

# Current Evidence and Research Needs Regarding the Risk of Manganese-Induced Neurological Effects in Welders

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Received 4 July 2004; accepted 28 October 2004

Available online 8 December 2004

**Keywords:** Manganese; Welding; Occupational exposure; Risk assessment; Neurobehavioral; Neurotoxicity

Occupational exposure to elevated airborne levels of manganese (Mn) dust and fumes in mining and certain manufacturing settings (e.g., steel production) is associated with an increased risk of “manganism”—a pattern of clinical symptoms often characterized by speech disturbances, altered gait, balance problems, muscular rigidity, involuntary movements, and other neurological effects. In the past few years, questions have been raised regarding a possible causal association between neurological effects in welders and the use of Mn-containing consumables (e.g., electrodes and wires). While some researchers have suggested that the current clinical, toxicological, and epidemiological data do not support the existence of such a relationship, others have concluded that welding is not only a high-risk occupation for the development of manganism, but that it may also be a risk factor for, or can accelerate, the onset of Parkinson’s disease (PD). Indeed, a recent court decision concluded that a former welder developed PD as a result of exposure to Mn in welding fumes (*Elam v. Union Electric, 2003*). Several thousand lawsuits that allege neurological effects in

current or former welders, or occupational bystanders to welding operations, have been filed recently throughout the U.S. Clearly, this controversial topic is gaining momentum, and there are several critical risk assessment matters that will require interpretation by industrial hygienists, toxicologists, physicians, epidemiologists, and others.

In this commentary, we frame the scientific issues as “what is currently known” and “what additional information might be useful” to address the following questions: (1) Does sufficient dose–response information exist to provide plausible estimates of increased neurological risk as a function of Mn exposure in welders? (2) Are adequate data available to reconstruct or otherwise estimate Mn-related exposures for welders? (3) Is the Mn dose–response and welding exposure information consistent with the epidemiological studies of welders?