



# Windows of Vulnerability



When We  
Are **Least**  
Resistant to



**Toxic Exposures**





# Toxic Exposures and Our Health

**Hazardous substances are everywhere** —in our food and water, in household and health products we use each day, in our electronics and fabrics, and even in children's toys and baby bottles. There are now 80,000 chemicals registered for commercial use—a 30% increase over 1979. According to recent testing, the bodies of most Americans contain a chemical soup.

**People across the country are taking action to turn this toxic tide.**

## HERE ARE A FEW OF THE MOST COMMON ENVIRONMENTAL POISONS

**BPA** – Bisphenol A, like many toxic chemicals, is a hormone disruptor—a synthetic sex hormone that mimics or blocks the body's own hormones and alters hormonal functions. Commonly used to make plastic flexible and durable, BPA is found in toys, sports and soda bottles, the lining of canned food, plastic dinnerware, medical equipment and electronics products. Studies show links, even at low doses, to obesity, breast cancer, diabetes, heart problems and other illnesses.

**Dioxins** – Dioxins are the toxic by-products of incineration and some manufacturing processes. Burning of residential waste is thought to be the largest source of dioxins in the U.S. Dioxins can be found in 93% of our meats and in 23% of our dairy products.

**Phthalates** – A family of compounds used as plasticizers, these toxic chemicals are found everywhere—in toys, food containers, flooring and wall coverings, medical devices such as IV tubes, air fresheners, cosmetics and personal care products, including baby products.

**PBDEs** – Polybrominated diphenyl ethers are dangerous, persistent neurotoxins. PBDEs are in flame retardant chemicals put into appliances, textiles and plastic foams used in furniture, baby strollers and other children's products. They emit dangerous toxic particles just being in the products and although they delay fires, they create more dangerous particles when they finally do burn.

**Pesticides** – Widespread use of toxic agricultural pesticides has resulted in universal exposure through our diets and increased levels of exposure from pesticide "drift" traveling from the fields on wind and in water to areas where workers and families are living in rural communities.

**Lead** – Power plants are the primary source of lead emissions into the environment, and lead contaminated household dust is the major pathway of lead exposure for children. Lead poisoning accounts for the majority of pediatric health costs in the U.S. Lead is also found in many lipsticks.

**THE IMPACT** of our exposure to an ever-increasing number of environmental toxins?  
**GROWING** numbers of developmental disabilities, cancers and many other chronic diseases.

And now science is showing that the **timing of our toxic exposure** has as much or more impact than the amount of our exposure:

**During our lifetime, we have "windows of vulnerability."**

According to **Sandra Steingraber Ph.D.**, internationally renowned biologist and author:

- ◆ "We go through important changes during our life and enter **windows of vulnerability** when we are exquisitely sensitive to the effects of toxic exposures—far out of the proportion that the dose might predict."

**For example**, Steingraber has pointed out that the first six months of post-natal life, when the infant's blood barrier has not yet formed, is a particularly vulnerable time when:

- ◆ "Tiny, vanishingly small exposures of insecticides ... can create disproportionate risks to the brain, and can be a terrible saboteur of that brain compared to similar or even much larger exposures for older humans."

# Our Windows of Vulnerability to Toxic Exposures

- ◆ **In Utero** – A pregnant woman's blood flows through the umbilical cord from the placenta to the fetus, which exposes the fetus to toxic substances present in the mother's body.
- ◆ **Infants/Toddlers** – The propensity of young children to chew on anything they can reach, their close-to-the-floor method of movement, and their rapid growth give them special vulnerability.
- ◆ **Adolescents** – During puberty, when hormones are in a state of excited movement, exposure to synthetic hormone disruptors can alter this natural rite of passage.
- ◆ **Adults/Seniors** – With age, human defense mechanisms, including the immune system, kidneys, liver and the brain-blood barrier, begin to weaken and put seniors at great risk.



## First environments are the key to developing healthy adults.

## In Utero

The blood that flows from the mother through the umbilical cord provides essential nutrients to the fetus, but it also exposes the fetus to dangerous chemicals. Depending on the type of *in utero* exposure, both the fetus and the developing postnatal person can be affected in many ways and at different stages of their evolution.

**Miscarriage** – Miscarriage rates are three-fold for women impacted by certain toxins. For example, exposure to BPA early in a pregnancy has been linked to miscarriage.

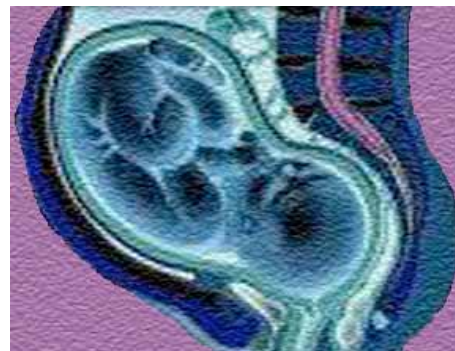
**Premature Birth/Lowered Birth Weights** – Fetal exposure to phthalates has been associated with premature births and dioxin exposure with lowered birth weights.

**Birth Defects** – Living close to agricultural fields where pesticides are sprayed has been connected to higher than average cases of birth defects such as certain kinds of clefts, cardiac defects, limb reduction deficits and undescended testicles. Phthalates exposure is linked to genital abnormalities in boys.

**Abnormal Brain Development** – Phthalates exposure can result in disruption in maternal and fetal thyroid hormones, which are important to brain development. BPA exposure can also result in abnormal brain development. Even low-level fetal exposure to lead can result in mental impairment.

