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Nonstick chemicals may pose a threat

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LAST OF THREE PARTS

Brianna Koehn's favorite baking pans have nonstick coatings. Such cookware is believed to be one source of exposure to chemicals that some scientists fear can cause cancer at high enough levels.

Kyle Counts works on a spelling lesson. He has small concentrations of PFOA and PFOS in his blood.

Wrappers used by many fast-food restaurants contain chemicals that are entering people's bodies.

ZORAIDA RODRIGUEZ

BRYAN BRADFORD

LAMAR CALVERT

KIMBRA COUNTS

ANGELIA COUNTS

KYLE COUNTS

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DESIREE KOEHN

BRIANNA KOEHN

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ZORAIDA RODRIGUEZ

CHARLOTTE LANDON

They're found in floor waxes and shampoos. They're used in many fast-food wrappers and microwave popcorn bags. They coat pizza boxes, carpets and frying pans.

And they're in people.

They're perfluorochemicals. While you may not recognize the word, you probably know the brand names: Teflon, Stainmaster, Gore-Tox.

You are exposed to those compounds every day, and there is mounting concern that they may cause a variety of health problems. A panel of scientists selected by the Environmental Protection Agency concluded this year that a perfluorochemical used in nonstick cookware is a likely cancer-causing agent.

As is the case with many of the 82,000 chemicals in commercial use today, health officials aren't sure what levels of perfluorochemicals in the body can cause health problems. Researchers aren't even sure of the main source of human exposure: household products or manufacturing plants.

They know only that perfluorochemicals remain in the environment and the body for a long time.

"These compounds are used in an unbelievable number of products that we come in contact with every day," said Kurunthachalam Kannan, a research scientist at the New York State Department of Health, in Albany, who has extensively researched the compounds.

Scientists have found that U.S. residents have the world's highest levels of perfluorochemicals in their bodies.

Kannan says it takes the body at least eight years to rid itself of the chemicals.

That's one reason 3M agreed six years ago to stop making and using perfluorooctane sulfonate, or PFOS, to make Scotchgard. The company's own research found that the compound was showing up in low doses in people and wildlife worldwide.

Today, a different chemical is used in the popular stain- and water repellent.

"We didn't want to be a contributing source of these materials in the environment," said Bill Nelson, a 3M spokesman. He said the company's decision does not mean that there is evidence that the chemicals in the products cause harm.

In January, DuPont and other companies volunteered to phase out the use of perfluorooctanoic acid, or PFOA, used in Teflon nonstick cookware and some microwave popcorn bags.

But researchers say there's evidence that both compounds persist in the environment -- perhaps forever. That means people could be exposed for an untold amount of time.

A Star-Telegram research project tested the blood of 12 volunteers for a host of chemicals, and PFOS was found in all 12; PFOA was found in six.

The concentrations were tiny -- in the parts-per-billion range. One part per billion is equivalent to one kernel of corn in a 45-foot silo filled to the brim. Yet one study published last year in the peer-reviewed journal *Toxicological Sciences* found that PFOA hurt the livers of laboratory rats at low levels.

The highest level of PFOA found in any of the *Star-Telegram* study participants was 5 parts per billion.

Zoraida Rodriguez, 33, had one of the lowest levels of perfluorochemicals. And she had no measured level of PFOA.

One possible reason, says Rodriguez, a Puerto Rican native, is that she has never used nonstick cookware. Her mother always cooked with stainless steel pans, which were common where she grew up.

But not here. Rodriguez, who lives in Burlington, said that she's seen news reports about Teflon products and the health concerns associated with them and that she tries to avoid them. She's just not sure that's possible.

"You go to a restaurant, and they may cook with it," she said. "I go to eat at my sister-in-law's. I go out of town. I eat out. You never know."

DuPont's troubles

The chemical that makes nonstick cookware slick is in the national spotlight now.

DuPont, based in Wilmington, Del., is North America's only producer of PFOA and faces numerous lawsuits tied to plants that produce the compound.

In 2004, DuPont agreed to pay up to \$343 million to settle a class-action suit filed by Ohio and West Virginia residents who said their water supplies had been contaminated with PFOA from DuPont's Parkersburg, W.Va., plant. The settlement requires the company to spend up to \$70 million for medical evaluations for tens of thousands of people who drank contaminated water.

