

A Theoretical Model for Zn Homeostasis by the Intake of Phytate or Calcium in Marginal Zn-Deficient Rats

In-Sook Kwun, Dept. of Food and Nutrition, College of Human Ecology, Andong National University

The marginal Zn-deficiency is prevalent through the whole ranges of the populations. A theoretical model was available to describe zinc homeostasis that is affected by the intake of phytate and/or calcium diet, which are considered the antagonists for the Zn absorption/reabsorption, in marginal Zn-deficient rats. In addition, the pancreatic/biliary (P/B) fluid, the main endogenous Zn secretion, was analyzed. Sprague-Dawley rats were fed a casein-based diet with added phytate containing either high or low Ca for 4 weeks to deplete the body Zn pool. After depletion, animals were reallocated by weight to phytate or non-phytate diets within their respective Ca level. 370 kBq ⁶⁵Zn was injected IP to label the endogenous pool. Feces were collected for 3 wks (2 wks of the initial collection and 1 wk after dietary crossover). At termination, common bile duct was cannulated and P/B fluid was collected. Flow rate of P/B fluid was 0.71 mL/h for high Ca and 0.58 mL/h for low Ca. Total P/B fluid Zn by AAS was 0.43 μg/mL for high Ca and 0.38 μg/mL for low Ca. Total P/B fluid Zn for the phytate group was 0.59 μg/mL and 0.27 μg/mL for the non-phytate group. ⁶⁵Zn radioactivity was 859 Bq/mL in the phytate group and 419 Bq/mL for the non-phytate group. By using calculated means of the concentration of the dietary Zn, Pancreatic Zn, and absorbed/excreted Zn, Zn homeostasis was maintained with the phytate or calcium effect in marginal Zn-deficient rats.