



# The Parkinson's Plan

Parkinson's Disease Care Connection Experience Event  
March 26, 2026



# Outline

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**Potential causes**

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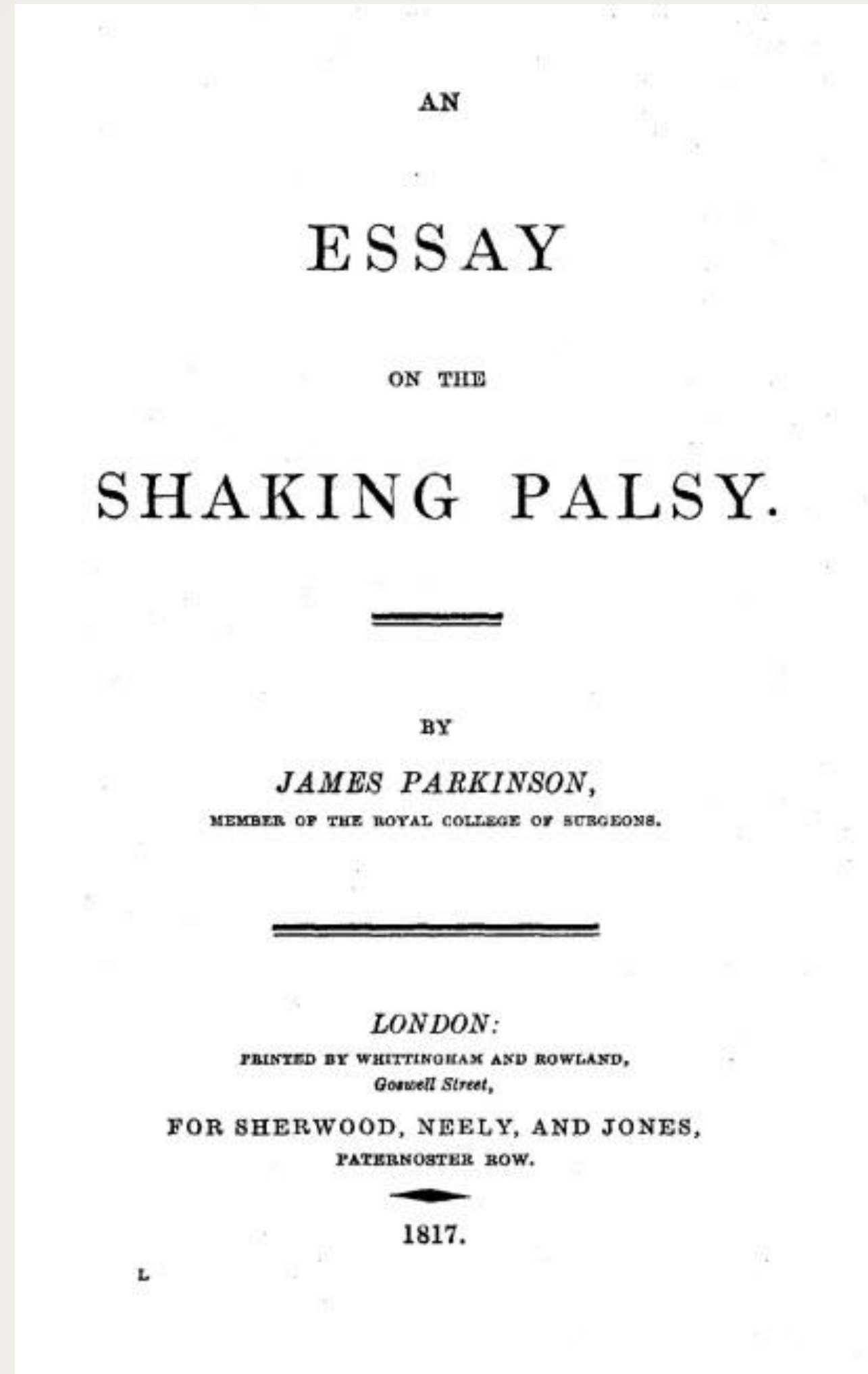
Pathology of Parkinson's

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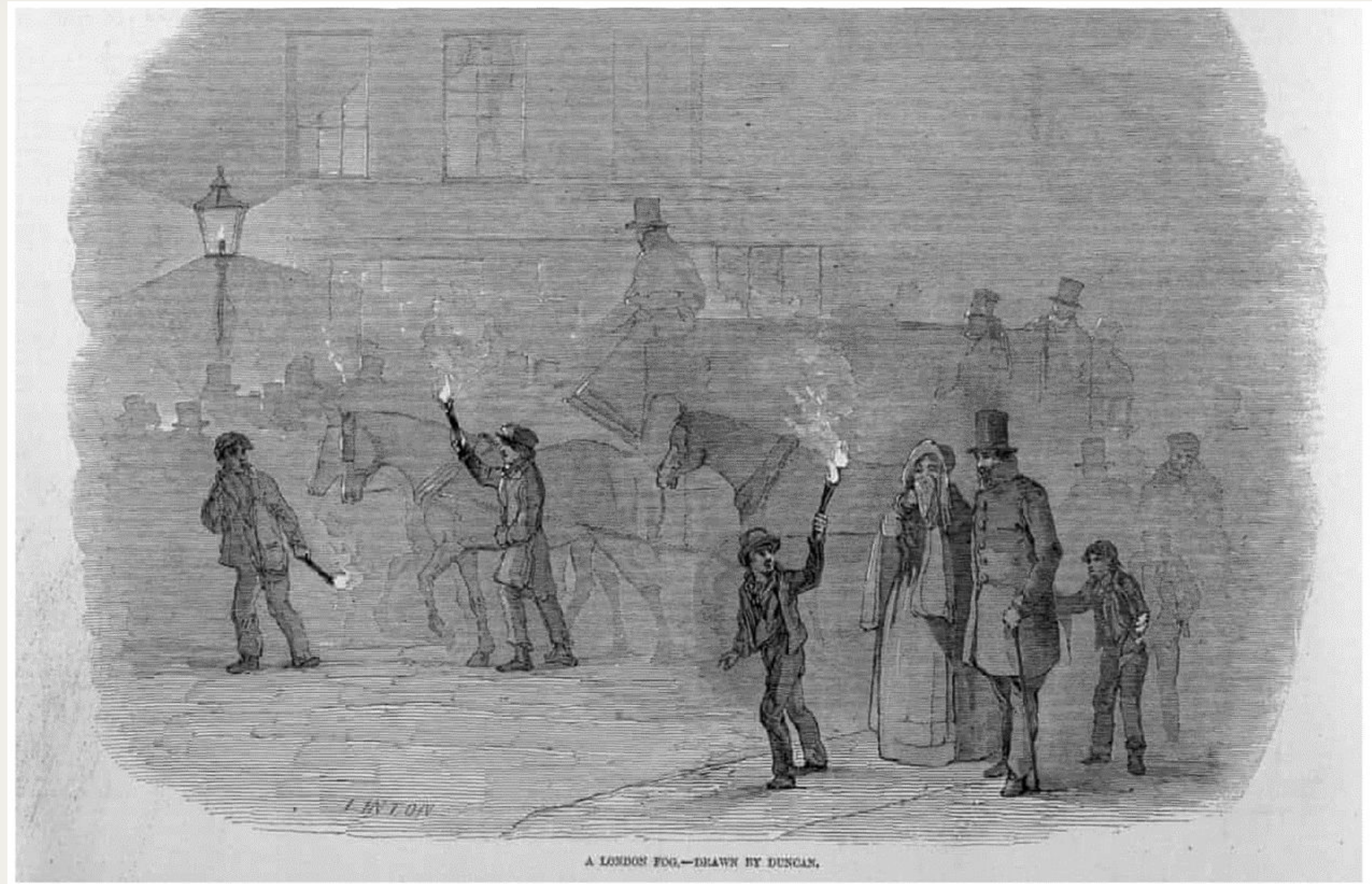
The PLAN

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# Parkinson's disease was once rare



