

90 DAY INHALATION STUDY OF STAINLESS STEEL WELDING FUME IN SPRAGUE DAWLEY RATS

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In order to investigate welding fume exposure related occupational diseases such as nasal septum perforation, pneumoconiosis and manganese intoxication, welding fume exposure system including welding fume generator, exposure chamber and fume collector were built. Then the welding fume exposure system was monitored and validated. After an acute inhalation toxicity study, welding fume generated from stainless steel arc welding was exposed to male Sprague Dawley rats. The rats were exposed to the welding fume with approximately 70-80 mg/m³ for 2 hrs in an inhalation chamber. Animals were sacrificed at 0, 14, 30, 60 and 90 days after initial exposure. Upper respiratory tract including nasal pathway, conducting airway, and gas exchange region including alveolar ducts, alveolar sacs and alveoli were investigated through histopathological examinations. The organ distribution of major metals including Mn, Cr, Fe, and Ni was measured in the blood, liver, testis, brain, kidney, and lung. The fume particles had various in their diameters ranging from 0.02 - 0.81 μ m and were distributed log normally with average diameter and geometric mean of 0.1 \pm 1.42. The average diameter 0.1 μ m resulted in fewer adsorptions of the welding fume particles in the upper respiratory tract. The major sites for particle adsorption and deposition were the lower respiratory tracts including the bronchioles, alveolar ducts, alveolar sacs, and alveoli. No significant Mn increase was observed in the various organs during 90 day exposure of welding fume. We could not find any welding fume exposure related pathological lesion in the nasal region. The histopathological evaluation of the lower respiratory region will be continued.

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