Abstract:

Humans are simultaneously exposed to aluminum and other metals, whose interaction may elicit different adverse health effects than exposure to Al alone. Therefore, the aim of this cross-sectional study was to analyze the association of Al-metal interactions with olfactory and cognitive test performance. The interaction of fingernail Al with fingernail copper (Cu), manganese (Mn), lead (Pb), or zinc (Zn) was assessed among 56 ferroalloy and manufacturing male workers from Zunyi, China. Olfactory function was assessed with the University of Pennsylvania Smell Identification Test and cognitive function was assessed with the WHO/UCLA Auditory Verbal Learning Test (AVLT). Metal concentrations were determined using ICP-MS and demographic information was self-reported through a questionnaire. Median (interquartile range (IQR)) fingernail values were: 60.1 µg/g (IQR=63.7) Al; 26.4 µg/g (IQR=53.9) Cu; 72.2 µg/g (IQR=162.5) Mn; 3.4 µg/g (IQR=3.2) Pb and 178.5 µg/g (IQR=54.4) Zn. Linear regression models controlled for age, education, current alcohol consumption, current smoking status, and the other metals. For non-interaction term models, higher Mn was associated with lower performance on four AVLT measures, as reported previously; higher Zn was associated with lower performance for AVLT difference. The interaction term for Al and Zn was associated with higher cognitive performance on AVLT trial 1 ($\beta = 2$, 95% confidence interval (CI)=[0.07, 3.93]), AVLT trial 5 ($\beta = 2.71$, 95% CI=[0.02, 5.41]) and AVLT average ($\beta = 2.11$, 95% CI=[0.01, 4.21]). No other interactions were statistically significant. These results suggest that the interaction of Al and Zn may have a protective effect on cognitive function; however, larger studies are needed to confirm these results.

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