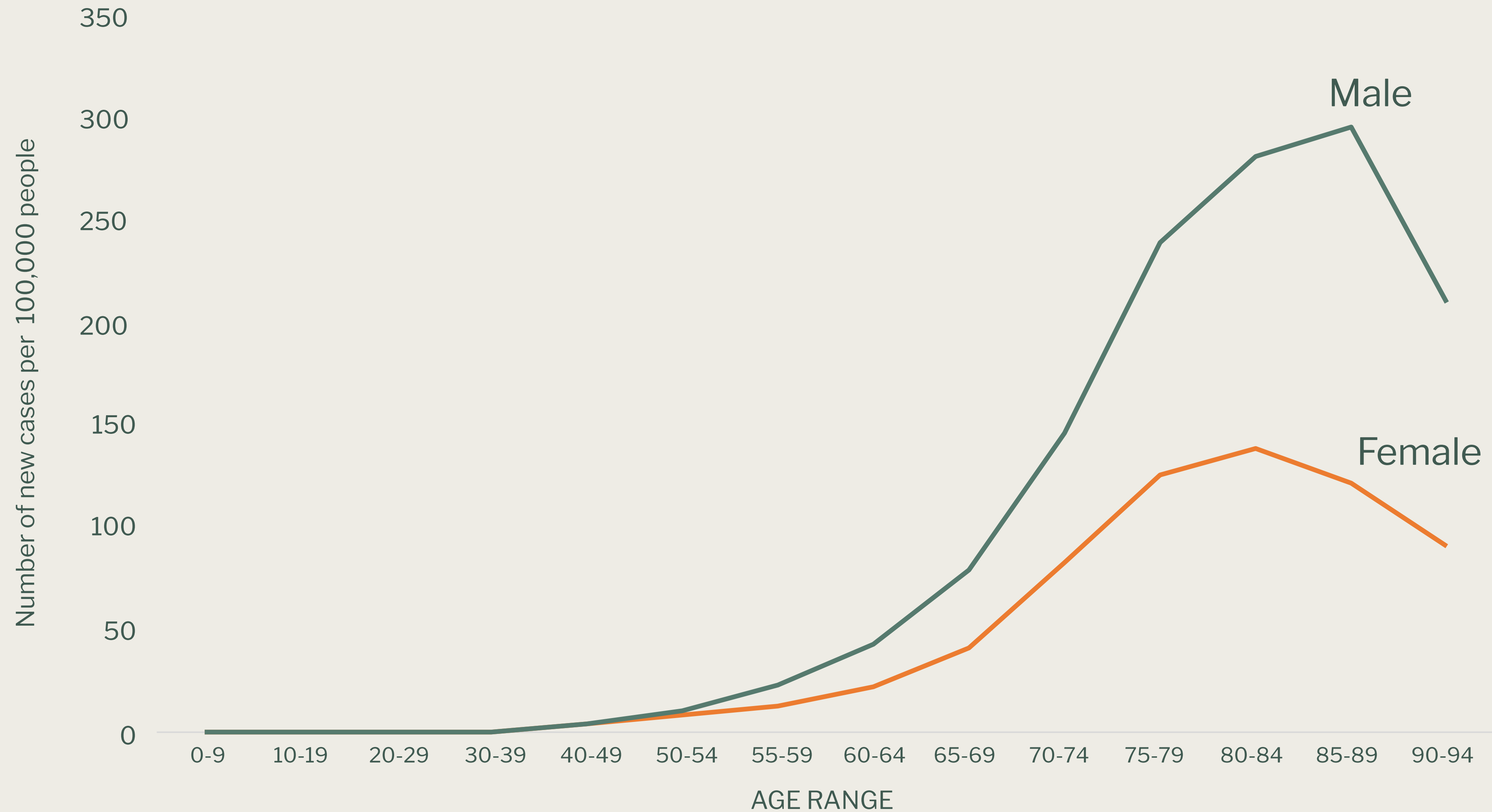
*An Essay on the Shaking Palsy, 1817*



*London Fog, 1847*



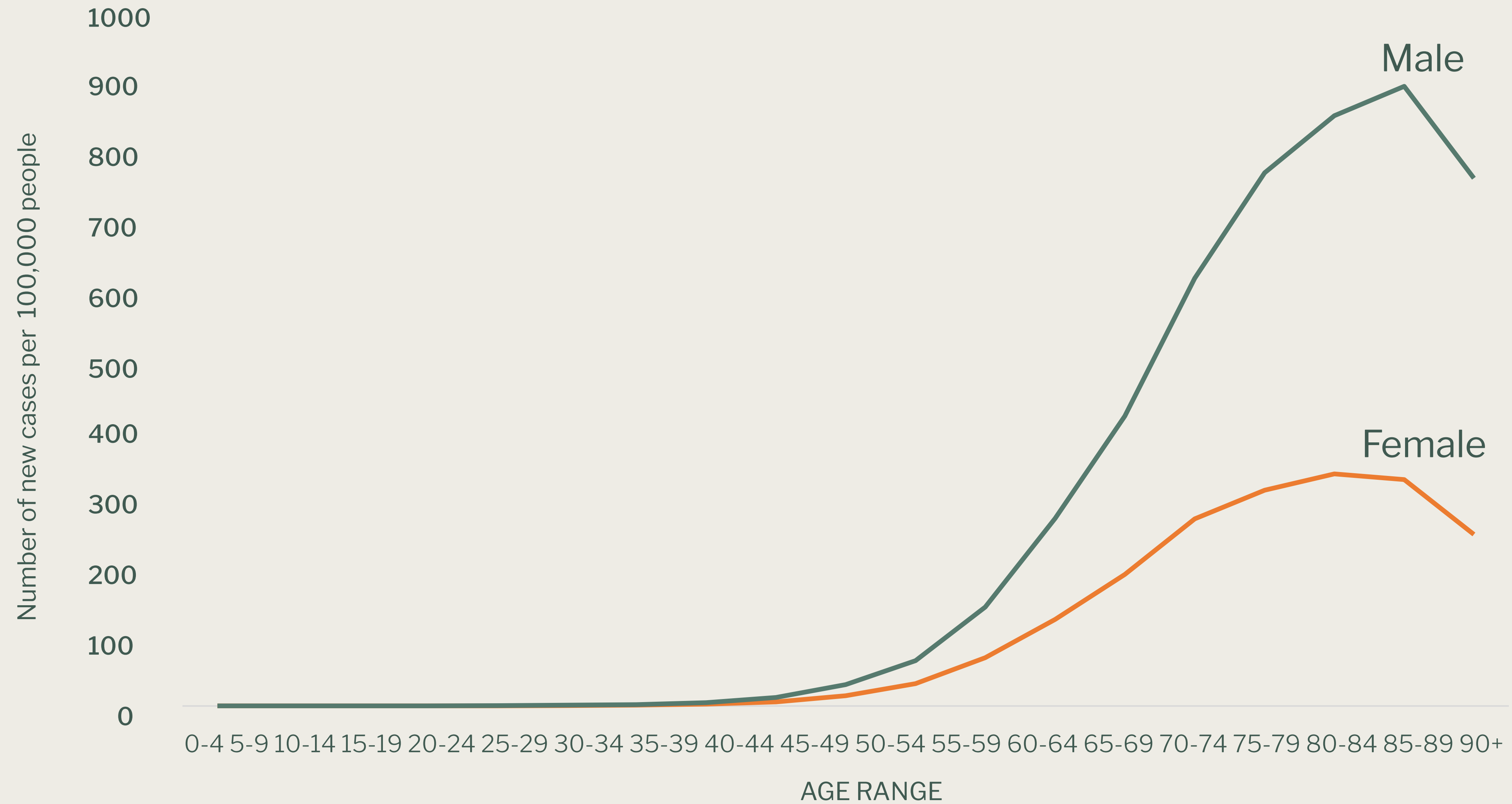
# Longevity gives the symptoms of PD time to appear



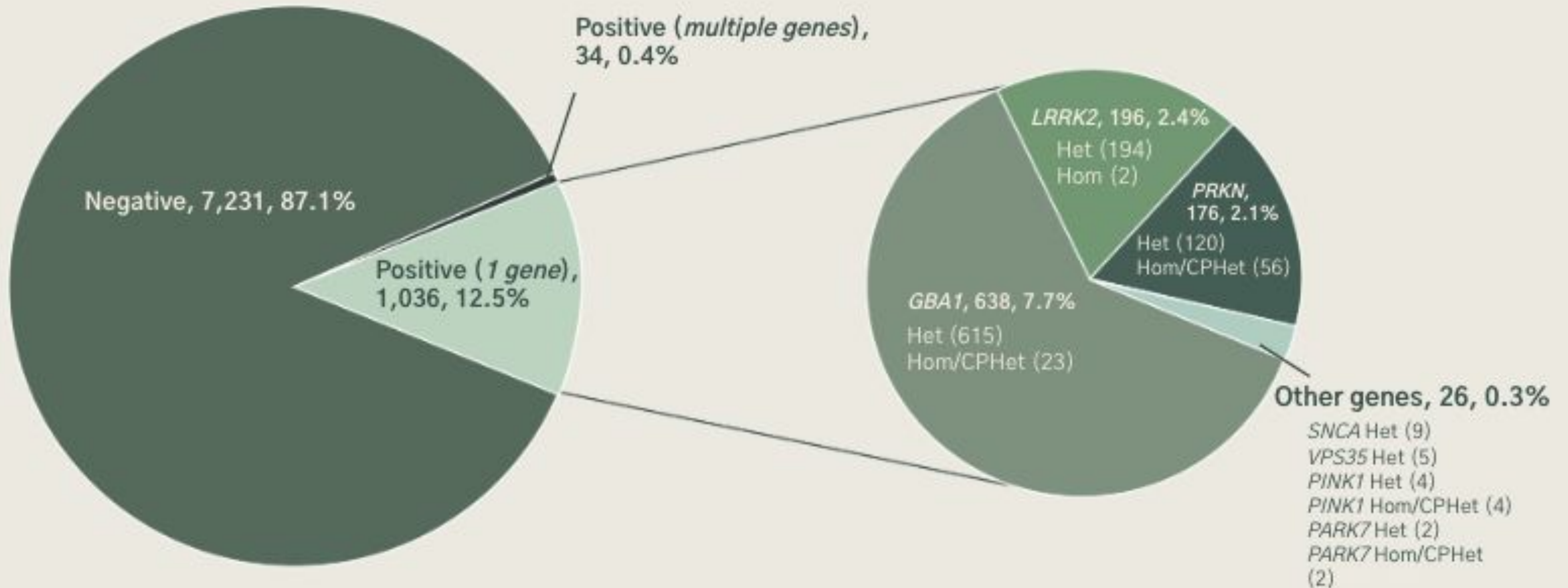
Source: The Incidence and prevalence of Parkinson's in the UK report by Parkinson's UK 2330-1619 available at: [https://www.parkinsons.org.uk/sites/default/files/2018-01/Prevalence%20%20Incidence%20Report%20Latest\\_Public\\_2.pdf](https://www.parkinsons.org.uk/sites/default/files/2018-01/Prevalence%20%20Incidence%20Report%20Latest_Public_2.pdf)



... which is almost identical to lung cancer



# The genetic contributions to Parkinson's are small in North America ...



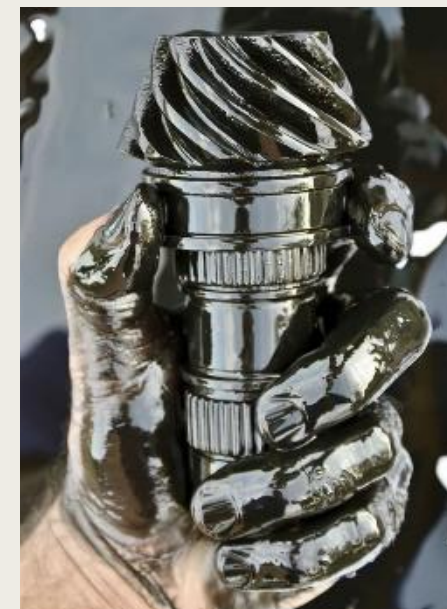
# Three environmental toxicants may be fueling its rise

Certain pesticides



- Paraquat is associated with **150% increased risk** of PD and **its use has doubled** recently
- Prenatal chlorpyrifos exposure is associated with **reduced IQ, brain abnormalities and childhood tremors**

