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The Antagonistic Effect of Selenium on Lead Toxicity Is Related to the Ion Profile in Chicken Liver

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Abstract

The interactions between the essential element selenium (Se) and the toxic element lead (Pb) have been reported extensively; however, limited data are available regarding the effects of Se on Pb and the ion profile in chicken liver. Whether the change in the ion profile was involved in the protective process of Se and the toxic effect of Pb is unknown. In the present study, we detected 26 ion profiles (including those of Na, Mg, K, Ca, B, Si, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Se, Mo, Sb, Ba, Tl, Li, Al, As, Cd, Sn, Hg, and Pb) in chicken liver following treatment with Se or Pb and with the compound treatment of Se and Pb. The results showed that Se supplementation decreased the content of B and Cr and increased that of Zn and Ba ($P < 0.05$); however, Pb exposure decreased Cr, Mn, Cu, Se, Mo, and Hg and increased V, Fe, Cd, and Sn ($P < 0.05$). The results showed that Se and Pb

primarily influenced essential microelements and toxic microelements in the chicken liver. In this process, Se alleviated the increased Cd and Pb induced by Pb exposure but aggravated the decreased Cu and Mn. The results also indicated that there existed both synergistic and antagonistic interactions between different ions, further verifying the principal component analysis. Thus, the results showed that prolonged exposure to Se and Pb influences the ion profiles in chicken liver. The protective role of Se and toxic effect of Pb may be related to these changing ion profiles in chicken liver.

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All authors have read the manuscript and have agreed to submit it in its current form for consideration for publication in the Journal.

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