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The Role of Environmental Factors in Parkinson's Disease

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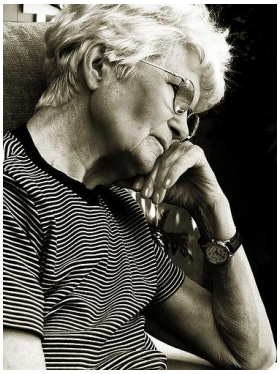
Introduction

Parkinson's disease was first described in 1817 by the British physician James Parkinson. The etiology and the underlying mechanism of action causing the selective destruction of the dopaminergic (substantia nigra) pathway in Parkinson's disease has remained unknown. There have been numerous studies linking Parkinson's to environmental pesticide and heavy metal exposure. A positive correlation between Parkinson's disease and industrialization has been well documented in the literature implicating pesticides, herbicides and heavy metals as contributory factors to the development of Parkinson's, the "environmental disease". These studies further support a holistic approach to this disease which focuses on reduction and removal of the individual's overall exposure. In addition, this augments the conventional treatment, which focuses on symptoms and provides more holistic choices for the patient.

Pesticides

Long and short term exposures to pesticides, solvents and certain metals have been implicated in the etiology of Parkinson's disease. In animal studies, exposures to different classes of pesticides have been reported to be neurotoxic to the dopaminergic pathway. These same pesticides have also been associated as potential factors in humans. A relationship between Parkinson's disease and heroin use was found in addicts. This strong occurrence was the result of a by-product of illicit heroin synthesis, MPTP (1-methyl-4-phenyl-1, 2, 3, 6-tetrahydropyridine). MPTP crosses the blood-brain barrier and is taken up by dopaminergic cells. MPTP is the only environmental agent that has been directly linked to development of levodopa-responsive Parkinsonism, a form that is clinically indistinguishable from Parkinson's disease. The structural similarity between the active metabolite of MPTP and paraquat, a common herbicide used for killing weeds, suggests that paraquat might also be a dopaminergic neurotoxin. Positive correlations with increased incidence of Parkinson's disease and exposure to pesticides including paraquat have been reported in parts of Canada. Similar observations have also been documented in farming communities in Taiwan. Dithiocarbamate based fungicides is another class of herbicides that is neurotoxic to the dopaminergic system. Case reports have associated exposure to maneb, a widely used dithiocarbamate fungicide in this class, with the development of Parkinson's disease. The third class of pesticides linking environmental exposure with increased incidence of Parkinson's disease is rotenone. Rats exposed to rotenone developed Parkinson's like symptoms and changes in the brain that resemble Parkinson's disease; there was dopaminergic (substantia nigra) degeneration. The fourth class of pesticides with potential dopaminergic neurotoxic effect consists of the organochlorine pesticides that include DDT and dieldrin. Elevated levels of residual dieldrin have also been detected post mortem in the brains of Parkinson's patients.



Heavy Metals

Based on epidemiological studies, occupational exposure to specific metals, manganese, copper, lead, iron, mercury, zinc and aluminum appear to be a risk factor for Parkinson's disease. An analysis of the Parkinson's disease mortality rates in Michigan (1986–1988) with relation to heavy metal exposure revealed that counties with an industry in the paper, chemical, iron or copper related-industrial categories had significantly higher Parkinson's death rates than counties without these industries. Similarly an increased risk for Parkinson's disease from prolonged occupational exposure to heavy metals was established in Valleyfield, Quebec (1987-1989). Post mortem analysis of brain tissues from patients with Parkinson's disease gives further confirmation to the involvement of heavy metals and this disorder. The previous studies have been done on occupational exposure and Parkinson's disease, however in a recent study on U.S. urban communities, long-term environment exposure was found to contribute to disease development. This 2003 study examined 35,000 Parkinson's disease patients who have not changed residence since 1995 and found an increased incidence in Parkinson's disease around urban areas with metal emitting facilities.