Trichloroethylene (TCE) and perchlorethylene (PCE)



- TCE is associated with **500% increased risk** of PD
- PCE is still widely used in drycleaning

Air pollution

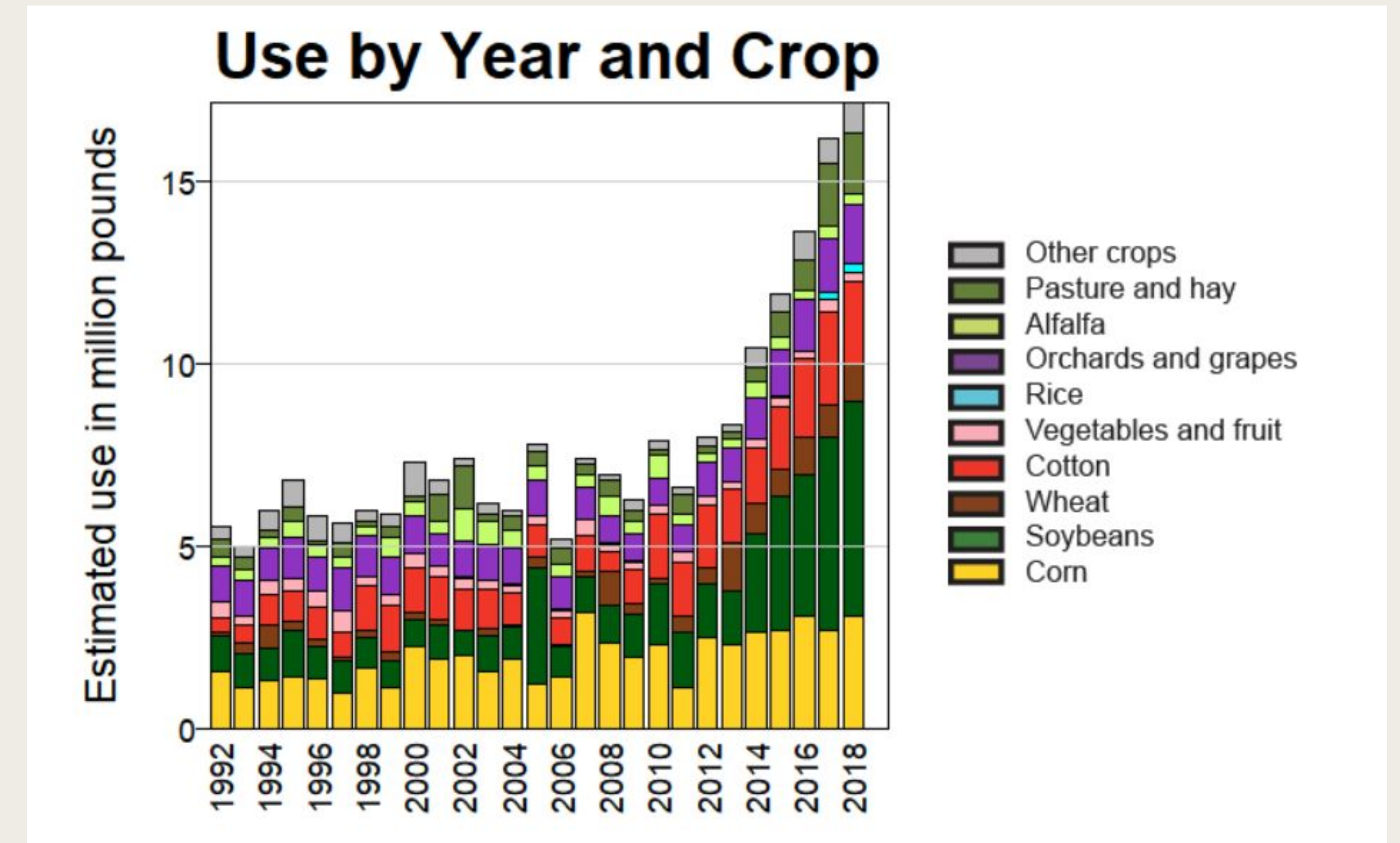
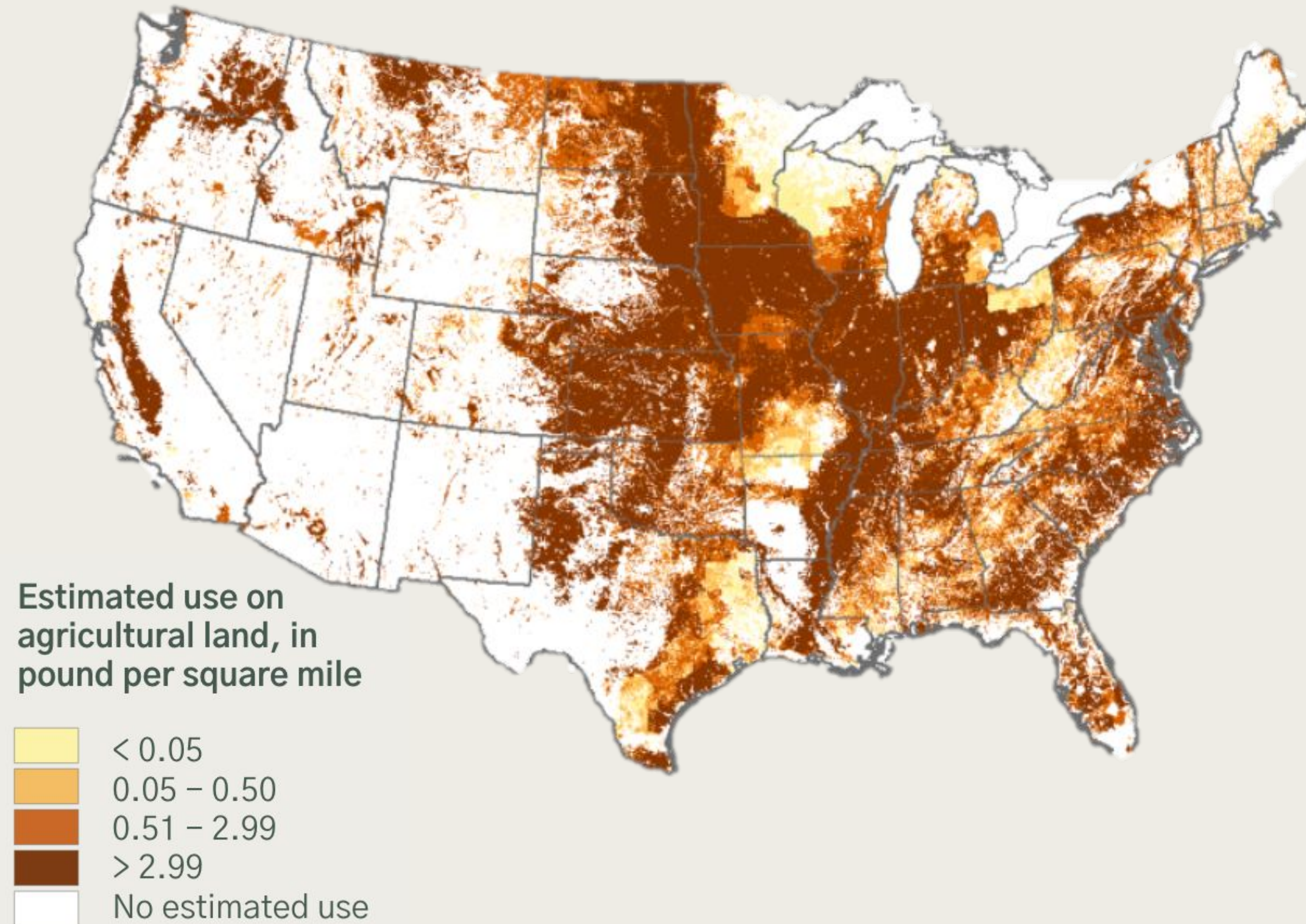


- **Sixth leading preventable cause** of death
- **40% breathe in unhealthy air** in the U.S.

Sources: Tanner C et al. Environmental Health Perspectives. 2011;119:866-72, Pesticide U.S. Geological Survey. Available at: [https://water.usgs.gov/nawqa/pnsp/usage/maps/show\\_map.php?year=2018&map=PARAQUAT&hilo=H](https://water.usgs.gov/nawqa/pnsp/usage/maps/show_map.php?year=2018&map=PARAQUAT&hilo=H), Our World in Data available at: <https://ourworldindata.org/pesticides> ; Goldman S et al. Ann Neuroy 2012;71:776-84; JPD 2023;13(2):203-218, Kravchenko J et al. Enviro Health Research 202116(7):e0253253, Our World in Data available at: <https://ourworldindata.org/outdoor-air-pollution#outdoor-air-pollution-is-one-of-the-leading-risk-factors-for-premature-death> ; American Lung Association available at: <https://www.lung.org/research/sota/key-findings>

