

How a UCSF Scientist Helped Ban a Chemical Connected to Cancer and Parkinson's

This research on TCE shows neurodegenerative diseases like Parkinson's Disease aren't all about your genes. Your environment matters.

February 10, 2025 By University of California San Francisco and Laura López González

The U.S. will ban nearly all uses of the common industrial cleaning agent, trichloroethylene (TCE), this year – more than 50 years after it led to one of the country's worst cases of contaminated drinking water. It has been found in up to a third of sampled U.S. drinking water, including near Modesto, Fresno and Santa Rosa.

The ban, announced by the Environmental Protection Agency in December, outlaws most uses of the chemical within a year, allowing industries such as aviation, refrigeration and defense to phase it out over the coming decade.

We wanted to know more, so asked UC San Francisco Professor of Medicine [Samuel M. Goldman](#), MD, MPH, who, with colleagues, [published the largest study to show high levels of TCE exposure are associated with an increased risk of Parkinson's Disease](#). He explains some of the science behind the ban and why his work is helping medicine rethink whether our risk of some illnesses is really all in our genes.

What is TCE?

TCE is a chemical that's really good at dissolving things, which is why, for the past 30 years, it's been primarily used as an industrial degreaser to dissolve substances off plastic, metals, and even computer chips down in the South Bay chip foundries.

Which products have historically contained TCE?

TCE's uses have been incredibly varied over the last century. In the 1950s, it was the main dry-cleaning solvent. Companies used it to decaffeinate coffee and, in some countries, as a general anesthetic until 1977. But it was also found in many other common household products like carpet and spot cleaners as well as paint. Today, it is primarily used to degrease industrial metal parts. The chemical is vaporized to dissolve the grease, which can release it into the atmosphere.

Why has TCE been found in so many water supplies across the country?

TCE's a very common contaminant in the groundwater throughout the U.S. and the world because how it's disposed of wasn't always highly regulated. If we think back, it was used in a lot of "mom-and-pop" auto repair and dry-cleaning shops, which would have been hard to monitor. And once TCE enters the soil or groundwater, it can persist for decades.

Does TCE exposure increase your risk of Parkinson's Disease?

A 2023 study by UCSF colleagues and I strongly suggest that it does.

By 2017, growing research led the Department of Veterans Affairs to presume a link between Parkinson's Disease and occupational exposure to TCE for some service members who served at North Carolina's Camp Lejeune. From the 1950s to the late 1980s, the military base's water was heavily contaminated with TCE, with levels of the chemical 70 times higher than the safe drinking water standards.

At the time, UCSF colleagues and I were concerned that TCE exposure increased Parkinson's risk, but there wasn't enough scientific data to support a definitive determination. That's why we wanted to do a really strong, well-designed study in a large population to test the theory. To do this, we compared the medical records of nearly 160,000 service members. About half of these veterans served at Camp Lejeune, while the other half had been stationed at Camp Pendleton in Southern California where there was no TCE exposure.

We found that Camp Lejeune veterans' risk was 70% higher than that of those based at Pendleton. It's important, however, to remember that overall the average lifetime risk of developing Parkinson's Disease remains low at about 2%.

Can TCE cause cancer?

Yes. The International Agency for Research on Cancer designated TCE as a cancer-causing chemical in humans in 2012. It's been connected to a range of blood and kidney cancers as well as several others.

Only more recently has there been any focus on chronic and neurodegenerative diseases like Parkinson's Disease.

You helped spark that shift. How?

In 2008, a Kentucky doctor realized that three of his patients with Parkinson's Disease had all spent about 25 years working at the same plant where they were exposed to TCE. He investigated and found several of their coworkers also showed early possible signs of Parkinson's Disease.

The doctor published a paper on the cases just as a team and I, coincidentally, were completing a study following identical twins over time to see whether the risk of Parkinson's Disease was predominately genetic or environmental. If the risk was mostly genetic, then the study should have found that when one twin got it, the other did too, for the most part. Instead, our study found

the opposite.

These studies helped kick off a lot of basic research into the relationship between TCE and Parkinson's.

Is a ban enough?

No. It's still in our environment, not just in our water but in the soil where, in high concentration, it can release vapors into the homes and business above these plumes – and we don't know what level of concentration is safe if any.

My hope is that this ban will draw greater attention to the hypothesis that environmental factors are helping fuel the rise in Parkinson's Disease and that it will stimulate funding and public interest in this.

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