CLASS SET – DO NOT WRITE ON THIS PAPER

Excerpts from "The Pollution Within"

Modern chemistry keeps insects from ravaging crops, lifts stains from carpets, and saves lives. But the ubiquity of chemicals is taking a toll.
By David Ewing Duncan

Photograph by Peter Estink

An Old Nemesis
Lead paint chips speckle the gut of a two-year-old Cleveland girl. Phased out decades ago, lead paint is still injuring children who swallow it.

My journalist-as-guinea-pig experiment is taking a disturbing turn. A Swedish chemist is on the phone, talking about flame retardants, chemicals added for safety to just about any product that can burn. Found in mattresses, carpets, the plastic casing of televisions, electronic circuit boards, and automobiles, flame retardants save hundreds of lives a year in the United States alone. These, however, are where they should not be: inside my body.

In fact I'm a writer engaged in a journey of chemical self-discovery. Last fall I had myself tested for 320 chemicals I might have picked up from food, drink, the air I breathe, and the products that touch my skin—my own secret stash of compounds acquired by merely living. It includes older chemicals that I might have been exposed to decades ago, such as DDT and PCBs; pollutants like lead, mercury, and dioxins; newer pesticides and plastic ingredients; and the near-miraculous compounds that lurk just beneath the surface of modern life, making shampoos fragrant, pans nonstick, and fabrics water-resistant and fire-safe.

Now I'm learning more than I really want to know. Where I picked up these chemicals that I had not even heard of until a few weeks ago remains a mystery. And there's the bigger question: How worried should I be?

I'm healthy, and as far as I know have no symptoms associated with chemical exposure. In large doses, some of these substances, from mercury to PCBs and dioxins, the notorious contaminants in Agent Orange, have horrific effects. But many toxicologists—and not just those who have ties to the chemical industry—insist that the minuscule smidgens of chemicals inside us are mostly nothing to worry about.

"In toxicology, dose is everything," says Karl Rozman, a toxicologist at the University of Kansas Medical Center, "and these doses are too low to be dangerous." One part per billion (ppb), a standard unit for measuring most chemicals inside us, is like putting half a teaspoon (two milliliters) of red dye into an Olympic-size swimming pool. What's more, some of the most feared substances, such as mercury, dissipate within days or weeks—or would if we weren't constantly re-exposed.

Yet even though many health statistics have been improving over the past few decades, a few illnesses are rising mysteriously. From the early 1980s through the late 1990s, autism increased tenfold; from the early 1970s through the mid-1990s, one type of leukemia was up 62 percent, male birth defects doubled, and childhood brain cancer was up 40 percent. Some experts suspect a link to the man-made chemicals that pervade our food, water, and air. There's little firm evidence. But over the years, one chemical after another that was thought to be harmless turned out otherwise once the facts were in.

Regulators have often allowed a standard of innocent until proven guilty in what Leo Trasande, a pediatrician and environmental health specialist at Mount Sinai Hospital in New York City, calls "an uncontrolled experiment on America's children."

Each year the U.S. Environmental Protection Agency (EPA) reviews an average of 1,700 new compounds that industry is seeking to introduce. Yet the 1976 Toxic Substances Control Act requires that they be tested for any ill effects before approval only if evidence of potential harm exists—which is seldom the case for new chemicals. The agency approves about 90 percent of the new compounds without restrictions. Only a quarter of the 82,000 chemicals in use in the U.S. have ever been tested for toxicity.

Studies by the Environmental Working Group, an environmental advocacy organization that helped pioneer the concept of a "body burden" of toxic chemicals, had found hundreds of chemical traces in the bodies of volunteers. But until recently, no one had even measured average levels of exposure among large numbers of Americans. No regulations required it, the tests are expensive, and technology sensitive enough to measure the tiniest levels didn't exist.

I began my own chemical journey on an October morning at the Mount Sinai Hospital in New York City, where I gave urine and had blood drawn under the supervision of Leo Trasande. Trasande specializes in childhood exposures to

mercury and other brain toxins. A few weeks later, Axys sent me my results—a grid of numbers in parts per billion or trillion—and I set out to learn, as best I could, where those toxic traces came from.

