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Healthy Welders May Be at Increased Risk for Early Brain Damage

New research suggests that workers exposed to welding fumes may be at risk for developing brain damage in an area of the brain also affected in Parkinson's disease. The study is published in the April 6, 2011, online issue of Neurology®, the medical journal of the American Academy of Neurology.

Fumes produced by welding contain manganese. Manganese is a chemical element that, even at low levels, has been linked to neurologic problems, including Parkinson's disease-like symptoms.

"There are over one million workers who perform welding as part of their job functions in the United States," said Brad A. Racette, MD, with Washington University School of Medicine in St. Louis and a Fellow with the American Academy of Neurology. "If a link between neurotoxic effects and these fumes were proven, it would have a substantial public health impact for the U.S. workforce and economy."

The study involved 20 welders with no symptoms of Parkinson's disease, 20 people with Parkinson's disease who were not welders and 20 people who were not welders and did not have Parkinson's. The welders were recruited from two Midwest shipyards and one metal fabrication company. All participants were given brain PET and MRI scans, motor skills tests and examined by a neurologist who specializes in movement disorders. The welders had an average of 30,000 hours of lifetime welding exposure. Their average manganese levels were found to be two times the upper limits of normal.

Scientists found that welders had an average 11.7 percent reduction in a marker of dopamine in one area of the brain on PET scans as compared to people who did not weld. Dopamine is a chemical messenger that helps nerve cells communicate and is decreased in specific brain regions in

people with Parkinson's disease. The welders' motor skills test scores also showed mild movement difficulties that were about half of that found in the early Parkinson's disease patients.

"While these changes in the brain and dopamine dysfunction may be an early marker of neuron death related to welding exposure, the damage appeared to be different from those of people with full-fledged Parkinson's disease," said Racette. "MRI scans also revealed brain changes in welders that were consistent with manganese deposits in the brain."

"Although this study shows that these workers had dopamine dysfunction in the brain, the study authors could not determine whether this was specifically related to manganese," said W. R. Wayne Martin, MD, who wrote an accompanying editorial on the topic. Martin is with the University of Alberta in Edmonton, Alberta, Canada and a member of the American Academy of Neurology. "Will these individuals develop full-fledged Parkinson's disease? We can't answer that question based on the study but more research should be done to explore this possibility."

The study was supported by the Michael J. Fox Foundation, the National Institutes of Health, the American Parkinson Disease Association, Advanced Research Center at Washington University, the Great St. Louis Chapter of the ADPA, the McDonnell Center for Higher Brain Function and the Barnes-Jewish Hospital Foundation.