

Emerging Knowledge in Toxics and Environmental Health



Eileen Gunn

Toxics Use Reduction Institute, UMASS Lowell

Eileen_Gunn@uml.edu

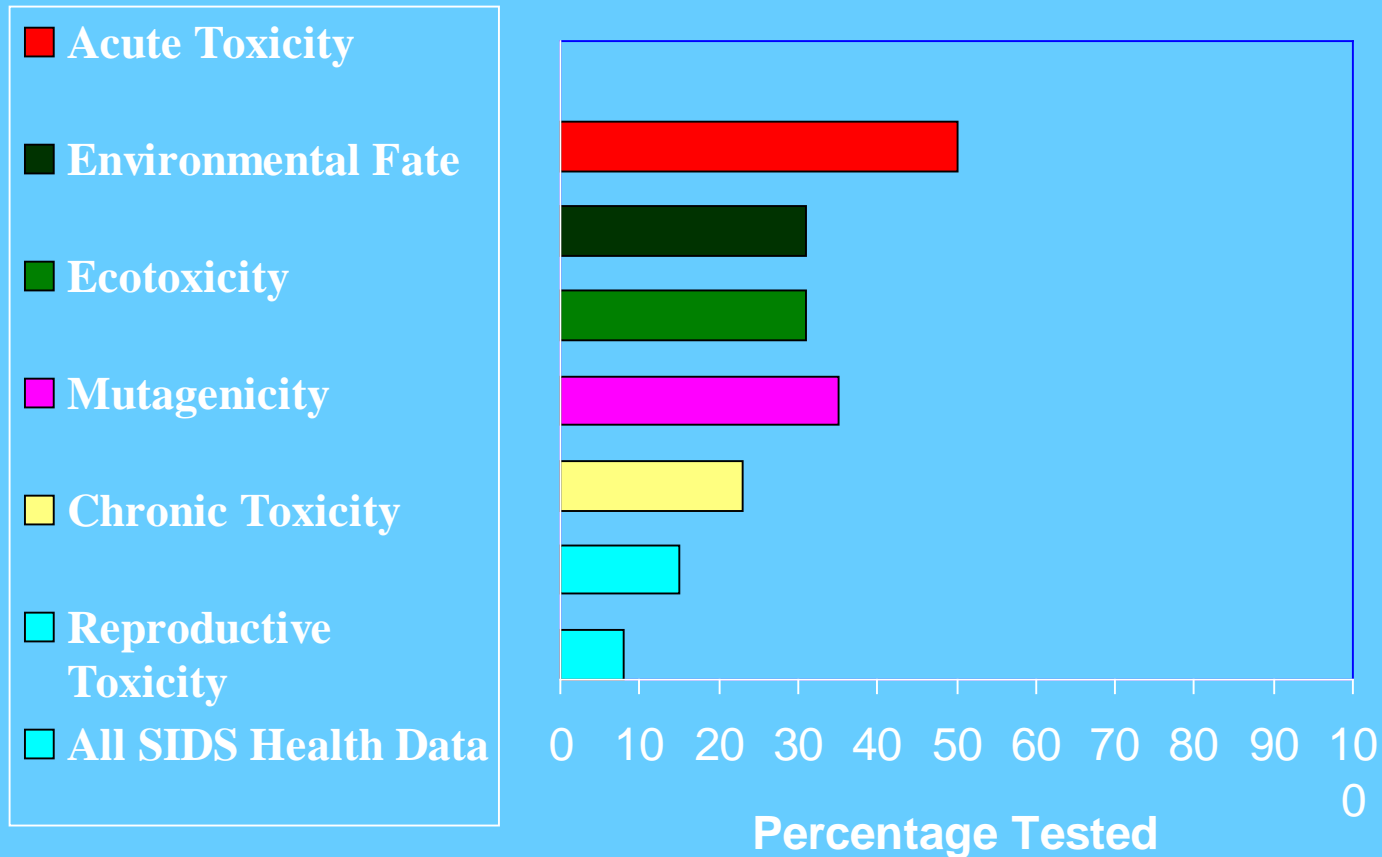
Emerging Knowledge in Toxics and Environmental Health

