

## Concurrent Session 11: Trace Elements I

### The bioavailability of selenium in Brazil nuts

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**Background** – There is growing evidence to suggest that higher than recommended dietary intakes of selenium (Se) confer additional health benefits (1), and many individuals are interested in supplementing their diet. Brazil nuts are the richest known natural food source of Se, yet no studies have investigated their efficacy in humans in raising Se status.

**Objective** – To assess the efficacy of Brazil nuts in increasing Se status in comparison to a selenomethionine (SeMet) supplement and a placebo, as measured by the response of plasma Se and glutathione peroxidase (GPx) activity in plasma and whole blood.

**Design** – A semi-blinded, placebo controlled trial was conducted with 56 healthy Dunedin adults (18-60 yr) with low Se status. Participants consumed two Brazil nuts containing an estimated 100µg Se, 100µg Se as SeMet, or a placebo tablet (Alaron Products Ltd, Nelson), daily for 12 weeks. Because of a large range in Se concentrations in Brazil nuts, the intake for the nuts averaged 79 µg/day with a possible range of 50-105 µg. Fasting, morning blood samples were taken at baseline, weeks 2, 4, 8 and 12 for measurement of plasma Se and plasma and whole blood GPx activities. The effects of the three treatments were compared using a random effects model (STATA 8.2), adjusting for baseline values, age, sex and BMI.

**Results** – Mean (SD) baseline plasma Se concentrations were 90 (13), 92 (14) and 89 (14) µg/L in the Brazil nut, SeMet supplemented and placebo groups, respectively. Plasma Se increased by 67.9% ( $p<0.001$ ), 73.1% ( $p<0.001$ ), and 6.9% ( $p=0.117$ ) in the three groups. Changes in plasma Se over time in the Brazil nut and SeMet groups differed significantly from the placebo group ( $p<0.0001$ ), but not from each other ( $P=0.301$ ). Whole blood GPx activity increased by 12.6% ( $p<0.001$ ), 6.4% ( $p=0.005$ ), and 1.4% ( $p=0.478$ ) in the three groups, respectively. The change in whole blood GPx activity was greater in the Brazil nut group than placebo group ( $p<0.001$ ), but did not differ between SeMet and placebo groups ( $p=0.102$ ). The change was greater in both the Brazil nut than the SeMet group, but the difference was not significant ( $p=0.087$ ). Plasma GPx activity decreased by 4.0% ( $p=0.165$ ) in the placebo group and increased by 12.1% ( $p<0.001$ ) and 6.4% ( $p<0.01$ ) in the Brazil nut and SeMet groups, respectively. The change was greater in both Brazil nut and SeMet groups than the placebo group ( $p<0.001$ ), but did not differ from each other ( $p=0.165$ ).

**Conclusions** – Consumption of two Brazil nuts daily is at least as efficacious at increasing Se status and enhancing GPx activity, as is a 100 µg Se SeMet supplement. This was in spite of lower average Se intake from the nuts. It is possible, therefore, that Se from Brazil nuts is more bioavailable for GPx synthesis than is SeMet. Although SeMet is probably the major form of Se in Brazil nuts (2), uncharacterized Se species in Brazil nuts may be more bioavailable. In view of the increasing interest in possible health benefits of higher Se intakes, Brazil nuts are a convenient source of Se to increase Se status of New Zealanders. A simple public health message to consume this high-Se food would avoid the need for fortification of foods or for expensive supplements.

### References

1. Thomson CD. Assessment of requirements for selenium and adequacy of selenium status: a review. *Eur J Clin Nutr* 2004;58:391-402.
2. Vonderheide AP, Wrobel K, Kannamkumarath SS, B'Hymer C, Montes-Bayon M, Ponce de Leon C, JA Caruso. Characterization of selenium species in Brazil Nuts by HPLC-ICP-MS and ES-MS. *J Agric Food Chem* 2002;50:5722-5728.