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Rural Well Water Linked to Parkinson's Disease California finding bolsters theory linking neurological ailment to insecticides

By Marla Cone and Environmental Health News

Rural residents who drink water from private wells are much more likely to have Parkinson's disease, a finding that bolsters [theories](#) that farm pesticides may be partially to blame, according to a new California study.

Nearly one million people in the United States--one of every 300--have the incurable neurological disease. Beginning with a slight tremor, [Parkinson's](#) often progresses to severe muscle control problems that leave patients struggling to walk and talk.

Over the past few years, a growing body of evidence has led many experts to suspect that [pesticides](#) can attack developing brains, perhaps in the womb or infancy, leading to neurological diseases later in life. Many insecticides widely used on farms are potent neurotoxins, and lab animals exposed to mixes of them develop Parkinson's symptoms. In addition, several previous studies of farmers and rural residents have reported a link.

The new study of more than 700 people in California's Central Valley found that those who likely consumed contaminated private well water had a higher rate of Parkinson's.

The risk was as much as 90 percent higher for those who had private wells near fields sprayed with the widely used insecticides propargite or **chlorpyrifos**.

People with Parkinson's "were more likely to have consumed private well water, and had consumed it on average 4.3 years longer" than those who did not have the disease, said the scientists, led by UCLA epidemiology professor [Beate Ritz](#), in their study published online in the journal [Environmental Health Perspectives](#).

Unlike municipal water supplies, private wells are largely unregulated and are not monitored for contaminants. Many are dug at shallow depths of less than 20 yards, and some of the crop chemicals used to kill pests and weeds can seep into ground water.

The study participants lived in Fresno, Kern and Tulare counties—the heart of California's farm belt. About 17 percent reported drinking private well water during the study period from 1974 through 1999.

Previous studies have reported connections between Parkinson's and consumption of rural well water and pesticide use. The UCLA research, however, is the first to examine people's proximity to specific chemicals and estimate their exposure. Incorporating a geographic information system and land use maps, the researchers based their analysis on California's pesticide use records.

A weakness of the research is that the scientists do not know exactly what each person in the study was



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exposed to because private wells are not tested. Close proximity to sprayed fields does not necessarily mean their wells were contaminated.

The UCLA team examined state records identifying where pesticides were used between 1974 and 1999. They then compared the address of each participant in the study to those records. From that, they estimated each person's exposure via the air and the water based on how much pesticide was used within 500 meters of their homes.

Jonathan Chevrier, a University of California at Berkeley postdoctoral researcher in [epidemiology](#) who did not participate in the research, said the new effort "is an interesting study" that "goes further than prior research" in connecting pesticides to Parkinson's.

Most other studies had no exposure information at all, while the UCLA scientists tapped into the historical data, which Chevrier called "a major strength." Nevertheless, he added, "it is important to note that the authors did not measure the water concentration of pesticides or determine the amount of well water participants consumed."

Twenty-six farm pesticides were included in the study, although six with widespread use were studied individually to look for connections to Parkinson's. The goal was to identify specific pesticides that may warrant further investigation.

People drinking well water within 500 meters of a dozen or more of the pesticides had a 66 percent greater rate of Parkinson's, the study says. Airborne exposure only slightly increased the risk.

The strongest link to the disease was for propargite. Those who had wells near fields sprayed with the chemical had a 90 percent higher risk of having Parkinson's, according to the study.

About half a million pounds of propargite were sprayed on California crops in 2007, mostly on nuts, corn and grapes, according to the state [Department of Pesticide Regulation's database](#).

Propargite, sold under the names Omite and Comite, has been used on crops since 1969, but many uses, including the spraying of many fruits and beans, were rescinded by the U.S. Environmental Protection Agency in 1996 due to the cancer risk. The EPA, however, in 2001 approved its continued use on restricted crops and reported that levels in drinking water are below levels of concern, based on the cancer risk.

Other strong links were found for the insecticides methomyl and [chlorpyrifos](#), which increased the risk of Parkinson's by 67 percent and 87 percent. [Chlorpyrifos](#), sold under the names [Dursban](#) and [Lorsban](#), was banned in the United States for residential use in 2001 but is still widely used on cotton, corn, fruit trees and other crops. Methomyl is highly restricted because of its toxicity and is mostly used on alfalfa.

In recent years, scientists have gathered a large amount of human and animal evidence suggesting that exposure to agricultural pesticides, particularly early in life, may play a major role in who gets Parkinson's.

University of Rochester scientists found that newborn mice exposed to a mix of two commonly used pesticides—maneb and paraquat—developed Parkinson's symptoms as they aged. Earlier this year, Ritz and colleagues reported similar human results after investigating Central Valley residents exposed to those same two pesticides.

Parkinson's is caused when nerve cells die in an area of the brain, called the substantia nigra, that produces dopamine. As dopamine decreases, messages from the brain that control how and when the body moves are blocked.

Only a small percentage of those with the disease share a gene or family history of the disease. Experts say the cause of the vast majority is probably due to a combination of genetic and environmental factors.

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