



In Focus

NutriCology Newsletter

May 2005

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NutriCology®
2300 North Loop Road, Alameda, CA 94502
Phone: 800-545-9960/510-263-2000
Fax: 800-688-7426/510-263-2100
www.nutricology.com

Calcium & Weight Loss

Dietary calcium has recently been associated with weight loss. More specifically, it may facilitate fat loss, excretion of dietary fat, the reversal of gradual weight gain, the prevention of fat storage, raising metabolism, increasing high density lipoproteins, and the reduction of both kidney stones and symptoms of PMS. Plus it just may be more effective than most common weight-loss drugs on the market today!

In a recent 16-week study, a very high calcium diet produced greater weight loss than the average weight loss shown in one year in studies using weight loss drugs. *International Journal of Obesity & Related Metabolic Disorders*, Sep 16, 2003.

Robert Heaney, M.D., one of the foremost calcium and vitamin D researchers states:

"Only 1000 mg of additional calcium daily can result in a 17.6 pound difference in your body weight." Davies KM, Heaney RP, Recker RR, Lappe JM, Barger-Lux MJ, Rafferty K, Hinders S. Calcium intake and body weight. J Clin Endocrinol Metab. 2000 Dec;85(12):4635-8.

"Increasing calcium intake can be estimated to reduce the prevalence of overweight...by perhaps as much as 60 to 80 percent." Heaney RP. Normalizing calcium intake: projected population effects for body weight. J Nutr. 2003 Jan;133(1):268S-270S.

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Vitamin K2: Putting Calcium Where It Belongs

Vitamin K2 provides major protection from osteoporosis, cardiovascular blockages and pathological calcification.

Vitamin K's job is to put calcium in the right places and keep it from being deposited in the wrong places. The right places are bones and blood, and the wrong places include calcification of the vessels, bone spurs and calcification of soft tissues.

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Unique Vitamin/Mineral Formula Stops Cravings & Increases Satiety - Instantly!

From Betty Kamen's new book: **Lose Weight with the California Calcium Countdown***

In 1984, the Haight-Ashbury Free Medical Clinic in San Francisco was searching for something that would help treat patients who were seriously addicted to stimulant drugs and alcohol. As a result of their quest, a unique vitamin/mineral formula was found and tested. The compound curtailed these cravings almost dead in their tracks! The longer the participants used the formula, which was natural and free of side effects, the more benefits they derived.

The product worked fast, in fact, within minutes. Nor was a large quantity necessary for the positive results. The average intake was only 1 1/2 teaspoons per day.

The scientists taking part in the project conjectured that if this formula could achieve such striking and powerful effects on critically addicted people, it could help those struggling against powerful food cravings. After all, they reasoned, the metabolic pathways involved in the addiction or cravings for fat and sugar are comparable to those of most addictive drugs.

Experts in the field note that it's more than a linguistic accident that the same term - craving - is used to describe intense desires for both foods and for a variety of drugs of abuse.

I now understand that this nutrient-dense, non-drug product helps to create a sense of satiety - a feeling of being full, the kind of feeling that says, "I'm really not hungry. I don't need that slice of cheesecake."

The original product was comprised of vitamin C along with generous amounts of potassium, calcium, and magnesium. The current version includes vitamin C

derived from a unique cassava root source, which makes it easily tolerated by those who have difficulty with extracts of vitamin C from other derivations. And, like the old formula, the new blend contains the same minerals, but it has been enhanced with vitamin D3, vitamin K and a few other additional nutrients.

How these nutrients work synergistically to elicit a lean-body advantage is explained later. Stirred into liquid, the combination makes a sparkling, effervescent drink. The carbonates of potassium, calcium and magnesium give the product an acid/alkaline buffering action, potentially improving bowel tolerance and hyperacidity.

Dr. John Diamond, M.D. on Buffered Vitamin C

The original Buffered Vitamin C was developed to help patients with environmental illness and has been used by hundreds of environmental doctors for thousands of patients. Leading doctors including Theon Randolph, M.D., the "grandfather" of Environmental Medicine, used Buffered Vitamin C for his patients.

John Diamond, M.D., Psychiatrist, is considered a leading national authority on kinesiology, with a unique focus on fundamental, emotional and energetic responses to various nutritional supplements. Here's what Dr. Diamond has to say about Buffered Vitamin C:

"In terms of Life Energy, Buffered Vitamin C relates to the large intestine meridian, the meridian of self-worth. Specifically it actuates LI 19. This point is involved with obsessionism, the feeling that one is never good enough and must get everything, especially the self, absolutely perfect and pure.

In the more general sense, the energization of LI 19 leads to a feeling of expansion, as if one's presence has now enlarged so as to fill the space around oneself. It is as if with this new belief in his/her self-worth, the person feels confident to openly present all of his/her self to the world. This effect applies not only to those who have a specific LI 19 problem, but to virtually everyone.

I also use a combination of three parts ProGreens, two parts Buffered Vitamin C and one part OxyNutrients to help overcome some of the chi-depleting electromagnetic noxious influences to which we are subjected. Not only on a daily basis, but especially in particular circumstances, such as flying." - Dr. John Diamond, M.D.

*To order Betty Kamen's book the California Calcium Countdown call: (800) 353-7322.

CALCIUM & WEIGHT LOSS

The Experts Weigh In: Validation from Medical Journals

Currently, the weight-loss effect of calcium has been receiving a great deal of attention. More exciting is that reliable scientific research has been catching up with the observations:

❑ **A diet consisting mainly of high calcium foods resulted in an average weight loss of 24.6 pounds in 16 weeks. This is greater than the average weight loss in one year in trials using weight loss drugs** such as dexfenfluramine, sibutramine or orlistat. (Even if the drugs rivaled the calcium diet for weight loss, they have serious side effects: sibutramine increases blood pressure and pulse rate; orlistat causes gastrointestinal side effects; and dexfenfluramine results in serious respiratory and cardiovascular complications.) *International Journal of Obesity & Related Metabolic Disorders, Sep 16, 2003 / Hopkins PN, Polukoff GI. Risk of valvular heart disease associated with use of fenfluramine. BMC Cardiovasc Disord. 2003 Jun 11;3(1):5.*

❑ Test animals were placed on a diet high in sucrose and increased fat, including lard. As anticipated, **these animals quickly became obese. But when given high levels of calcium, they stopped gaining weight and, instead, began to lose weight. Even though the caloric intake of the two sets of animals was identical, those on a low calcium diet gained weight, while those on a high calcium diet lost weight. Calcium helps to suppress a substance that would normally increase adiposity (fat) with a calorie-dense meal.** By increasing dietary calcium, the result is a significant reduction in adipose tissue - accelerating weight loss and body fat loss. *Zemel MB. Role of dietary calcium and dairy products in modulating adiposity. Lipids. 2003 Feb;38(2):139-46.*

❑ **High-calcium, low-calorie diets helped test animals lose weight at rates double those given low levels of calcium.** *Experimental Biology 2000, Conference, San Diego, April 21, 2000.*

❑ Overweight patients with high blood pressure were asked to consume two cups of yogurt daily to increase their calcium intake in order to lower their blood pressure. No other changes were made in

their diet or exercise routines. **An average of 10.56 pounds was lost in one year simply by adding the yogurt.** *Zemel MB, Shi H, Greer B, Dirienzo D, Zemel PC. Regulation of adiposity by dietary calcium. FASEB J. 2000 Jun;14(9):1132-8.*

❑ A two-year study found that young women who **had the highest intakes of calcium lost the most weight and body fat on weight control programs, regardless of exercise level.** *Lin YC, Lyle RM, McCabe LD, McCabe GP, Weaver CM, Teegarden D. Dairy calcium is related to changes in body composition during a two-year exercise intervention in young women. J Am Coll Nutr. 2000 Nov-Dec;19(6):754-60.*

❑ Additional sophisticated peer-reviewed trials continue to indicate that high-calcium diets are associated with lower body weight. And, in a study published in the Journal of Nutrition, researchers estimated that **only 1,000 milligrams of additional calcium intake daily can result in a 17.6 pound difference in your body weight.** *Davies KM, Heaney RP, Recker RR, Lappe JM, Barger-Lux MJ, Rafferty K, Hinders S. Calcium intake and body weight. J Clin Endocrinol Metab. 2000 Dec;85(12):4635-8.*

❑ Higher levels of calcium intake **may prevent fat storage, and more calcium may raise metabolism, thus burning more calories.** *Southwestern Medical Center Report, 2003.*

❑ Each 300 mg increment in regular calcium intake is associated with approximately 1 kg less body fat in children and 2.5-3.0 kg lower body weight in adults. **Increasing calcium intake could reduce the risk of overweight substantially, perhaps by as much as 70 percent.** (1 kilogram is equal to 2.2 pounds.) *Heaney RP, Davies KM, Barger-Lux MJ. Calcium and weight: clinical studies. J Am Coll Nutr. 2002 Apr;21(2):152S-155S.*

❑ **Calcium may play a role in increasing levels of high density lipoprotein (HDL, the good kind), reducing kidney stone recurrence, reducing symptoms of premenstrual syndrome, and promoting weight loss.** *Moyad MA. Osteoporosis. Part III--Not just for bone loss: potential benefits of calcium and vitamin D for overall gen-*

eral health. Urol Nurs. 2003 Feb;23(1):69-74.