- **Knowledge in toxics and environmental health is emerging rapidly**
- **Current regulatory structure does not provide adequate protections for humans and the environment**
- **A focus on reducing exposures to toxic substances is most protective of human and environmental health**

The chemical environment

- 85,000 chemicals on Federal inventory
- 2000-3000 introduced each year
- 15,000 >10,000 lb/yr
- 2,863 >1,000,000 lb/yr
- Full Toxicity data lacking for most

Hazard Data - Chemicals Produced > 1 Million Pounds/Year



Emerging Knowledge in Toxics and Environmental Health

- 1. Occurrence is Ubiquitous**
- 2. Increase in Environmentally related diseases**
- 3. Impacts at Lower Exposure Levels and Timing of Exposure**
- 4. Disruption of Hormone Systems**
- 5. Unique vulnerability of Children**

Occurrence is Ubiquitous

- Certain classes of chemicals found in:
 - Humans
 - Wildlife
 - Environment

Occurrence is Ubiquitous- Humans

- **Mount Sinai/EWG Body Burden Report
–2002**
- **First comprehensive look at human
chemical burden in blood and urine**
- **Nine volunteers tested for 210 chemicals**
- **None work with chemicals on the job**

ENVIRONMENTAL WORKING GROUP - THE POWER OF INFORMATION

BodyBurden

the pollution in people.



- Site Contents -

[EWG Home](#) >> [BodyBurden](#) >> [Test Results](#) || Next Page: [Health Effects](#)

>> TEST RESULTS: BODYBURDEN PROFILES >> NEXT PAGE

Please click on a person to see what we found


Mtl																Oc			
Mtl	Mtl																OP	Oc	
Fur	Mtl																OP	Oc	
Fur	Diox	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	Pht	Pht	OP	Oc
Fur	Diox	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	Pht	OP	Oc
Fur	Diox	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	Pht	OP	Oc

click for a detailed list of chemicals found in Sharyle Patton

Internet

the pollution in people

>> TEST RESULTS

Mtl				
Mtl	Mtl			
Fur	Mtl			
Fur	Diox	PCB	PCB	PCB
Fur	Diox	PCB	PCB	PCB
Fur	Diox	PCB	PCB	PCB
Fur	Diox	S/Voc	S/Voc	S/Voc

BodyBurden

the pollution in people.



PCB-47



The contaminant **PCB-47** is a **Tetra-PCB** (a subclass of Polychlorinated Biphenyls.)

PCB-47 was found in **5** of our nine test subjects. Lexi Rome had 1,360.0 picograms per gram of lipid in the blood (pg/g). The 5 people had an average of 1,476.0 pg/g and a range of 1,000.0 to 1,860.0.

[\[Uses, manufacturers, and products containing this chemical\]](#)

Polychlorinated biphenyls, or PCBs, are toxic, persistent, bioaccumulative, and lipophilic ("fat-loving"). This means that PCBs build up and are stored in fatty tissues and fluids, such as breast milk, and can be passed on to fetuses and infants during pregnancy and lactation. In humans PCBs are linked to increased rates of a number of cancers, including malignant melanoma; non-Hodgkin's lymphoma; and brain, liver, and lung cancer. PCB poisonings in humans have caused fetal and infant death, birth defects, and brain damage in children exposed in the womb. PCBs are known to interfere with hormonal processes. In 1976, the manufacture of PCBs was banned in the United States because of concern for human health impacts, but are still widely found in the general population of the U.S.

In humans, PCBs are associated with skin lesions, thyroid disruption, and altered menstrual cycling, as well as damage to the nervous, immune, and cardiovascular systems. PCB exposure in the womb or during lactation is also associated with decreased IQ and impaired psychomotor development, decreased immune function, and skin disease (chloracne) (ATSDR 2000b). The

Body Burden Results

- **In total, nine subjects had:**
 - **76 Chemicals linked to cancer in humans or animals**
 - **94 chemicals that are toxic to the brain and nervous system**
 - **86 chemicals interfere with hormone systems**
 - **79 chemicals associated with birth defects or abnormal development**
 - **77 chemicals toxic to reproductive system**
 - **77 chemicals toxic to the immune system**

