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Toxic Man?

I've been tested for 320 environmental chemicals, from DDT to flame retardants.

By David Ewing Duncan

To watch a video of David delivering a talk about his "Toxic Man?" results, click [here](#).

**(A transcript is also available.) The talk was given on January 9, 2007, at the California Commonwealth Club in San Francisco.*

For discussions of the article on NPR's Morning Edition, the Today Show, and other media, go to my [website](#).

Oddly enough, my first blog for *Technology Review* is about an article I wrote in another magazine. Sorry, *TR*! But in beginning this cyber tête-à-tête with you, I would like to pick up a dialogue I've been having with readers of an article I wrote in last October's *National Geographic* titled "The Pollution Within." (A condensed version of the article is below.)

In the article, I reported the results of tests run to see if my body contained any of 320 environmental chemicals that I might have picked up from food, drink, the air I breathe, and the products that touch my skin. This was my own secret stash of compounds acquired merely by living. The list included 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.

Turns out there were 165 pollutants detectable in my blood and urine. Most of the levels are about average, with some exceptions. I had higher than average levels of DDE, a metabolite of DDT, undoubtedly because I grew up in the Midwest when DDT was still legal to spray as a pesticide. I also had unusually high levels of bromide flame retardants known as PBDEs--used in almost anything that can burn, from clothing and furniture to electronics. I had 10 times the normal level of PBDEs. The reason why is a mystery that the experts could not account for, although they had some theories, which are discussed below.

For my complete chemical report card and the complete [article](#).

Before people get upset and worried, it is important to emphasize that the amounts of chemicals that showed up in me are very, very small--mostly measured in terms of parts per billion and parts per trillion. For nearly all of these chemicals, no one knows if the tiny amounts are dangerous or not. Toxicologists will tell you that the dose makes the poison--and these doses are tiny. That said, what is needed is far more research to determine if these small levels are hurting us or are harmless.

The other question I have been asked hundreds of times is, Can anything be done? In most cases, say the experts, no: there are ways to remove some of the chemicals from the body, but most of these chemicals are so pervasive in the environment that we are being constantly exposed to them. We can run, but we can't hide. I'll be writing more about this in future blogs.

Finally, can you be tested for these chemicals? Yes--but the tests are highly technical and expensive, and they're available in only a handful of labs. My tests cost \$15,000--paid for by *National Geographic*. A few tests--for mercury and lead, for instance--are inexpensive and readily available, but most are not.

For [further information](#) about the article and human chemical exposure, there are numerous links and citations.

Here is a condensed version of the article:

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.

Åke Bergman of Stockholm University tells me he has received the results of a chemical analysis of my blood, which measured levels of flame-retarding compounds called polybrominated diphenyl ethers. In mice and rats, high doses of PBDEs interfere with thyroid function, cause reproductive and neurological problems, and hamper neurological development. Little is known about their impact on human health.

"I hope you are not nervous, but this concentration is very high," Bergman says with a light Swedish accent. My blood level of one particularly toxic PBDE, found primarily in U.S.-made products, is 10 times the average found in a small study of U.S. residents and more than 200 times the average in Sweden. The news about another PBDE variant—also toxic to animals—is nearly as bad. My levels would be high even if I were a worker in a factory making the stuff, Bergman says.

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.

I ran the tests to learn what substances build up in a typical American over a lifetime, and where they might come from.

Now I'm learning more than I really want to know.

Bergman wants to get to the bottom of my flame-retardant mystery. Have I recently bought new furniture or rugs? No. Do I spend a lot of time around computer monitors? No, I use a titanium laptop. Do I live near a factory making flame retardants? Nope, the closest one is over a thousand miles (1,600 kilometers) away. Then I come up with an idea.

"What about airplanes?" I ask.

"Yah," he says, "do you fly a lot?"

"I flew almost 200,000 miles (300,000 kilometers) last year," I say. In fact, as I spoke to Bergman, I was sitting in an airport waiting for a flight from my hometown of San Francisco to London.

"Interesting," Bergman says, telling me that he has long been curious about PBDE exposure inside airplanes, whose plastic and fabric interiors are drenched in flame retardants to meet safety standards set by the Federal Aviation Administration and its counterparts overseas. "I have been wanting to apply for a grant to test pilots and flight attendants for PBDEs," Bergman says as I hear my flight announced overhead. But for now the airplane connection is only a hypothesis. Where I picked up this chemical 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?

The same can be asked of other chemicals I've absorbed from air, water, the nonstick pan I used to scramble my eggs this morning, my faintly scented shampoo, the sleek curve of my cell phone. 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, 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.

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, and male birth defects doubled. Some experts suspect a link to man-made chemicals. 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.

The classic example is lead. In 1971 the U.S. Surgeon General declared that lead levels of 40 micrograms per deciliter of blood were safe. It's now known that any detectable lead can cause neurological damage in children, shaving off IQ points.

Each year the U.S. Environmental Protection Agency 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 United States have ever been tested for toxicity.

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, MD, a Sinai pediatrician and expert on toxicology. From New York my samples were shipped to Axys Analytical Services on Vancouver Island in Canada. 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.

I began collecting my own chemicals as I grew up in northeastern Kansas. There I spent countless hot, muggy summer days playing in a dump near the Kansas River. This was the late 1960s, and my friends and I had no way of knowing that this dump would later be declared an EPA superfund site, on the National Priority List for hazardous places. Now sealed and closely monitored, the dump also happens to be half a mile upriver from a county water intake that supplied drinking water for my family and 45,000 other households.

My blood contains traces of several chemicals that show up in the old dump, or were used heavily when I was a child, and later banned, including DDT (in the form of DDE, one of its breakdown products) and other pesticides such as the termite-killers chlordane and heptachlor.

Back home in San Francisco, I encounter a newer generation of industrial chemicals — compounds that are increasing year by year in the environment and in my body. That

faint lavender scent as I shampoo my hair? Credit it to phthalates, molecules that dissolve fragrances, thicken lotions and add flexibility to PVC and vinyl. Phthalates disrupt reproductive development in mice, though the effects on humans are not known. 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? In 2004, Europe did just that for the BDE flame retardant known as pentas and octas, which animal tests suggest are the most toxic of the compounds. California will also ban these forms in all consumer items by 2008, and in 2004 Chemtura, an Indiana company that is the only U.S. maker of pentas and octas, agreed to phase them out.

However, it is not 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. "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 to know more about these substances, so we are not blindsided by unexpected hazards. The European Union last year gave initial approval to a measure called REACH — Registration, Evaluation, and Authorization of Chemicals — which would require companies to prove the substances they market or use are safe, or that the benefits outweigh any risks.

Soon after I receive my results, I show them to my internist, who 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 easier in so many ways.

*Thanks to [Fora TV](#), a new video site where *Charlie Rose*-style content meets YouTube, for filming this talk. Fora carries video and transcripts from hundreds of presentations around the country delivered by major figures in politics, business, the arts, and elsewhere.

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