❑ Women at midlife gain an average of about one pound a year (with one-sixth of them gaining at the rate of 2.5 pounds a year) if they are on low calcium intakes. By contrast, women who take **the RDI amount of calcium show a slight negative weight gain each year.** *Davies KM, Heaney RP, Recker RR, Lappe JM, Barger-Lux MJ, Rafferty K, Hinders S. Calcium intake and body weight. J Clin Endocrinol Metab. 2000 Dec;85(12):4635-8.*

❑ If you are overweight and not watching your diet, increasing dietary calcium results in significant reductions in fat tissue, and **if you are on a calorie-restricted diet, the calcium will accelerate your weight loss and body fat loss.** *Zemel MB. Role of dietary calcium and dairy products in modulating adiposity. Lipids. 2003 Feb;38(2):139-46.*

❑ Growing evidence supports a relationship between increased calcium intakes and reductions in body weight specific to fat mass. The impact of calcium intake on weight loss or prevention of weight gain has been **demonstrated in a wide age range of Caucasian and African Americans of both genders.** *Teegarden D. Calcium intake and reduction in weight or fat mass. J Nutr. 2003 Jan;133(1):249S-251S.*

❑ **Girls who consume more calcium tend to weigh less and have lower body fat than those with low calcium consumption, although it is not important whether the calcium comes from food or supplements.** *Experimental Biology Meeting, San Diego, Oct 2003.*

❑ Low calcium diets impede body fat loss. *Zemel MB. Role of dietary calcium and dairy products in modulating adiposity. Lipids. 2003 Feb;38(2):139-46.*

❑ An increase in calcium consumption can reduce the risk of obesity. *International Obesity Symposium, Toronto, Sep 2003 / McCarty MF, Thomas CA. PTH excess may promote weight gain by impeding catecholamine-induced lipolysis-implications for the impact of calcium, vitamin D, and alcohol on body weight. Med Hypotheses. 2003 Nov-Dec;61(5-6):535-42. / Moyad MA. The potential benefits of dietary and/or supplemental calcium and vitamin D. Urol Oncol. 2003 Sep-Oct;21(5):384-91.*



Dr. Weston Price

The Dentist Who Traveled The World

Long-Lived Cultures & Calcium

From Betty Kamen's new book,
Lose Weight with the California Calcium Countdown

Long-lived cultures consume higher amounts of calcium, along with more magnesium and other minerals, and often get more sunshine (vitamin D) and vitamin K than most of us. Longevity research from around the world is consistent with these correlations. **In fact, such cultures consume 2-4 times the calcium consumed in the U.S. Studies of our ancestors also support a higher calcium intake.**

In a quest to discover the origins of poor health and disease, a progressive dentist of the 1930's, Dr. Weston Price, set out on a trip around the world to study communities of people who appeared to be of exceptional good health and free of disease.

Over a period of nine years, Price visited fourteen different groups of native peoples, from the islands of the Scottish Hebrides to the Swiss Alps, from Polynesia to the Andes Mountains in Peru. This was no easy task in the days before jet airplanes, but Weston Price's commitment to seek answers was boundless.

When Price told these far-flung patients to open their mouths, what he discovered was glowing health, reflected in normal gum tissue and a paucity of cavities. He observed strong bone structure and almost no degenerative diseases.

This was true despite sometimes harsh living conditions - such as those endured by Eskimos living above the Arctic Circle or Peruvian natives high in the Andes. When he did find a few unhealthy native cultures, usually they were suffering from health problems related to food shortages or drought.

The diets of the people Price visited were widely diverse, but he confirmed certain similarities common to most of the cultures. The foods eaten were generally fresh, often raw, and of course, completely natural and organic. Price also noticed that almost all the groups ate some fermented foods every day, rich in digestive enzymes and vitamin K.

When he analyzed food samples, Price learned that they contained many times the nutrients found in the American diet, **including about 2-4 times the amount of calcium.** To Price, this explained not only the good health, but also the longevity of these various peoples. *Price W., Nutrition and Physical*

Degeneration, Sixth Edition, 2002.

Although some may have died young due to dangerous or life-threatening living conditions, those who did survive remained healthy and strong well into their golden years.

At the same time, those who converted to new diets (that is, meals consisting mostly of canned goods, white flour products, and other processed foods) began to get the kind of diseases common to us "civilized" folk. *Price W., Nutrition and Physical Degeneration, Sixth Edition, 2002.*

In the Fiji Islands two young men were assigned the task of doing the "marketplace" shopping for a pregnant woman: It was their daily job to obtain from the sea a particular kind of crab that was extraordinarily high in nutrients. (Crabs are always included on lists of high-calcium foods) *Price W., Nutrition and Physical Degeneration, Sixth Edition, 2002.*

Among Eskimos fish eggs were eaten by childbearing women. Coastal Indians in Peru also knew this great secret. (Fish roe are among the most healthful foods on our planet. Needless to say, they have a high calcium content.) *Price W., Nutrition and Physical Degeneration, Sixth Edition, 2002.*

Among Several African tribes expectant mothers depended on a form of red millet for their calcium intake. This same cereal was used in Peru by nursing mothers as an encouragement for milk flow. (This particular red millet has a calcium rating five to ten times higher than other cereals.) *Price W., Nutrition and Physical Degeneration, Sixth Edition, 2002.*

It's also amazing that such distant cultures would follow the same dietary customs - but as is so often the case, those who live closer to nature understand its wisdom much better than those of us lost in the "modern" world.

The authors of *The Okinawa Program* report studies on the health and longevity of the people of Okinawa, a chain of small tropical islands in southern Japan. **There is strong evidence that the natives of Okinawa are the longest-living people in the world today, with many among them celebrating birthdays well into their nineties and longer.** In fact, Okinawa has the highest per-

centage of 100-year olds in the world. *Wilcox B., et al., Okinawa Program, 2001.*

Of interest is that **calcium, magnesium and other minerals are also found in the island's drinking water**. Because these islands are comprised of coral reefs, the decaying coral, which is high in calcium, magnesium and other minerals, is present in the spring water.

Apparently, the longevity and low incidence of degenerative diseases observed in these islanders are at least consistent with the high levels of calcium, magnesium and trace minerals found in their drinking water, along with their high vitamin D levels due to long hours in the bright sunshine.

Indeed, high levels of calcium, magnesium and trace minerals in drinking water seem to be a common factor among these long-living peoples. Many centenarians reside in mountainous regions like the Andes or the Caucasus, and drink water from melting glaciers, water that is often whitish in tint because of dissolved calcium and other minerals. This is the "milk of the mountains" - or in Okinawa, the "milk of the ocean."

Like the peoples Price visited, the healthy Okinawans had a very low incidence of obesity.

Calcium and the Cavemen

Dr. Robert Heaney, a renowned calcium researcher, believes that calcium was much more prevalent in our very early food supply. The calcium intake of many Stone Age adults is estimated to have been 3-5 times the calcium intake of modern adults, or from 2,000 to 3,000 milligrams per day. Heaney suggests that the body's calcium regulatory mechanism has evolved over time as a result of greater availability of calcium. *Heaney RP, Barger-Lux MJ. Low calcium intake: the culprit in many chronic diseases. ADSA Foundation Lecture. J Dairy Sci. 1994 May;77(5):1155-60. / Barger-Lux MJ, Heaney RP. The role of calcium intake in preventing bone fragility, hypertension, and certain cancers. J Nutr. 1994 Aug;124(8 Suppl):1406S-1411S.*

At the other end of the scale however, the smaller the intake of calcium - the smaller the dietary supply - the more efficient the absorption. Nature has its checks and balances.

So while the general trend has been the consumption of less calcium than our distant ancestors, and our greater intake of calcium antagonists (phosphorus in particular and high protein diets), our bodies have retained the adaptive mechanisms better suited to prehistoric calcium consumption.

According to Heaney, this may play a role in promoting those excess pounds. The problem might be reversed by improving our intake of calcium, magnesium and vitamin D in supplemental form. *Weaver, et al., Modern Nutrition in Health and Disease, 9th Edition, 1999.*

A very important concept to keep in mind is that diets high in phosphorus initiate results similar to calcium deficiency.

Heaney explains the consequences this way: **Adequate calcium is a signal to fat tissue that your body is well nourished. This indicator tells your body that it no longer needs to store fat, but can burn it. Fat storage is reversed and fat burning is increased.** In test animals on a low-calcium diet, an enzyme increases fat deposition by 2.6 times. But with high dietary calcium, fat burning is boosted by 3.4 to 5.2 times. The increased burning of fat causes the elevations in body temperature - either directly or by stimulating a special protein that leads to temperature elevation due to metabolism. *Zemel MB, Shi H, Greer B, Dirienzo D, Zemel PC. Regulation of adiposity by dietary calcium. FASEB J. 2000 Jun;14(9):1132-8.*

According to the National Institutes of Health, calcium intake up to about 2,000 milligrams a day in supplemental form appears to be safe in most individuals. *Journal of the American Medical Association, Dec 18, 1994.*

S. Boyd Eaton, a physician also known for his studies on Paleolithic diets, analyzed more than one hundred plant foods consumed by tribes of hunter-gatherers. Eaton's results support the notion that high levels of calcium intake are desirable because our physiologies developed this way over generations. Wild vegetable foods average about 130 milligrams of calcium per 100-gram portions.

Late Paleolithic people were eating about 1,460 grams of such food each day, yielding over 1,800 milligrams of calcium, while the meat they ate would have supplied another 100 milligrams. Gnawing on bones from fowl (as I remember my grandmother doing) or from small mammals might have substantially increased the amount of calcium ingested.

The nutritional requirements of contemporary humans were almost certainly established over eons of evolutionary experience and the best available evidence indicates that this evolution occurred in a high-calcium nutritional environment. Calcium intake was twice what it is for contemporary humans. Requirements for physical exertion were also much greater. And again, there were no processed foods or the kind of calcium antagonists we encounter today. Bone remains from that period suggest that Stone Agers developed a greater peak bone mass and experienced less age-related bone loss than do humans today. *Eaton SB, Nelson DA. Calcium in evolutionary perspective. Am J Clin Nutr. 1991 Jul;54(1 Suppl):281S-287S.*



Betty Kamen, Ph.D., is an internationally known nutrition authority, with hundreds of published articles, 19 books, and countless media appearances worldwide to her credit. Dr. Kamen has hosted her own radio and TV shows on major stations in NYC, San Francisco, and syndicated. She has recently shared the platform with scientific researchers from many different countries on various subjects and nutrition in general.

To order Betty's new book **the California Calcium Countdown** call: (800) 353-7322.

Additional Selected Abstracts

Regulation of adiposity and obesity risk by dietary calcium: mechanisms and implications

Zemel MB

J Am Coll Nutr. 2002 Apr;21(2):146S-151S.

