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Manganese Distribution in Brains of Sprague Dawley Rats after 60 Days of Stainless Steel Welding-Fume Exposure

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Welders working in athe confined space, like in the shipbuilding industry, arehave at risk of being exposed toing a high concentrations of welding fumes and of developing pneumoconiosis or other welding- fume exposure related diseases. Among such diseasesthem, manganism resulting fromcaused by welding- fume exposure remains ais still controversial issue, as the movement ofnd no clear demonstration of manganese movement into the specific brain regions has not been clearly established. Accordingly, tTo investigate the distribution of manganese in the brain after welding- fume exposure, male Sprague Dawley rats were exposed to welding fumes generated from manual metal arc stainless steel (MMA-SS) atwere exposed to male Sprague Dawley rats with concentrations of 63.6 4.1 mg/m³ (low dose, containing 1.6 mg/m³ Mn) and 107.1 6.3 mg/m³ (high dose, containing 3.5 mg/m³ Mn) total suspended particulates for 2 hrs per day, in an inhalation chamber overfor a90 60-day periods. BBlood, brain, lungs and liver samples were collected aftert the end of 2hr1,. 15, 30, and 60 days of exposure, and the tissues were analyzed for theirmanganese concentrations using anbyatomic absorption spectrophotometer. Although there were dose- and time-dependent increases in theof manganese concentrations were found in the lungs and livers of the exposed rats exposed forduring 60 days of exposure, only slight manganese increases were observed in the blood during this exposure period. Major statistically significant increases in theof brain manganese concentrations in the brain were detected in the cerebellum after 15 days of exposure and up until -60 days of exposure. SThere were slight increases in theof manganese concentrations were also foundin the substantia nigra, basal ganglia (caudate nucleus, putamen,and globus pallidus), temporal cortex, and frontal cortex, thereby. This result indicasuggestings that the pharmacokinetics and distribution of inhaled manganese inhaled from in the welding fumes would appear to be are different from those resulting fromof manganese-only exposures.