's your granny. She's preggers with your mom. And see the green dots inside your mom, those are her eggs. One of them is you (or half of you).

2: All girls are born with all the eggs they will ever have.

3: Any exposure to endocrine disruptors that occur while your mother is in the womb will also affect you – be you male or female. That's the grandmother effect.

But if those exposures cause chromosomal abnormalities, your offspring may inherit them.

And so it goes, down the generations.

So: any of you who were feeling relieved that they were born post-1971, when DES was banned as an anti-miscarriage med, you're not out of the woods.

In summary

- Many EDs used in many consumer products
- EDs detectable in ~100% of the human population
 - Many EDs have clear effect in animal studies
- Relevance for human health is not always clear (few studies; doses, timing not well studied; and with every new method developed to study them, new q?s arise)
 - More research needed

(but growing evidence from multiple disciplines that EDs are nasty. A marked level of consensus among scientists)



Thanks to

- Glenys Webster, UBC
- Dr. Stelvio Bendiera, UBC
- Dr. Patty Hunt, Centre for Reproductive Health, UWA-Pullman
- Phyllis Dale and Sharon Sutherland (of course)



What to do?

- Open your windows (home/car); get outside
- Reduce exposure to indoor dust
- Avoid “air fresheners” and scent-maskers (eg., Febreze)
- Avoid perfumes and perfumed products
- Search out “CE” mark (European products)
- Ask for non-toxic products – help to create change
- Avoid non-stick / stain-repellant products



What to do?

- Seek out natural fibres and non-foam alternatives for upholstery/carpeting/mattresses
- Choose non-toxic products during renovations (paint, stain, wood products, window frames, etc)
- Avoid “anti-bacterial”/ “anti-microbial” cleansers
- Avoid heavy-duty cleansers
- Wash your hands before eating



What to do?

- No plastic in the microwave or dishwasher
- Choose non-plastic containers to store fatty foods
- Avoid microwave popcorn & fast-food wrappers
- Avoid eating tuna and other aged fishes
- Eat low on the food chain
- Grow your own (fruits and veggies)
- Eat fresh or frozen food, or food preserved in glass (avoid tinned food when possible – esp. tinned acidic foods like tomatoes or fruit)
- Eat organic