Dietary calcium plays a pivotal role in the regulation of energy metabolism; high calcium diets attenuate weight gain during periods of overconsumption and preserve thermogenesis during caloric restriction, thereby markedly accelerating weight loss... Moreover, we have recently demonstrated that the increased calcitriol released in response to low calcium diets stimulates Ca²⁺ influx in human adipocytes and thereby promotes adiposity. Accordingly, suppressing calcitriol levels by increasing dietary calcium is an attractive target for the prevention and management of obesity... Further, low calcium diets impede body fat loss, while high calcium diets markedly accelerate fat loss in transgenic mice subjected to caloric restriction. These findings are further supported by clinical and epidemiological data demonstrating a profound reduction in the odds of being obese associated with increasing dietary calcium intake...

Low calcium intake: the culprit in many chronic diseases (ADSA Foundation Lecture):

Heaney RP, Barger-Lux MJ.

J Dairy Sci. 1994 May;77(5):1155-60.

...Moreover, the natural diets of all mammals are rich in calcium. The diet of Stone Age human adults is estimated to have contained from 50 to 75 mmol of calcium (2000 to 3000 mg)/d, three to five times the median calcium intake of present-day US adults... At least 14 intervention studies have established the skeletal benefit of increased calcium intake during growth and among women in the late postmenopause...

The role of calcium intake in preventing bone fragility, hypertension, and certain cancers.

Barger-Lux MJ, Heaney RP.

J Nutr. 1994 Aug;124(8 Suppl):1406S-1411S.

This paper examines the evidence that connects calcium intake and vitamin D status to bone fragility, hypertension, colon cancer, and breast cancer. Human calcium physiology, with an intestinal absorptive barrier and inefficient conservation, reflects the abundance of calcium in the primordial human food supply... Long-term calcium restriction and/or insufficient vitamin D may promote the development of bone fragility, high blood pressure, colon cancer, and breast cancer in susceptible individuals...

Calcium supplements: practical considerations.

Heaney RP.

Osteoporos Int. 1991 Feb;1(2):65-71.

The preferable source of calcium is a balanced diet, but medicinal supplements are sometimes necessary if patients are to reach desired intakes. A divided dose regimen (4x/d; i.e., with meals and at bedtime) results in substantially greater absorption of a supplement than does 1x/d dosing... Because typical patients exhibit a wide range of absorption efficiencies, it is desirable to assess absorption fraction before beginning a supplement regimen. (Some patients will need three times as large a dose as others to absorb the same amount of calcium.) **Calcium intakes up to at least 62.5 mmol (2500 mg) are safe for virtually all patients.** (note: study excluded sodium-insensitive hypertension patients, etc.)

Calcium, dairy products and osteoporosis.

Heaney RP.

J Am Coll Nutr. 2000 Apr;19(2 Suppl):83S-99S.

...Of 52 investigator-controlled calcium intervention studies, all but two showed better bone balance at high intakes, or greater bone gain during growth, or reduced bone loss in the elderly, or reduced fracture risk. This evidence firmly establishes that high calcium intakes promote bone health... While most of the investigator-controlled studies used calcium supplements, six used dairy sources of calcium; all were positive. Most of the observational studies were based on dairy calcium also, since at the time the studies were done, higher calcium intakes meant higher dairy intakes... All studies evaluating the issue reported substantial augmentation of the osteoprotective effect of estrogen by high calcium intakes... (note: there are some extensive recent studies that find that milk does not protect the skeletal system.)

Calcium needs of the elderly to reduce fracture risk.

Heaney RP

Creighton University, Osteoporosis Research Center

...Supplemented intakes to a total in the range of 32.5-42.5 mmol (1300-1700 mg)/day have been shown to arrest age-related bone loss and to reduce fracture risk in individuals 65 and older and intakes of 60 mmol (2400 mg), to restore the setting of the parathyroid glands to young adult values... Accordingly, suppressing calcitriol levels by increasing dietary calcium is an attractive target for the prevention and management of obesity...

The cellular ionic basis of hypertension and allied clinical conditions.

Resnick L

Prog Cardiovasc Dis. 1999 Jul-Aug;42(1):1-22.

...a unifying "ionic hypothesis" is proposed, in which steady-state elevations of cytosolic free calcium and suppressed intracellular free magnesium levels, characteristic features of all hypertension, concomitantly alter the function of many tissues. In blood vessels this causes vasoconstriction, arterial stiffness, and/or hypertension; in the heart, cardiac hypertrophy; in platelets, increased aggregation and thrombosis; in fat and skeletal muscle, insulin resistance; in pancreatic beta cells, other endocrine tissues, and sympathetic neurons, potentiated stimulus-secretion coupling resulting in hyperinsulinemia, increased sympathetic nerve activity, and so on...

New Key Study!

Effect of short-term high dietary calcium intake on 24-h energy expenditure, fat oxidation, and fecal fat excretion.

Jacobsen R, Lorenzen JK, Toubro S, Krog-Mikkelsen I, Astrup A. Int J Obes Relat Metab Disord. 2005 Mar;29(3):292-301.

Observational studies have shown an inverse association between dietary calcium intake and body weight, and a causal relation is likely. However, the underlying mechanisms are not understood... 10 subjects participated in a randomized crossover study of three isocaloric 1-week diets with: low calcium and normal protein (LC/NP: 500 mg calcium, 15% of energy (E%) from protein), high calcium and normal protein (HC/NP: 1800 mg calcium, 15E% protein), and high calcium and high protein (HC/HP: 1800 mg calcium, 23E% protein). RESULTS: The calcium intake had no effect on 24-h EE or fat oxidation, but fecal fat excretion increased approximately 2.5-fold during the HC/NP diet compared with the LC/NP and the HC/HP diets (14.2 vs 6.0 and 5.9 g/day; $P < 0.05$). The HC/NP diet also increased fecal energy excretion as compared with the LC/NP and the HC/HP diets (1045 vs 684 and 668 kJ/day; $P < 0.05$). There were no effects on blood cholesterol, free fatty acids, triacylglycerol, insulin, leptin, or thyroid hormones. CONCLUSIONS: **A short-term increase in dietary calcium intake, together with a normal protein intake, increased fecal fat and energy excretion by approximately 350 calories per day. This observation may contribute to explain why a high-calcium diet produces weight loss, and it suggests that an interaction with dietary protein level may be important.**

2005 Study on Calcium & Reduced Colorectal Cancer:

Calcium from diet and supplements is associated with reduced risk of colorectal cancer in a prospective cohort of women.

Flood A, Peters U, Chatterjee N, Lacey JV Jr, Schairer C, Schatzkin A.

Cancer Epidemiol Biomarkers Prev. 2005 Jan;14(1):126-32.

We investigated the association between calcium intake and colorectal cancer in a prospective cohort of 45,354 women without a history of colorectal cancer who successfully completed a 62-item National Cancer Institute/Block food-frequency questionnaire. Women were followed for an average of 8.5 years, during which time 482 subjects developed colorectal cancer. We used Cox proportional hazards models, with age as the underlying time metric, to estimate risk of colorectal cancer... For increasing categories of calcium from supplements, the risk ratios (and 95% CI) relative to no supplement use were 1.08 (0.87-1.34), 0.96 (0.70-1.32), and 0.76 (0.56-1.02), $P(\text{trend}) = 0.09$. **Simultaneously high consumption of calcium from diet and calcium from supplements resulted in even further risk reduction, RR = 0.54 (95% CI, 0.37-0.79) compared with low consumption of both sources of calcium. These data indicate that a difference of < 400 to > 800 mg of calcium per day was associated with an approximately 25% reduction in risk of colorectal cancer, and this reduction in risk occurred regardless of the source of the calcium (i.e., diet or supplements)**

Abstract of Negative Findings:

Effect of calcium and dairy foods in high protein, energy-restricted diets on weight loss and metabolic parameters in overweight adults.

Bowen J, Noakes M, Clifton PM.

Int J Obes Relat Metab Disord. 2005 Feb 15; [Epub ahead of print]

OBJECTIVE: **To compare the effects two high-protein (HP) diets that differ in dietary calcium and protein source on weight loss, body composition, glucose and lipid metabolism, markers of liver function, fibrinolysis and endothelial function and blood pressure.** DESIGN:: Randomized, parallel study (12 wk of energy restriction, 4 wk of energy balance) of high dairy protein/high-calcium (DP, 2400 mg Ca/d) and high mixed protein/moderate calcium (MP, 500 mg Ca/d) diets (5.5 MJ/d, 34% protein, 41% carbohydrate, 24% fat). SUBJECTS:: In all, 50 healthy, overweight (age 25-64 y; body mass index 25-35 kg/m²); males (n=20) and females (n=30). RESULTS:: Loss of total weight (-9.7+/-3.8 kg), fat mass (-8.3+/-0.4 kg) and lean mass (-1.6+/-0.3 kg) were independent of dietary group. Improvements in fasting insulin, lipids, systolic/diastolic blood pressure, and markers of liver function, fibrinolysis and endothelial function were independent of dietary intervention. CONCLUSIONS:: Increased dietary calcium/dairy foods in an energy-restricted, HP diet does not affect weight loss or body composition. Weight reduction following increased protein diets is associated with beneficial metabolic outcomes that are not affected by protein source.

Editor's Comment: In our opinion, high protein diets would mitigate against calcium's weight loss effects as explained and demonstrated in the Jacobson, et al. abstract. The difference reported for the normal protein diet versus the high protein diet was attributable to a fecal fat and energy excretion of 350 calories per day.

Calcium critics* must consider the large scale calcium deficiency that exists across various populations

Calcium Deficiency Firmly Established

KELLEY'S TEXTBOOK OF INTERNAL MEDICINE

Osteopenia (loss of bone density) is a very common and costly disorder in the United States that affects 25% of elderly women and, at a given age, half as many men as well. The cause is multifactorial, with several nutritional factors playing important roles in calcium balance. **Almost all nutritional surveys indicate that calcium intake in the elderly is far less than the RDA (which was recently increased from 800 mg to 1,200 mg for persons over age 50). Still higher intakes of 1,500 mg per day were recommended for men and women over age 65 by a 1994 National Institutes of Health consensus panel on optimal calcium intake.** The NHANES II study found mean calcium intakes of 596 and 475 mg per day in older men and women, respectively, and NHANES III found that virtually all elderly had intakes below 800 mg per day. Calcium intake is also inadequate in younger women, with 66% of women 18 to 30 years old and 75% older than 35 years similarly consuming less than 800 mg per day. Reduced consumption at these early ages may be critical because peak bone mass is attained during early adulthood. Of interest, a recent large randomized trial found that supplemental calcium (1,200 mg per day) also decreased the risk of colorectal adenomas, providing another potential rationale for calcium supplementation beyond its beneficial effects on bone. **Absorption of calcium supplements appears to be most efficient at individual elemental calcium doses of 500 mg or less and when taken between meals (except for persons with reduced gastric acid production, in whom calcium citrate may be preferable to more commonly used calcium carbonate supplements).**

Kelley's Textbook of Internal Medicine, Fourth Edition, Chapter 470, pg. 3111, Lippincott Williams & Wilkins, 2000.

