Thesis Title Fractional Calcium Absorption From Calcium Sulfate Precipitated Tofu and Milk in Healthy Women.

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ABSTRACT

At present, Thai people are at risk of suffering from osteoporosis as a consequence of increased lifespan and low calcium intake. It was shown that most Thai adults are lactase deficient and many of them tend to discard milk from their diets. The aims of this study were to determine the efficiency of calcium absorption from milk and tofu, a non-dairy high calcium product to substitute for milk.

The absorbability of calcium from milk and tofu were studied in 34 healthy female volunteers, ages 20-80 years, using a simplified single isotope technique. The volunteers were devided into 4 groups. Gr.I aged 20-39 years (n=8), Gr.II aged 40-49 years (n=9), Gr.III aged 50-59 years (n=8), Gr.IV aged 60-80 years (n=9). The study was a randomized cross-over design using a standardized Ca containing breakfast administered after an overnight fast. The

average carrying test-loads of calcium in tofu and milk were 238 ± 5.9 and 218.3 ± 7.1 mg of Ca, respectively and labelled with 5 μCi of ^{45}Ca. In addition, the present study also analyzed the amount of calcium intake, ionized calcium, urinary calcium, parathyroid hormone, vitamin D receptor gene and bone mineral density.

The mean values of daily calcium intake in all-age group, Gr.I, Gr.II, Gr. III and Gr.IV were 325 ± 178, 416 ± 221, 349 ± 130, 292 ± 203 and 248 ±178 mg, respectively. In all-age group, serum ionized calcium ($S.Ca^{++}$) reached its peak at 1 hour after ingesting milk and the value was significant from baseline ($p<.005$) while after ingesting tofu $S.Ca^{++}$ reached its peak at 2 hours. Serum parathyroid hormone (S. PTH) were significantly decreased at 1/2, 1 and 3 hours ($p<.001$) after ingesting milk, while they were significantly reduced at 1/2, 1 hour after ingesting tofu ($p<.001$). After ingesting both test-loads in subjects aged 20-49 years, S. Ca^{++} reached their highest levels at the same time while in subjects aged 50-80 years, S. Ca^{++} after drinking milk reached the peak faster than after ingesting tofu. S. PTH in subjects aged 20-49 years were also significantly suppressed for 3 hours while in age-groups 50-80 years the suppression occurred only 1 hour after ingesting both test-loads. In addition, the alterations of S. Ca^{++} and S. PTH concentrations in the younger (20-49 years) were more evident than the older groups (50-80 years). Urinary calcium excretion were significantly higher after ingesting milk than tofu, especially in the younger groups.

Average fractional calcium absorption from milk and tofu for all cases were 0.3002 ± 0.088 and 0.2781 ± 0.086, respectively ($p<.05$). Fractional calcium absorption fell gradually with age in both test-foods. However, a

significant decrease in fractional calcium absorption was found after age 60. Interestingly, there were no significant differences between fractional calcium absorption from milk and tofu in most age-groups except in Gr.IV in which fractional calcium absorption from milk was greater than tofu ($0.2221 \pm .061$ vs $0.1822 \pm .055$, $p<.005$). Fractional calcium absorption from milk in subjects aged 20-45 years was $0.3340 \pm .08$ which was similar to fractional calcium absorption in the Americans. There were positive relationships between fractional calcium absorption and Ht, Wt, BMD, and urine Ca (mg/5h). In addition, subjects with bb genotype of vitamin D receptor tended to have higher fractional calcium absorption and BMD than subjects with Bb genotype.