"Long-term environmental exposure to heavy metals increases development of Parkinson's Disease."

The potential role of heavy metals, in the pathology of Parkinson disease is supported by multiple studies. Lead, mercury, aluminum and arsenic are known neurotoxins that accelerate the development of Parkinson's disease. Interestingly, these metals have also been shown to compound herbicides and pesticides causing a synergistic toxic effect to the brain. The heavy metals, pesticides and herbicides initiate a cascade of destructive cellular oxidative reactions leading to dopaminergic cell death.

Treatment

With all this evidence supporting the environmental link and Parkinson's disease, the approach to treating this disease should also address these potential underlying causal factors. One step is to facilitate the removal of these factors from the body. Chelating compounds, like dimercaptosuccinic acid (DMSA), dimercaptopropanesulfonic acid (DMPS) and ethylenediaminetetraacetic acid (EDTA) have all been used effectively to reduce the body burden of heavy metals such as mercury, lead, aluminum and arsenic. DMSA was first utilized as a treatment for heavy metal toxicity in 1965. EDTA was developed in Germany in the early 1930's and has been available since 1948 to remove lead and aluminum. EDTA, DMPS and DMSA, when administered under the care of trained professional, will increase urinary output of these heavy metals. DMSA has been shown to cause an increase in urinary mercury excretion by 163 percent and DMPS an increase of 135 percent. DMSA and DMPS have similar affinities for heavy metals. They will increase the excretion of copper and zinc and they both have affinity for manganese and molybdenum. When administered intravenously, the primary route of excretion is the kidneys, however when administered orally, the primary route of excretion is the bowels. In order to minimize hepatic reuptake from the bowels and facilitate removal, psyllium fiber and colonic irrigation will be of great benefit in reducing the overall load.

The second step to treatment is the supplementation of nutrients needed to assist the clearance of the environmental toxins (pesticides, herbicides, heavy metals) from the body, restore induced deficiencies inherent in exposure and repair tissue damage.

The body eliminates toxins by directly neutralizing them through our detox pathways and excretes them in the urine or feces. If the body's ability to remove them is compromised then these toxins build up in the tissues, fat stores and the bones. The liver, intestinal system and the kidneys are the primary organs of detoxification. The liver plays several roles in detoxification, filters the blood to remove large toxins, synthesizes and secretes bile to remove fat soluble toxins and enzymatically disassembles unwanted chemicals. Adequate protein and reduced sugar intake ensures proper liver clearance of toxins from the blood. Deficiency of glutathione has been implicated in Parkinson's disease due to oxidative stress. NAC and whey protein (a complete protein) increase glutathione levels and enhance liver function. Protein deprivation is associated with reduced metabolism of toxic chemicals, drugs and increased toxicity of these compounds.

"Eliminating these toxins from the body through our detoxification pathways must be approached when treating this disease."

Along with nutritional support to aid the removal of toxins, correction of induced deficiency must be addressed. Chlorinated pesticides create a nutritional deficiency that contribute to a continuous negative cycle; a reduction of fat soluble vitamins A, E and D to normal tissues will further enhance the toxic effect of pesticides. A high quality multiple vitamin/mineral supplement with extra magnesium and B-complex is therefore recommended. Vitamin C should be taken in maximal doses to help clear toxins from the blood and to provide high antioxidant activity. Omega 3 oils are necessary for any pesticide exposure to increase antioxidant activity in the brain and prevent induced damage.

Summary

This article attempts to provide a brief overview of environmental links to Parkinson's, along with potential treatment options offered at NaturoMedic™.com. Heavy metals, pesticides and herbicides acting individually or synergistically have detrimental toxic effects to the dopaminergic (substantia nigra) pathway, the pathway responsible for the establishment and progression of Parkinson's disease. Exposure to these toxic environmental factors can occur both in and outside of the home and from dietary consumption. There are a variety of treatment options available to eliminate and excrete these factors from the body and aid in tissue repair. In order to have a targeted holistic protocol a specific assessment is required.

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