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What's Hot in Parkinson's Disease Column

**Pesticides and Environmental Exposures in Parkinson's disease:
Should We Stay Away From The Stink Truck?**

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When I was a kid we used to ride our bicycles around the neighborhood and in the afternoons we chased one of two trucks; the ice cream truck or the pesticide spraying "stink" truck. Needless to say, ice cream has not been implicated in causing Parkinson's disease, however, certain pesticides and environmental exposures have been making the news for possible Parkinson associations. There has been a recent explosion of research into pesticide exposure and Parkinson's disease. I typed the words "Parkinson's disease and pesticides" into Pubmed (one of the most powerful medical search engines on the internet for scientists) and 982 studies, 121 of which were from 2008-9 appeared. In this month's "What's Hot" column, I will try to briefly synthesize and distill the important information available on this topic.

There is a branch of medical research called epidemiology. In epidemiological studies, scientists will often go door to door to identify how many people in a population do and do not have a disease. They will then assemble lists of disease characteristics and potential risk factors for a particular disease or syndrome. Parkinson's disease seems to be more common in men than women, but is similar in incidence across many continents, races and ethnicities. There may be a lower prevalence of Parkinson's disease among African Americans and this is a point under intensive study. Risk factors associated with the development of Parkinson's disease (and parkinsonism) include such things as well water, rural living, herbicides/pesticides, trauma, drugs and exposure to chemicals such as tetrahydroquinolone (found in common foods such as barbeque). Head trauma, welding, and several other controversial risk factors have been debated by the experts. The herbicide rotenone has been used to develop animal models of Parkinson's disease as has the accidentally discovered recreational drug compound referred to as MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine). Some studies have pointed to protective factors against the development of Parkinson's disease such as caffeine, nonsteroidal anti-inflammatories (e.g. ibuprofen and that class of drugs) and smoking (Langston, 2002; Langston, 1995; Elbaz, 2008).

It is important that people suffering from Parkinson's disease understand that risk factors are just risk factors, and once you have been diagnosed with Parkinson's disease, modification of your lifestyle will likely have no impact in these areas. Also, it is important to realize that there are many epidemiological studies and sometimes there are conflicts in their findings. These conflicts can

sometimes be explained by study design, biases (e.g. cultural, racial, gender, geographical, etc.), and other factors.

The notion that an environmental exposure such as a pesticide could set off a cascade of events leading to Parkinson's disease 5-10 years ago would have been judged as ridiculous. The evidence today, however, has been reasonably convincing that the environment plays some role in the development of at least some cases of Parkinson's disease. Some experts have even speculated that there is a gene/environment interaction where "genetics loads the gun, and the environment pulls the trigger."

Hancock and colleagues studied "319 cases and 296 relatives and other controls subjects for possible associations of direct pesticide application, well-water consumption, and farming residences/occupations with Parkinson's disease." In their study, Parkinson's disease patients had more direct pesticide exposure compared to unaffected relatives, and there seemed to be a relationship with the amount of exposure. Their findings suggested that insecticides and herbicides increased the risk of Parkinson's disease. "Two specific insecticide classes, organochlorines and organophosphorus compounds, were significantly associated with PD." There are now several studies in the literature suggesting that exposure to insecticides and herbicides may increase the risk of developing Parkinson's disease (Hancock, 2008; Hatcher 2008).

Based on the available literature we would suggest that people use appropriate protective measures (e.g. masks, etc.) to lessen any potential exposures to these agents. Discoveries linking pesticides and Parkinson's disease may help us to uncover the important molecular and genetic pathways underpinning the genesis of the disease. Nowadays we would recommend you chase the ice cream truck and not the "stink truck."

References:

J. William Langston. The Impact of MPTP on Parkinson's Disease Research: Past, Present, and Future. In: Parkinson's Disease. Diagnosis and Clinical Management by Stewart A. Factor and William J. Weiner (eds.), Demos Medical Publishing, 2002.

J. William Langston. The case of the Frozen Addicts. 1995.

Elbaz A, Moisan F. Update in the epidemiology of Parkinson's disease. *Curr Opin Neurol.* 2008 Aug;21(4):454-60. Review.

Hancock DB, Martin ER, Mayhew GM, Stajich JM, Jewett R, Stacy MA, Scott BL, Vance JM, Scott WK. Pesticide exposure and risk of Parkinson's disease: a family-based case-control study. *BMC Neurol.* 2008 Mar 28;8:6.

Hatcher JM, Pennell KD, Miller GW. Parkinson's disease and pesticides: a toxicological perspective. *Trends Pharmacol Sci.* 2008 Jun;29(6):322-9. Epub 2008 Apr 29.