再　録

聖徳栄養短期大学紀要No.20　(1989)

Magnesium Reserch Vol. 2, No.1/2, p. 134(1989).

A decrease in faecal magnesium output, without a decrease in urine magnesium excretion, under a relatively low mineral intake in young females

Kazumasa Suzuki*, Yoshie Yamada, Tetsuo Yamada**, Naoko Kodama, Keiko Ono, Shuhei Kobayashi and Mamoru Nishimuta

The National Institute of Nutrition, 1-23-1 Toyama, Shinjuku-ku, Tokyo (162)
**Seitoku Junior College, 1-4-6 Nishishinkoiwa Katsushika-ku, Tokyo (124)*
***Kanto Gakuin Women's Junior College, 4834 Mutsu'ura-cho, Kanazawa-ku, Yokohama (236), Japan*

Human magnesium (Mg) requirement has not been determined because of accumulation of confusing data. Jones et al.(1967) estimated minimum Mg requirement to keep positive Mg balance in human as 200 to 300 mg/day. On the other hand, concerning the regulation of Mg metabolism, it was generally believed that urine output was suppressed after dietary Mg restriction, and that renal handling of Mg was the main process in controlling Mg homeostasis (Heaton, 1969). So far as we know, changes in intestinal Mg absorption after Mg restriction, however, has not yet been reported. So we conducted a 8-day balance study using a low mineral diet originally designed for renal disease patients.

METHODS

Subjects were 8 female paid volunteers (19-22y, 154±5 cm in height, 53±13 kg BW, mean±s.d.). They took part in the 12-day study. They stayed in a human experimental facility of the National Institute of Nutrition during the study. They consumed a 4-day rotating menu (energy, 2000 kcal; protein, 60 g; fat, 32% of energy; potassium 1.9 g; Mg, 160 mg /day)(Step I), with supplement of potassium (K) gluconate (860 mg as K /day) during last 4 days (Step II). They spent first two days before the balance period for adaptation to provided dietary and living conditions, and last two days after the period to complete fecal sampling. During the study, they perspired in a heated chamber 40 min a day, and sweat loss of minerals was also determined. Blood was sampled to estimate serum mineral levels in the fasted morning at 1st, 4th and 8th day of the balance period.

RESULTS AND DISCUSSION

Mg loss from sweat during heat exposure was less than 1 mg/day, and was negligible for the balance. Serum Mg increased at 4th and 8th day compared with those at 1st day (Fig. 1). Fecal Mg output at Step II was decreased compared with those at Step I, without obvious changes in urine Mg output (Fig. 2). Overall result of Mg balance was shown in Table 1.

Mg balance was maintained even at 160 mg of daily Mg intake. This level may be below that estimation by Jones et al.(1967). Heat exposure may have a potential to increase intestinal Mg absorption, although further evidence must be obtained to illustrate the relation between heat exposure and Mg balance. Potassium supplement at Step II, however, did not seem to affect Mg metabolism, for serum Mg levels at 4th day were already higher than those at 1st day, and for those at 8th day did not show further increase.

In any case, Mg balance was positively maintained, through increasing intestinal absorption, provided Mg excretion into digestive canal was not changed. This was supported by the increase in serum Mg levels.

REFERENCES

Heaton, F.W.(1969): The kidney and magnesium homeostasis., Ann.N.Y.Acad.Sci., 162, 775-785

Jones, J.E. et al.(1967): Magnesium requirement in adults., Am.J.Clin.Nutr., 20, 632-635

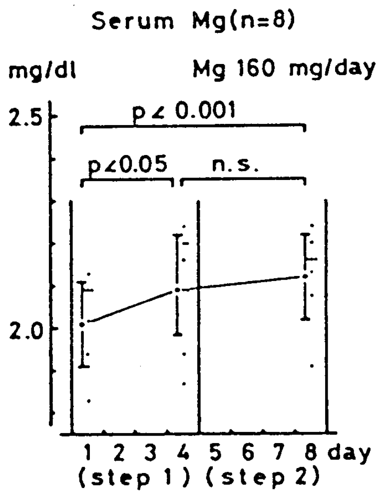

Fig.1. Serum Mg levels in the fasted morning at 1st, 4th and 8th days of the balance study period. Individual values and mean±s.d. are shown. (paired-t test)

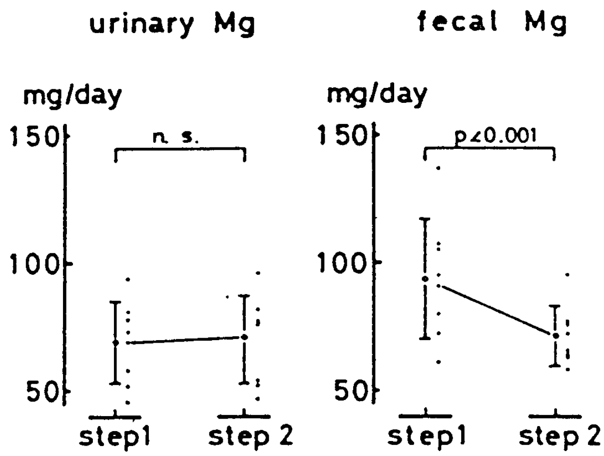

Fig. 2. Comparisons of urine and fecal output between Step I and II. Manifestations are the same as Fig. 1.

Table 1. Mg balance (mg/day/caputa)

Input	Fecal output	Absorption*	Urine output	Retention
160	82±15	78±15	70±16	8

* apparant absorption (n=8) (mean±s.d.)