*We have found that some of the leading authorities in nutrition are against calcium supplementation.

Normalizing Calcium Intake: Projected Population Effects for Body Weight

Robert P. Heaney

American Society for Nutritional Sciences, 2003, p. 268S-270S

Discussion Excerpts: The data presented in this analysis suggest that the prevalence of obesity (or weight gain) in women could be reduced by 60-80% by the simple strategem of ensuring population-wide calcium intakes at the currently recommended levels...

...Also reassuring in this regard is the analysis of the NHANES-III data earlier reported by Zemel, et al.(1) After adjusting for age, sex, race and energy intake, they found a stepwise reduction in risk of obesity for each quartile of calcium intake. **At the highest quartile (approximately equal to current recommendations for calcium), the risk of being in the highest BMI quartile was reduced by about 80%...**

...The observation, both evident here and previously noted (2), that mean weight gain at midlife is effectively zero if calcium intake is at currently recommended levels is a fortuitous confirmation of the approximate adequacy of those recommendations. It is fortuitous in the sense that the currently recommended intakes were pegged to a skeletal endpoint, and there is no prior reason to expect that all systems would exhibit the same requirement. It is also interesting to note that, despite the established bone protective benefit of an adequate calcium intake, **the data presented here suggest that the effect on obesity prevalence-unrecognized until recently - is likely to be as large as, or larger than, the corresponding effect on osteoporosis prevalence...**

... Low calcium intakes in this case are so widespread in the North American population today that virtually everyone is exposed to that influence. If, as seems increasingly likely, these low intakes are inadequate, then correcting calcium intake at a population level would produce benefits for many body systems. Furthermore, some of the factors currently considered to be causative of the diseases concerned will likely turn out to be only predisposing or triggering factors, operating by exaggerating or uncovering the effects of the real cause, inadequate calcium intake.

1. Zemel MB, Shi H, Greer B, Dirienzo D, Zemel PC. Regulation of adiposity by dietary calcium. *FASEB J.* 2000 Jun;14(9):1132-8.
2. Heaney RP, Davies KM, Barger-Lux MJ. Calcium and weight: clinical studies. *J Am Coll Nutr.* 2002 Apr;21(2):152S-155S.

The Calcium Factor Against Disease

Calcium Against Syndrome X Diseases & More

“Of course, all of these diseases may have many causes, but they also all have one thing in common – calcium deficiency.” - Robert Heaney, M.D.

In this section, we present some remarkable research about calcium and disease. This research demonstrates that the lack of calcium and magnesium (and vitamin K and sunshine) may contribute to a large number of illnesses. We will discuss the work of Dr. Lawrence Resnick, one of the most prominent modern researchers in the field. But let's start by looking at the work of a pioneer who developed an entire theory of disease based on calcium: Dr. Carl Reich, M.D.

Probing the Mystery of Disease

In the early 1950's, Dr. Carl Reich, during his post-graduate studies, began to suspect that a number of imbalances and diseases could be traced to deficiencies in certain vitamins and minerals, particularly calcium.

In 1954, he began treating his patients with nutritional supplements. Patients with a variety of symptoms such as chronic asthma, constipation, leg cramps and sinusitis experienced rapid relief when treated with elevated calcium and vitamin D, as well as a full spectrum of basic nutrients.

Encouraged, Reich began to treat more patients with his nutritional therapy. A whole host of symptoms such as indigestion, headaches, muscle pain, constipation and migraines were successfully treated with calcium and other nutrients. He also came to believe that a number of diseases as diverse as chronic arthritis, rheumatoid arthritis, ileitis and colitis, asthma, hypertension, heart spasms, diabetes, Alzheimer's disease, Parkinson's disease, Lou Gehrig's disease, and even cancer, were all in some way related to calcium deficiency.

The connection, according to Reich, was

in an individual's response to physical or emotional stress. When the body is under stress, the autonomic nervous system sends out various messages to internal organs; for example, the blood vessels can be stimulated to dilate or constrict, the heart can beat faster, and the digestive system can slow down. Reich reasoned that many diseases were due to an imbalanced stimulation of the internal organs by the nervous system. And the roots of this imbalanced response, he believed, were deficiencies in certain key nutrients, especially calcium and, secondarily, vitamin D.

Individual response to stress is a complex topic. Some people take all kinds of stress in stride – even seem to thrive on it – while others react badly, often developing debilitating symptoms or, over the long term, serious diseases. Reich's theory may partly explain why people respond to stress so differently.

Reich theorized that a lack of dietary calcium would lead to an over-constrictive response to stress in specific tissues. For example, an over-constrictive response in muscles surrounding blood vessels would lead to hypertension or migraines; constriction of muscles in the lungs would cause asthma. Reich believed angina was related to constriction of the coronary arteries, while ileitis and colitis meant there was a constriction of the gastrointestinal tract. Obviously, this is an oversimplification of complex physiology, but Dr. Reich's treatments became widely known, suggesting some validity of his approach.

Dr. Reich's Special Advantage

Dr. Reich had a special advantage over the scientific and medical communities: he got to test his theories with real people for many years. Regularly, he saw proof that calcium, magnesium and vitamin D were very often the key factors in disease.

Reich also used substantial doses of vita-

min D. Reasoning that mankind's consumption of calcium and other minerals, as well as exposure to the sun, has decreased with evolution. His treatment program also included the use of other vitamins and minerals.

Reich perceived, and further research confirms, that the lack of vitamin D is one of the major nutritional deficiencies of our time. This deficiency, estimated at 40 to 50 percent of the U.S. population (*New England Journal of Medicine*, 1998), dramatically compounds the already existing deficiency in calcium. Without vitamin D, calcium cannot be absorbed into the body or perform its tasks properly in the bloodstream. This deficiency, combined with a low calcium intake, contributes to a lot of very disturbing statistics: a very high osteoporosis rate, hip fracture rate, and a skyrocketing onset of Syndrome X diseases, as well as an increase in other disease patterns discussed by Dr. Reich.

Calcium Takes Center Stage

Building on the pioneering work of Dr. Reich, in 1999, in his published work *The cellular ionic basis of hypertension and allied clinical conditions* (*Prog Cardiovasc Dis*. 1999 Jul-Aug;42(1):1-22), Dr. Lawrence Resnick proposed a unifying hypothesis with calcium at center stage. His work goes back almost a decade, and is well represented in the medical literature and is often cited by his peers.

Resnick's hypothesis states that when the level of calcium inside the cells becomes elevated, combined with a decrease in intracellular magnesium, cellular functioning is impaired and the cell is likely to become diseased. The hypothesis goes on to state that Syndrome X diseases are closely related to this impairment in cellular functioning.

Simply stated, too much calcium inside the cells is a disaster in the making. Calcium is normally supposed to be at very low levels inside the cells: 10,000

continued next page

Syndrome X continued

times less than the levels of calcium in the fluid surrounding the cells. The body uses the difference between the concentration of calcium in the cell and the calcium in the bloodstream as a signaling mechanism among the cells. When the difference in concentration is correct, proper signaling between cells can occur.

If the intracellular calcium level (calcium inside the cells) is too high, however, the signaling response is blunted. As a result, the cells can no longer regulate themselves, grow less responsive to stimuli, become calcified and begin the dying process. And this deterioration of the cells can lead to a host of serious diseases. *Resnick L. The cellular ionic basis of hypertension and allied clinical conditions. Prog Cardiovasc Dis. 1999 Jul-Aug;42(1):1-22.*

Syndrome X

These metabolic alterations of cellular calcium and magnesium alter and damage the function of the body tissues. **In certain diseases, there is incontrovertible evidence that intracellular calcium is elevated and intracellular magnesium is deficient. These include Type II diabetes, hypertension, cardiac hypertrophy, insulin resistance, and hyperinsulinemia.** (See *Glossary of Terms*) These conditions have been lumped together into a syndrome you have probably heard of: the infamous “Syndrome X.” **It’s important to note that obesity is also considered one of the “Syndrome X” diseases.** Researchers propose that adequate dietary calcium and magnesium, by preventing high levels of intracellular calcium, may be protective for a whole host of obesity related conditions.

Dr. Resnick and other researchers, including the Zemel Group, have discovered that all the conditions in Syndrome X are characterized by an underlying impairment of intracellular calcium. In addition, they found that when excessive amounts of intracellular calcium were lowered, there was a clinical improvement in blood pressure, insulin resistance, platelet aggregation and left ventricular hypertrophy. *Resnick L. The cellular ionic basis of hypertension and allied clinical conditions. Prog Cardiovasc Dis. 1999 Jul-Aug;42(1):1-22.*

What Causes the Syndrome X Diseases?

The critical role of calcium in regulation of cellular actions needs to be balanced with magnesium. Magnesium provides the balancing and relaxation effects that offset the constrictive effect of calcium. Reduced intracellular magnesium leads to an excess of intracellular calcium and exaggerates calcium-induced stimulation. The elevated intracellular calcium sends out a message to “tighten up,” and the message goes to the contractile apparatus of cells, causing them to constrict.

As an example, these messages lead to alterations in the smooth muscles surrounding blood vessels. This in turn leads the blood vessels to constrict, causing restriction of blood flow. This can ultimately result in arterial stiffness and/or hypertension.

In the heart, these mineral metabolic imbalances lead to overwork and exhaustion of the heart muscle, as the heart must work harder to pump the blood throughout the body. This is called “cardiac hypertrophy.” In the blood platelets, whose function is to regulate the clotting of blood when necessary, these same metabolic imbalances lead to increased blood “stickiness” and the potential for deadly blood clots. The stickiness of blood also impedes circulation and reduces oxygen and nutrient availability to the cells all over the body.

