

# **Manganese Health Research Program: Recent published literature**

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# Introduction

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This report presents the bibliographic details of papers identified as being first published during the period December 2007 to February 2008.

The papers were selected because they address research areas that are considered of direct relevance to the health effects of manganese (Mn); in order to aid review, the papers are presented under the following categories:

**Section 1 - EXPOSURE MEASUREMENT AND MODELLING:** Papers relating to the measurements or modelling of environmental and occupational Mn exposure, the development of biomarkers of exposure or effect.

**Section 2 - HEALTH EFFECTS:** Papers on the influence of Mn on health, disease and dysfunction.

**Section 3 - MECHANISM:** Papers on the physiological, biochemical and cellular mechanisms underlying the toxic effects of Mn.

**Section 4 - HUMAN SUSCEPTIBILITY:** Papers relating to assessment of the influence of genetic and epigenetic factors on human susceptibility to the effects of Mn.

**Section 5 - TREATMENT AND IMAGING:** Papers on the development and implementation of new medical approaches to the treatment of excessive Mn exposure.

**Section 6 - MISCELLANEOUS:** Other papers considered of interest or potential relevance to the study of the health effects of Mn.

The papers presented herein were identified using a series of structured searches of the following on-line databases: Medline, Toxline, Biological Sciences and Proquest Health. The paper abstracts were reviewed and categorised by an experience Scientist to confirm their relevance before inclusion in this report.

# 1. EXPOSURE MEASUREMENT AND MODELLING

Ellingsen, D.G., Konstantinov, R., Bast-Pettersen, R., *et al.* (2008) A neurobehavioral study of current and former welders exposed to manganese. *NeuroToxicology*, 29(1), 48-59.

Halatek, T., Sinczuk-Walczak, H. & Rydzynski, K. (2008) Early neurotoxic effects of inhalation exposure to aluminum and/or manganese assessed by serum levels of phospholipid-binding Clara cells protein. *Journal of Environmental Science and Health- Part A*, 43(2), 118.

Michalke, B., Berthele, A., Mistriotis, P., *et al.* (2007) Manganese species from human serum, cerebrospinal fluid analyzed by size exclusion chromatography, capillary electrophoresis coupled to inductively coupled plasma mass spectrometry. *Journal of Trace Elements in Medicine and Biology*, 21(Suppl 1), 4-9.

Montes, S., Riojas-Rodríguez, H., Sabido-Pedraza, E., *et al.* (2008) Biomarkers of manganese exposure in a population living close to a mine and mineral processing plant in Mexico. *Environmental Research*, 106(1), 89-95.

Wang, D., Du, X. & Zheng, W. (2008) Alteration of saliva and serum concentrations of manganese, copper, zinc, cadmium and lead among career welders. *Toxicology Letters*, 176(1), 40-47.

## 2. HEALTH EFFECTS

Ellingsen, D.G., Konstantinov, R., Bast-Pettersen, R., *et al.* (2008) A neurobehavioral study of current and former welders exposed to manganese. *NeuroToxicology*, 29(1), 48-59.

Halatek, T., Sinczuk-Walczak, H. & Rydzynski, K. (2008) Early neurotoxic effects of inhalation exposure to aluminum and/or manganese assessed by serum levels of phospholipid-binding Clara cells protein. *Journal of Environmental Science and Health - Part A*, 43(2), 118.

Huang, C-C. (2007) Parkinsonism induced by chronic manganese intoxication-an experience in Taiwan. *Chang Gung Medical Journal*, 30(5), 385-395.

Mašánová, V., Mitrova, E., Ursinyova, M., *et al.* (2007) Manganese and copper imbalance in the food chain constituents in relation to Creutzfeldt-Jakob disease. *International Journal of Environmental Health Research*, 17(6), 419.

Sahni, V., Leger, Y., Panaro, L., *et al.* (2007) Case report: A metabolic disorder presenting as pediatric manganism. *Environmental Health Perspectives*, 115(12), 1776-1779.

Wang, L., Luo, C.-. & Liu, Z.-. (2007) Association between manganese exposure and neurobehavior of children. *Chinese Journal of Public Health -Shenyang-*, 23(11), 1309-1310.

Wasserman, G.A., Liu, X., Factor-Litvak, P., *et al.* (2008) Developmental impacts of heavy metals and undernutrition. *Basic & Clinical Pharmacology & Toxicology*, 102(2), 212-217

### 3. MECHANISM

Cai, T., Yao, T., Li, Y., *et al.* (2007) Proteasome inhibition is associated with manganese-induced oxidative injury in PC12 cells. *Brain Research*, 1185, 359-365.

Crittenden, P.L. & Filipov, N.M. (2008) Manganese-induced potentiation of in vitro proinflammatory cytokine production by activated microglial cells is associated with persistent activation of p38 MAPK. *Toxicology in Vitro*, 22(1), 18-27.

Hirata, Y., Suzuno, H., Tsuruta, T., *et al.* (2008) The role of dopamine transporter in selective toxicity of manganese and rotenone. *Toxicology*, 244(2-3), 249-256.

Morello, M., Canini, A., Mattioli, P., *et al.* (2008) Sub-cellular localization of manganese in the basal ganglia of normal and manganese-treated rats: An electron spectroscopy imaging and electron energy-loss spectroscopy study. *NeuroToxicology*, 29(1), 60-72.

Tamm, C., Sabri, F. & Ceccatelli, S. (2008) Mitochondrial-mediated apoptosis in neural stem cells exposed to manganese. *Toxicological Sciences*, 101(2), 310-320.

Tjalkens, R.B., Liu, X., Mohl, B., *et al.* (2008) The peroxisome proliferator-activated receptor- $\gamma$  agonist 1,1-bis(3'-indolyl)-1-(p-trifluoromethylphenyl)methane suppresses manganese-induced production of nitric oxide in astrocytes and inhibits apoptosis in cocultured PC12 cells. *Journal of Neuroscience Research*, 86(3), 618-629.

Wu, S., Guo, S., Qin, X., *et al.* (2007) [Effect of manganese on apoptosis in striatum neurons of rats]. *Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi = Zhonghua Laodong Weisheng Zhiyebing Zazhi (Chinese Journal of Industrial Hygiene and Occupational Diseases)*, 25(11), 657-659.

Xu, Z., Xu, B. & He, A. (2007) Effects of sodium selenite and N-acetylcysteine in oxidative damage of rat induced by manganese. *Industrial Health and Occupational Diseases -Beijing-*, 33(6), 321-324.

## 4. HUMAN SUSCEPTIBILITY

Mašánová, V., Mitrova, E., Ursinyova, M., *et al.* (2007) Manganese and copper imbalance in the food chain constituents in relation to Creutzfeldt-Jakob disease. *International Journal of Environmental Health Research*, 17(6), 419.

## 5. TREATMENT AND IMAGING

Agarwal, G.S., Sharma, R. & Bhatnagar, V. (2008) Assessment of latent manganese toxicity as a prognostic factor following surgery for biliary atresia. *Zeitschrift Fur Kinderchirurgie (European Journal of Pediatric Surgery)*, 18(1), 22-25.

## 6. MISCELLANEOUS

Wright, R.O. & Baccarelli, A. (2007) Metals and neurotoxicology. *Journal of Nutrition*, 137(12), 2809-2813.