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EFFECT OF CHRONIC LACTOSE FEEDING ON CALCIUM BALANCE IN RATS. G. D. Miller, R. W. Kessler, P. J. Ruth, and R. G. Burney. (EPON: H. Jeffrey). Kraft, Inc., Glenview, IL 60025.

Studies were conducted to evaluate the effect of dietary lactose (LAC) ingestion on calcium (Ca) balance (%CB) and absorption (%CA). Semi-purified diets (20% prot., 8% corn oil, and 100% NRC nutrient levels) were fed ad-libitum to groups of male weanling rats for 9 weeks in a 3X4 factorial design. Three-day calcium balance determinations were conducted during weeks 3, 6, and 9. A predictable linear decrease in %CB and %CA was observed with increasing dietary Ca (P<.01), expressed almost exclusively as greater fecal Ca (P<.02) levels. Similarly, a clear trend of decreased %CB and %CA with age was observed, especially at 50% NRC Ca. Effects of LAC on calcium balance was inconsistent and transient. A trend toward increased %CA with increased LAC was observed at 50% NRC Ca, but was not consistent with age. Conversely, a trend of decreased %CA with increased LAC was observed at 150% Ca, but was not consistent with age. A consistent increase in urinary Ca was observed with higher dietary LAC levels, this was independent of dietary Ca level (P<.02). Dietary Ca and LAC levels fed had no effect on weight gain or femur Ca concentration. These results indicate that chronic consumption of up to 15% dietary lactose in growing rats has little effect on %CB and %CA, and does not support observations of lactose induced enhancement of calcium absorption.

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BLOOD CALCIUM AND BLOOD PRESSURE LEVELS OF SELECTED ADULT FEMALES IN WASHINGTON, D.C. G. Downer, A. Johnson, E. Knight, and J. Adkins. Howard University, Department of Human Nutrition and Food, Washington, D.C. 20059.

Previous studies of the relationship of blood calcium levels to blood pressure have yielded conflicting results. The purpose of this study was to examine the relationship of blood calcium and magnesium levels to blood pressure in adult females. The study was quasi-experimental in design, and included 30 black and 30 white females. Blood calcium and magnesium were measured by atomic absorption spectroscopy. Blood pressure was measured by using a Hawksley Sphyg. Among blacks significant correlations were found between blood magnesium and systolic pressure ($r = 0.47$, $P = 0.005$) when controlled for 1 wt. for ht. For whites, significant correlations were found between blood magnesium and systolic pressure ($r = 0.38$, $P = 0.019$) and between blood magnesium and diastolic pressure controlling for 1 wt. for ht. No significant correlation was found between blood calcium and blood pressure for either group.

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CALCIUM BIOAVAILABILITY AND IRON-CALCIUM INTERACTION IN ORANGE JUICE. Halle Mahansho, Robert L. Kanerva, G. R. Hudonohi and Kenneth T. Smith. Miami Valley Laboratories, The Procter & Gamble Co., Cincinnati, Ohio 45247.

The effect of orange juice on calcium bioavailability and iron-calcium interaction in rats was determined using whole body isotope retention and gel permeation chromatography techniques. When compared to water, orange juice enhanced calcium bioavailability by about 30% and substantially ameliorated the inhibition of iron absorption by calcium. Data from Sephadex G-25 chromatography demonstrated that (a) three or more orange juice components complex with iron, (b) citric acid rather than ascorbic acid is the major iron ligand in orange juice and (c) calcium and iron in orange juice do not compete for the same ligands. Citric acid contributed a significant benefit in overcoming the calcium dependent inhibition of iron absorption. Ascorbic acid enhanced the citric acid mediated alleviation in iron-calcium interaction. However, individually added orange juice components including ascorbic acid and fructose failed to overcome the depression of iron absorption by calcium. The combination of citric acid and ascorbic acid at orange juice levels are as effective as orange juice in preventing iron-calcium interaction. Orange juice, due to its composition, is an excellent vehicle for both calcium and iron fortification.