In larger, active muscle tissues, the calcium/magnesium imbalances can lead to insulin resistance, a common condition associated with diabetes. In the beta-cells of the pancreas, where insulin is produced, these mineral deficiency symptoms can lead to insulin abnormalities and diabetes.

In other endocrine tissues, where hormones are generated, these same metabolic alterations can lead to associated hormone problems. In certain nerve cells that respond to stress, called sympathetic nerve cells, it can lead to stress diseases and increased nervous activity, as well as a hyper-responsiveness to stimuli and anxiety syndromes.

Resnick’s simple hypothesis explains how a broad range of diseases are associated at a fundamental cellular level, through imbalances of calcium and its companion nutrients.

“All together, whichever aspect of hypertensive disease that was assessed, the higher the intracellular calcium, and the lower the intracellular magnesium, the more severe the clinical manifestation of each individual tissue abnormality measured; the level of blood pressure, cardiac mass (enlargement of the heart), arterial stiffness, abdominal visceral fat (“beer belly”), hyperinsulinemia, and even fasting and chronic average level of blood glucose.”

Dr. Lawrence Resnick

GLOSSARY OF TERMS

Intracellular: inside the cell.

Extracellular: outside the cell (in the fluid surrounding the cells).

Type II Diabetes: The most common form of diabetes. In Type II diabetes, either the body does not produce enough insulin or the cells have become desensitized to insulin.

Hypertension: Excessively high blood pressure, especially arterial blood pressure.

Cardiac Hypertrophy: Overwork and exhaustion of the heart muscle.

Insulin Resistance: When the body does not respond adequately to insulin (insulin is the blood sugar hormone produced by the pancreas).

Hyperinsulinemia: Too much insulin in the bloodstream.

Blood Platelets: Also known as thrombocytes, are large cells found in the bone marrow. They are the key clotting mechanism for an injury.

Platelet Aggregation: The tendency of blood platelets to form clots in the blood vessels. This can lead to blockage of the vessel resulting in stroke.

Triglycerides: The chemical form in which most fat exists in food as well as in the body. They are also present in blood plasma.

Resnick's Model

Resnick's Cellular Mineral Hypothesis Is Similar to Carl Reich's

It is interesting to note the similarities between Dr. Resnick's mineral hypothesis of diseases with that of Dr. Carl Reich. It turns out that Reich died before Resnick published his research, but he had already figured out that calcium and magnesium deficiency was at center stage in a number of illnesses, and he presented a hypothesis remarkably similar to Resnick's.

Like Reich, Resnick also prescribed high doses of calcium and vitamin D, and used a full range of vitamins and minerals, including of course, magnesium, and told his patients to spend time in the sun.

Cellular Overload

What causes cells to become overloaded with calcium? A lack of dietary magnesium, vitamin D, vitamins K1 and K2 and calcium are only part of the answer. When there is insufficient calcium in the diet, the body responds by withdrawing calcium from the bones (bone resorption). The bones act as kind of a "bank" for calcium. At the time when Reich was doing his research, scientists believed that calcium deficiency could be fully and completely compensated by bone resorption, and that the bone-supplied calcium would fill all the needs of the body's metabolic machinery.

Of course, without new deposits, the body cannot continue to withdraw from any bank without consequences: In this case, the consequence is osteoporosis. Reich however, believed that there were immediate medical effects of calcium deficiency that went far beyond the risk of osteoporosis. His theory was that when the body was forced to take calcium from the bones, the metabolic processes suffered. This conceptual leap was obvious

to Reich because he saw his patients dramatically responding to calcium and vitamin D therapy (along with magnesium and other nutrients) on a daily basis. And the responses were immediate, as it often is with buffered vitamin C.

These concepts are only now becoming more obvious to scientists and doctors. New research demonstrates that dietary calcium can protect against certain types of hypertension, colon cancer, the absorption of cadmium and lead and certain other toxic metals. In addition, of course, calcium can provide long-term protection against osteoporosis. Higher calcium and vitamin K1 and K2 also prevent calcium from being deposited in the wrong places such as soft tissues and joints (tissue calcification). Diseases in which calcification occurs include arthritis, rheumatism, sclerosis, periodontal disease, and Alzheimer's disease.

The Calcium Paradox Appears to Explain Calcification

Parathyroid hormone or PTH, is a hormone produced by the parathyroid gland. PTH works to maintain adequate blood levels of calcium at all times. Any decrease in blood calcium levels will stimulate the parathyroid gland to secrete PTH, which then removes calcium from the bones and delivers it to the blood to maintain critical levels. PTH thereby facilitates such critical metabolic functions as the activity of the heart and brain. However, PTH can be inefficient in its action and often floods the blood with too much calcium. Excess blood calcium is excreted by the body through the urine,

and is also deposited into soft tissues, where it contributes to tissue damage.

The "calcium paradox" refers to the observation that excess blood calcium via PTH, may lead to a number of unwanted health conditions such as calcification of joints, cartilage, and other tissues, bone spurs, plaque in the blood vessels, obesity, the Syndrome X diseases, colon cancer, gingivitis and even Alzheimer's disease - all of which can result from an overactive PTH mechanism.

These conditions represent the body's maladaptive coping mechanisms that are activated by dietary calcium deficiency. It is our contention, as Resnick stated, and based on the research we quote here, that the diseases that result from this faulty bodily response can either be prevented or greatly reduced by simply maintaining a higher dietary intake of calcium, combined with the optimum amounts of vitamin D, magnesium and vitamin K.

The Role of Calcium and Associated Nutrients in Disease Prevention

If we add other related Syndrome X diseases, we will have covered an overwhelming percentage of the illness that occurs in the U.S. Obesity, of course contributes to many illnesses, including all the Syndrome X diseases, which are all related to each other. But obesity also relates to cancer, especially to hormone-sensitive cancers. Clearly, we are looking at a broad range of conditions which cause much of the morbidity and mortality in the U.S. □

IMPORTANT SAFETY CAUTION ABOUT CALCIUM & SODIUM INSENSITIVE HYPERTENSION

Generally, all of the health conditions we have discussed, except for a certain rare type of high blood pressure called sodium insensitive (high rennin) high blood pressure, can probably be helped with calcium and magnesium therapy. In salt-sensitive hypertension, sodium is worsening the calcium entry into the cell and the elevated blood pressure may be reduced with supplemental calcium. However, in salt-insensitive hypertension, there are compensatory membrane phenomena that reverse this, and extra calcium may need to be restricted. Too much calcium can worsen this type of hypertension and cause a blood pressure crisis. If you have been diagnosed with hypertension, it is important that you consult with your doctor about supplemental calcium. (See Editor's Note citing the work of Hans Selye on pg. 14)



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Albert Dahlberg, M.D., Ph.D.
Professor, Brown University, Providence, RI



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A Note from Dr. Ralph Holsworth

"As the leading researcher of nattokinase in the U.S. and as a clinician, I am greatly concerned that the nattokinase available in the marketplace is safe and effective. It is important to realize that different commercial preparations of nattokinase may differ significantly in terms of safety and efficacy. Consumers must insist upon valid safety and efficacy data. For this reason, I have supported the proper development of NSK-SD™ nattokinase and carefully studied the safety and efficacy data, which consistently has the highest nattokinase activity available (>20,000 FU/g), the highest levels of safety testing, and the largest human clinical trials to date. Based on these studies and my personal experience with the product, I am confident in saying that NSK-SD™ is the gold standard for nattokinase on the market today."

Dr. Ralph E. Holsworth, Jr., D.O.
Lt. Commander U.S. Public Health Services

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Editor's Note on Calcium Supplementation

Of all the ideological conflicts in nutritional medicine, one area where there is huge disagreement is whether to supplement with calcium or not.

Leaders and opinion makers I respect have criticized supplementation of additional calcium despite increasing RDA's and dozens of studies showing benefits for osteoporosis prevention. Evidence exists that higher intakes of calcium minimize expression of such conditions as cancer of the colon and breast, and hypertension and obesity, all of which are multifactorial in causation and have a calcium deficiency component. The higher RDA's are a result of studies showing that higher levels are required to maintain calcium balance. *J. Nutrition.* 133: 249S-251S 2003

If we go back to the very basic issues, calcium deficiency is firmly established, as summarized from Kelley's Textbook of Internal Medicine (Fourth Edition, Chapter 470, pg. 3111, 2000) as presented on page 8. We are a population deficient in calcium, as defined by federal based requirements. It is one of the most significant nutritional deficiencies that exist. Other paramount nutritional deficiencies that are talked about here include vitamin D, magnesium and vitamin K, especially vitamin K2. Since all of these nutrients work together to optimize calcium biochemistry, and since calcium is such a critical structural and regulatory molecule, functional problems associated with deficiencies are likely be much greater, as clinical effects are compounded by multiple deficiencies of these related nutrients. The odds are that most of us are deficient in one or more of these nutrients.

Why do we need so much calcium when other cultures don't? There are some other cultures that exhibit much lower calcium consumption and lower osteoporosis? Our culture wastes calcium via high protein, high phosphorus and acidifying diets. These are big factors and cannot be overlooked. Jaffe R, Brown S. Acid-Alkaline balance and its effect on bone health. *Intl J Integrative Med*, 2001; 4 (6): 7-18.

Also, our consumption of pasteurized milk, being our major food source of calcium, may exaggerate magnesium deficiency because the ratio of calcium to magnesium is so high at 9:1. As I will show, magnesium deficiency compromises some of calcium's function, so milk may be worsening both calcium and magnesium deficiency in some patients. There are also recent findings that suggest

that milk may not be the best source of calcium for healthy bones, as seen in the Nurse's Study done at Harvard, although numerous other studies show benefit for bones.

So why are leading orthomolecular doctors, who are opinion leaders, and internationally-known authoritative figures, anti-calcium or let's say, calcium antagonists? Because these doctors are concerned about calcium accumulation in the vascular system and in soft tissues over many years, and they blame dietary calcium. Also, these doctors are well aware of the vast magnesium deficiencies that exist and are afraid that supplemental calcium will compete with magnesium for absorption.

I will quote from the very prestigious textbook *Modern Nutrition in Health and Disease* (9th Edition, edited by Maurice Shils, James Olson, Moshe Shike, Catherine Ross. 1999, Lippincott Williams & Wilkins). (All quoted text is italicized.)

