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Manganese biomonitoring for assessment of exposure to airborne manganese in foundry plants

Seyedtaghi Mirmohammadi

Mazandaran University of Medical Science, Iran

Manganese (Mn) is used as raw material for melting process in ferrous foundry and it is considered as a hazardous neurotoxic substance. The furnace-men and melting department workers are potentially exposed to manganese particles or fume in the workplace which accumulates in their central nervous system and neurological disorder observed for exposed workers. The objective of the research was to investigate the sources and levels of manganese exposure in the foundry by correlation of blood-manganese (B-Mn) and air-manganese (air-Mn) measurement. Air-Mn and B-Mn were measured involving workers (case=35, control=35) who worked in a big size foundry during one year. The standard method of OSHA-ID121 was used for air and blood assessment and atomic absorption spectroscopy (AAS) was carried out for air and blood sample analysis. The air sampling results revealed that there is a high exposure to manganese (4.5 mg/m^3) in the workplace compared to NIOSH time weighted average (Reference TWA=1 mg/m³). The average blood Mn concentration were 2.745 and 274.85 $\mu\text{g/l}$ for less than three months (n=35) and 3-12 months working experience (n=35), respectively; it implies that there is a high accumulation of manganese in their blood. Risk assessment based on mutual evaluations of B-Mn and air-Mn seems to be valid in the understanding of workers' hazard. Our study indicates that B-Mn assessment by AAS may be a precious procedure for estimation of exposure condition based on working experience (more than 3 months).

Biography

Seyedtaghi Mirmohammadi has earned his PhD degree in Environmental Technology (Indoor Air Pollution) from University Science Malaysia, Malaysia (2010). He is Assistant Professor at Mazandaran University of Medical Sciences, Department of Occupational Health in Iran. He served as Deputy Dean for Health Affairs (7/2010-11/2011), University Chancellor Consultant for Toxicants Safety (/52010-9/2012). He published more than 20 refereed papers by peer reviewed journals. His research interests are air quality control modeling, toxicology and human exposure, indoor air pollution assessment, indoor air analyzing and control, particle technology. He currently guides several postgraduate students.

seyedtaghim@gmail.com

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