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CALCIUM ABSORPTION AND BALANCE IN RATS FED SELECTED LEVELS OF CORN TORTILLAS IN THE DIET. M. Bock and L. Appeldoorn. New Mexico State University, Las Cruces, NM 88003.

The objective of this study was to ascertain the impact of selected levels of corn tortillas (CT) on selected calcium parameters. Over an 8 wk period, young male rats were fed isonitrogenous diets containing 400 mg Ca/100 g diet with 0, 10, 20, or 30% CT, diets A-D, respectively. Weekly weight and diet intake records were maintained. Urine and feces were collected during weeks 2, 4, 6 and 8. Animals were sacrificed after 8 wks. Diets, urine, feces and femurs were analyzed for calcium using atomic absorption. The results indicated that apparent and relative absorption of calcium and calcium balance declined in all groups through week 6; both absorption measures and calcium balance increased after week 6 in animals fed 20 and 30% CT. Both measures of absorption and calcium balance were negative after 4 wks in animals fed 30% CT. After week 2, dietary treatment significantly affected both absorption measures (P<0.0018) and calcium balance (P<0.0018). Comparison of both absorption means and calcium balance means indicated that after week 2, animals fed diet A (0% CT) had significantly higher (P<0.05) calcium absorption and balance than animals fed any of the diets with corn tortillas. In conclusion, one can see that although animals fed 20 and 30% CT may have been adapting, corn tortillas affected both calcium absorption and balance. This conclusion was supported by the femur calcium data. Research conducted and supported as part of the SAES Western Regional Project W-143.

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SWEAT CALCIUM LOSS DURING RUNNING

J. Krebs, V. Schneider, J. Smith, A. LeBlanc, W. Thornton, C. Leach, KRUG International, NASA/Johnson Space Center Houston Tx 77058, University of Texas, Houston, TX 77225.

Current recommendations for preventing osteoporosis include exercise and good nutrition. Some reports suggest significant sweat calcium (Ca) losses with vigorous exercise. We measured the sweat calcium (Ca) loss of 3 men who ran daily (approximately one hour) on a treadmill for one week. The rate of sweat Ca loss during running was compared to their average daily Ca loss without running. The subjects wore clothing prewashed with EDTA. Ca was extracted from the clothing by washing with 6 liters of deionized water and EDTA soap. Ca concentration was measured by atomic absorption. Per cent recovery determined by spiking representative clothing was 96-102%. The average sweat Ca losses of the 3 subjects during an hour of running were 52.2±8.4, 57.6±23.4, and 31.8±19.8 mg. Their average sweat Ca loss per hour for the entire day excluding running were 0.9±0.2, 0.8±0.2, 0.7±0.3 mg, respectively. We conclude that vigorous exercise substantially increases sweat Ca losses, which may have significance for individuals who are ingesting inadequate amounts of Ca. Also, sweat Ca losses should be monitored during Ca balance studies of exercising adults.

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EFFECT OF HIGH CALCIUM INTAKE ON MAGNESIUM EXCRETION
Spiller, G.A., Jensen C.D. and Whittam J.H. Shaklee Health Sciences, San Francisco, CA 94111

The effect of a 10 day, 1500 mg/day supplementary calcium diet versus a 10 day unsupplemented diet on fecal and urinary magnesium excretion was studied in eight healthy college-age women on a controlled diet of whole foods providing approximately the RDA of calcium and magnesium. Subjects were randomly assigned to the calcium treatment in either the first or the second period. Total feces and urine were collected the last four days of each period. The periods were separated by two weeks without controlled diet. Dietary intake of calcium and magnesium as measured by analysis of food samples were similar for each period. The effect of the addition of 1500 mg/day of calcium was to increase the mean fecal magnesium excretion per subject by 140 mg/4 days and urinary magnesium by 30 mg/4 days, resulting in a total increase in magnesium excretion of 170 mg/4 days (0.05 < p < 0.10). This study suggests that the levels of calcium often recommended to prevent osteoporosis may have a minor effect on the excretion of magnesium in healthy young women. Because of the small sample size and short duration of this study, further studies under careful metabolic control, with larger populations and various levels of magnesium and calcium are needed.

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ABSTRACTS

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