



Scientists Sound Alarm for Our Health

Progress Brings Unexpected Consequences

The great scientific progress of the past century has created tens of thousands of synthetic chemicals with a wide range of uses in millions of products. These chemicals have made our homes more comfortable and secure, eased our workloads, contributed to our wealth, and made our lives more convenient and fun.

However, the use of these chemicals has had an unintended and unexpected consequence; many of them have turned out to be toxic to our health.¹ Solvents developed for cleaning were not expected to cause cancer. We did not anticipate that chemicals added to plastic polymers would disrupt our hormonal systems and harm child development. Glues used in particleboard were not intended to cause cancer and respiratory illness. Many Americans assume that the health impacts of chemicals are tested before they are used, but in most cases, they are not.

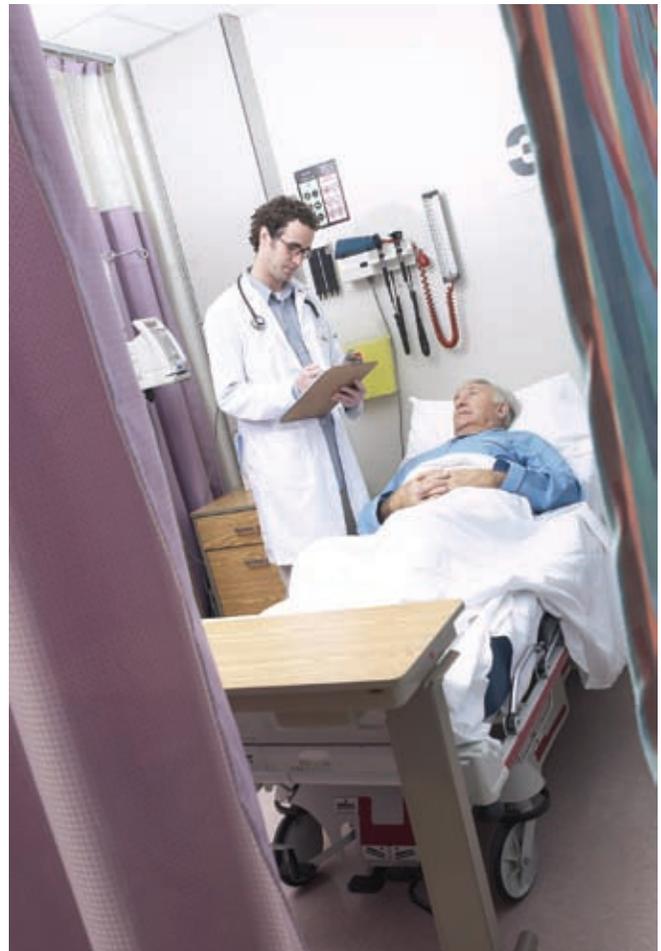


► **Chronic Diseases and Disorders**

In recent decades, scientific evidence has increasingly demonstrated that toxic chemicals are contributing to **a growing epidemic of chronic diseases and disorders.**² These include childhood and adult cancers, asthma, learning and developmental disabilities, birth defects, reproductive disorders such as infertility, and neurodegenerative disorders such as Parkinson's disease.³

Consider this:

- **Environmental factors** – including toxic chemicals – compared with heredity, **play the principal role in causing cancer**, according to an exhaustive study of twins published in the *New England Journal of Medicine* in 2000.⁴
- **As much as 90% of childhood cancer may be explained by environmental exposures.**⁵ A review of 31 studies of childhood cancer concluded that the use of pesticides in the home during pregnancy and childhood was associated with increased likelihood of brain cancer and leukemia.⁶
- **More than 200 chemicals (including commonly used pesticides and solvents) were listed as known to be toxic to the brain in a recent report published in the *Lancet*.** The researchers report that mounting evidence has linked toxic chemicals to such neurological disorders as learning problems and sensory deficits. The report concludes, "the combined evidence suggests that neurodevelopmental disorders caused by industrial chemicals have created a silent pandemic in modern society."⁷
- **Air pollution has been linked to respiratory illness and asthma hospitalizations.** Recent studies have found links between air pollution and pre-term birth, infant mortality, deficits in lung growth, and possibly development of asthma in children.⁸
- The majority of cases of **Parkinson's disease and Alzheimer's disease**, the two most common neurodegenerative disorders in American adults, are the result of interactions between genetic and environmental factors (such as exposure to chemicals as well as infections and medications).⁹
- **Male reproductive health** has declined since the 1990s, according to a growing number of reports. This evidence includes birth defects of the genitals, increasing numbers of testicular and prostate cancers, decreased sperm count and quality. This trend is due, at least in part, to exposure to **chemicals that mimic hormones during fetal and childhood development.**¹⁰