With advancing age, humans commonly accumulate calcium deposits in various damaged tissues, such as atherosclerotic plaques in arteries, healed granulomas, and other scars left by disease or injury, and often in the rib cartilages as well. These deposits are called dystrophic calcifications and rarely amount to more than a few grams of calcium. These deposits are not caused by dietary calcium, but by local injury, coupled with widespread tendency of proteins to bind to calcium.

Our opinion is that higher dietary calcium, via the calcium paradox, and magnesium and other minerals such as boron, and especially vitamin K, will prevent much of the dystrophic calcification.

Calcification, which usually occurs intracellularly in tissues other than bones and teeth is generally a sign of tissue damage, cell aging and cell death. As cells lose control of calcium regulation and are unable to maintain low intracellular calcium, cellular function must degenerate.

It is worth explaining that calcium binds to a large number of cell proteins, which result in the activation of their function. By binding with oxygen atoms of glutamic acid and aspartic acid residues projecting from the peptide backbone, calcium stiffens the protein molecule and fixes its tertiary structure. Hence the cell keeps cytoplasmic concentration very low, and when it wants to activate

these calcium-associated enzymes, it allows calcium to enter and uses calcium in a regulatory manner. When calcium generally "leaks" into cells it means the cells are sick and failing to regulate calcium and this will initiate a further loss of function of the cell.

These calcium-associated proteins range from those involved in cell movement and muscle contraction to nerve transmission, glandular secretion, and even cell division. In most of these situations calcium acts as both a signal transmitter from the outside of the cell to the inside, and an activator of the functional proteins involved. In fact, ionized calcium is the most common signal transmitter in all of biology. It operates from bacterial cells all the way up to cells of highly specialized tissues in higher mammals.

There is concern that high calcium intake would produce relative magnesium deficiency, and this has been observed in rats but not humans. Calcium intake does not affect magnesium retention in humans. However the reverse, hypocalcemia, can occur as a result of magnesium deficiency. (Summarized in Shils, et al., *Modern Nutrition in Health and Disease*, 1999.)

Hypercalcemia refers to an elevation of calcium in blood and is generally reported where there is large consumption of calcium to raise the pH in peptic ulcer disease, but not for the normal diet. In Africa, the nomadic pastoral Masai tribe diet consists mostly of milk from the herds and flocks, and they consume 5000 mg of calcium per day or more, which is 5 or more times what the industrial population consumes. The Masai tribe are not known to have unusually high incidence of hypercalcemia or kidney stones. (Shils, et al., *Modern Nutrition*). They probably have another good source of magnesium.

The theory presented by Heaney and others that prehistoric man consumed a lot of calcium is also presented in the Shils text and referenced to in Eaton's *New England Journal of medicine* article. (Eaton SB, Konner M. N. *England J. Med.* 1985:312 283-289) Therein it is stated that:

Early man derived calcium from roots, tubers, nuts, and beans in quantities believed to exceed 1500 mg per day, and perhaps twice this amount when consuming food to meet the caloric demands of a hunter/gatherer of contemporary body size.

Such a well-known text and nutritional source

continued next page

as Modern Nutrition presents generally accepted nutritional concepts which must be accepted by a wide range of experts. So their opinions represent a consensus of academic thinking. In these cases, the concepts generally agree with the citations from Dr. Westin Price's work, the Okinawa program by Willcox B, Willcox C, and Suzuki M., and the theoretical and research conclusions from a host of other researchers presented in this newsletter.

The health benefits of pasteurized milk have become highly questioned due to significant research correlations with cardiovascular risk, prostate cancer, MS, bovine leukemia virus and more. The exact cause is still uncertain, but proteins altered by the heat of pasteurization and other potential causes are cited. Raw milk and yogurts are probably better choices. It is interesting to note that much of civilization grew up surrounded by flocks of goats and other milk-bearing animals. Such animals have fed hungry families for millennium, and our genetic constitution must have adjusted to some degree. (The Untold Story of Milk, Ron Schmid, N.D., 2003, NewTrends Publishing).

Calcium critics should probably direct their concerns towards commercial milk and milk products rather than the calcium they contain.

Responses to Common Criticisms of Calcium Supplementation:

Criticism: None of the studies strongly support calcium supplements as contributing to weight loss. They do support dairy calcium, meaning calcium found in non-fat dairy.

Response: The original study was made when yogurt was added to the diet of hypertensive patients with no other dietary changes. On average, over 10 lbs was lost by participants in one year. These results lead to an interest in calcium and weight loss. Shortly afterwards, animal studies in which calcium was increased from .1% to 2% resulted in a reduced weight gain in both lean and overweight Zucker rats. Extensive biochemistry studies followed to delineate the mechanism involved. Both calcium from milk products and calcium salts were used (summarized in Calcium Intake and Reduction in Weight or Fat Mass, Mass J. Nutr. 33: 249S-251S 2003). In a two year study, mineral bone mass was tested. 54 women completed a two year trial. Calcium intakes were low, 781+- 212 mg per day, compared to dietary reference of 1000 mg per day. The primary calcium source was dietary calcium

from dairy (67%). Dietary calcium ratio to energy (calories) negatively predicted changes in body weight and body fat, but not for lean mass. This means the more calcium, the less fat accumulated without reductions in protein levels. Dairy calcium predicted the changes as well as did non-dairy calcium; the research on fat storing enzymes and alterations in body temperature by calcium works independent of the source of calcium.

Another very important point is that this relationship of lowered body weight to calcium intake occurs in low, but not high calorie diets.

"Calcium intake did not predict changes in weight or fat mass in the group with calorie intakes above the mean. On the other hand calcium, but not calories, negatively predicted changes in weight and fat mass in calorie intakes below the mean."

So you can't stuff yourself and expect calcium to protect you. This indicates that one should be moderate in food consumption in order to get calcium to work for your biochemistry.

"Clearly if dairy products are added to a diet without compensation for energy intake, one is likely to gain weight."

We would like to emphasize that this is not a magic bullet for immediate weight loss, but a long term solution which may generally aid patients to gain advantage over the slow weight gain that accompanies aging. Calcium could turn around that increase in girth, when consumed with a moderate diet, and even turn that to a slight weight loss, according to the researchers we cite.

However, aggressive interventions as described on page 1 might be tried under medical supervision, and may produce dramatic results as the study cited, with a milk diet.

Also, notable benefit may follow the use of a highly buffered form of calcium, magnesium and potassium formula in relationship to food cravings.

Criticism: The low incidence of obesity in ancient people and underdeveloped countries is directly proportional to activity levels and lack of food or lack of refined food.

Response: There are obviously many factors and exercise is certainly got to be a big one. The calcium effect is a statistical factor. We have tried to emphasize that by relying on

some of the analysis in the abstracts. Not everyone will respond and this is a long term potential solution of potentially great magnitude. Also, one might appreciate OUR model that winter brings hibernation in hibernating animals. I suspect that we (humans) also have some of those hibernation characteristics. Perhaps because not enough vegetables and other rich sources of dietary calcium are being consumed, and less time is spent in the sun, humans may have retained the ability to conserve reserves by reducing fat burning, thereby conserving energy in the form of fat "for a sunny day" or for the spring and summer season. Just as the old adage goes, normally we save our resources "for a rainy day" and the body does the same by conserving fat and reducing fat burning when sunshine and calcium (a marker for vegetable consumption) are in short supply. There is data that vitamin D also has an inverse relationship to obesity. Hence, lack of vegetables (high in calcium) and sunshine would signal the body to go into a modified hibernation mode, slowing down metabolism for the winter season. So that's our hibernation theory.

We have presented expert "textbook" opinions on the safety of calcium supplementation, along with the probable explanation of the calcium paradox and clinical benefits from higher levels. However, more needs to be said on safety.

Certain medical conditions might be related to or worsened by increased dietary calcium, but this is not clear from the literature from what we have seen. It is plausible that in patients with renal failure there could be preferential mineralization in vascular tissue instead of bone. Kidney failure, as with other serious illness may require special consideration on a case by case basis. In other disease states, abnormal calcification of vessels and tissues as described in complex animal studies by Hans Selye (Calciphylaxis, 1962, The University of Chicago Press) may occur, but again we think the weight of the evidence by far, suggests safety and benefit for RDA, and even somewhat higher levels for the general population.

Since we have presented statistical findings, we cannot apriori determine which patients will respond. It is likely that a portion will not respond and this may well be related to metabolic type. Since some significant groups may not respond, the data for those that do respond would thus be understated, because it would represent average numbers (per individual). Hence a more profound response might be expected from responders. ♦

Vitamin K2 *continued from cover story*

Vitamin K: Its Relationship to the Optimal Tissue Distribution and Function of Calcium

It has been shown that calcium has a ubiquitous role in health, impacting on essentially all the Syndrome X conditions and diseases, which include obesity, blood pressure disorders, cardiovascular disease, diabetes, and malfunctioning of cell signaling. Calcification of the arteries is a major known consequence of aging, as is the calcification of soft tissues and the accumulation of calcium intracellularly (within the cells).

Optimum calcium nutrition depends on the interplay of a number of related compounds, such as magnesium, vitamin D3, and vitamin K. Just recently, the importance of vitamin K in regulating the healthy function of calcium has been recognized. It has been shown that vitamin K2 can be supplemented in very high doses, as used in Japan. It has been found to be safe even at 45 mg or more per day - up to a thousand times greater than generally occurring in the daily diet. Even small amounts of vitamins K1 & K2, as we will see, can have a great impact on overall health.

Vitamin K1 and more importantly, vitamin K2, play critical roles in preventing arterial calcification, which is a risk factor in coronary artery disease, as well as other calcification conditions associated with aging.

Vitamin K is actually a group name for related compounds, which all have a similar molecular structure (methylated naphthoquinone ring structure).

Vitamin K was discovered in the 1920's as a fat-soluble factor important in blood coagulation ("K" for koagulation). Vitamin K1 is found in plants and vitamin K2 is found in animals and bacteria, including beneficial probiotic bacteria, aka "good bacteria," from the GI tract. The body can store about a one-month

supply of the vitamin. Antibiotics interfere with the growth of healthy intestinal bacteria and as a result, impair vitamin K production. The prescription anticoagulant Warfarin also interferes with the metabolism and function of vitamin K by inhibiting critical enzymes that are involved with the production of coagulation factors. Without these coagulation factors, excessive bleeding can occur.

