AAN 76th ANNUAL MEETING ABSTRACT

EMBARGOED FOR RELEASE UNTIL 4 P.M. ET, TUESDAY, FEBRUARY 27, 2024

Abstract Title: Application of simazine, atrazine, and lindane pesticides are associated with incident Parkinson's disease risk in the Rocky Mountain region

Press Release Title: Study Finds Pesticide Use Linked to Parkinson's in Rocky Mountain, Great Plains Region

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Objective: To investigate the role of pesticide exposure on PD risk.

Background: Parkinson's disease is the fastest-growing neurological disorder in the world. Since the discovery of the nigral toxin, MPTP, many studies have investigated the role of environmental contaminants, notably pesticides, on PD risk but mostly in epidemiologic studies with limited geographic coverage.

Design/Methods: In the Multiple Air Pollutants in PD (MAP-PD) study, we conducted a nationwide, population-based, geographical study of 21,549,400 Medicare beneficiaries (aged 67+ in 2009) and 465 pesticides obtained from the United States Geological Survey. Our outcome variable was county-level standardized relative risk derived from Bayesian modeling and our independent variables were estimates of average annual pesticide application from 1992-2008. We mapped the nationwide association for 65 pesticides (those with sufficient data) using Multiscale Geographic Weighted Regression (MGWR), and classified pesticides according to the strength and ratio of positive to negative regression coefficients. We used linear regression to quantify the nationwide relationships between PD risk and pesticides. We explored county-level air pollution, rural/urban residence, and median income as potential confounding factors.

Results: We identified 14 pesticides strongly associated with PD in the Rocky Mountain and Great Plains region. Of these, simazine, lindane, and atrazine had the strongest relationship with PD. Counties with the highest decile of simazine application had a 36% (95% CI 32%-41%) greater relative risk of PD compared to counties with the lowest decile of exposure. For atrazine and lindane, relative risks were 31% (95% CI 26%-35%) and 25% (95% CI 21%-29%) greater for counties in the top decile of application compared to the lowest decile, respectively. Moreover, there was a modest dose-response relationship between PD risk and all three pesticides.

Conclusions: In the Rocky Mountains/Great Plains region, application of lindane, simazine, and atrazine are associated with PD.