A similar federal lawsuit was filed in April by New Jersey residents who claim that DuPont's plant in Salem County, N.J., contaminated drinking water supplies there and that the company knew of the contamination for years. The PFOA levels in those cases are much higher than what would be expected from products.

Texas has no industrial plants that are known to emit PFOA.

DuPont faces a federal class-action lawsuit brought by residents in 26 states and the District of Columbia who say the company failed to make public possible health risks associated with the use of its nonstick pots and pans. The lawsuit, filed in May in Iowa, alleges DuPont knew its Teflon cookware releases PFOA and other toxic gases into the air when heated.

DuPont denies the allegation.

Last year, the EPA fined DuPont \$10.25 million -- the largest civil penalty in the agency's 36-year history -- for failing to report that it had learned as early as 1981 that PFOA could pass from a woman's blood to her fetus.

Researchers at Johns Hopkins Hospital in Baltimore said in February that in blood samples from the umbilical cords of 300 newborns, 298 contained trace levels of the compound.

"We're not only looking at the levels, but we're also trying to understand whether there are potential health effects or biological markers, biological changes that might be indicative of a biological effect," said Dr. Lynn Goldman, a pediatrician and researcher at the Johns Hopkins Bloomberg School of Public Health who helped lead the study.

Goldman, a former assistant administrator in the EPA's Office of Prevention, Pesticides and Toxic Substances, said researchers don't know the answer yet.

Dr. Leo Trasande, a pediatrician and environmental health specialist at Mount Sinai Hospital in New York, said: "We know relatively little about PFOA. But what we know raises strong concerns about their human health effects, especially their effects on children."

What industry's doing

Under mounting public pressure, industry is taking action.

DuPont and seven other companies worldwide agreed in January to work toward stopping manufacture and use of PFOA by 2015.

"The fact that it's out there in the blood of the population raises questions that need to be answered," said David Boothe, global business manager for DuPont Fluoroproducts.

But the company vigorously defends the use of the chemical and the products that contain it, saying it is "not toxic by the yardsticks that the government usually measures these things."

A number of independent health studies dispute that, however.

The EPA's science advisory board that recommended PFOA be considered a likely carcinogen has also proposed that the agency study PFOA's potential to cause liver, testicular, pancreatic and breast cancers and whether it affects the hormones or nervous or immune systems.

DuPont rejects the science panel's review because it is based primarily on animal testing.

"We think the weight of evidence and science says, look, the things that are happening in rats don't happen in people," Boothe said.

He also said the EPA has ignored company studies that did not find health problems in workers "exposed to thousands of times higher levels than in the general population."

"So DuPont's position on this is, to date, there are no known health effects from exposure to PFOA," Boothe said.

But the company's worker studies "have many limitations, such that definitive conclusions about PFOA cannot be made at this time," said Charles Auer, director of the EPA's Office of Pollution Prevention & Toxics, in an e-mail response to written questions from the *Star-Telegram*.

There's nothing wrong with using animal studies to gauge the health effects of chemicals, said Linda Birnbaum, an EPA toxicologist.

"People are animals," Birnbaum said. "If you find a similar kind of response in a couple of species of animals or if you find that a chemical is targeting multiple kinds of tissues, why would we think that humans would be completely resistant or different?"

Tracking PFOA

Researchers know that PFOA is widespread in the environment, but how did it get there?

Until recently, many suspected Teflon cookware was the main source. A 2001 University of Toronto study published in the *British science*

journal *Nature* concluded that PFOA is one of several toxic gases emitted when Teflon is heated to 680 degrees, which is easy to do, even if cooking an omelet. And there have been at least 94 documented cases of a flulike illness, polymer fumer fever, among industrial workers exposed to Teflon heated beyond 700 degrees.

DuPont has spent millions of dollars on studies that it says show that the compound is not coming off nonstick pots and pans. And DuPont has recently reduced the level of PFOA in new Teflon products.

Independent researchers say small levels do come off the pans but not enough to explain the widespread exposures that have been measured.

Today, the focus has shifted to food wrappers, carpet and other household products. Kannan, the New York State Department of Health scientist, believes that those items release perfluorochemicals as a gas.

"They are constantly leaching from the surfaces they are applied to," he said. "The indoor air is filled with these compounds."

They can also be released from manufacturing plants. That's one reason that the EPA pledged in January to add PFOA to a program that tracks industrial emissions of toxic chemicals and makes the results public.