**Behavioral and Learning Disorders** – *In utero* exposure to dioxins has been connected to both learning and behavioral disorders as the infant matures; PBDE exposure is linked to behavioral problems.

**Health Problems Later in Life** – Exposure to PBDEs and other hormone disruptors has been associated with the growing rates of infertility. Prostate and breast cancers have been linked to prenatal phthalates exposure. Based on animal studies, there is wide-spread belief that early life exposure to pesticides can result in Parkinson's Disease in adult life.



## Infants/Toddlers

Every child younger than six months is missing the suit of armor that surrounds the brain and offers protection against the neurological damage of pesticides.

—Sandra Steingraber, Ph.D.

Young children, with their nervous systems still developing and undergoing rapid growth, have unique characteristics, which cause particular vulnerability to toxic exposures.

**A child's blood-brain barrier is not in place until the 6<sup>th</sup> postnatal month.** The blood-brain barrier is the key element of the brain, which isolates the brain from disturbances in the composition of fluids in the rest of the body. Toxic exposures can cause damage to an unprotected brain.



**Young children have a propensity to put almost everything in their mouths.** Many of the toys and other objects that end up in children's mouths are made of plastic, which may contain toxic plasticizers like BPA or phthalate. Exposure to these synthetic chemical hormone disruptors can alter a child's normal hormonal functioning.

**They tend to spend time on the floor.** Crawling and playing on the floor exposes children to household dust, a major pathway of lead exposure, which can result in learning and reading difficulties, delayed growth and hearing loss. On the floor, children can also be exposed to PBDEs, the hormone disrupting flame retardant found in carpeting.

**They eat more food per pound of body weight than adults.** This of course means that children consume, pound for pound, more pesticides and more dioxins and PBDEs—which bioaccumulate in food, and more BPA and phthalates—used in food packaging, than adults.

**Additionally,** young children are exposed to phthalates through baby care products such as lotions, powders and shampoos.

## Adolescents

Research has just begun to uncover the effects of toxic exposures on adolescents going through puberty.



**Puberty is a time of rapid growth** in which a lot of DNA is excitedly replicating and is thus a time of greater vulnerable to damage from chemical hormone disruptors than when in a quiet state.

Although there are not yet robust findings on the effects of toxic exposures on puberty, it is clear: certain chemicals can alter and disrupt the process. For example, BPA is suspected to cause earlier puberty.

**Adolescent girls** are of particular concern as they begin to use a variety of cosmetics, most of which contain extremely toxic substances such as BPA, lead and phthalates.

# Adults/Seniors

**Senior adults come to a time when they are exquisitely sensitive to toxic substances.**



**With age, all defense mechanisms weaken, the blood-brain barrier starts to fall apart, and seniors become more vulnerable to toxic substances.**

For example, older adults have been shown to have higher blood levels of lead than younger adults. Research is demonstrating that increased levels of lead in blood and bone contribute to hypertension, renal insufficiency and cognitive impairment. There is also the issue of the liver losing its capacity to detoxify as thoroughly as when a person is younger, which leads to increased sensitivity to environmental toxics.



Additionally as the metabolic activity of adults slows, the possibility of over dosing on prescribed medications becomes more likely. The medication is not well metabolized and greater toxicity can occur.

**Silent exposures early in life matched by exposures in adult life could be a threatening combination.**

There is speculation, backed by animal studies, that early life exposure to pesticides can result in Parkinson's disease later in life and when combined with adult exposure may elicit the neuro-degenerative changes that can then lead to full-blown Parkinson's dementia. It has been documented that certain kinds of farmers are more prone to dementia than other people and certain veterans of wars where pesticides were used are at higher risk for Parkinson's.

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# Opportunities for Change

While researchers continue to learn more and more about the effects of toxic exposures, polluters continue to release billions of pounds of toxics into the air, water and soil.

## What can we do?

**We can help turn this toxic tide in KY.**

### All across the country, people are working for change.

- ◆ Several state and local governments have already taken actions like banning bisphenol-A, phthalates and lead. Go to <http://saferstates.org/> to find out what's going on where.
- ◆ Groups are working together to push the US Congress to reform industry and regulatory processes;
- ◆ Retailers are getting the message: toxic products are not acceptable; safer substitutes are needed.

### Here are some opportunities for you to take action in Kentucky.

The Kentucky Environmental Foundation (KEF) wants you to get involved!

- ◆ **Endorse the Louisville Charter:** A Platform for Chemical Reform. The Charter, named to honor the struggles of Louisville's Rubbertown community, lays out the necessary steps for comprehensive chemical industry reform. Find the Charter at KEF's website (see below).
- ◆ **Schedule a presentation** on toxics and health for your organization, your religious or community group. KEF will use video and hands-on materials to inform folks on the problems of toxic exposures and involve you in the movement for change.
- ◆ **Sign Up on the Safer Chemicals, Healthy Families campaign** to put pressure on Congress for chemical industry reform now! Go to <http://www.saferchemicals.org> for more information. Also, check out the KEF website for information on other national campaigns.
- ◆ **Stay in touch.** KEF is working with other health and environmental justice groups in the state to plan new strategies for positive change in Kentucky. We'll keep you informed and involved in actions to protect our air, water, food and bodies from harmful chemicals.
- ◆ **Donate** funds to keep the good work going. Your contribution to KEF will help us continue this critical work. Donations can be sent to our address below, or via our website.

For more information on turning the toxic tide, contact:

**Kentucky Environmental Foundation**

**859-986-0868**

**128 Main St. Berea KY 40403**

Don't forget to visit our web site for toxics information links.

<http://kyenvironmentalfoundation.org/>

