SELENIUM INTAKE OF AUSTRALIAN BREAST FED INFANTS

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A series of 20 mother-infant pairs were studied in Brisbane, Australia at 6–12 weeks post-partum. Mean breast milk selenium concentration (± SD) was 11.9 ± 3.5 ng/g; infants' mean 24 hour selenium intakes (± SD) were 10.7 ± 4.1 µg. Mean selenium concentration in material blood was 101 (± SD 19) ng/g and in material serum 81 (± 15) ng/g.

INTRODUCTION

Selenium has been recognized as a trace element essential for health in animals since 1957, when SCHWARZ and FOLTZ reported that traces of selenium prevented liver necrosis in vitamin E deficient rats\(^1\). Low selenium intake in humans has since been associated with a number of clinical manifestations, in particular with Keshan disease, an endemic cardiomyopathy that has been recognized in China for more than a century\(^2\).

Young mammals are born with limited stores of selenium, and their growth rate is high during the first few months of life\(^3\). Hence, an adequate dietary intake of selenium is necessary for satisfactory infant growth and development. During the first four to six months of human life, breast milk is often the sole source of the infant's nutrition. However, only limited data are available on the transfer of selenium from mother to infant during lactation.

The aim of this Australian study was to estimate the dietary intake of selenium in fully breast fed infants. We also aimed to
determine (total) selenium concentration in breast milk and in maternal blood. Such investigations were desirable in view of the almost total lack of relevant data in Australia, a country where the prevalence of breast feeding is relatively high.

Eighty-five percent of Australian mothers leave hospital breast-feeding their newborn infants; at 3 months post-partum 54-55 percent of mothers continue to breast feed their infants, and at 6 months post-partum 40-42 percent of infants are breast fed.

**METHODS**

Twenty lactating women from Brisbane (Queensland) participated in the study, when their infants were 6-12 weeks old. All infants were fully breast fed on demand. The mothers were visited in their homes, where a 10 ml blood sample was drawn from the antecubital vein. Small samples (approximately 10 ml) of breast milk were manually expressed at the beginning and end of a mid-morning feed, from the first breast offered at that feed. Milk and blood samples were collected into acid-washed containers and stored at -20°C until analysis.

Milk and whole blood samples were freeze-dried, and 150 mg irradiated at a thermal neutron flux of $5 \times 10^{12} \text{n.cm}^{-2} \text{s}^{-1}$ in precleaned tubes for 3 days in the X-6 irradiation facility of the Australian Nuclear Science and Technology Organization's 10-MW material test reactor, HIFAR, at the Lucas Heights Research Laboratory. Both laboratory prepared and NIST Standard Reference Material, Bovine Liver, SRM 1577 standards were irradiated along with the samples. After 28 days cooling, the 265 keV photopeak of $^{75}\text{Se}$ was counted by high resolution gamma-ray spectrometry on a hyperpure germanium detector having a resolution of 1.8 keV for the 1332 peak and a relative efficiency of 20%. Both precisions and accuracies of less than 3% were obtained, with limits of detection of 1 and 10 ng.g$^{-1}$ for milk and whole blood, respectively.

Serum samples were analyzed according to the method of MCORIST, FARDY and FLORENCE using a rapid, chemical (ultrafiltration) neutron activation analysis procedure via the $^{77}\text{Se}$ activation product. Samples (200-400 mg) were weighed into