

【P-25】

Recovery of Anemia from Iron Deficient Animals After Exposing Mixed Metal Fine Particles of Welding Fume

Jae Hyuck Sung^{1,3}, Jung-Duck Park², Jeong Hee Han^{1,3}, Ki-Young Kim², Dong-Won Kim²,
Sung-Jin Choi², Yong Hyun Chung¹, Myung-Haing Cho³, Young-Kyu Park¹, Il Je Yu¹

*¹Center for Occupational Toxicology, Occupational Safety & Health Research Institute,
Daejeon, Korea*

IDA (iron deficient anemia) is a very late manifestation of iron deficiency. Anemia does not develop until storage iron is exhausted. Among various components of welding fumes, iron oxide would appear to cause pneumoconiosis (called siderosis), a prominently abnormal pulmonary function attributable to welding-fume exposure. The rats were fed an Fe-sufficient (FeS) diet (120mg Fe/kg, Harlan Teklad) and an Fe-deficient (FeD) diet (2-6mg Fe/kg, Harlan Teklad) to induce the iron deficiency. To investigate the recovery of IDA using the IDA induced animals, groups of male Sprague-Dawley rats were exposed to manual metal arc-stainless steel (MMA-SS) welding fumes with concentrations of 63.5 ± 2.3 mg/m³ total suspended particulates for 2 hr/day, 5 day/week in an inhalation chamber for 1, 15 and 30 days. And we estimated the change of body and lung weight, pulmonary function with whole body plethysmograph compensated (WBP Comp, SFT38116, Buxco Electronics, Sharon, CT), and the change of red blood cell (RBC) index and RBC shape. The body weight and lung weight in welding fume-exposed the FeD groups increased significantly ($p < 0.01$), but tidal volume decreased significantly ($p < 0.01$) in the pulmonary function test. And the shape and index of RBC were recovered to normal state after 15 days exposure of welding fume. Therefore, the results of the current study suggests that the iron in the welding fume could easily be transported to systemic blood circulation across alveolar cells to capillary of interalveolar septum after exposure of the welding fume.

Keyword: welding fume, iron, iron deficiency, tidal volume, red blood cell