How this vitamin is involved in blood coagulation eluded scientists until 1974, when a requirement for vitamin K was shown for the formation of numerous proteins in the body known as gamma-carboxy glutamic acid (GCGA). These proteins, when modified, specifically bind to calcium which is important for blood coagulation, as well as other critical processes, and through which calcium regulation affects cartilage, bone, protein in blood, and very importantly, regulates the calcium in the cardiovascular system. It appears that the extra carboxyl group binds calcium so that it can be moved around.

What Are GCGA Proteins?

Vitamin K works by acting as a cofactor in the carboxylation (adding of a carboxyl group CO₂) via an enzyme (gamma glutamyl carboxylase), of glutamic acid (a specific amino acid) to form a modification of that amino acid (gamma carboxyglutamic acid) in a variety of critical plasma proteins. Without this step, these plasma proteins will not function in their role of the regulation of calcium concentrations in various tissues.

There are several different types of GCGA proteins including: osteocalcin (OC), which is the most abundant GCGA protein in humans and is synthesized in bone; the GCGA protein con-

taining blood coagulation factors are synthesized in the liver; the matrix GCGA proteins (MGP) are synthesized in the cartilage and in the vessel walls of arteries.¹

According to the Food and Nutrition Board of the National Academy of Sciences National Research Council, the requirements of vitamin K in micrograms (mcg) ranges from 5 micrograms for infants and up to 80 mcg for adult males and 65 mcg for adult females.²

When vitamin K is in short supply in the body, these proteins are formed without the GCGA component and are inactive for their intended functions - which play important roles in four different tissue types including: 1) liver; 2) bone; 3) cartilage; and 4) arterial vessel walls.

These four tissues are all able to pull vitamin K from the blood. However, the uptake from the liver is much greater for K1 than for other tissues. **Very important recent findings indicate that vitamin K2, and not K1 inhibits Warfarin-induced arterial calcification. This research is important for those on Warfarin, and has implications for the majority of us who are unaware that we are deficient in this lifesaving nutrient.**

Because the liver needs so much vitamin K, this can leave the cartilage and bone GCGA proteins with inadequate levels. Hence the dietary vitamin K requirement for bone, and the special requirements for the cardiovascular system and cartilage may not be met even though normal clotting factor production occurs, as this occurs in the liver. **Therefore, the requirement to keep the vasculature clear of accumulating calcium and to keep the bones well supplied with calcium may not be adequately supplied. This is why the recent discoveries on the value of vitamin K2 and its recent commercial availability can make a great difference in the lives of millions - probably a majority of the population would benefit.**

continued next page

Vitamin K continued

The FDA's current recommendations for vitamin K dosage is based solely on the liver's requirements alone. It has been identified that a large percentage of the enzymes that do not receive GCGA because of a vitamin K1 or K2 deficiency, become unable to mobilize calcium and place it into the bone where it belongs. This GCGA-deficient enzyme is known as under-carboxylated osteocalcin (ucOC). **It was found that this occurs in the majority of the healthy adult population indicating subclinical vitamin deficiency in a large portion of the population.**^{3,4} **Though this is subclinical in terms of obvious symptoms, the first symptoms may be osteoporosis or acute coronary disease... the first symptom may even be death.**

The results of a vitamin K intervention study have been examined in which both bone mineral density and vascular elasticity were shown to increase.⁵ **Other studies have demonstrated consistent findings adding to the conclusion that vitamin K1, and preferably, a good amount of vitamin K2, may be some of the best protection for preventing calcification of the arteries, and for protection against osteoporosis.**

Oral anticoagulant medications such as Warfarin or Coumadin, etc., which are the most commonly used anticoagulants, are vitamin K antagonists and lessen the concentration of the anticoagulants.

Scientific Studies

An excellent history and review of Vitamin K is offered in a number of scientific papers - one being *Vitamin K1 supplementation retards bone loss in postmenopausal women between 50 and 60 years of age* by Braam, Knapen, Geusens, Brouns, Hamulyak, Gerichhausen, and Vermeer, epub 2003. *See below for more study results:*

In 1984 it was found that patients with osteoporotic fractures had circulating vitamin K levels which were over 70% lower than those in the control group.⁶ The data was consistent with other studies showing that low serum vitamin K is associat-

ed with low mineral density, which is a high risk factor for bone fracture.^{7,9}

In analyzing British and American populations, it was found that they did not meet the RDA levels of 1.5 micrograms per day per kg of body weight⁽¹⁰⁻¹²⁾ and that low intake is associated with low bone mineral density which is associated with risk of bone fracture.

In the Nurses Health Study, over 72,000 women between 38 and 63 years of age were followed for 10 years. The risk of fracture in the lower quintile for vitamin K intake almost doubled that in the higher quintile.¹³

In the Framingham study of an older group of patients, with an average age of 75 years, the results were more dramatic.¹⁴ Subjects in the highest quartile for vitamin K intake had a significantly lower hip fracture risk.¹⁵

Hence the critical involvement of vitamin K in bone health and its general deficiency in our population is firmly established.

Vitamin K Supplementation Retards Postmenopausal Bone Loss

In the Maastricht osteo study, 188 postmenopausal women between 50 and 60 years old were treated for 3 years with daily supplements.¹⁶ There was a placebo group which received only maltodextrin and the second group received minerals, 500 mg/day of calcium, 150 mg/day of magnesium, 10 mg/day of zinc and 8 mcg/day of vitamin D3. The third group received these minerals plus the vitamin D3 and 1 mg/day of vitamin K1. The group without vitamin K benefited only transiently. In the group with vitamin K, bone loss at the femoral neck was retarded by 35%-40% compared to the other mineral vitamin D group. It is stated that if these effects continued over decades, lifelong supplementation could postpone fractures by up to 10 years.

Further research of the D-Bavis study using calcium (1000 mg), vitamin D (10 ug) and vitamin K (200 mcg) per day, supported the previous findings. They also found a significant increase in bone mineral content and density in the vita-

min K group.¹⁷

The authors concluded that **combined supplementation with vitamin K1 and D3 at dietary relevant levels improved bone mass density at the trabecular bone site** and that the equivalent supplementation in high osteoporotic risk groups may be beneficial. Extremely high doses 45-90 mg/day of vitamin K2 are successfully used in the treatment of osteoporosis in Japan.¹⁸⁻²⁰ These doses of K2 exceed RDA levels by 1000 fold and no side effects were noted.

Low Vitamin K Intake as a Risk Factor for Cardiovascular Disease

256 postmenopausal women were studied by Jie, et. al. in the EPOZ study. They found an inverse correlation between long term vitamin K intake and arteriosclerotic aorta calcification.²¹ Only vitamin K1 (phylloquinone) was included in the study.

A subsequent study of 4500 participants of the Rotterdam study by Gelejinse, et. al. reports a much stronger negative correlation between long term, lower than adequate intake of vitamin K2 (menaquinone) and aortic calcification. The data was stronger for K2 than for K1. This is consistent with the suggestion of preferential uptake of K2 by the vessel wall.²²

Vitamin K Supplementation Prevents Age Related Vascular Stiffening

In an animal study in rabbits with high cholesterol, vitamin K2 was shown to decrease circulating cholesterol concentrations, suppress progression of vascular plaque, thickening in the vessels, and pulmonary atherosclerosis.²³ **In a study of rats on arterial calcification, vitamin K2 completely prevented calcification, whereas vitamin K1 had little effect.**²⁴ **A three year study involving postmenopausal women (a group which is generally known to be at risk for vascular illness), the elastic properties of the carotid artery were recorded using ultrasound. A supplement of 1 mg/day of vitamin K1 completely abolished age-related arterial stiffening, whereas the placebo group showed a decrease of 13% of elastic properties of the vasculature during the test period.**²⁵

continued on page 18



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Vitamin K continued

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“However, both K1 and K2 are well absorbed from supplements as long as they are taken with some dietary fat to stimulate bile secretion.”²⁸

Recommendations of a European Expert Group

In November 2002, a number of European experts in the fields of vitamin K research, bone metabolism and cardiovascular disease met to review all the available scientific data to formulate an opinion on the amount of recommended dietary vitamin K and the use of vitamin K-containing supplements, for optimal bone and vascular health. Some of the conclusions from this meeting are summarized below:

Daily intake of between 200 and 500 mcg/day of vitamin K through food sources may be required for optimal health.

Accumulating evidence suggests there is a synergistic effect between vitamins K, D and calcium (and of course, magnesium). Optimal health effects may be obtained from combined supplementation of vitamins K, D and minerals.

Any risks associated with high consumption of either vitamin K1 or K2 appear minimal, with intakes up to 1 mg/day of vitamin K1 and 45 mg/day of vitamin K2, often having been used with no observed side effects.

The only potential problem with high levels of vitamin K supplementation relates to interference with oral anticoagulant medications such as Warfarin and Coumadin,

which are antagonists of vitamin K. Patients on oral anticoagulant treatment should not use vitamin K supplements and avoid strong fluctuations in their daily dietary vitamin K intake. However, in a systematic dose-response study of patients on oral anticoagulant therapy, it was demonstrated that the stability of anticoagulation was not significantly affected by vitamin K supplementation at doses below 150 mcg/day.³⁰ Patients on anticoagulant medications should consult with their physician or healthcare practitioner regarding vitamin K.

Other Benefits of Vitamin K

We have discussed the beneficial effects of vitamin K on bone density, cardiovascular health, and the Syndrome X diseases, however, there are even more benefits to vitamin K supplementation.

Anti-Inflammatory

Further research has demonstrated vitamin K’s anti-inflammatory action. As the body ages, levels of the inflammation-promoting cytokine interleukin-6 (IL-6) increase. Once IL-6 becomes out of balance with the other cytokines, inflammation accelerates. It has been observed that people with arthritis, Alzheimer’s disease, and atherosclerosis have higher levels of IL-6. In a study done by the National Research Institute in Italy, it was shown that subjects with the highest levels of IL-6 were almost twice as likely to develop mobility-related disabilities.

