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Tuesday, February 7, 2012

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PENN STATE HERSHEY RESEARCHERS STUDY EFFECTS OF MANGANESE ON BRAIN

HERSHEY, PA— Penn State College of Medicine scientists are doing research that seeks to understand the effects of the metal manganese on brain functions. This research builds on the results of an earlier, smaller scale study that looked at welders.

“Exposure to manganese is widespread in the general population from gasoline additives and the burning of fossil fuels, but also is particularly concentrated in welding fumes,” said Xuemei Huang, M.D., Ph.D., professor of neurology and lead investigator. “At high levels of exposure, manganese is a well-known toxin, but at the same time it is also a mineral that at low concentrations is essential for life.”

There are many environmental factors that may cause toxic effect. “Research has indicated that environmental factors, including metals toxic to the neurological system, may play a role in the cause of neurobehavioral disorders,” Huang said. “Symptoms of overexposure to manganese can be similar to Parkinson’s disease.” In a preliminary study, Huang and colleagues looked at a small group of welders and found an association between exposure to manganese-containing metal fumes and decreased motor performance on a test for dexterity/fine motor control in the welders.

“Our prior study suggests that there is manganese accumulation in many other regions of the brain in welders who are showing no classic symptoms of overexposure,” she said. “Specifically, we’ve shown that manganese is in a part of the brain associated with smell, and suggests at least some of the manganese is getting into the brain through inhalation. We also showed manganese in the areas of the brain associated with motor control, which correlates to the decreased motor control we observed.”

The link between relatively low levels of manganese exposure and neurobehavioral damage has been suspected but difficult to test because of the difficulty of studying manganese deposits in the brain and how it relates to changes in function. Technical advances allowed Huang and her colleagues at Penn State, along with Michael Flynn, professor at University of North Carolina, to measure manganese in the brain and link it with a functional outcome--decreased motor skill. Now, they will seek to confirm these results in a larger population, and also do more extensive tests and analyses. "We hope that this study will lead to a better understanding of the role of the effect of environmental toxins on the brain and their role in the development of neurobehavioral disorders," Huang said.

The initial study was supported by National Institute of Environmental Sciences, with additional support from the National Institute of Neurological Disorders and Stroke; the Penn State General Clinical Research Center (now the Penn State Clinical and Translational Science Institute), and were published in the scientific journal Toxicological Sciences. The current study has received funding from the National Institute of Environmental Sciences.

For more information on the current study, call Melissa Santos, study coordinator, at 717-531-0003, x281277.

[Penn State College of Medicine](#), located on the campus of [Penn State Milton S. Hershey Medical Center](#) in Hershey, Pa., boasts a portfolio of more than \$105 million in funded research. Projects range from the development of artificial organs and advanced diagnostics to groundbreaking cancer treatments and understanding the fundamental causes of disease.