Body Burden Results

- 167/210 chemicals detected
- 48 PCBs
- 15 dioxins and furans
- 10 organochlorine pesticides and metabolites
- 6 phthalates
- 77 semivolatile and volatile chemicals
- 4 metals

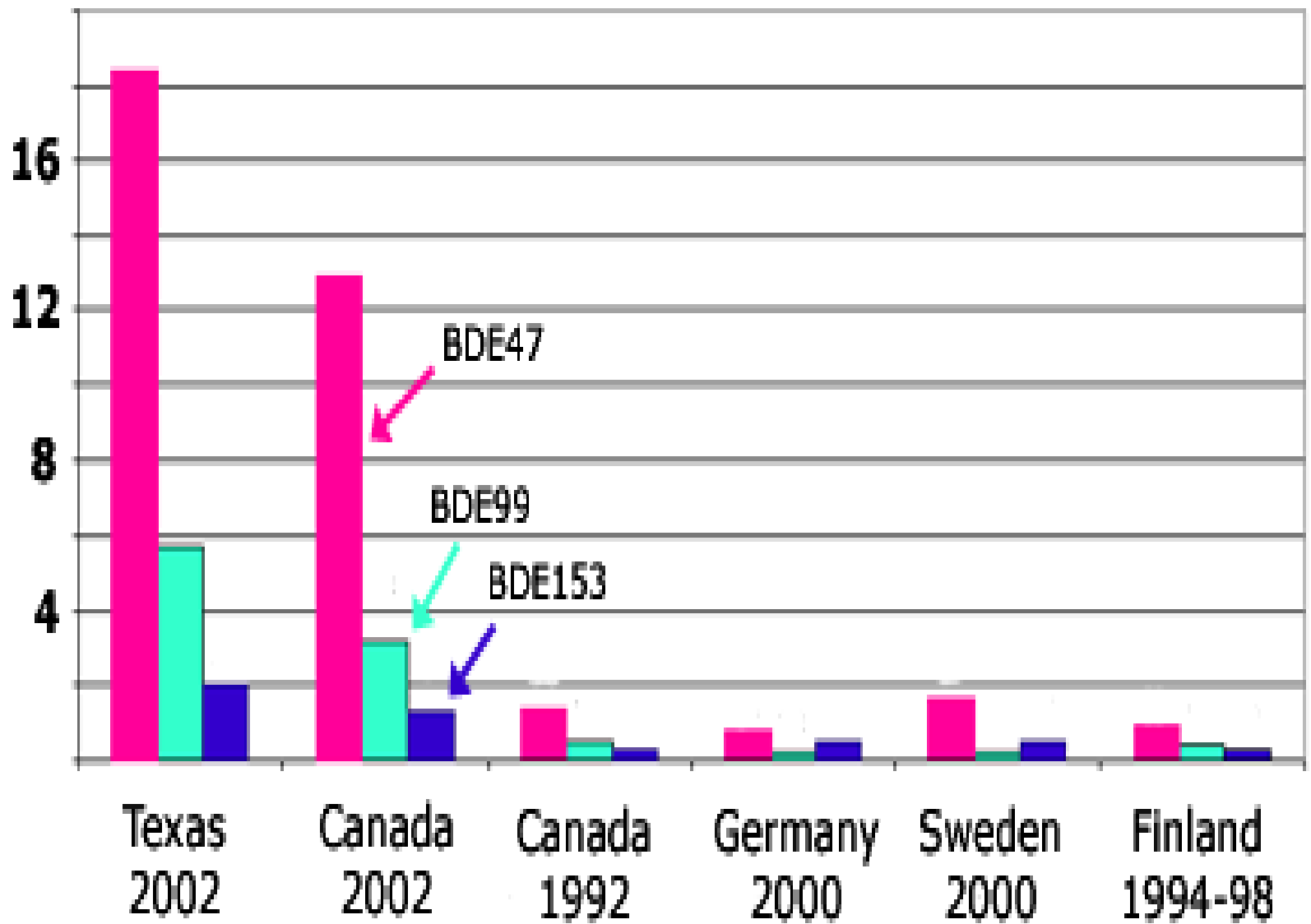
Chemicals Associated with:

- **183 types of consumer products (brake fluid, paint, flame retardents, pesticides, floor cleaners, rust guard, hand cream, thermostats, particleboard, batteries, gasoline)**
- **64 chemical functions (plasticizers, froth flotation agents, defoaming agents)**

Occurrence is Ubiquitous- Humans

- **Polybrominated diphenyl ethers (PBDE's)**
 - Brominated flame retardant similar in structure of PCBs
 - Found in computers, TV sets, cars and furniture, flexible polyurethane foam, carpet
- **Found in breast milk**
 - Levels in Swedish breast milk samples were 55 times higher in 1997 than in 1972.
 - Nov 2003 first study of polybrominated diphenyl ether (PBDE) contamination burdens in US breast milk finds levels 10 - 100 times higher than typical for Europe, and consistent with data on other tissues in Americans

**PBDE in breast milk
parts per billion**

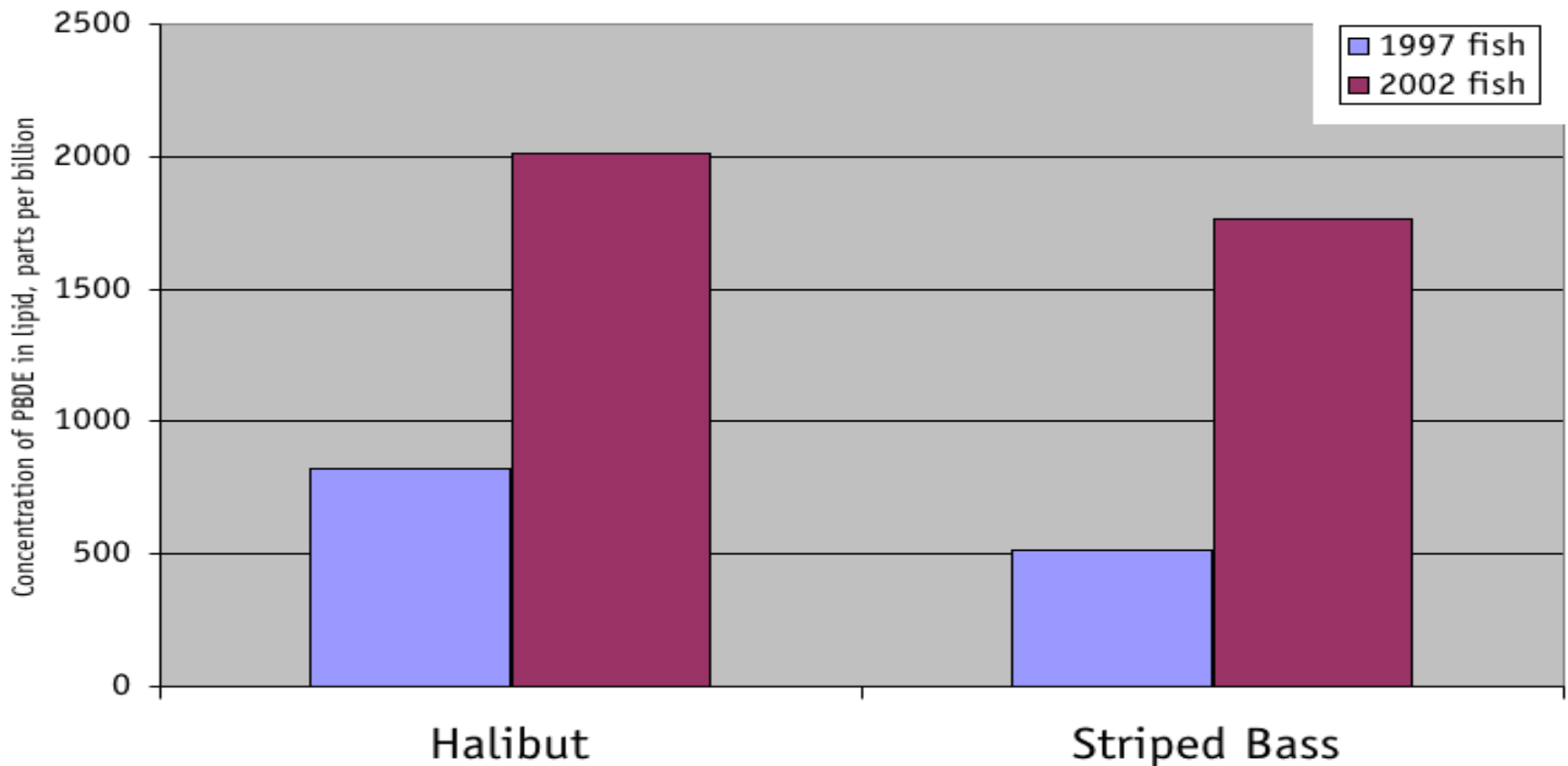


Occurrence is Ubiquitous

- **Recent animals research show that exposure to low levels of PBDEs can cause permanent neurological and developmental damage including:**
 - **Disrupt thyroid fx (critical for proper brain development)**
 - **deficits in learning, memory and hearing**
 - **changes in behavior**
 - **delays in sensory-motor development**
- **Banned in Europe, California**

