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LETTER TO THE EDITOR

Copper-zinc imbalance and renal tubular damage in a population of chronic environmental cadmium exposure

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Eom et al. (2020) conducted a cross-sectional study to assess the relationship between environmental cadmium (Cd) exposure, copper–zinc imbalance and renal tubular damage in inhabitants living in a Cd-polluted area. The geometric mean of urinary Cd was 2.25 µg/g creatinine, and 2 µg/g creatinine was used for the cut-off point of binary Cd exposure classification. The risk of renal tubular damage was significantly associated with urinary Cd level, particularly in the lowest or highest serum copper-to-zinc ratio (CZR) tertile groups. I have some concerns about their study.

First, the authors cannot evaluate the causal association, and they presented the association between Cd exposure and renal tubular damage with special reference to the level of serum CZR.

Second, the authors used serum CZR as a determinant of oxidative stress markers. Oxidative stress is one of the causes for Cd-induced nephrotoxicity. Cadmium is transported to renal proximal tubules by binding to specific substances, such as metallothioneins and glutathione. Thereafter, increase of reactive oxygen species (ROS) becomes a trigger of DNA damage and mitochondrial dysfunction, which will lead to apoptosis of renal proximal tubules. Unfortunately, there exist no clear evidence on the association between ROS, low levels Cd exposure and nephrotoxicity in human (Liu et al. 2009). Interactions of several heavy metals might exist in a Cd-polluted population, and relationship between CZR and several oxidative stress markers should be specified by further study.

Regarding the second query, I reported the multiple metal exposures and renal effect with special reference to their magnitude of contribution (Kawada 2014). I speculate that sex and age might contribute to the inter-relationship among Cd exposure, copper–zinc imbalance and renal tubular damage. Stratified analysis by sex and age is required to verify the association.

References

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