

URINARY SELENIUM IN PRETERM INFANTS

Effect of Inorganic Versus Organic Selenium Intake

L. A. Daniels, R. A. Gibson, and K. Simmer

Flinders University of South Australia
Adelaide, South Australia
Australia

In adults urinary Se has been used to assess Se status as there is a strong correlation between Se intake and urinary excretion. However, supplementation with inorganic selenite results in higher urinary excretion than organic Se, which is the form in infant formulae and breast milk. There is recent evidence that urinary Se excretion in preterm infants is not directly related to renal function infants and hence may also be a useful indicator of Se status in these infants. However, there is very little data available on urinary Se in infants. The aim of this paper is to assess the effect of organic versus inorganic exogenous Se on Se excretion and evaluate the utility of urinary Se as an indicator of Se status in preterm infants.

Plasma and urine Se (single void sample) in preterm infants were measured between days 1–5 and then weekly until discharge. Standard parenteral nutrition (negligible Se) was used for 19 infants (PN + 0) (15 males, mean \pm SD gestational age 28 ± 2 weeks). Additionally, PN supplemented with selenite (inorganic Se) at 3 (PN + 3) and 6 (PN + 6) $\mu\text{g}/\text{kg}/\text{day}$ was used for 19 (8 males; 29 ± 2 weeks;) and 8 (5 males; 29 ± 2 weeks;) infants respectively. All infants were graded from PN to standard preterm formulae (3–8 $\mu\text{g}/\text{l}$) and/or breast milk (13 $\mu\text{g}/\text{l}$). Average daily Se intake over each week was determined.

For the PN + 0 group urine Se declined ($p < 0.01$) over the first 6 weeks despite increasing organic Se intake (0.2 to 1.5 $\mu\text{g}/\text{kg}/\text{day}$). There was also a net decline ($p < 0.05$) in urine Se over the same period in both the supplemented groups. At each of the first five weeks urinary Se losses in the PN + 6 group were greater than those for the PN + 3 group which in turn were greater than in the PN + 0 group. There was a significant increase in plasma Se ($p < 0.0001$) for the PN + 6 group over the first 6 weeks compared with no change in the PN + 3 group and a decline ($p < 0.001$) in the PN + 0 group. At week 6, when Se intakes were the organic form as PN use was minimal, there was no difference in urine Se between the three groups despite significant differences in intake (PN + 0 = 1.6 ± 0.6 , PN + 3 = 2.0 ± 0.6 and PN + 6 = $3.0 \pm 1.3 \mu\text{g}/\text{kg}/\text{day}$; $p < 0.05$).

Organic Se intake showed a weak relationship ($r = 0.3$ to 0.5) with plasma Se but none with urine Se and there was no relationship between the latter parameters.

These data indicate that urinary Se is substantially influenced by the form of Se intake and the intake of inorganic but not organic Se. In conclusion, the relationship between urinary, dietary and plasma Se in preterm infants appears to be different to that in adults and requires further study before urinary Se can be recommended as a useful indicator of Se status in preterm infants.