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The calcium myth

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'During times of universal deceit, telling the truth becomes a revolutionary act.' (George Orwell)

There is a lot of confusion around the subject of calcium intake. We are made to believe that dairy is a good source of calcium. We also use calcium supplementation as an insurance policy against osteoporosis. However, it is a question of how much calcium we 'absorb' and not how much we 'ingest'. Furthermore, many of our Western lifestyle habits adversely affect the way our bodies handle calcium.¹

CALCIUM BALANCE

Several important and complex control mechanisms are involved in calcium homeostasis and metabolism. Calcium is vital to a large number of functions within the body, including the mediation of hormonal signals, the triggering of muscle contraction, the transmission of nerve impulses and blood clotting. The body has three pools of calcium:

- Plasma plus extracellular fluid (in the blood and fluid outside the cell)
- Intracellular calcium (in the cell)
- Bone calcium.

Calcium homeostasis between the three pools of calcium depends on the balance between the calciotropic hormones: parathyroid hormone (PTH), calcitonin and calcitriol (vitamin D). Vitamin D is important in the control of plasma calcium, particularly by controlling the intestinal absorption of calcium and the resorption of

bone. Bones are the body's main calcium reservoir, and by no means metabolically inert. They are constantly being resorbed and replaced. The general health of the bone cells, nutritional factors, and the balance of the hormones that control calcium metabolism, will determine how effectively calcium is deposited in the bones.

Calcium metabolism problems that afflict people in Western countries today are not caused by calcium-deficient diets, but from other errors of metabolism and nutrition that affect calcium metabolism adversely, making it inefficient and often ineffective. The result is negative calcium balance – the condition in which the person loses more calcium each day than s/he takes in, and the end result can only be the withdrawal, in time, of substantial calcium from the bones. It is calcium loss in the midst of plenty.

Negative calcium balance or calcium-dumping syndrome is therefore the failure to deposit calcium into the bones at an appropriate and normal rate. Bone resorption exceeds bone deposition even in the presence of an adequate and possibly even excessive amount of calcium absorbed from the intestines.

Given this error in bone metabolism, the calcium that should have been deposited into bone can only be either excreted or dumped. This could also be referred to as 'calcium mishandling'. Calcium mishandling in the body gives rise to the hardening of muscles and even other internal organs like the liver. This also results in many cases of back pain and 'frozen shoulder'. In this case it is not dumping of calcium deposits, but the outer membrane of the cell that becomes less efficient than normal in keeping extracellular calcium out of the cell, while at the same time the intracellular structures become less efficient at pumping calcium out of the cytosol into their interiors. It is thus clear that calcium mishandling makes its contribution to the early causative stages of many serious diseases.² It has been predicted that out-of-control cytosolic calcium levels may even contribute to the causation of some cancers, notably breast cancer.³⁻⁵

Many aspects of our current lifestyle are potential contributors to the problem of negative calcium balance,⁶ with its associated accumulation of excess intracellular calcium. The major factors upsetting calcium metabolism and therefore also bone metabolism and bone health are as follows.

Dairy consumption. Although dairy products have a high calcium content, they actually deplete the body of both calcium and magnesium. The calcium in milk is about 10 times higher than that of magnesium. Therefore, diets high in dairy are relatively magnesium-deficient. Since magnesium is essential for regulating calcium metabolism, the lack of magnesium is particularly undesirable. A marginal deficiency in magnesium already seems to be epidemic in those who consume a typical Western-style diet, with excess ingestion of dairy, dietary fats, refined carbohydrates and high

phosphorus. Furthermore, dairy products have a high phosphorous-to-calcium ratio, which is also adverse. Calcium is absorbed more effectively when the calcium-to-phosphorous ratio favours calcium. Phosphorous draws calcium from reserves in the bone and it binds with calcium in the intestines resulting in poor absorption. Milk also encourages sodium to enter the cells, which leads to an imbalance of intracellular calcium, magnesium and trace minerals.

