

An Analysis of the Mechanism behind the Effect of Zinc Deficiency on Salt Preference

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Summary

Because of habitual problems of an unbalanced diet, or the zinc-chelating effect of certain kinds of drugs, the number of individuals suspected to be suffering marginal zinc deficiency is suggested to be increasing. Zinc deficiency causes to anorexia, growth retardation, epilation, and hypogeusia. It has also been suggested that zinc deficiency rapidly triggers salt preference, however, the mechanism has not been well elucidated. We reported previously that the NaCl preference suddenly increased on day 4 in the zinc deficient and low-zinc rats, and peripheral nerve responses to NaCl solutions are normal at such early stages of zinc deficiency, suggesting that decreased taste sensitivity to salt is not the cause for the early onset of salt preferences. We also found that blood pressures, hematocrit, plasma Na⁺ and K⁺ concentrations are not significantly changed at the early stage of zinc deficiency. In the first-year report of this study, we demonstrated that zinc deficiency causes to decrease plasma calcium concentrations prior to an increase of the plasma parathyroid hormone. However, the timing of the change of plasma calcium concentrations was not well corresponding to the early onset of salt preferences, suggesting that marginal calcium deficiency caused by zinc deficiency is not associated with the triggering mechanism of salt preferences. We next tried to focus on the effect of aldosterone, however, plasma concentrations of aldosterone and urinary potassium excretion of zinc deficient rats were not significantly different to those of pair-fed rats. On the contrary, the urinary sodium excretion of zinc deficient rats was significantly reduced to that of pair-fed rats. We suspected that oxytocin, a hormone known to stimulate sodium excretion, may be involved in the process, and found that the plasma oxytocin concentration of zinc deficient rats was significantly reduced to that of pair-fed rats, suggesting that reduced oxytocin secretion may be involved in the early onset of salt preferences caused by zinc deficiency.