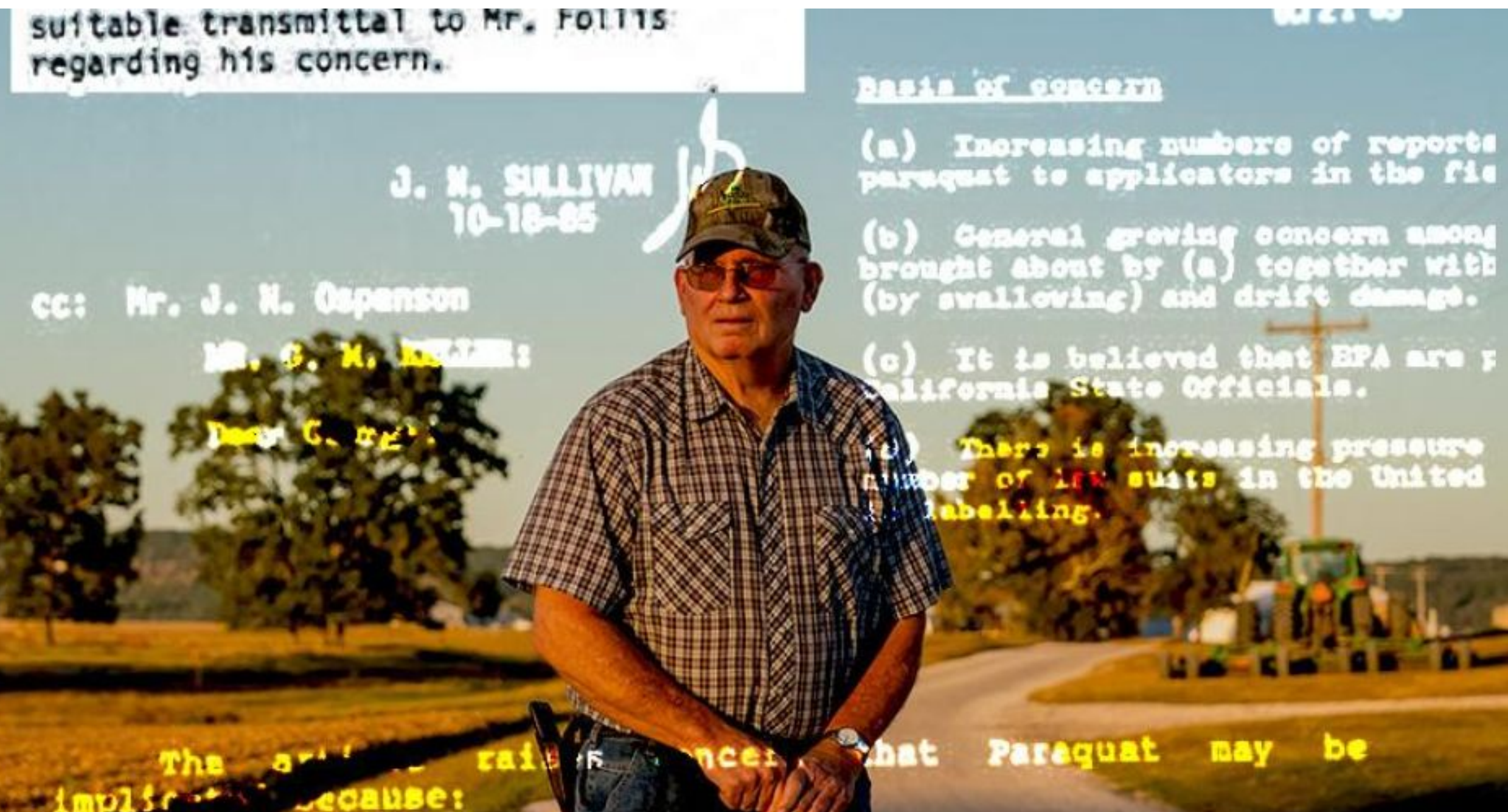
# Paraquat is still sprayed across the United States

Estimated use of paraquat on U.S. agricultural land, 2018

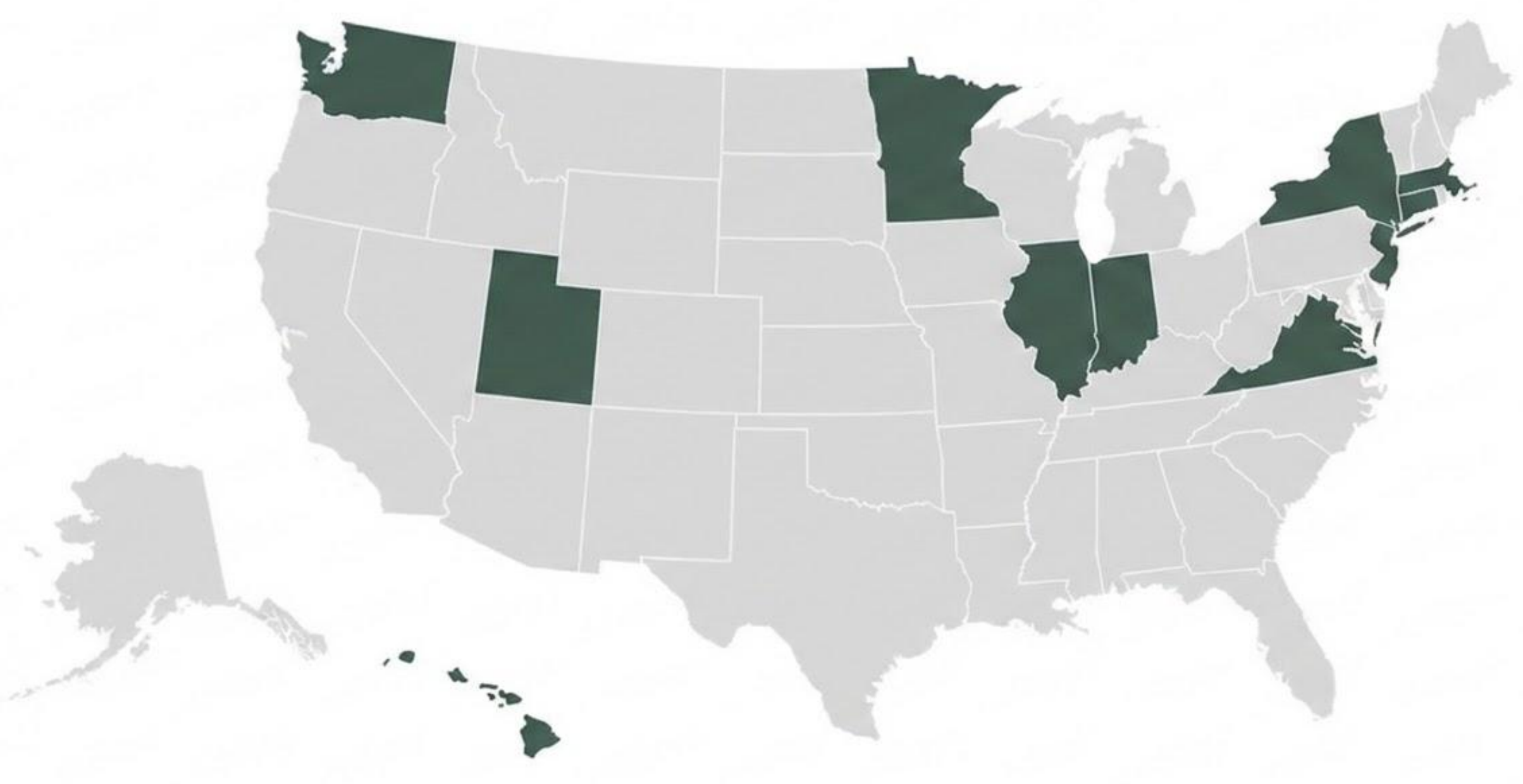


# ...but we are making progress

## Company will halt production of controversial paraquat weed killer by end of June as it faces thousands of lawsuits



## State bills show building momentum to ban toxic weedkiller paraquat



Source: Environmental Working Group, available at <https://www.ewg.org/news-insights/news/2026/02/state-bills-show-building-momentum-ban-toxic-weedkiller-paraquat> and Carey Gillam, Guardian available at <https://www.theguardian.com/environment/2026/mar/03/syngenta-pesticide-parkinsons> and, Gillam C and Uteuova C. Secret files suggest chemical giant feared weedkiller's link to Parkinson's disease. The Guardian. 20 October 2022. Available at: <https://www.theguardian.com/us-news/2022/oct/20/syngenta-weedkiller-pesticide-parkinsons-disease-paraquat-documents>



# ...and toxic pesticides are still used on golf courses

Original Investigation | Neurology

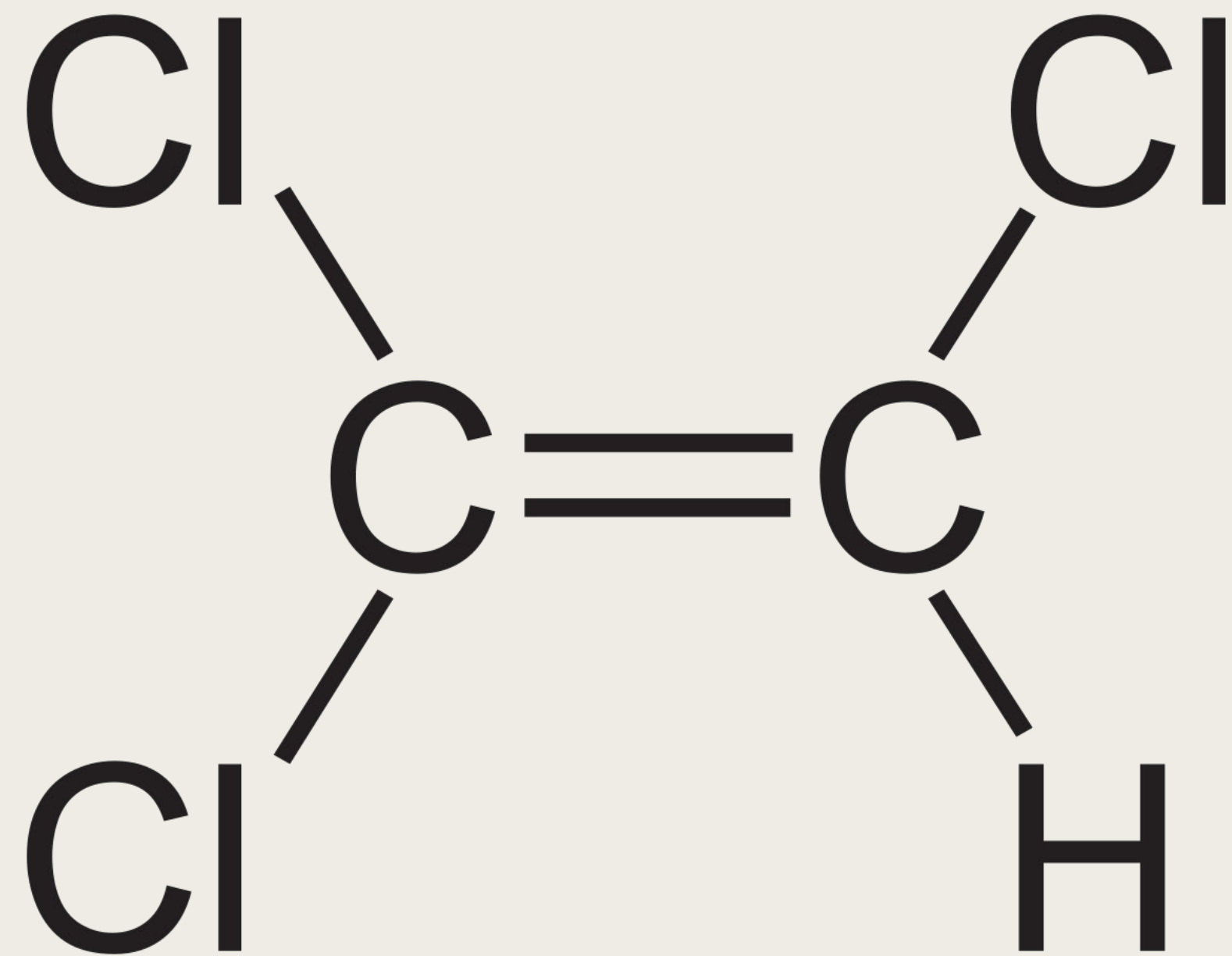
## Proximity to Golf Courses and Risk of Parkinson Disease

