MERCOLA
Take Control of Your Health

Common Pesticide Linked to More Than Double the Risk of Parkinson's Disease

Analysis by Dr. Joseph Mercola | September 14, 2026

STORY AT-A-GLANCE

- Long-term residential exposure to the insecticide chlorpyrifos was associated with more than a 2.5-fold higher risk of developing Parkinson's disease, adding to growing evidence that certain pesticides may pose a significant risk to brain health
- Researchers strengthened the findings by showing that chlorpyrifos produced similar Parkinson's-like changes in laboratory animals (via mice exposed by inhalation over 11 weeks), including loss of dopamine-producing nerve cells, harmful protein buildup, and chronic brain inflammation
- The pesticide disrupted the brain's natural recycling system in these animal models, allowing damaged proteins to accumulate inside nerve cells instead of being cleared away, which may help explain how exposure could contribute to Parkinson's disease in humans
- A lawsuit against Dow Chemical, Corteva and FMC Corporation, the companies that developed and originally marketed chlorpyrifos, alleges they failed to adequately warn users about the pesticide's neurological risks, bringing renewed attention to the dangers faced by agricultural and pest control workers
- Reducing repeated pesticide exposure, supporting gut health, staying physically active, managing stress, and maintaining healthy vitamin D levels are practical steps that may help support long-term brain health, though evidence connecting them specifically to Parkinson's disease risk is still developing

Parkinson's disease is a progressive brain disorder characterized by tremors, muscle stiffness, slowed movement, balance problems, and, in many people, changes in sleep, smell, and thinking that begin years before diagnosis. The nerve cells that produce dopamine, a brain chemical that helps control smooth movement, gradually die off. These cells are concentrated in a small region deep in the brain, which is why losing even a modest number of them has an outsized effect on movement and coordination.

Left unchecked, the disease makes everyday tasks such as walking, speaking, writing, and swallowing increasingly difficult. Whenever researchers identify a modifiable risk factor, it's important to pay attention because reducing exposure before symptoms appear offers one of the few opportunities to lower your risk. A growing body of evidence now points to one widely used agricultural insecticide, chlorpyrifos, as a possible contributor to the risk of Parkinson's disease.[1]

The latest research goes further than earlier observational studies by combining human health data with laboratory experiments that examine how the chemical may damage nerve cells at a biological level. At the same time, legal and investigative scrutiny is catching up with the science, raising urgent questions about why exposure continues in certain agricultural settings despite decades of concern.

The strength of this evidence warrants a close look at what researchers found, how they found it, and what you can do to reduce your own exposure starting today.

Long-Term Chlorpyrifos Exposure Linked to the Hallmarks of Parkinson's Disease

A study published in Molecular Neurodegeneration in December 2025 set out to answer if the widely used insecticide **chlorpyrifos** directly contributes to **Parkinson's disease**, or if the connection is simply a coincidence.[2] The researchers analyzed health data from people living in agricultural communities and exposed mice to chlorpyrifos in a way that closely resembled how people breathe it during agricultural spraying.

To understand what happened inside nerve cells after exposure, researchers used genetically engineered zebrafish (small fish whose transparent bodies, and whose brain pathways resemble those in humans), which allowed them to watch cellular processes unfold in real time. This combination allowed the researchers to examine both real-world risk and the biological processes behind it.

- **The study examined hundreds of people from farming communities —** The human portion of the research was a population-based case-control analysis that included 829 people diagnosed with Parkinson's disease and 824 people without the disease who lived in three agricultural counties in central California (Kern, Fresno, and Tulare).

  Rather than relying on participants' memories of pesticide encounters spanning decades, the researchers reconstructed each person's exposure history by cross-referencing California's detailed pesticide application records with residential and workplace addresses going back years.

  They estimated how much chlorpyrifos had been applied within roughly 500 meters (0.31 miles) of each home and workplace, drawing on California's Pesticide Use Report database, while also adjusting for exposure to other pesticides such as glyphosate, paraquat, and diazinon. This approach reduced the chance that faulty memory influenced the results and strengthened confidence in the findings.