► **Lessons of Lasting Health Damage**

Scientists are now challenging our old ways of understanding the toxic effects of chemicals on health. For instance, the old paradigm of "the dose makes the poison" has been challenged by new information on the impact of the *timing* of toxic exposure. Scientists, in the fields of toxicology and epidemiology among others, are documenting the **subtle, synergistic and complex impacts that multiple chemicals have on our bodies.**

► **Damage Affects Children and Grandchildren**

Scientific studies are now demonstrating that toxic exposures to a parent can also damage the next generations, potentially through alterations of genes or gene expression. For example, studies have consistently found an increased likelihood of certain types of childhood cancers following a parent's earlier exposure to pesticides and solvents. Children of fathers who work with the solvents benzene or alcohol prior to pregnancy were nearly six times more likely to develop leukemia.¹¹

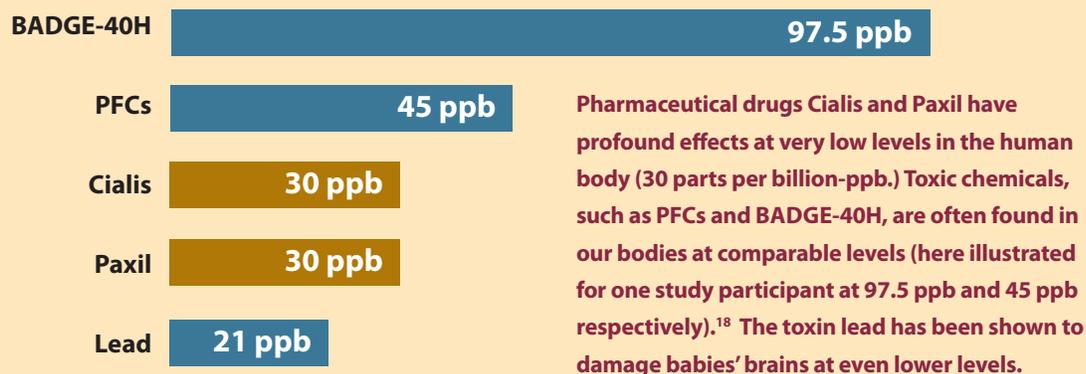
ARE DOSES TOO LOW TO MATTER?

Peer-reviewed studies in scientific journals such as *Environmental Health Perspectives* continue to find that common chemicals impact health at lower levels than previously believed.¹⁵ Lead, a known neurotoxin, damages babies' brains at very low levels.

One lesson scientists have learned is that the timing of the exposure can be as important as the amount of exposure. For example, animal tests show that one small dose of certain pesticides on a critical day of development can cause permanent hyperactivity and changes in brain chemistry.¹⁶

Chemical companies that oppose further regulating toxic chemicals sometimes claim that exposure to low doses of chemicals does not create serious health effects. However, drugs such as the antidepressant Paxil and erectile-dysfunction treating drug Cialis are both effective at 30 parts per billion,¹⁷ which is equivalent to a single grain of salt in a bathtub of pure water. **These medicinal chemicals have profound effects on the human body at levels comparable to levels commonly found for toxic chemicals.** For example, BADGE-40H, a breakdown product of the hormone disrupting chemical, Bisphenol A, has been found in the human body at levels three times higher than these drugs. Also, PFCs—found to disrupt hormones and likely to cause cancer—are in stain- and grease-proof coatings such as Teflon, Scotchgard, and Gore-Tex and have been found in the human body at 45 ppb.