Diabetes

The second highest concentration of vitamin K in the body is in the pancreas, which plays a major role in blood sugar and insulin regulation. In animal studies, **Japanese researchers found that when they induced vitamin K deficiency, the test animals developed Type II diabetes.**³¹

Antioxidant

Research has indicated that vitamin K has antioxidant activity comparable to vitamin E and CoQ10.^{32,33} Animal studies have demonstrated complete hepatic (liver) protection from induced oxidative stress using vitamin K, and was

found to be 80% as effective as vitamin E in preventing oxidation.

Alzheimer’s

About 25% of the population have a genetic predisposition for developing Alzheimer’s disease - they carry the E4 form of the lipoprotein apoE. Interestingly, people who carry this gene have been found to have low levels of vitamin K. Calcification and the development of lesions in blood vessels that feed the brain tissues are believed to be a component of Alzheimer’s development. Further research may reveal high-dose vitamin K therapy to be preventive.

Japanese Study on Vitamin K2 & Viral Cirrhosis-Related Liver Cancer

Japanese researchers have recently discovered that vitamin K2 may play a significant role in prevention of liver cancer caused by viral cirrhosis. In a 2004 study published in the *Journal of the American Medical Association*, 40 women diagnosed with viral liver cirrhosis were studied, in which 21 were given 45 mg vitamin K2 per day. **Vitamin K2 was found to decrease the risk of the development of liver cancer** in female patients with viral cirrhosis, possibly by delaying the onset of the cancer.³⁴ For over seven years, the patient’s progress was closely followed. **The proportion of patients who developed liver cancer was significantly smaller in the group of women treated with the vitamin K2 (2 of 21), compared to the non-treated group (9 of 19).** The annual incidence of liver cancer in the treated group was 1.6%, compared to the non-treated group, which was 8.8%. The researchers believe that a substance called geranylgeraniol (a by-product of vitamin K2), induces cell death in tumor cells suggesting that it may play an important role in cell growth inhibition. The researchers wrote, **“The study indicates that vitamin K2 decreases the risk of liver cancer to about 20% compared to the control group.”** The researchers also commented that these are only preliminary results and further research needs to be done through clinical trials. ♦

Vitamin K2 References:

- Schurgers LJ, Vermeer C. Differential lipoprotein transport pathways of K-vitamins in healthy subjects. *Biochim Biophys Acta*. 2002 Feb 15;1570(1):27-32.
- Kelleys Textbook of Internal Medicine, Fourth Edition, 2000, Lippincott, Williams and Wilkins, Philadelphia, PA.
- Knapen MH, Jie KS, Hamulyak K, Vermeer C. Vitamin K-induced changes in markers for osteoblast activity and urinary calcium loss. *Calcif Tissue Int*. 1993 Aug;53(2):81-5.
- Booth SL, Sokoll LJ, O'Brien ME, Tucker K, Dawson-Hughes B, Sadowski JA. Assessment of dietary phyloquinone intake and vitamin K status in postmenopausal women. *Eur J Clin Nutr*. 1995 Nov;49(11):832-41.
- Vermeer C, Braam L, Schurgers L, Brouns F. *Agro-Food Industry Hi-Tech 2002*, 13:11-15.
- Hart JP, Catterall A, Dodds RA, Klenerman L, Shearer MJ, Bitensky L, Chayen J. *Lancet* ii 283 (1984).
- Hart JP, Shearer MJ, Klenerman L, Catterall A, Reeve J, Sambrook PN, Dodds RA, Bitensky L, Chayen J. Electrochemical detection of depressed circulating levels of vitamin K1 in osteoporosis. *J Clin Endocrinol Metab*. 1985 Jun;60(6):1268-9.
- Hodges SJ, Pilkington MJ, Stamp TC, Catterall A, Shearer MJ, Bitensky L, Chayen J. Depressed levels of circulating menaquinones in patients with osteoporotic fractures of the spine and femoral neck. *Bone*. 1991;12(6):387-9.
- Hodges SJ, Akesson K, Vergnaud P, Obrant K, Delmas PD. Circulating levels of vitamins K1 and K2 decreased in elderly women with hip fracture. *J Bone Miner Res*. 1993 Oct;8(10):1241-5.
- Booth SL, Pennington JA, Sadowski JA. Food sources and dietary intakes of vitamin K-1 (phyloquinone) in the American diet: data from the FDA Total Diet Study. *J Am Diet Assoc*. 1996 Feb;96(2):149-54.
- Booth SL, Suttie JW. Dietary intake and adequacy of vitamin K. *J Nutr*. 1998 May;128(5):785-8.
- Thane CW, Paul AA, Bates CJ, Bolton-Smith C, Prentice A, Shearer MJ. Intake and sources of phyloquinone (vitamin K1): variation with socio-demographic and lifestyle factors in a national sample of British elderly people. *Br J Nutr*. 2002 Jun;87(6):605-13.
- Feskanich D, Weber P, Willett WC, Rockett H, Booth SL, Colditz GA. Vitamin K intake and hip fractures in women: a prospective study. *Am J Clin Nutr*. 1999 Jan;69(1):74-9.
- Booth SL, Broe KE, Gagnon DR, Tucker KL, Hannan MT, McLean RR, Dawson-Hughes B, Wilson PW, Cupples LA, Kiel DP. Vitamin K intake and bone mineral density in women and men. *Am J Clin Nutr*. 2003 Feb;77(2):512-6.
- Booth SL, Tucker KL, Chen H, Hannan MT, Gagnon DR, Cupples LA, Wilson PW, Ordovas J, Schaefer EJ, Dawson-Hughes B, Kiel DP. Dietary vitamin K intakes are associated with hip fracture but not with bone mineral density in elderly men and women. *Am J Clin Nutr*. 2000 May;71(5):1201-8.
- Braam LAJLM, Knapen MHI, Geusens P, Brouns F, Hamulyak K, Gerichhausen MJW, Vermeer C. Vitamin K1 supplementation retards bone loss in postmenopausal women between 50 and 60 years of age. *Calcif. Tissue Int*. 72, epub (2003).
- Bolton-Smith C, Mole PA, McMurdo MET, Paterson CR, Shearer MJ. *Ann. Nutr. Metab*. 45 Suppl. 1 246 (2001).
- Orimo H, Shiraki M, Tomita A, Morii H, Fujita T, Ohata M. *J. Bone Miner. Metab*. 16:106-112, 1998.
- Shiraki M, Shiraki Y, Aoki C, Miura M. Vitamin K2 (menatetrenone) effectively prevents fractures and sustains lumbar bone mineral density in osteoporosis. *J Bone Miner Res*. 2000 Mar;15(3):515-21.
- Iwamoto J, Takeda T, Ichimura S. Effect of menatetrenone on bone mineral density and incidence of vertebral fractures in postmenopausal women with osteoporosis: a comparison with the effect of etidronate. *J Orthop Sci*. 2001;6(6):487-92.
- Jie KS, Bots ML, Vermeer C, Wittman JC, Grobbee DE. Vitamin K intake and osteocalcin levels in women with and without aortic atherosclerosis: a population-based study. *Atherosclerosis*. 1995 Jul;116(1):117-23.
- Geleijnse JM, Vermeer C, Schurgers LJ, Grobbee DE, Pols HAP, Wittman JCM. *Thromb. Haemostas. (Suppl July)* P473, 2001.
- Kawashima H, Nakajima Y, Matubara Y, Nakanowatari J, Fukuta T, Mizuno S, Takahashi S, Tajima T, Nakamura T. Effects of vitamin K2 (menatetrenone) on atherosclerosis and blood coagulation in hypercholesterolemic rabbits. *Jpn J Pharmacol*. 1997 Oct;75(2):135-43.
- Spronk HM, Soute BA, Schurgers LJ, Thijssen HH, De Mey JG, Vermeer C. Tissue-specific utilization of menaquinone-4 results in the prevention of arterial calcification in warfarin-treated rats. *J Vasc Res*. 2003 Nov-Dec;40(6):531-7. Epub 2003 Dec 3.
- Braam LAJLM. Thesis, Maastricht ISBN 90-5681-145-2, 2002.
- Schurgers LJ, Vermeer C. Determination of phyloquinone and menaquinones in food. Effect of food matrix on circulating vitamin K concentrations. *Haemostasis*. 2000 Nov-Dec;30(6):298-307.
- Ronden JE, Drijff-Reijnders MJ, Vermeer C, Thijssen HH. Intestinal flora is not an intermediate in the phyloquinone-menaquinone-4 conversion in the rat. *Biochim Biophys Acta*. 1998 Jan 8;1379(1):69-75.
- Vermeer C, Braam L, Knapen M and Schurgers L; Vitamin K supplementation: a simple way to improve vascular health. *Agr Food Industry hi Tech Nov 2003*.
- Vermeer C, Shearer MJ, Zittermann A, Bolton-Smith C, Szulc P, Hodges S, Walter P, Rambeck W, Stocklin E, Weber P. Beyond deficiency: potential benefits of increased intakes of vitamin K for bone and vascular health. *Eur J Nutr*. 2004 Dec;43(6):325-35. Epub 2004 Feb 5.
- Schurgers LJ. Thesis, Maastricht ISBN 90-5681-138-X, 2002.
- Sakamoto N, Wakabayashi I, Sakamoto K. Low vitamin K intake effects on glucose tolerance in rats. *Int J Vitam Nutr Res*. 1999 Jan;69(1):27-31.
- Mukai K, Itoh S, Morimoto H. Stopped-flow kinetic study of vitamin E regeneration reaction with biological hydroquinones (reduced forms of ubiquinone, vitamin K and tocopherolquinone) in solution. *J Biol Chem*. 1992 Nov 5;267(31):22277-81.
- Mukai K, Morimoto H, Kikuchi S, Nagaoka S. Kinetic study of free-radical-scavenging action of biological hydroquinones (reduced forms of ubiquinone, vitamin K and tocopherol quinone) in solution. *Biochim Biophys Acta*. 1993 Jul 11;1157(3):313-7.
- Habu D, Shiomi S, Tamori A, Takeda T, Tanaka T, Kubo S, Nishiguchi S. Role of vitamin K2 in the development of hepatocellular carcinoma in women with viral cirrhosis of the liver. *JAMA*, 2004 Jul 21;292(3):358-61.

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