Dairy is acid-forming. The body is therefore forced to use calcium from your bones to buffer the high acid content so that your blood pH remains constant. The problem with dairy is that it takes more calcium to buffer its acid content than what you actually receive from the dairy. Since milk is mucous-forming and contributes to the putrefactive conditions in the colon, it often disturbs gut conditions so badly that calcium absorption may virtually cease, even though it has such a high calcium content.

Milk and dairy products have been pasteurised, which destroy the phosphatase enzyme necessary for the assimilation of calcium. Furthermore, it has been skimmed, homogenised and otherwise processed and adulterated, further degrading the calcium, rendering it even more difficult for the body to absorb.⁷

Excess dietary phosphorus. We receive phosphorus from many food sources, including soft drinks, beef, preserved foods, dairy, toothpaste and various health foods such as wheat germ, bran, yeast and supplements. Excessive phosphorus binds other essential trace minerals such as magnesium, manganese, zinc and copper, which are all essential for calcium absorption. The disturbed calcium-to-phosphorous ratio of our present diet may produce a low-level, chronic secondary or nutritional form of hyperparathyroidism in many patients. This causes a loss of bone calcium and the excess parathyroid hormone also drives calcium into cells, such as the muscle cells in arteries, leading to arterial calcification.^{8,9}

Deficiency of magnesium, boron, manganese, chromium, silicon, copper or zinc. These minerals play a major role in calcium metabolism and are depleted to a great extent in the average Western diet, which consists mainly of processed food.

Inadequate and excess vitamin D intake. Prolonged intake of vitamin D results in tissue calcification of the arteries. Vitamin D is added to animal feed and is therefore present in the fat of the beef and chicken we eat. Vitamin D is also added to bread, breakfast cereals, margarine, flour and enriched milk products and is present in many supplements.

High alcohol intake. This leads to chronic bone decalcification and negative calcium balance.

Impaired glucose metabolism. Type II diabetes patients and those with chromium or dietary fibre deficiencies and even some food allergy problems have abnormal insulin levels and/or blood sugar levels, all leading to a negative calcium balance.¹⁰

Lack of exercise. It is common knowledge that failure to use the skeleton leads to overall bone loss.¹¹ A research study indicated that exercise for one hour three times a week increased total body calcium by 2.6%, while a more sedentary control group decreased their total body calcium by 2.4% in the same time frame.¹²

Diets high in animal protein, e.g. dairy, meat, fish, chicken and eggs contribute to acidosis. One of the processes for neutralising excess acid in tissues is known as protein-induced hypercalciuria. This involves using the body's supply of calcium, including reserves in the bones if necessary. Meat is low in calcium and high in phosphorous. Scientists have reported that calcium excretion and bone loss increase in proportion to the amount of animal protein ingested. Animal proteins, due to their high sulphur (acidic) content, alter the kidneys' reabsorption of calcium, so that more calcium is excreted on a diet based on meat, eggs and dairy products. People on high-protein diets excrete between 90 mg and 100 mg of calcium a day.¹³ The traditional Eskimo diet contains over 2 000 mg of calcium a day, but because their diet is so acidic (virtually 100% from animal sources), it produces the highest hip fracture rate in the world.

On the other hand, diets low in protein content can also lead to bone loss, since nearly 50% of the bone volume consists of protein and bone deposition requires a continuing supply of fresh dietary protein. This stresses the importance of ingesting a balanced wholefood diet.^{14,15}

Hyperparathyroidism and /or hyperthyroidism. Hyperparathyroidism and malignant diseases are the two main causes of hypercalcaemia. Both result in an increase in the resorption of bone and renal re-absorption of calcium.¹⁶

Chronic heavy metal exposure. Lead, mercury, cadmium and aluminum found in our water, food and air contribute to excess intracellular accumulation of calcium (calcinosis). Excessive aluminum, as found in antacids, also causes increased parathyroid hormone production and therefore could induce a negative calcium balance.¹²

Coffee, tea, cocoa and red wine. These contain certain food factors that impair sodium and potassium ATPase. This leads to impairment of the membrane pump, which will also affect calcium and other intracellular minerals.

