

Nicotine in Peppers and Other Vegetables May Reduce Parkinson Disease Risk

Eating nicotine-containing vegetables, mainly peppers, may provide a protective effect against Parkinson disease (PD), according to new research from the University of Washington (UW) Superfund Research Program (SRP). Based on studies consistently suggesting that smokers are less likely than non-smokers to develop PD, Susan Searles Nielsen, Ph.D., led a study to explore other sources of nicotine that might have effects similar to active smoking, such as vegetables from the same plant family as tobacco, including peppers, tomatoes, and potatoes.

PD is a progressive and debilitating disorder that impairs movement. Researchers believe PD is caused, in part, by environmental exposures. Although specific causal exposures for human PD remain to be identified, suspects include various pesticides and metals found at many Superfund hazardous waste sites. For decades, a surprising, yet consistent epidemiologic observation has been a reduced PD risk, by about half, among ever cigarette smokers compared to never smokers.

Harvey Checkoway, Ph.D., Director of the UW SRP, conducted a population-based case-control study that included 490 newly diagnosed PD cases and 644 unrelated, neurologically normal controls. The study confirmed the predicted strong inverse relationship between active tobacco smoking and PD risk. To determine whether nicotine, among the hundreds of chemicals in tobacco smoke, is the neuroprotective agent as suggested by animal studies, Searles Nielsen began exploring other sources of nicotine that might have similar effects as active smoking.

First, Searles Nielsen examined the relation between PD and environmental tobacco smoke exposure at home and work, based on self-reports by cases and controls. Environmental tobacco smoke, whether occurring at home or at work, appeared to be as strongly inversely associated with PD as active smoking. However, it remained unresolved whether a truly protective effect of tobacco smoke underlies these associations, and cigarette smoke is generally detrimental to health, accounting for an estimated 443,000 deaths each year in the United States.¹

Searles Nielsen then investigated whether other relatively modest sources of nicotine would demonstrate an inverse association with PD. Drawing on participants' self-reported lifetime dietary data, frequency of consumption of foods from the same plant family as tobacco, *Solanaceae*, was inversely associated with PD risk, even though consumption of all other vegetables combined was not.

The potentially protective effect was strongest for peppers. Compared to study participants who ate peppers less than once a week, people who ate peppers 2-4 times per week had a 30% reduced risk of PD, and those who ate them even more frequently had a 50% reduction. The dose-response association was mainly evident in people who had never smoked, consistent with a low-dose nicotine effect being over-shadowed by the substantially higher doses received by smokers.

According to Searles Nielsen, nicotine may be protective because of its interaction with nicotinic acetylcholine receptors on dopaminergic neurons, the type of cells lost in PD. Additionally, other *Solanaceae* phytochemicals structurally similar to nicotine, such as anatabine, exhibit anti-inflammatory properties. Neuroinflammation is



Peppers, a nicotine-containing vegetable in the same plant family as tobacco, are associated with lower risk of Parkinson's disease.

widely acknowledged as a potentially important pathogenesis mechanism in PD.

“If it turns out that a small amount of nicotine is indeed somehow beneficial with respect to PD, it is certainly good news that peppers and tomatoes are sources of vitamins A and C, instead of the known cancer-causing chemicals in tobacco,” said Searles Nielsen.

The authors recommend further studies to confirm and extend their findings, which could have important implications for elucidating PD pathogenesis and ultimately for disease prevention.

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To learn more about this research, please refer to the following source:

Checkoway H, Powers K, Smith-Weller T, Franklin GM, Longstreth WT Jr, Swanson PD. Parkinson’s disease risks associated with cigarette smoking, alcohol consumption, and caffeine intake. *Am J Epidemiol.* 2002;155:732-738. DOI: [10.1093/aje/155.8.732](https://doi.org/10.1093/aje/155.8.732).

Searles Nielsen S, Gallagher LG, Lundin JI, Longstreth WT Jr, Smith-Weller T, Franklin GM, Swanson PD, Checkoway H. Environmental tobacco smoke and Parkinson’s disease. *Mov Disord.* 2012;27:293-296. doi: 10.1002/mds.24012. DOI: [10.1002/mds.24012](https://doi.org/10.1002/mds.24012).

Searles Nielsen S, Franklin GM, Longstreth WT Jr, Swanson PD, Checkoway H. Nicotine from edible Solanaceae and risk of Parkinson disease. *Ann Neurol.* E-published May 9, 2013. DOI: [10.1002/ana.23884](https://doi.org/10.1002/ana.23884).