Occurrence is Ubiquitous- Wildlife

PBDE levels in striped bass and halibut 1997 and 2002

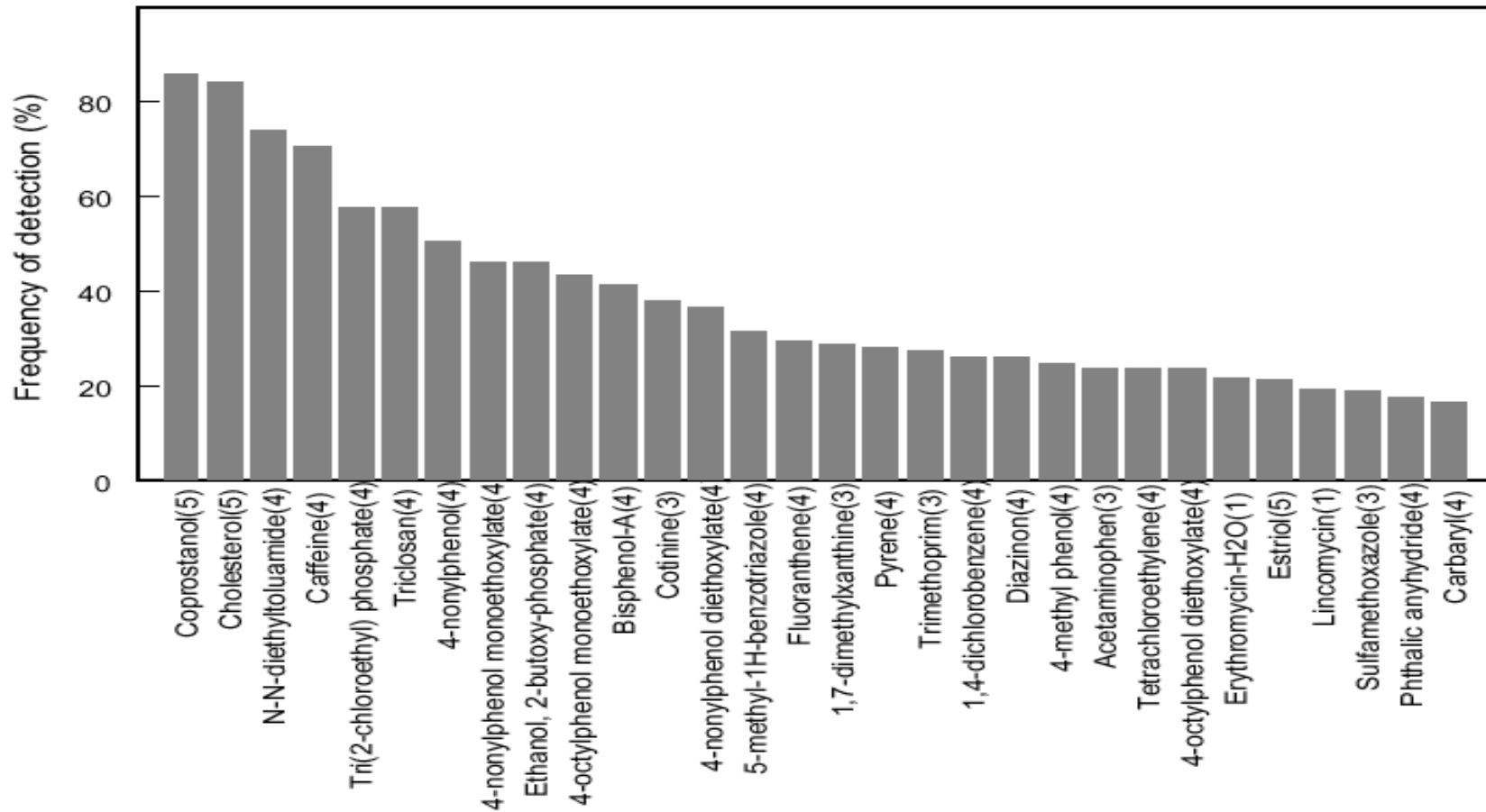


Occurrence is Ubiquitous- Wildlife



- Wherever scientists look - the tropics, marine systems, industrial regions, the Arctic - they find the effects of toxic chemicals.
- Polar bears, whales, frogs, eagles, and fish are contaminated with pesticides and industrial chemicals. Many scientists have concluded that synthetic chemicals have damaged wildlife populations by causing decreased fertility, thyroid dysfunction, behavioral abnormalities, decreased hatching success, and feminization and demasculinization in males.