- **Long-term exposure mattered more than isolated contact —** The investigators found that long-term residential exposure to chlorpyrifos was associated with more than a 2.5-fold increased risk of developing Parkinson's disease. The strongest single association in the analysis was for the longest-duration workplace exposure. Because this portion of the study was observational, it can demonstrate association but cannot establish cause.

  That said, if you live near agricultural fields or spend significant time where pesticides are routinely sprayed, the findings suggest that reducing repeated exposure may matter more than one isolated event.

- **Researchers strengthened their findings by reproducing Parkinson's-like changes in animals —** Scientists often look for evidence that an environmental exposure produces the same biological changes seen in people. That's exactly what happened here.

  Male mice that inhaled aerosolized chlorpyrifos six hours a day, five days a week over 11 weeks — at airborne concentrations rising from roughly 77 to 300 micrograms per cubic meter — developed movement problems that resembled Parkinson's disease.

  At the same time, researchers found fewer dopamine-producing nerve cells in the brain — about a 26% loss in the substantia nigra, which influences movements and brain chemistry — and greater activation of immune cells that drive inflammation. These immune cells, called microglia, act as the brain's first responders.

  When they stay activated over long periods, they release inflammatory molecules that can damage surrounding nerve cells, turning a protective response into a source of ongoing harm. The exposed mice also showed increased accumulation of abnormal alpha-synuclein protein — a 1.66-fold rise.

  Alpha-synuclein is normally present in healthy nerve cells, but when it misfolds and isn't cleared away, it clumps together into toxic deposits that are a defining feature of Parkinson's disease. Finding a consistent pattern in both humans and animals strengthens the case that chlorpyrifos may contribute to disease processes rather than simply appearing alongside it.*

- **The pesticide interfered with the brain's housekeeping system —** One of the most important discoveries involved a process called autophagy. Think of autophagy as your cells' recycling and garbage disposal system. Healthy cells constantly collect worn-out proteins and damaged cell parts, break them down, and recycle their components.

According to the researchers, chlorpyrifos disrupted this cleanup process in the mouse and zebrafish models. As the recycling system slowed, abnormal alpha-synuclein proteins accumulated instead of being removed.

The zebrafish experiments reinforced this finding. When researchers deliberately disrupted the same cleanup pathway, nerve cells died in much the same way. When they restored that recycling process or reduced the harmful protein buildup, nerve cells became less vulnerable to injury.

- **The study points toward prevention as well as future treatments —** The researchers identified biological pathways that deserve attention for future therapies. Because damage centered on impaired cellular cleanup rather than a single toxic event, they suggest that approaches aimed at restoring autophagy or reducing alpha-synuclein accumulation warrant investigation as potential disease-modifying strategies.

  While those treatments still require additional study, you don't have to wait for a new drug before taking action.

  Every opportunity to reduce repeated exposure to chlorpyrifos and similar pesticides may reduce the amount of stress placed on the brain over time, especially if you live or work near agricultural spraying. Understanding where exposure occurs can help you make more informed choices about your long-term brain health.

**These findings are from laboratory or animal research and may not directly apply to human health.*

A Lawsuit Puts Chlorpyrifos Under Increased Scrutiny

While the science builds a case against chlorpyrifos at the cellular level, the legal system is now pressing the question of who bears responsibility for decades of exposure. As reported by The New Lede, a lawsuit filed in June 2026 names Dow

Chemical, the company that developed and originally marketed chlorpyrifos, along with Corteva and FMC Corporation. The complaint was filed in the Philadelphia County Court of Common Pleas by a former pest control worker.[3]

The lawsuit alleges that years of exposure to the insecticide caused the plaintiff to develop Parkinson's disease and argues that Dow knew or should have known about the pesticide's neurological dangers but failed to adequately warn the people who handled it regularly. The complaint also cites research linking chlorpyrifos exposure to Parkinson's disease to support its claims. These are allegations that have not yet been tested in court.