- Living within 1 mile of a golf course associated with 126% increased odds of developing PD
- Pesticide use on golf courses is ~5x what is used on farms
- Pesticides like chlorpyrifos and 2,4-D, a component of Agent Orange, are still used on golf courses today
- These pesticides damage dopamine-producing nerve cells in the lab



Source: Krzyzanowski B et al JAMA Network Open 2025(5):e259198, USGS data, pesticide use available at: [google.com/url?q=https://www.usgs.gov/publications/water-quality-pesticide-occurrence-and-effects-irrigation-reclaimed-water-golf-courses%23::~text%3DSamples%2520from%2520wastewater%2520treatment%2520plants,and%2520fenamiphos%2520sulfoxide%252C%2520and%2520diuron&sa=D&source=editors&ust=1771346156334616&usg=AOvVaw0gaUCPBttOrDMCZGv\\_OQKy](https://www.usgs.gov/publications/water-quality-pesticide-occurrence-and-effects-irrigation-reclaimed-water-golf-courses%23::~text%3DSamples%2520from%2520wastewater%2520treatment%2520plants,and%2520fenamiphos%2520sulfoxide%252C%2520and%2520diuron&sa=D&source=editors&ust=1771346156334616&usg=AOvVaw0gaUCPBttOrDMCZGv_OQKy) and Attorney General of New York, New York State, Office of the Attorney General Environmental Protection Bureau Original Printing: July 1991 Revised: Feb. 1994, Dec. 1995 available at: <https://www.beyondpesticides.org/assets/media/documents/documents/toxic-fairways-1995.pdf>

Trichloroethylene may be another cause of Parkinson's



Trichloroethylene (TCE)

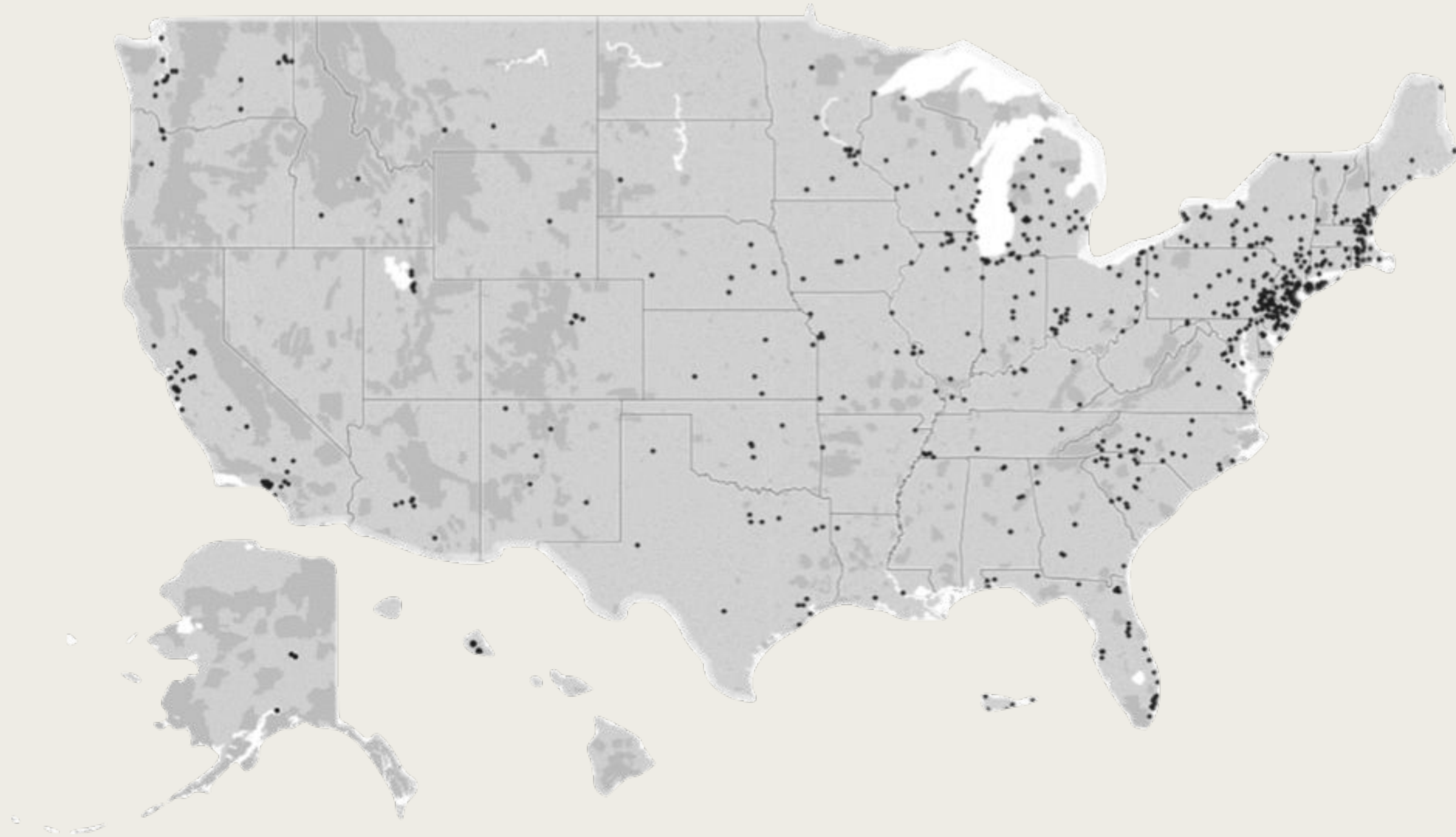




# TCE was and is ubiquitous

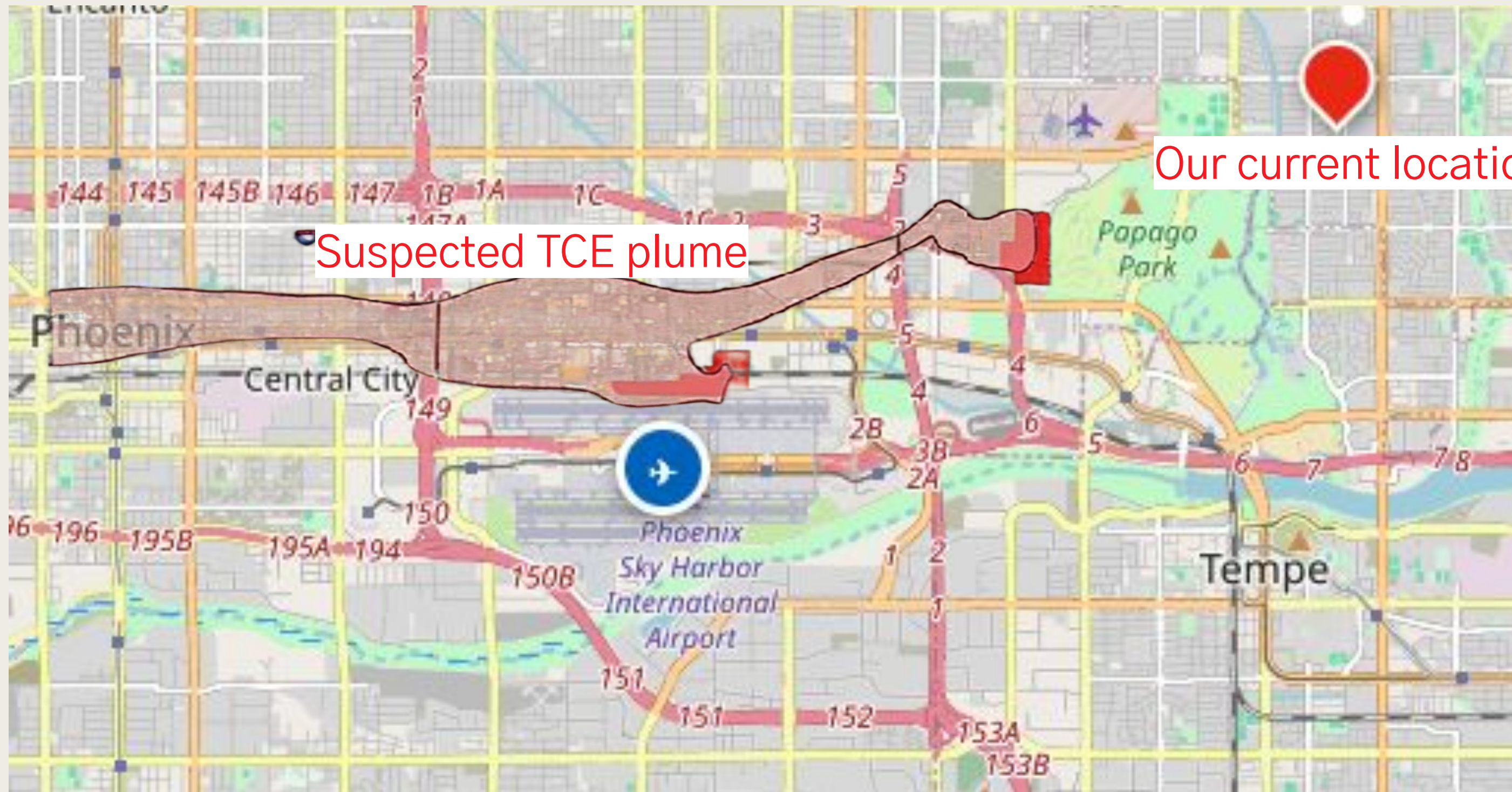
Occupations with possible TCE exposure	Commercial and consumer uses	Industry uses
<ol style="list-style-type: none"><li>1. Aircraft/jet engine mechanics</li><li>2. Automobile workers</li><li>3. Computer specialists</li><li>4. Dry cleaners</li><li>5. Electronic manufacturers</li><li>6. Embalmers</li><li>7. Metal treatment workers</li><li>8. Oil processors</li><li>9. Painters</li><li>10. Printers</li><li>11. Refrigerant manufacturers</li><li>12. Sewage workers</li><li>13. Shoe makers</li><li>14. Taxidermists</li><li>15. Textile and fabric cleaners</li><li>16. Water treatment workers</li><li>17. Weapons specialists</li><li>18. Varnish workers</li></ol>	<ol style="list-style-type: none"><li>1. Adhesives</li><li>2. Aerosol cleaning products</li><li>3. Carpet cleaners</li><li>4. Cleaning wipes</li><li>5. Degreasers</li><li>6. Decaffeinated coffee</li><li>7. Film cleaners</li><li>8. Glue</li><li>9. Gun cleaner</li><li>10. Inks</li><li>11. Lubricants</li><li>12. Paint and paint removers</li><li>13. Pepper spray</li><li>14. Pesticides</li><li>15. Refrigerant</li><li>16. Stain removers</li><li>17. Typewriter correction fluid</li><li>18. Wood finishes</li></ol>	<ol style="list-style-type: none"><li>1. Automotive care</li><li>2. Dry cleaning</li><li>3. Degreasing</li><li>4. Furniture care</li><li>5. Manufacturing<ul style="list-style-type: none"><li>○ Computer and electronics</li><li>○ Dyes</li><li>○ Fat and oil extracts</li><li>○ Jewelry</li><li>○ Machinery</li><li>○ Paint and coating</li><li>○ Paper</li><li>○ Perfume</li><li>○ Plastics</li><li>○ Refrigerants</li><li>○ Soap</li></ul></li></ol>