How Small Doses Compare



Source: Environmental Working Group¹⁹

A recent study by Washington State University professor Michael Skinner, Ph.D., and colleagues showed that exposure of rats to an insecticide and to a fungicide, both hormone disruptors, caused changes that affected not just the offspring exposed in the womb but to *all males born for at least four subsequent generations*.¹² The rats appeared normal at birth, but at mid-life they developed diseases:

"When we got them to age, we... saw everything from breast tumors, prostate disease, kidney disease, immune dysfunction. We saw ... many of the diseases we see in the human population," Dr. Skinner said.¹³

"A human analogy would be if your grandmother was exposed to an environmental toxicant during mid-gestation, you may develop a disease state even though you never had direct exposure, and you may pass it on to your great-grandchildren."

— Dr. Michael Skinner,
Washington State University.¹⁴

► **Chemicals Build Up and Interact**

We are exposed to hundreds of chemicals daily, in our air, water, food, and the products we use. While one exposure to a chemical may be harmless, many chemicals can accumulate in our bodies, **building up to increased and potentially harmful levels**. The damage can be additive because a few small doses may be as damaging as getting a single larger dose.

Hundreds of potentially hazardous chemicals can be found in the blood, urine, and tissues of Americans.²⁰ Combinations of chemicals can have synergistic effects – producing larger or different effects together in the body than they would separately. This is similar to more familiar concerns about interactions of different medicines. Taking two or more medicines together may make your

medicine less effective, cause unexpected side effects, or increase the action of a particular drug.

For example, researchers exposed mice to three common contaminants (aldicarb, atrazine and nitrate) at levels of contamination similar to those often encountered in US water supplies. The synergistic health impacts they detected in the mice involved immune, endocrine and behavioral changes.²¹

► **Preventable Suffering**

The good news is that the harm caused by toxic chemicals is preventable. Replacing toxic chemicals with safer alternatives can reduce the number of people who develop cancer, learning disabilities, and reproductive and neurodegenerative disorders.

“**Now science has revealed disruptors for almost every hormone system that has been studied. This includes other sex steroid hormones, like testosterone and progesterone, as well as thyroid and retinoids. Many more compounds are now known to be powerful endocrine disruptors. This includes contemporary use pesticides and a range of chemicals in widespread use in consumer products.**”

— John Peterson Myers, Ph.D.²²



HORMONE DISRUPTION HAS WIDESPREAD IMPACT

Hormones play extremely important roles as they help to direct the development of the fetus, infant, and child. Hormones are also important in adults as they are crucial for the normal functioning of many bodily systems. Hormones are unique because they are present and active in only tiny amounts, yet these tiny amounts produce major effects.²³ Dozens of chemicals have now been identified as potential “endocrine disrupting compounds” which means they can mimic or interfere with human hormones. Most importantly, exposure to an endocrine disruptor at a low level during a critical time in development can have lifelong impacts. **For example, the developing fetus may mistake a foreign chemical for a hormone, and this may in turn cause an incorrect “signal” to be sent to developing tissues.** These early mistakes can permanently damage the baby’s developing immune, reproductive or nervous systems.²⁴

“We are swimming in a sea of chemicals, most of them untested and practically speaking, unregulated. Promoting safer alternatives is an urgent and essential public health measure.”

— David Ozonoff, MD, MPH, Boston University School of Public Health²⁵

Through advances such as water disinfection and vaccinations, we have succeeded in nearly eradicating contagious diseases, like smallpox and polio, that once plagued entire generations. By committing resources into amazing medical advances, we now have treatments for diseases that were once death sentences, like heart disease and tumors.

It is time to combat our current disease epidemics with the same dedication, replacing toxic chemicals and spurring innovation into products that will improve our lives without endangering them. ■



Endnotes

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Safe Products Made Safely

The Scientific, Economic and Common Sense Arguments for Passing the Safer Alternatives Bill

This is number one in a series of ten fact sheets.

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