Water-Quality Data for Pharmaceuticals, Hormones, and Other Organic Wastewater

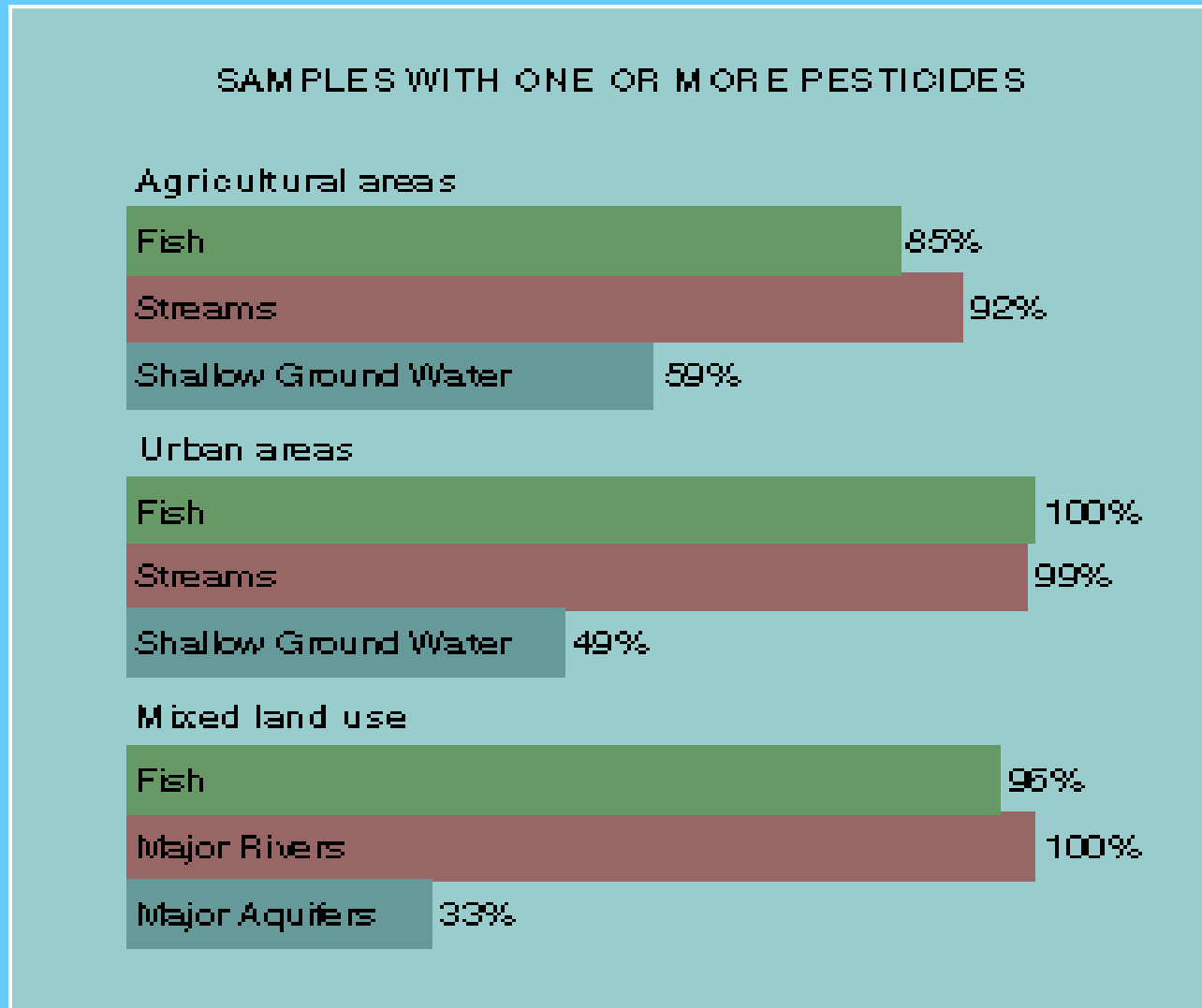


Occurrence in the Environment

Decades of pesticide use have resulted in their widespread occurrence in streams and ground water

U.S. Geological Circular 1225--The Quality of Our Nation's Waters--

Nutrients and Pesticides



Increase in Environmentally-Related Diseases

- **1992-1999 Cancer increases (breast, thyroid, kidney, liver, skin, some forms of leukemia)**
- **1975-1999 26% increase in childhood cancer**
- **Autism is 10x higher than in mid-1980s**
- **Dramatic increases in ADD and ADHD**
- **Environmental causes being linked with Parkinson's Disease**
- **Significant regional differences in sperm counts unexplained by genetic factors**

Increase in Environmentally-Related Diseases

- **Early onset in puberty in youth**
- **Hypospadias (birth defect of penis) doubled between 1970-1993 (1/125 male babies born)**
- **Incidence of undescended testicles and testicular cancer increasing in certain parts of the world**
- **Testicular cancer most common cancer in men 15-35**

Impacts at Lower Exposure Levels and Timing of Exposure

- Previous studies based on high doses and dose-response curve for adult animals
- High dose studies look for overt toxic effects: death (LD50), cancer, malformations, organ damage)
- Low dose safety not well predicted by high dose studies
- Scientist finding low doses far more harmful than believed