Doing so would allow researchers to track "where this stuff might be concentrated," said Brad Karkkainen, an expert on environmental and natural-resources law at the University of Minnesota Law School in Minneapolis.

It would also be a symbolic gesture, he said, "an official acknowledgement by the EPA that it has reason to believe that there are adverse environmental or public health effects associated with the thing."

The agency has not added the compound to its Toxics Release Inventory, and EPA officials say they have no timetable for doing so.

Wastewater treatment plants can also release perfluorochemicals.

When shampoos, denture cleaners and car waxes are washed down the drain, wastewater plants are not designed to treat the PFOA in them.

"So they get released into the rivers, lakes and ponds, and fish living in those places accumulate these compounds and enter into the food chain that way," Kannan said.

The voluntary withdrawal will help slow the spread of PFOA. But the deadline for withdrawal is not until 2015, which the EPA has classified as an "aspirational goal," not a mandate.

"Technical and cost issues might preclude eliminating PFOA and related chemicals entirely from emissions and product content by 2015," said Auer, the EPA toxics official.

That concerns some researchers who want to see regulatory action taken now to reduce human exposure, even if a lot more research is needed to determine precise human health effects.

"I think you want to take regulatory action at a point before there are effects in humans," said Goldman, the Johns Hopkins researcher. "The point is to try and prevent that."

PERFLUORO-CHEMICALS

What are they? A group of man-made chemicals often used in a wide variety of consumer products such as carpets, upholstery, textiles and nonstick cookware. Perfluorooctanoic acid, or PFOA, has grabbed the public spotlight recently because it is used in Teflon cookware. DuPont and other manufacturers agreed to work to phase out its use by 2015. Still, perfluorochemicals are in the blood of virtually all Americans, according to the federal Environmental Protection Agency. And numerous studies have found that the levels in U.S. residents are the world's highest. The chemicals' widespread use in carpets, stain-resistant textiles and cleaners is possibly the major source of human exposure.

What are the possible health effects? The main concern is that when perfluorochemicals enter the body, they stay there for years. An EPA science advisory panel recommended in February that PFOA is a "likely" human carcinogen. Other studies involving laboratory animals have found that perfluorochemicals damage organ function and sexual development. DuPont officials, however, say there is no evidence that the chemicals harm humans.

SOURCES: Environmental Protection Agency, federal Agency for Toxic Substances and Disease Registry, New York State Department of Health

ZORAIDA RODRIGUEZ

Zoraida Rodriguez walks into the patient's room and waves hello. The patient looks nervous. She hates to get shots, and she knows that Rodriguez has come to give her one.

Rodriguez, 33, is a medical assistant for a Fort Worth physician who specializes in alternative treatments, such as herbs and vitamins.

The patient gets a B-12 vitamin shot. It will become a daily routine from now on, and Rodriguez instructs the woman on how to give herself the shot at home.

"Go in like this," she says, pretending to stick her side with an imaginary needle.

Rodriguez smiles and pats the woman on the shoulder. Rodriguez is so adept at her work, Dr. Randall Hayes says, that "I'll hear patients say, 'Wow, I didn't even feel that.'"

She approached the *Star-Telegram* project with a bit of professional curiosity.

"This is stuff you don't ever think about," she said. "So it makes me wonder, what's in me?"

CLINICAL CURIOSITY

Zoraida Rodriguez was interested in having her blood analyzed partly because of her profession: She's a medical assistant for a Fort Worth physician.

ABOUT THIS PROJECT

Twelve Tarrant County residents volunteered to have their blood tested for 83 toxic chemicals, many of which are used in common household and office products.

The *Star-Telegram* worked with Dr. Arnold Schecter, an environmental-sciences professor and public-health physician at the University of Texas School of Public Health in Dallas. Blood samples were drawn at Lone Star Screening in Euless and sent to ERGO laboratories in Hamburg, Germany.

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Sunday: A *Star-Telegram* research project found dozens of toxic chemicals in the blood of 12 people who volunteered to be tested. And scientists say the odds are that you have many of those chemicals in your body, too.

Monday: Flame retardants save lives, but they are a growing concern to many researchers because the chemicals build up in the body and remain there for years.

On the web: For all the stories and additional graphics and video, go to www.star-telegram.com.

[star-telegram.com](http://www.star-telegram.com).

THE 12 PARTICIPANTS

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