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Parkinson's Association with Pesticide Exposure Gains Strength

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Published: March 28, 2008

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MIAMI, March 28 -- Pesticide exposure may boost the risk of developing Parkinson's disease over and above genetic factors, according to a case-control study here.

Parkinson's disease patients were 61% more likely to report direct contact with pesticides than their unaffected relatives, reported William K. Scott, Ph.D., of the University of Miami, and colleagues online in *BMC Neurology*.

There was a significantly higher dose-dependent relationship for frequency, duration, and cumulative exposure among Parkinson's patients compared with relatives ($P=0.013$), the study found.

Insecticides and herbicides appeared to be primarily responsible, particularly organochlorines and organophosphate insecticides, the researchers said.

Action Points

- Explain to interested patients that Parkinson's disease has been linked to genetic factors, but these account for only a small percentage of cases.
- Point out that this was a case-control study that could not demonstrate causality, as opposed to a randomized trial.

Previous studies have found a similar 70% to two-fold increased risk of Parkinson's with these environmental exposures (See: [Bug-Killing Chemicals Linked to Parkinson's in Men](#) and [Link Added to Pesticide-Parkinson's Chain](#)).

However, it's still too early to make recommendations on avoiding exposure for patients who may be at already elevated Parkinson's risk because of a family history, said co-author Dana B. Hancock, of Duke University.

And, the findings certainly don't discount the contribution of genetics to Parkinson's risk, she said.

Genetic variants known to cause Parkinson's disease are rare and account for only a small fraction of cases. The majority of cases are likely the result of environmental exposure and the interaction between genes and exposures, Hancock said.

The researchers conducted clinical exams and detailed interviews with 319 Parkinson's patients and 296 of their relatives and spouses.

Parkinson's patients were 1.61 times more likely to report ever personally using pesticides compared with their unaffected relatives (62.7% versus 49.7% exposed, 95% confidence interval 1.13 to 2.29).

Those who were exposed through direct pesticide application on more than 10 days a year were 2.07 times more likely to have Parkinson's disease than those who were never exposed (95% CI 1.26 to 3.42).



Likewise, participants in the highest duration category with more than 26 years of exposure through direct pesticide application were 1.87 times more likely to have Parkinson's than those who were never exposed (95% CI 1.16 to 3.00).

The highest exposure category for cumulative exposure was also positively associated with Parkinson's (OR 2.37, 95% CI 1.42 to 3.94).

Frequency, duration, and cumulative exposure were all associated with Parkinson's disease in a dose-dependent manner.

Although women generally had lower exposures, the highest frequency of pesticide application was associated with Parkinson's for both sexes (OR 2.15 for men, 95% CI 1.06 to 4.35 and OR 2.43 for women, 95% CI 1.18 to 5.01).

There was a dose-response association for both women ($P=0.0058$) and men ($P=0.021$ for duration and $P=0.036$ for cumulative exposure).

Notably though, family history appeared to be a more important factor than pesticide exposure among patients with a family history of Parkinson's. None of the associations was significant in this group.

The associations were even stronger in those without a family history. Parkinson's disease patients were 3.25 times more likely to report the highest cumulative exposure levels of at least 179 days than their unaffected relative (95% CI 1.84 to 5.73).

Herbicides were as strongly associated with Parkinson's as other pesticides, but among the pesticides only insecticides were significantly associated with the condition. Among the classes of chemicals participants reported using, only application of organochlorines and organophosphates were significantly linked to Parkinson's.

The most common of these chemicals were the agricultural insecticide chlordane, the now-banned insecticide dichloro-diphenyl-trichloroethane (DDT), the home-and-garden insecticide chlorpyrifos, the household insecticide diazinon, and the agricultural insecticide malathion.

Potential exposure routes other than direct application, such as well-water consumption and living or working on a farm, were not significantly associated with Parkinson's disease.

Although the findings supported pesticides as a contributor to Parkinson's risk, the case-control study could not establish a causal association and was also limited by potential recall bias, the researchers noted.

The study was supported by grants from the National Institutes of Health, National Institute on Neurological Disorders and Stroke. The researchers reported no conflicts of interest.

Additional source: BMC Neurology

Source reference:

Hancock DB, et al "[Pesticide exposure and risk of Parkinson's disease: A family-based case-control study](#)" *BMC Neurol* 2008; DOI: 10.1186/1471-2377-8-6.

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