

## SELENIUM IN THE DIET OF PKU CHILDREN: THE PROBLEM OF SUPPLEMENTATION

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Low levels of blood selenium and glutathione peroxidase activity have been reported (McKenzie et al. 1978; Lombeck et al. 1980) in children receiving a low phenylalanine diet for the treatment of phenylketonuria (PKU). Low levels of intake of Se by PKU children compared to the controls have also been reported (Lombeck et al. 1984; Gropper et al. 1988).

A study carried out at the Royal Children's Hospital, Brisbane found that mean ( $\pm$  s.d.) plasma Se in 20 PKU children was  $0.41 \pm 0.19$   $\mu\text{mol/l}$  (range 0.14 - 0.77) and red cell glutathione peroxidase  $14.25 \pm 5.54$  IU/g Hb (range 7.9 - 27.8), compared with  $0.98 \pm 0.15$   $\mu\text{mol/l}$  (range 0.83 - 1.29) and  $22.65 \pm 5.22$  IU/g Hb (range 14.3 - 32.0) respectively in 20 siblings. These differences were significant ( $P < 0.0001$ ) as were the mean urine Se values between the two groups ( $P < 0.0001$ ). Mean ( $\pm$  s.d.) urine Se in 11 PKU children was  $55.1 \pm 35.1$  nmol/day (range 25.9 - 84.0), compared with  $167.7 \pm 72.7$  nmol/day (range 65.7 - 324.5) in 15 siblings. No significant difference has been found for any other trace elements measured.

Three day weighed dietary intakes were recorded and food samples taken for analysis. The mean ( $\pm$  s.d.) intake of Se by 10 PKU children was  $7.7 \pm 2.0$   $\mu\text{g/day}$  (range 4.6 - 9.6), compared with  $36.6 \pm 10.0$   $\mu\text{g/day}$  (range 21.7-53.8) in 10 siblings. This difference is also significant for the two groups ( $P < 0.0001$ ). This difference is reflected in the differences in intake of whole protein foods by the two groups. The principal sources of Se for PKU children were vegetables, fruit and in only a few cases, cereals. Cereals have been found to contain relatively large amounts of Se. In the diet of siblings, Se was mainly supplied by whole protein foods, especially meat, and cereals. These must be restricted in the PKU diet because of their high phenylalanine content. The proposed Australian selenium RDI for children is 25-85  $\mu\text{g}$ .

Further analysis of foodstuffs will provide more information on Se sources in the diet and hopefully will be used to develop a strategy for improving intake without having to use a Se supplement. This is important since Se becomes highly toxic at relatively low levels and consequently when used in supplements requires considerable caution.

- GROPPER, S.S., ACOSTA, P.B., CLARKE-SHEEHAN, N., WENZ, E., CHENG, M. and KOCH, R. (1988). J. Am. Diet. Assoc. **88** (4): 459.
- LOMBECK, I., EBERT, K.H., KASPEREK, K., FEINENDEGEN, L.E. and BREMNER, H.J. (1984). Eur. J. Pediat. **143**: 99.
- LOMBECK, I., KASPEREK, K., BACHMANN, D., FEINENDEGEN, L.E. and BREMNER, H.J. (1980). Eur. J. Pediat. **134**: 65.
- McKENZIE, R.L., REA, H.M., THOMSON, C.D. and ROBINSON, M.F. (1978). Am. J. Clin. Nutr. **31**: 1413.

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