- **The report reviews decades of controversy surrounding the pesticide —** The article explains that chlorpyrifos became one of the most widely used insecticides in U.S. agriculture after Dow introduced it in the mid-1960s. Residential uses were phased out in the early 2000s under an agreement with the U.S. Environmental Protection Agency (EPA) because of concerns about children's health, but the chemical continued to be sprayed on many agricultural crops.

  Since then, chlorpyrifos has been the focus of years of legal disputes, regulatory reversals, and court battles over whether it should remain available for agricultural use. Although some restrictions have been adopted, the report notes that chlorpyrifos continues to be used on certain crops; the EPA currently permits limited agricultural use after court action blocked a 2021 ban, leaving opportunities for ongoing exposure.

- **Stronger safeguards are needed to reduce unnecessary exposure —** The lawsuit is part of a broader effort to increase accountability for pesticide manufacturers while improving protections for workers. People shouldn't have to choose between earning a living and protecting their long-term brain health. Stronger warnings, improved workplace safeguards, and continued efforts to reduce reliance on hazardous pesticides are important steps in lowering preventable exposure.

These points reflect the argument made in a North Texas Daily opinion column addressing pesticide policy in agriculture.[4]

- **Farmworkers deserve stronger protections —** Agricultural workers bear the greatest burden of exposure because they mix, apply, and work around pesticides throughout growing seasons. An opinion piece published by North Texas Daily argues that the people who plant, cultivate, and harvest the nation's food supply deserve better protection from chemicals that growing scientific evidence links to serious neurological disease.

  That column focuses specifically on paraquat, a different Parkinson's-linked pesticide, but its workplace-protection argument applies more broadly.[5] Rather than accepting repeated exposure as part of the job, the column calls attention to the need for safer working conditions and greater awareness of long-term health risks.

Reduce Your Pesticide Exposure Before It Accumulates

The featured study points toward a practical, modifiable step — reducing repeated exposure to pesticides before it accumulates over years. Every step that lowers your contact with chlorpyrifos and other agricultural pesticides may reduce one more source of stress on your brain and gives you something concrete to act on.

At the same time, everyday habits also influence the health of your brain, so the remaining steps focus on broader **lifestyle factors studied in relation to Parkinson's disease** risk.

1. **Identify where your pesticide exposure comes from —** If you live, work, or spend time near farmland, learn what crops surround you and whether pesticides are applied during the growing season. Pay attention to local spraying notices if they're available. Knowing when and where exposure occurs gives you the chance to avoid unnecessary contact instead of being caught off guard.

2. **Reduce pesticide residue that reaches your home —** If you're around agricultural areas, remove your shoes before coming inside, wash your hands after outdoor activities, and rinse fresh produce thoroughly before eating it. When possible, choose organic produce to reduce pesticide residues. If you grow your own fruits and vegetables, avoid using chlorpyrifos or similar insecticides. Small daily habits reduce repeated exposure over time.

3. **Support your gut so your brain gets calmer signals —** Your gut and brain are in constant communication. When digestion is disrupted, inflammatory signals travel through that connection and may add strain to the same nerve pathways that pesticide exposure burdens. To improve gut health, start by removing ultraprocessed foods and seed oils, which are high in linoleic acid (LA). This includes soybean, corn, sunflower, and canola oil.

   These foods deliver a heavy load of LA, contribute to inflammation, and undermine cellular energy production. Next, build your meals around easy-to-digest carbohydrates, such as whole fruit and white rice, to restore fuel without overwhelming your gut. As digestion improves, you can slowly expand to other well-tolerated starches, such as root vegetables.

   Aim for about 250 grams of healthy carbohydrates a day so your cells have enough energy to repair, help regulate inflammation, and maintain normal brain function. When your gut heals, beneficial bacteria produce butyrate, a short-chain fat that helps support your gut lining and mood, and may calm neuroinflammation.

4. **Move your body in ways that wake up your nervous system —** Walking, cycling, resistance training, and gentle coordinated movement such as tai chi all engage the circuits involved in balance, rhythm, and coordination. If you feel stiff, slow, or unsteady, treat that as a cue to move more often, not less.