# Sites contaminated with TCE are found across the US



**Map of federal Superfund sites contaminated with TCE in the US, 2018**

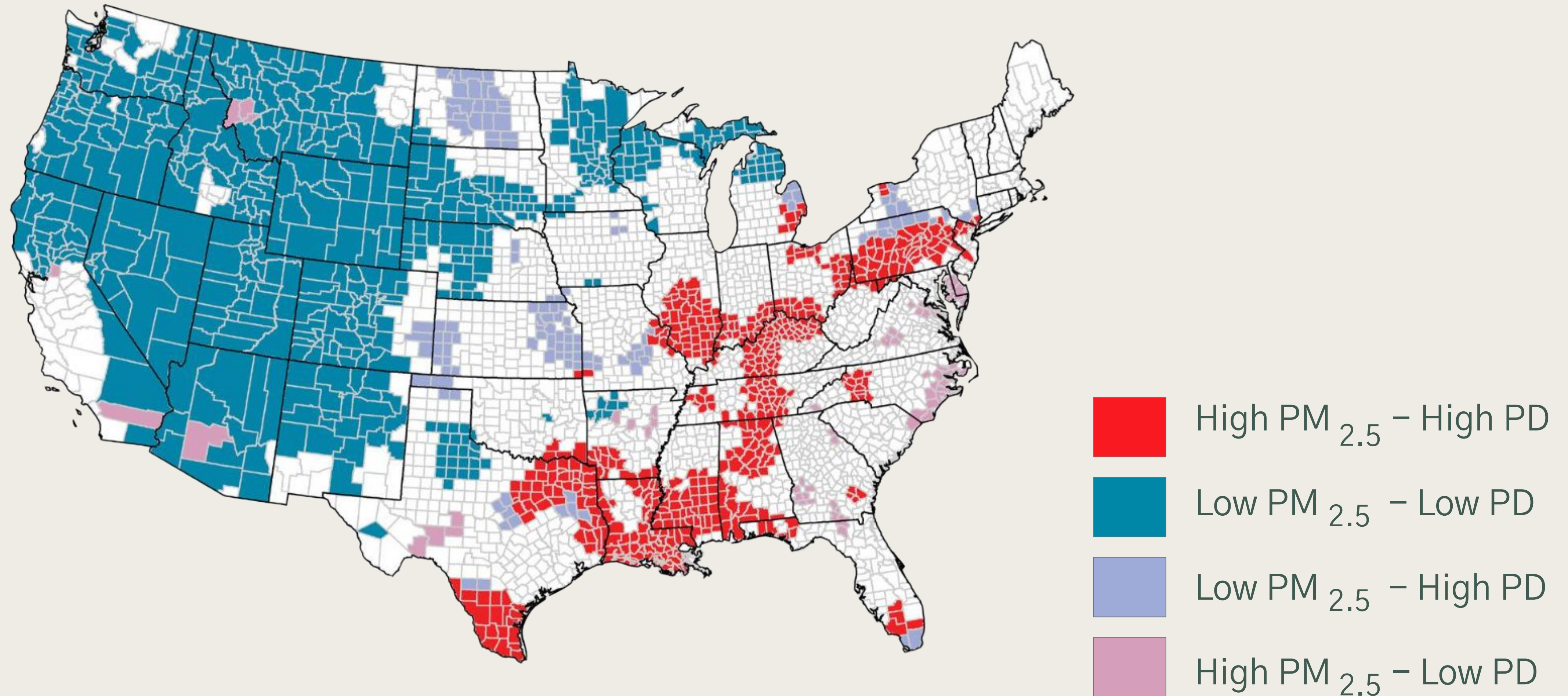
... including just 4 miles from where we are sitting



Suspected plume map from Arizona Department Environmental Quality modified by Claude AI

- **1956:** Electronics plant opens near the Phoenix airport
- **1982:** Contamination discovered, company reports possible TCE leak
- **2011–2016:** TCE and PCE found at levels up to 12 times the EPA’s safety recommendations in schools, commercial buildings, and homes in Lindon Park, McDowell Northside and McDowell Southside
- **Today:** Per the EPA “...one cannot draw conclusions as to whether human exposures are controlled”

# A recent study found an association between particulate matter (PM<sub>2.5</sub>) and Parkinson's





# Outline

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Causes

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**Pathology of Parkinson's**

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The PLAN

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# In 2003, Dr. Heiko Braak postulated that Parkinson's begins outside the brain

“Incidental cases of idiopathic Parkinson's disease may show involvement of both the enteric nervous system and the dorsal motor nucleus of the vagus nerve. This observation, combined with the working hypothesis that the stereotypic topographic expansion pattern of the lesions may resemble that of a falling row of dominos, prompts the question whether the disorder might originate outside of the central nervous system, caused by a yet unidentified pathogen that is capable of passing the mucosal barrier of the gastrointestinal tract.”

– Heiko Braak, 2003



**Dr. Heiko Braak**

# In 2008, Dr. Jeffrey Kordower showed that Parkinson's pathology was likely transmissible



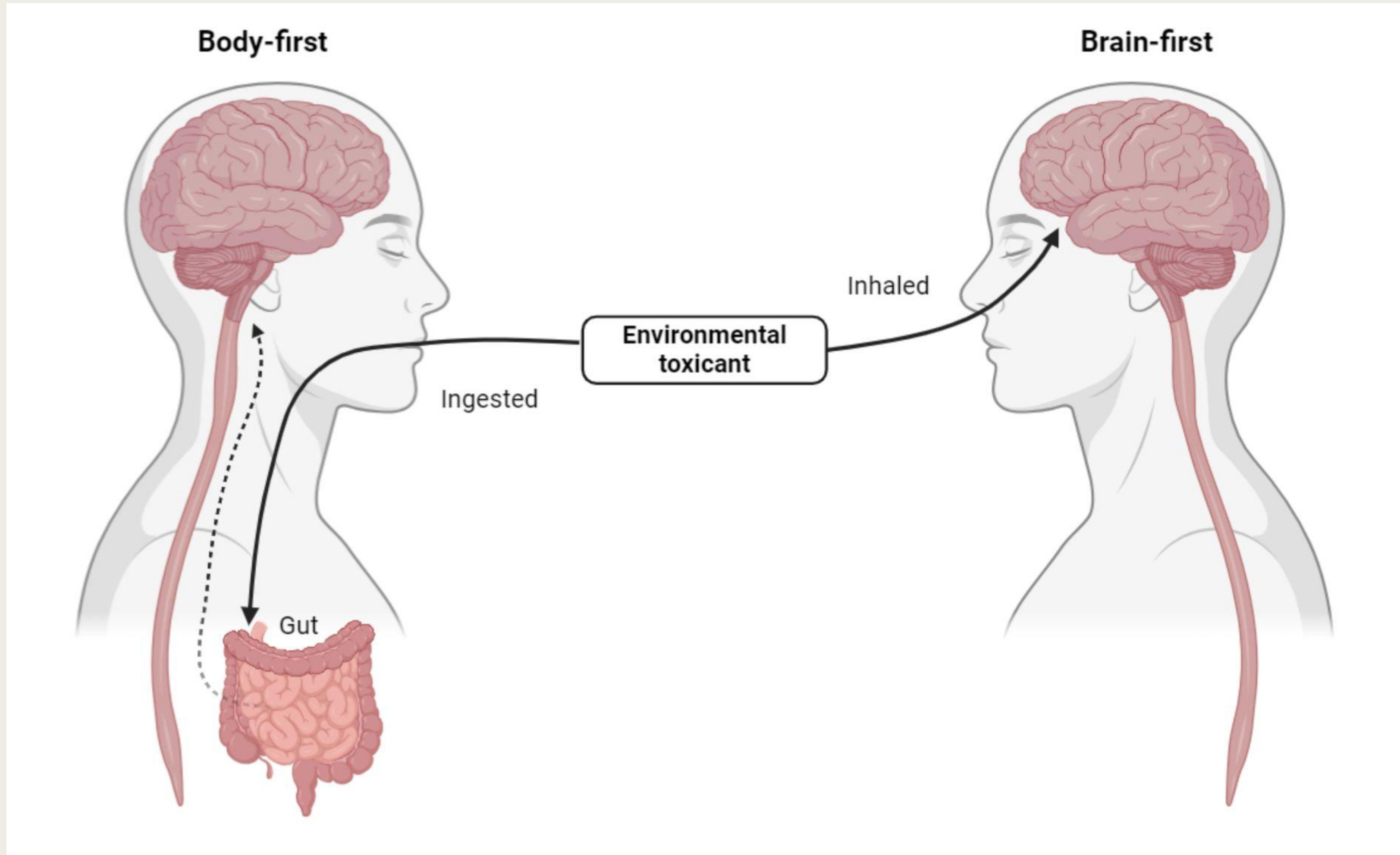
**Dr. Jeffrey Kordower**

## Lewy body–like pathology in long-term embryonic nigral transplants in Parkinson's disease

Jeffrey H Kordower<sup>1</sup>, Yaping Chu<sup>1</sup>, Robert A Hauser<sup>2</sup>,  
Thomas B Freeman<sup>3</sup> & C Warren Olanow<sup>4</sup>

Finally, our findings argue that there must be either a pathogenic factor in the brain milieu that affects dopaminergic neurons or a pathological process that can spread from one cellular system to another.