Impacts at Lower Exposure Levels and Timing

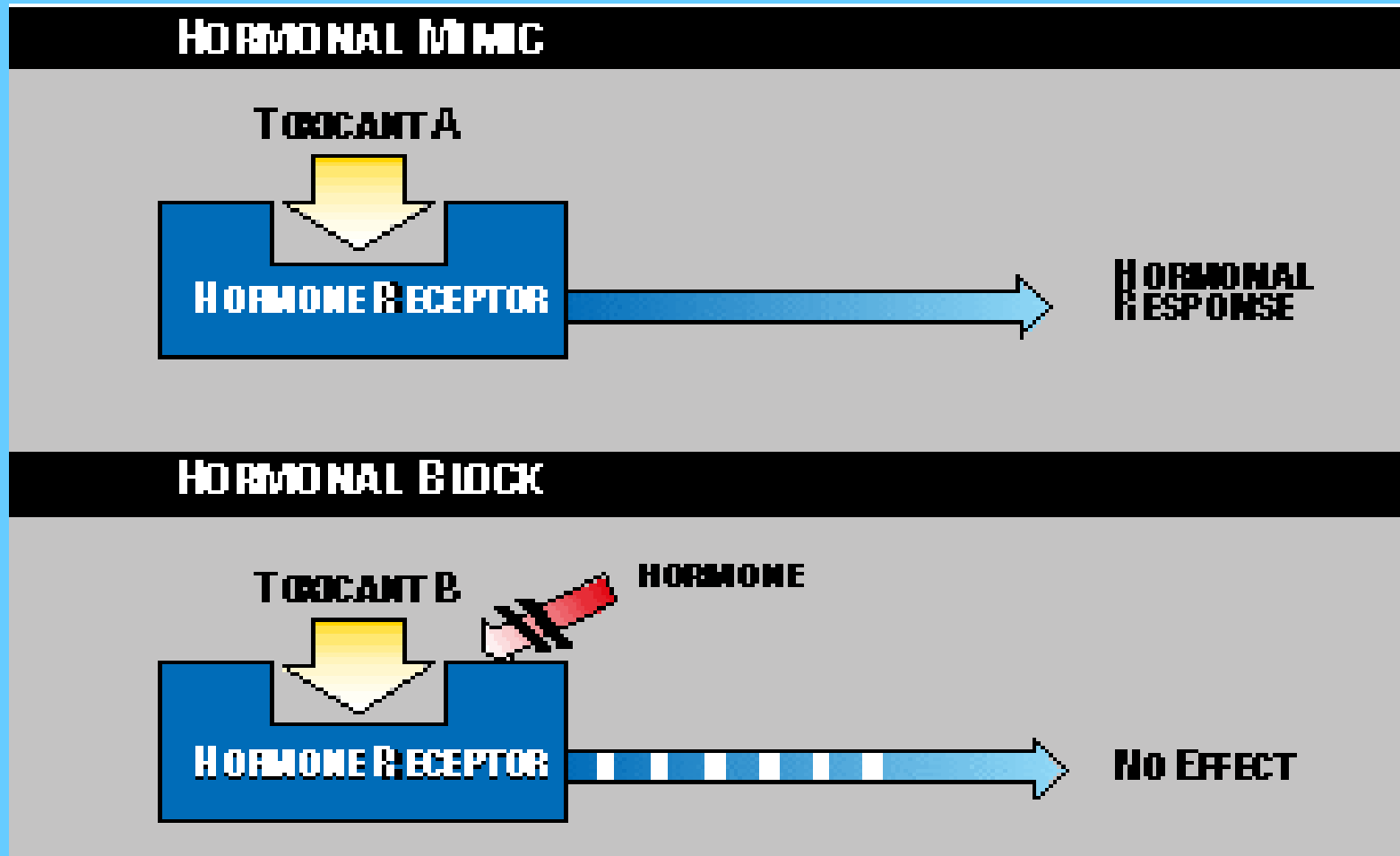
- Not just dose, but timing of exposure
- Low doses of Pb, Mercury, PCBs at specific days of fetal development can cause problems that manifest later in life while same dose to an adult would have little or no effect
- Low dose studies look for impaired fx of organ systems in animals exposed during development (impaired immune system, sperm counts, intelligence deficits, altered reproductive organs)

Impacts at Lower Exposure Levels and Timing

- **Biphasic dose response**
 - DES – synthetic estrogen stimulates prostate growth at .02,0.2, and 2 ug/kg-day
 - Inhibits prostate growth at 100-200ug/kg-day

High Dose studies are with purified single chemicals while in daily life we are exposed to mixtures of several chemicals

Disruption of Hormone Systems



Disruption of Hormone Systems

- **Atrazine- most commonly used weed killer in U.S. agriculture**
- **Widely found in agricultural area tap water (mcl 3ppb)**
- **Five studies found exposure to 100 ppt in water causes deformities in frogs (hermaphroditism), decrease in sperm and egg cells**

Disruption of Hormone Systems

- **Bisphenol A (building block of polycarbonate plastics, dental sealant, liner in steel and aluminum cans)**
 - Low doses linked to altered development of the mammary gland and sex organs, and early onset of puberty in female mice, behavioral effects, decreased sperm counts
 - Median human fetal plasma levels (2.3ppb)

'Gender-bender' fish problem widens



By BBC News

The entire male fish population of some European rivers show feminizing effects from so-called "gender-bending" chemicals, according to new research.

Unique vulnerability of Children

- **Children are highly vulnerable to toxics**
- **Children absorb more toxics from their environment than adults:**
 - **They play close to the ground**
 - **Hand-to-mouth behavior**
 - **Unique dietary patterns**
- **Undergoing rapid growth, development, and differentiation of their vital organ systems**
- **Decreased ability to detoxify and excrete toxics**
- **Skin is more permeable**

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