   If those symptoms are new or worsening, talk with your health care provider, since they can also be early signs of a neurological condition. Regular movement helps maintain those nerve connections, and research links consistent physical activity

with better long-term function.

Aim for about an hour of walking a day. Exercise is also a more effective way to activate autophagy — the same cellular cleanup system chlorpyrifos was found to disrupt — than fasting is.

5. **Lower daily stress and support healthy vitamin D levels —** Chronic stress keeps your nervous system locked in survival mode, which can raise stress hormones that may take a toll on brain cells over time. Build one calming routine into each day, such as slow breathing, quiet time, mindfulness, or a predictable evening rhythm. Add regular sunlight exposure to support healthy **vitamin D levels**, which act as an epigenetic regulator and may help support a balanced inflammatory response.

   If your diet has been high in seed oils, reduce them for four to six months before spending time in strong midday sun, because excess LA stored in your tissues increases your tendency to burn.

   When sunlight is limited, an observational analysis of nearly 3,000 participants in the GrassrootsHealth cohort found that people supplementing with both magnesium and vitamin K2 reached a given vitamin D level on substantially less vitamin D3 intake than those taking neither. A common pairing is 180 micrograms of vitamin K2 per 5,000 IUs of vitamin D.[6]

   Test your vitamin D twice a year and aim for 60 to 80 ng/mL (150 to 200 nmol/L) so you know exactly where you stand. Talk to your health care provider about whether this testing is appropriate for you.

These findings are from research conducted in clinical settings. Results may not apply to all individuals.

FAQs About Pesticides and Parkinson's Disease

Q: What did the Molecular Neurodegeneration study discover about chlorpyrifos and Parkinson's disease?

A: Researchers found that long-term residential exposure to the insecticide chlorpyrifos was associated with more than a 2.5-fold higher risk of developing Parkinson's disease, in a case-control analysis of 829 people with Parkinson's disease and 824 people without it.

The study strengthened that finding by showing the same pesticide caused movement problems, loss of dopamine-producing nerve cells, and other Parkinson's-like changes in laboratory animals, which strengthens the case beyond earlier observational research alone.

Q: How does chlorpyrifos damage the brain?

A: The researchers found that chlorpyrifos interferes with autophagy, the brain's natural recycling system that removes damaged proteins and worn-out cell parts. This was observed in mouse and zebrafish models. When that cleanup process breaks down, abnormal alpha-synuclein proteins build up inside nerve cells instead of being cleared away, which the researchers connect to the changes seen in Parkinson's disease.

Q: Who faces the greatest risk of chlorpyrifos exposure?

A: People who live or work near agricultural fields where chlorpyrifos is sprayed face the greatest likelihood of repeated exposure. Farmworkers, pesticide applicators, and others who regularly handle agricultural chemicals are especially vulnerable because they encounter these pesticides throughout growing seasons rather than during isolated events.

Q: What can I do to reduce my exposure to pesticides?

A: Start by identifying where exposure is most likely to occur. If you live near farmland, pay attention to pesticide application notices when available. Remove your shoes before entering your home, wash your hands after spending time outdoors, rinse fresh produce thoroughly, choose organic when possible, and avoid using chlorpyrifos or similar insecticides around your own home or garden whenever possible.

Q: Besides avoiding pesticides, what else supports long-term brain health?

A: Reducing pesticide exposure addresses one important risk factor, but your daily habits also influence long-term brain health.

Supporting a healthy gut with whole, minimally processed foods, staying physically active, managing chronic stress, maintaining healthy vitamin D levels through sensible sun exposure, and eating a nutrient-rich diet all are reasonable steps for supporting the brain and nervous system, though evidence connecting them specifically to Parkinson's disease risk is still developing.

This article is for informational purposes only and does not constitute medical advice. Consult a qualified health care provider before making changes to your health regimen.

Sources and References

- [1, 2] Molecular Neurodegeneration December 11, 2025, Volume 21, Article Number 3
- [3] The New Lede June 22, 2026
- [4, 5] North Texas Daily June 19, 2026
- [6] GrassrootsHealth March 10, 2020