# In 2019, Dr. Per Borghammer postulated two models of Parkinson's pathology



**Dr. Per Borghammer**



# Outline

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Causes

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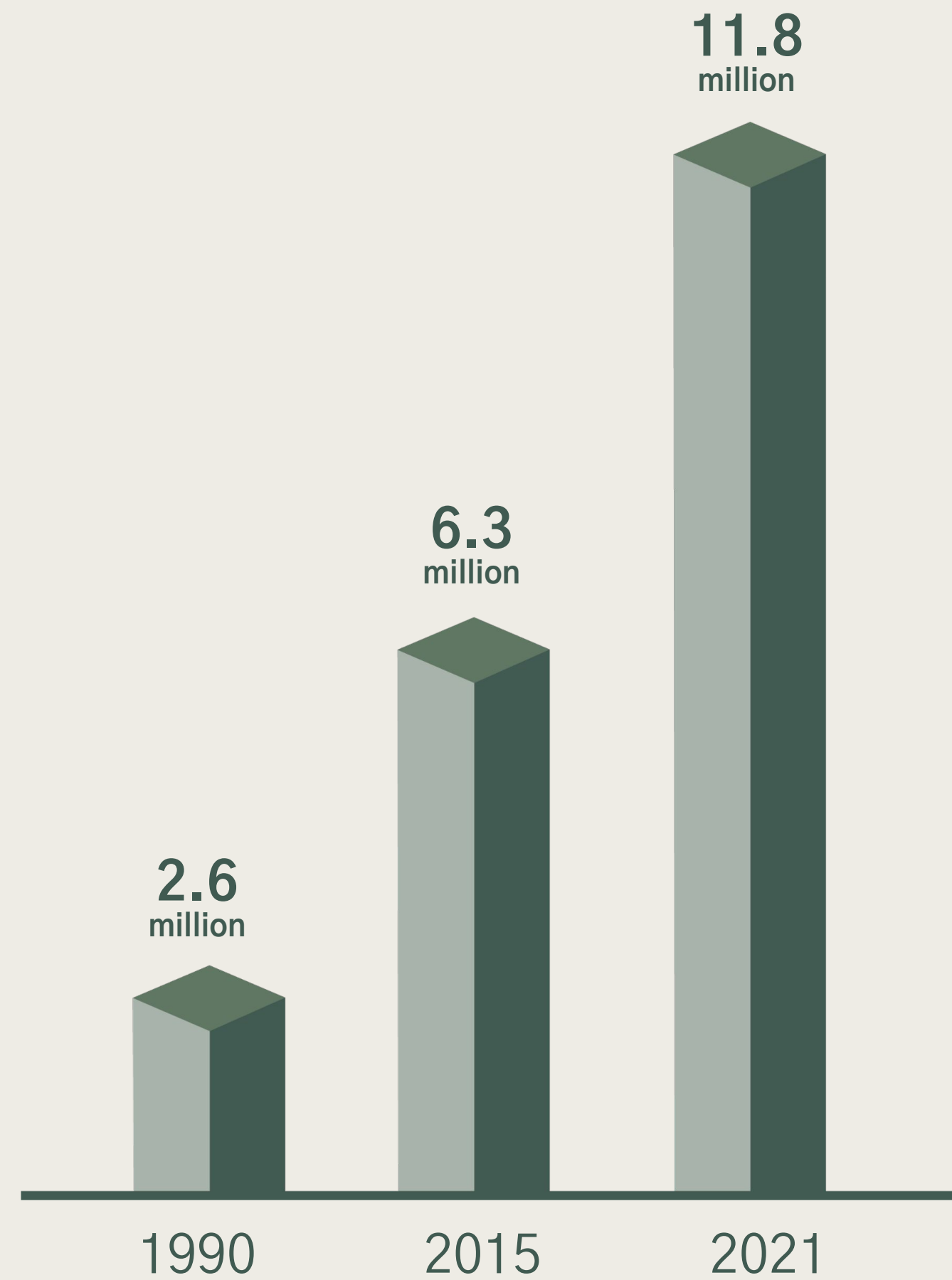
Pathology

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**The PLAN**

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# The rise of Parkinson's disease calls for a PLAN



**P** Prevent  
**L** Learn  
**A** Amplify  
**N** Navigate

# We must first **prevent** the preventable



The Parkinson's Prevention Pyramid

# The Parkinson's 25 can reduce exposure to toxicants





**1 Wash your produce, even your organic ones**

Pesticides have contaminated our food supply. Remnants of pesticides are found in 20% of common foods. Organic produce, dairy products, and meat can reduce exposure but can still have unsafe residues of pesticides. So wash your produce at least with water and consider simple gettable washes, vinegar, or salt solutions, too.



**2 Change your diet**

Individuals who eat a Mediterranean diet high in fruits and vegetables and low in animal products – may lower their risk of Parkinson's. Such a diet may also be beneficial for those who already have the disease. The reasons for the benefit are not certain and may include reduced exposure to pesticides, which can concentrate in meat and dairy as they make their way up the food chain.



**3 Make sure your grocery store is safe**

Perchloroethylene (PCE), the dry cleaning chemical, can readily spread beyond the walls of a dry cleaner. In Germany, PCE, which dissolves in fat, has been found in dairy products in supermarkets near dry cleaners. Germany now prohibits supermarkets from being located close to dry cleaners. You may want to steer away from them as well.



**4 Enjoy wine without pesticides**

Like produce, organic wines are not immune to pesticide contamination, but they have lower levels and thus reduced health risks. In addition, organic vineyards are likely safer for those who work there and for those who live nearby. Organic choices in what we eat and drink can improve the health of consumers, farmers, and communities.

# ... and possibly slow the progression of Parkinson's



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### Consider air purifiers

Air purifiers are an easy and effective way to lower your risk of disease from indoor air pollution. Air purifiers do range in cost (as low as \$10 to as high as \$1000), require periodic cleaning and filter changes, and may need to be installed in multiple places depending on the size of the home, school, or work place. Be sure to use air purifiers with carbon filters designed to remove "volatile organic chemicals," like TCE.

### Don't poison yourself

Sometimes the remedy is worse than the disease. Insects, including fleas, ants, and moths, can be unwanted guests. Unfortunately, some common pesticides can increase the risk of Parkinson's. For example, the pesticide permethrin, found in flea collars, ant sprays, moth balls, and outdoor apparel, can reduce dopamine-producing nerve cells in lab animals. Consider safer alternatives, and if necessary, minimize exposure by wearing a mask, increasing ventilation and avoiding spraying near children.



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### Choose your home carefully

70 Million Americans lives within three miles of a Superfund site. Most are unmarked, unfenced, and largely invisible. The EPA has a database where you can search for these sites, but less contaminated ones may be harder to find. If you live near a TCE or PCE-contaminated site, you can test (usually through an environmental firm) your indoor air. If either chemical is present, a mitigation system, like the ones used for radon, can pump air from below your foundation to above your roof so you and your family can breathe easy.

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### Dry clean cautiously

Dry cleaned clothes release dangerous chemicals like TCE and PCE into your car or home. To limit exposure, first, consider minimizing your dry cleaning. Second, find a dry cleaner that does not use PCE (also called "perc"). Third, if your dry cleaner does use PCE, "air" out your clothes before taking them inside the home. Take off the plastic bag and let the clothes breathe, so you don't have to breathe in the chemicals.



### Check the ground floor

Before moving into a high rise, check what is on the ground floor. Because if there is a dry cleaner, the air inside may not be safe. If there is one, ask if dry cleaning is done on site and whether they use PCE (commonly known as "perc"). If they do, test your indoor air.

