

中文題目：重金屬與白細胞和嗜酸性粒細胞計數之間的關聯和交互作用

英文題目：Associations and Interactions between Heavy Metals with White Blood Cell and Eosinophil Count

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**Background:** The concentration standards of heavy metals in the body and the health hazards caused when exceeding them. In some studies (non-humans), it can be seen that the accumulation of heavy metals is actually related to the increase in immune response. The aim of this study was to investigate the associations among heavy metals and white blood cell (WBC) and eosinophil count in the general population in Southern Taiwan. We also explored the interaction and synergetic effects among heavy metals on WBC and eosinophil count.

**Materials and Methods:** We conducted a health survey in the general population living in Southern Taiwan between June 2016 and September 2018. Seven heavy metals were measured: blood lead (Pb), urine nickel (Ni), urine chromium (Cr), urine manganese (Mn), urine arsenic (As), urine copper (Cu), and urine cadmium (Cd).

**Results:** A total of 2,447 participants was enrolled. After multivariable adjustment, the participants with high Pb (log per 1 mg/L; coefficient  $\beta$ , 0.332;  $p = 0.005$ ) and high Cu (log per 1  $\mu\text{g}/\text{dL}$ ; coefficient  $\beta$ , 0.476;  $p < 0.001$ ) were significantly associated with high WBC. The participants with high Pb (log per 1 mg/L; coefficient  $\beta$ , 0.732;  $p < 0.001$ ), high As (log per 1  $\mu\text{g}/\text{L}$ ; coefficient  $\beta$ , 0.133;  $p = 0.015$ ), high Cu (log per 1  $\mu\text{g}/\text{dL}$ ; coefficient  $\beta$ , 0.181;  $p = 0.018$ ), and high Cd (log per 1  $\mu\text{g}/\text{L}$ ; coefficient  $\beta$ , 0.139;  $p = 0.002$ ) were significantly associated with high eosinophil count. Further, the interactions between Pb and As (coefficient  $\beta$ , 0.721;  $p = 0.029$ ) and Mn and Cu on WBC (coefficient  $\beta$ , 0.482;  $p = 0.018$ ), and As and Cu (unstandardized coefficient  $\beta$ , 0.558;  $p = 0.002$ ) on eosinophil count was statistically significant.

**Conclusions:** In conclusion, we observed that heavy metals with Pb, As, Cu, and Cd were associated with WBC and eosinophil count. Synergistic effects of Pb and As and Mn and Cu on the association with WBC, and As and Cu on the association with eosinophil count were observed.

**Key words:** heavy metals, white blood cell, eosinophil count, interaction