To the Point
UW-SRP* Research Snapshots

Parkinson disease (PD) is a neurodegenerative disorder that is second only to Alzheimer’s disease in occurrence. It is a chronic and progressive movement disorder that affects over seven million people worldwide. Although PD has been identified and described in medicine for nearly two hundred years, today there is still no established way to objectively diagnose or monitor the progression of the disease. Dr. Jing Zhang, UW-SRP researcher, is studying protein biomarkers that will enable us to learn more about this disorder and other neurodegenerative diseases. Biomarkers are distinct biological ‘characteristics’ that can be measured and evaluated to be used as indicators of both normal and disease processes.

While the underlying cause of PD is largely unknown in most cases, most experts currently believe both genetic and environmental factors contribute to development of the disease. A potential population at risk that is being studied is welders, who may encounter elevated exposures to manganese in their profession. Manganese is recognized as an essential element in our diet required by our bodies to be healthy, but excessive exposure to this metal can have devastating neurotoxic impacts. By studying a group that experiences appreciable manganese exposures, it is hoped that novel biomarkers may be discovered which help identify the disease process at an early state as well as inform the underlying processes which ultimately lead to neurological dysfunction. The Zhang lab understands that in addition to improving treatments that address disease progression, their findings may also help identify those in the general population who may be more likely to experience negative health impacts from exposure to neurotoxicants like manganese.

A separate but intimately related component of Dr. Zhang’s research explores new and improved methods of biomarker discovery that offer a more practical and less costly approach to sample collection by using saliva rather than whole blood, plasma or spinal fluid.

What are neurotoxicants?
These are chemical compounds that can cause damage to the central nervous system in humans and other animals. Dr. Zhang’s research focuses on toxic effects of manganese exposure and the role this plays in parkinsonism, an incurable neurodegenerative disorder that affects several million people in the U.S.

How do neurotoxicants enter the environment?
Manganese is ubiquitous (present) in the environment and is an essential nutritional element for humans. However, manganese is toxic to the nervous system at high exposure concentrations. Manganese compounds are used in the production of steel, batteries and ceramics. Manganese can be found in our air as a combustion product of coal burning, mining and motor vehicle use.

What does this research have to do with Superfund site hazardous chemicals?
The Superfund is a federal program that was established to clean up the nation’s priority hazardous waste sites. The UW-SRP addresses a range of toxicants that include metals and pesticides. Manganese is a widespread contaminant in air, soil, and water and is found at many Superfund waste sites.

What is already being done to protect the environment?
Manganese compounds are listed on the 2005 Priority List of Hazardous Substances for the Comprehensive Environmental Response, Compensation, and Liability Act section 104 (i), as amended by the Superfund Amendments and Reauthorization Act. If you are interested in learning about manganese in your community please use this EPA website as a reference.


Linked resources for further information:
University of Washington Superfund Research Program: http://depts.washington.edu/sfund/
NIEHS Superfund Research Program: http://www.niehs.nih.gov/research/supported/srp/index.cfm
EPA Superfund sites information: http://www.epa.gov/superfund/sites
EPA summary of the Toxic Substances Control Act: http://www.epa.gov/lawsregs/laws/tsca.html
Michael J. Fox Foundation for Parkinson’s Research: https://www.michaeljfox.org/

*University of Washington Superfund Research Program