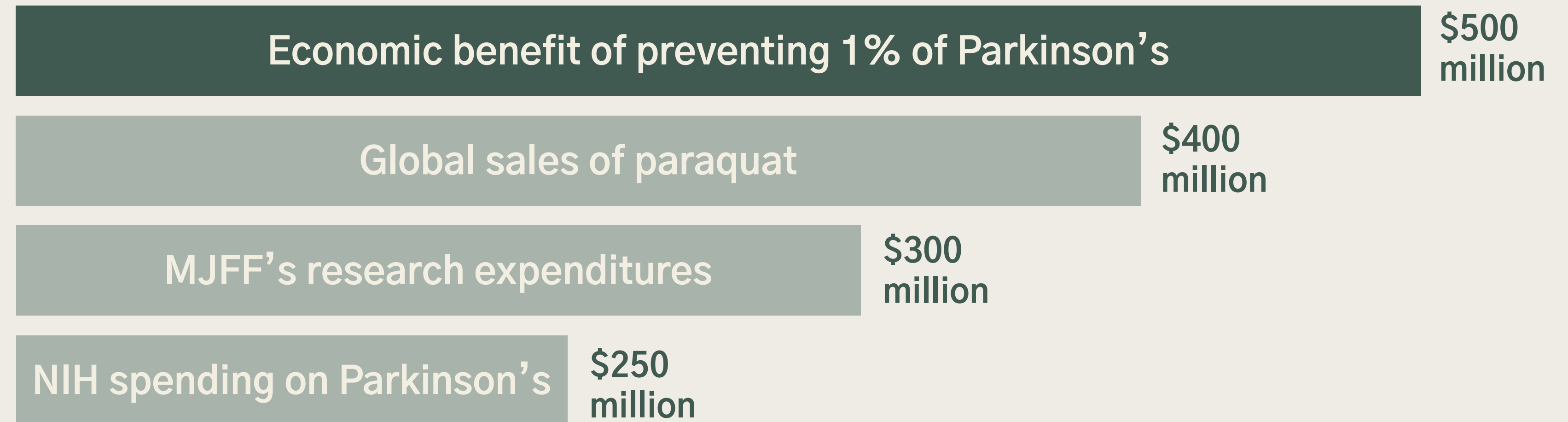
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# We need to **learn** more about the causes of Parkinson's

**Only 2 cents of every research dollar goes to prevention**



# We must amplify the voices of those affected



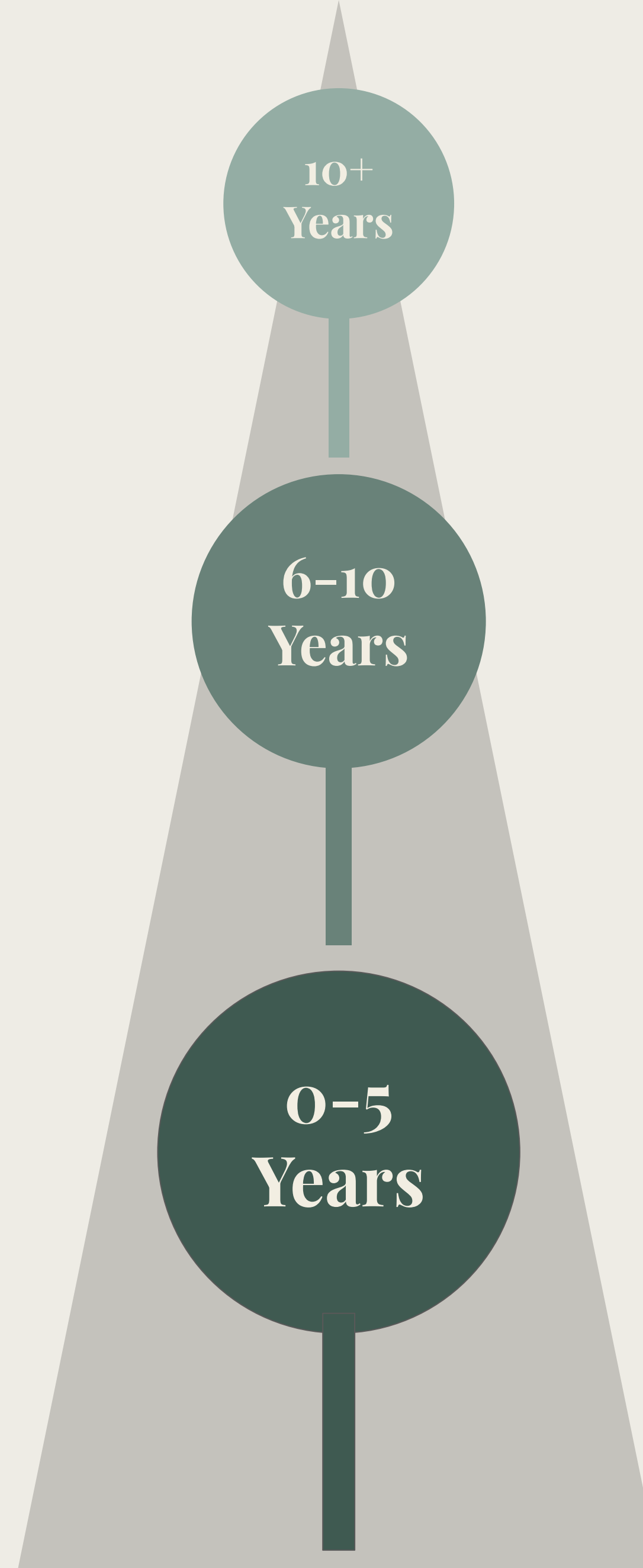
ACT UP members at the 1989 New York City Pride March



Candy Lightner, founder of Mothers Against Drunk Drivers (MADD), speaks at a press conference



# ... And navigate the frontiers of new treatments



**10+  
Years**

**Long-term**

- Regenerating circuits
- Rethinking gene editing
- Restarting combination therapies
- Raising nanomedicine
- Reinvesting and reinvigorating the next generation

**6-10  
Years**

**Mid-term**

- Reaching for new drugs
- Repositioning diets and the microbiome
- Rejuvenating stem cells
- Reconsidering vaccines and immune therapies

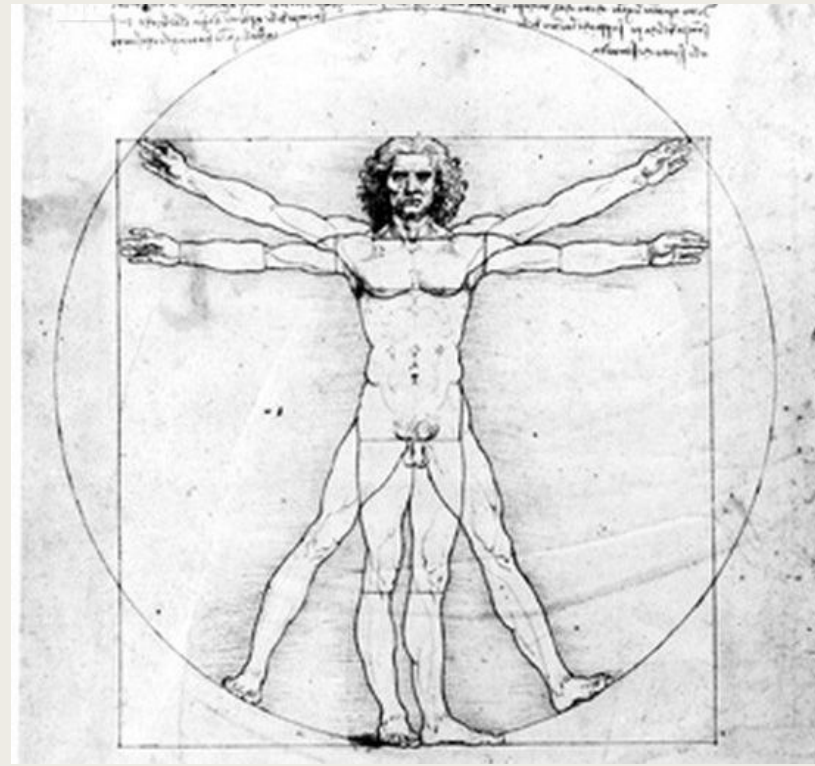
**0-5  
Years**

**Near-term**

- Recognizing Parkinson's fingerprints
- Reorganizing AI
- Realizing genes can drive drugs and therapies
- Repurposing old drugs
- Reorganizing electrical and pump therapies

# Center for the Brain & Environment

To identify and eliminate the environmental causes of brain diseases



## Measure chemicals in our bodies

- Blood
- Hair
- Urine
- Fat



## Measure chemicals in our environment

- Food
- Water
- Air
- Soil
- Dust



## Investigate clusters of brain disorders

- Autism
- Brain cancer
- ALS
- Parkinson's disease
- Alzheimer's disease
- Dementia with Lewy bodies



# Take Action Now

## On an individual level:

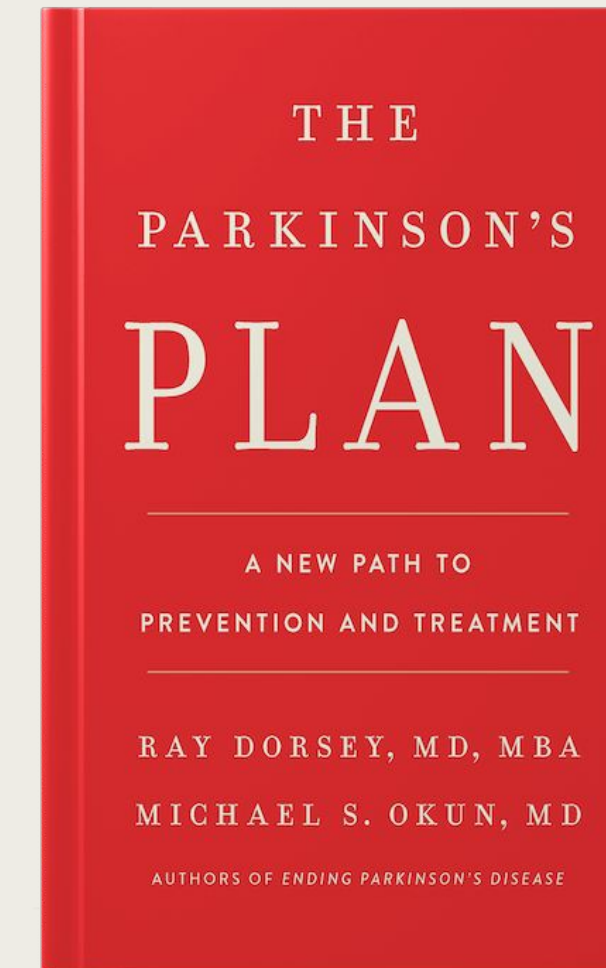
- Join PD Avengers at [www.pdavengers.com](http://www.pdavengers.com)
- Sign up for the Center for the Brain & Environment Research Registry
- Tell a friend.. or ten!

## In your community:

- Advocate for pesticide-free golf courses and schools

## At the national level:

- Contact the EPA Administrator, Lee Zeldin, at [zeldin.lee@epa.gov](mailto:zeldin.lee@epa.gov) and ask him to ban paraquat and chlorpyrifos



THINK GLOBAL. ACT LOCAL.



GLOBAL ALLIANCE TO END PARKINSON'S DISEASE

To learn more, visit [pdplan.org/takeaction](http://pdplan.org/takeaction) or contact us at [info@pdplan.org](mailto:info@pdplan.org)