



# Exposure Assessment for Workers at Antimony Industry in Taiwan and the Association with Immunologic Function

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## Abstract

### Background.

Antimony exposure has been associated with the compensatory activation of immune function. Studies have rarely investigated this association for industrial workers with exposure to the chemical at work.

### Aims.

This study investigated antimony exposure among workers at manufacturing industries in Taiwan and the relationship between antimony exposure and immunologic function.

### Methods.

A total of 133 male workers, including 41 administrative workers, were recruited from two glass manufacturing plants, one antimony smelting and two engineering plastic plants. Air samples were collected at worksites. Each participant provided specimens of urine, blood and hair for the assay of Sb, and As, Pb and Cd as well. IgA, IgE and IgG in blood specimens were determined.

### Results.

The mean antimony concentrations in air at the antimony smelting operation ( $1.05 \text{ mg/m}^3$ ) and in blood ( $2.81 \pm 0.42 \text{ } \mu\text{g/l}$ ), urine ( $7.84 \pm 3.15 \text{ } \mu\text{g/g Cre}$ ) and hair ( $0.22 \pm 0.15 \text{ } \mu\text{g/g}$ ) samples of the workers were significantly higher than those associated with engineering plastics manufacturing and glass manufacturing plants. The Sb concentrations in worksites air samples at the antimony trioxide manufacturing factory was 2.1-fold of the TWA-PEL level of  $0.5 \text{ mg/m}^3$ . Glass manufacturing workers had a higher exposure to As in the air, with significantly higher mean As levels in their blood, urine and hair samples. They also had significantly higher Cd exposure from the air with higher cadmium in urine and higher Pb in blood, urine and hair.

However, we failed to find significant associations between the immunologic function and antimony exposure levels for workers.

### Conclusions.

Higher Sb exposure was found for workers at the antimony trioxide manufacturing factory. But, the exposure is not high enough to alter immunologic function.

### Key words:

Antimony exposure, antimony trioxide manufacturing, engineering plastics manufacturing, glass manufacturing, immunologic function. (NSC99-2314-B039-032-MY2.)

Exposure of Sb for Workers at Industries				
Industry	Air, $\text{mg/m}^3$	Blood, $\mu\text{g/l}$	Urine, $\mu\text{g/g Cre}$	Hair, $\mu\text{g/g}$
Glass (N=55)	$0.14 \pm 0.01$	$0.78 \pm 0.21$	$5.60 \pm 1.24$	$0.10 \pm 0.01$
Sb <sub>2</sub> O <sub>3</sub> Plants	$2.51 \pm 0.57$	$3.88 \pm 1.10$	$27.2 \pm 6.00$	$5.66 \pm 3.66$
Plastics	$0.21 \pm 0.06$	$2.17 \pm 0.48$	$7.48 \pm 1.30$	$0.32 \pm 0.05$
p-value	<0.001	<0.001	<0.001	<0.001