Some of them date back to my time in the womb, when my mother downloaded part of her own chemical burden through the placenta and the umbilical cord. More came after I was born, in her breast milk. Once weaned, I began collecting my own chemicals as I grew up in northeastern Kansas, a few miles outside Kansas City.

My Axys test results read like a chemical diary from 40 years ago. My blood contains traces of several chemicals now banned or restricted, including DDT (in the form of DDE, one of its breakdown products) and other pesticides such as the termite-killers chlordane and heptachlor. The levels are about what you would expect decades after exposure, says Rozman, the toxicologist at the University of Kansas Medical Center. My childhood playing in the dump, drinking the water, and breathing the polluted air could also explain some of the lead and dioxins in my blood, he says.

[Later in life,] I encounter a newer generation of industrial chemicals—compounds that are not banned, and, like flame retardants, are increasing year by year in the environment and in my body. Sipping water after a workout, I could be exposing myself to bisphenol A, an ingredient in rigid plastics from water bottles to safety goggles. Bisphenol A causes reproductive system abnormalities in animals. My levels were so low they were undetectable—a rare moment of relief in my toxic odyssey.

And that faint lavender scent as I shampoo my hair? Credit it to phthalates, molecules that dissolve fragrances, thicken lotions, and add flexibility to PVC, vinyl, and some intravenous tubes in hospitals. The dashboards of most cars are loaded with phthalates, and so is some plastic food wrap. Heat and wear can release phthalate molecules, and humans swallow them or absorb them through the skin. Because they dissipate after a few minutes to a few hours in the body, most people's levels fluctuate during the day.

Like bisphenol A, phthalates disrupt reproductive development in mice. An expert panel convened by the National Toxicology Program recently concluded that although the evidence so far doesn't prove that phthalates pose any risk to people, it does raise "concern," especially about potential effects on infants. "We don't have the data in humans to know if the current levels are safe," says Antonia Calafat, a CDC phthalates expert. I scored higher than the mean in five out of seven phthalates tested. Given the stakes, why take a chance on these chemicals? Why not immediately ban them?

Nor is it clear that banning a suspect chemical is always the best option. Except for some pollutants, after all, every industrial chemical was created for a purpose. Even DDT, the archvillain of Rachel Carson's 1962 classic book Silent Spring, which launched the modern environmental movement, was once hailed as a miracle substance because it killed the mosquitoes that carry malaria, yellow fever, and other scourges. It saved countless lives before it was banned in much of the world because of its toxicity to wildlife. "Chemicals are not all bad," says Scott Phillips, a medical toxicologist in Denver. "While we have seen some cancer rates rise," he says, "we also have seen a doubling of the human life span in the past century."

The key is knowing more about these substances, so we are not blindsided by unexpected hazards, says California State Senator Deborah Ortiz, chair of the Senate Health Committee and the author of a bill to monitor chemical exposure. "We benefit from these chemicals, but there are consequences, and we need to understand these consequences much better than we do now."

Soon after I receive my results, I show them to my internist, who admits that he too knows little about these chemicals, other than lead and mercury. But he confirms that I am healthy, as far as he can tell. He tells me not to worry. So I'll keep flying, and scrambling my eggs on Teflon, and using that scented shampoo. But I'll never feel quite the same about the chemicals that make life better in so many ways.

Duncan, David Ewing, "The Pollution Within." October 2006. National Geographic Magazine. Retrieved 17 April 2012. http://ngm.nationalgeographic.com/2006/10/toxic-people/duncan-text

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Discussion Questions:

1. How do chemicals get into our bodies?
2. What do you think toxicologist Karl Rozman means in his statement:"In toxicology, dose is everything"?
3. What is the standard unit for measuring most chemicals found in our bodies?
4. Why have only a quarter of the 82,000 chemicals in use in the U.S. been tested for toxicity?
5. Do you feel that we should just ban all of these chemicals from use in the U.S.? Why or why not?