Smoking. Smoking is a major contributor to high cadmium levels, which interferes with calcium metabolism and accelerates development of arteriosclerosis.

Chronic use of drugs and stimulants such as aspirin, laxatives, diuretics, stimulants and coffee. Conventional drugs that interfere with calcium metabolism are steroid therapy, anti-epileptics, Depo-Provera, Aromatase inhibitors and excess thyroxine.

Low levels of calcitonin, as frequently seen in hypothyroidism, contributes to decalcification of bone.

Lack of oestrogen. This puts postmenopausal women at greater risk of gradual demineralisation of bones, earlier and more severely than men.

Fluoride. Avoiding fluoride in your drinking water is vital. Fluoride collects in the bones, and although it 'technically' increases bone mass and density, the evidence is very strong that fluoride intake can actually double the incidence of hip fractures.¹¹

Excess sodium intake. Salt is a negative risk factor because it increases obligatory calcium loss; every 100 mmol of sodium takes 1 mmol of calcium out of the body. Restricting salt intake has been found to lower the rate of bone resorption in postmenopausal women.¹³

All these Western-lifestyle factors adversely affect calcium metabolism. Therefore most people need very high levels of calcium intake to make up for the calcium mishandling, which will, however, result in the risk of calcium 'dumping' problems.¹⁷ This may lead to arthritis, spondylitis, gallstones, kidney stones and, perhaps, arterial atheroma. In arterial atheroma the calcium deposits are found in the walls of the arteries along with deposits of fatty materials. This makes up much of the thickened and roughened areas in the arterial wall called 'atheroma'. A high blood cholesterol level is one of the adverse signs for the susceptibility to coronary disease. Calcium is one of the nutritional factors that can help to reduce the blood cholesterol level. However, where calcium is being mishandled in the body, calcium deposition on the arterial wall is actually a part of the process by which arterial walls deteriorate. Only a healthy level and deposition of body calcium protects against arterial disease. The tendency to mishandle calcium gets worse with advancing years, therefore the soft tissue in elderly people also tends to harden and stiffen as a result.

These are labelled diseases in which calcium dumping is either an invariable or at least a common feature, but it also emerges as a predisposing factor in many other chronic diseases. Any excess accumulation of intracellular calcium is likely to produce a relative deficiency of intracellular magnesium, which is an essential catalyst to many metabolic processes. The extremely high doses of calcium that are prescribed by many health practitioners, without correcting any underlying sodium and potassium imbalance, nor taking into account the relationship calcium intake bears to intake of magnesium and trace elements, does not make sense. The logical treatment would be to avoid the above adverse lifestyle factors, which interfere with calcium metabolism, and to follow a fairly low calcium diet for a time, with elevated magnesium and trace element intake.

OSTEOPOROSIS

Osteoporosis is a generalised skeletal disorder characterised by thinning of the bone and deterioration in its architecture, causing susceptibility to fracture. Osteoporosis is a Western disease and it can therefore be presumed that it has its roots in the adverse Western-lifestyle practices that are responsible for upsetting the normal pattern of balance of body calcium. It has been recognised as a major public health problem for only the last 30 years. The incidence of hip fractures in countries that have the highest dairy consumption in the world (like Norway, Sweden, and the USA), is 50 times greater than in developing countries like Africa and Asia, where consumption of dairy products is lower.

Because calcium is stored in the bones to such a major extent, significant loss of calcium from the body always translates into loss of calcium from the bone. This leads to either softening of the bones or else a localised loss, with extensive depletion of minerals from whole areas, hence giving rise to large gaps in the bone structure.

Although vitamin D and the steroid sex hormones favour bone deposition, 'lack' of these is unlikely to be the only cause. Calcium-wasting factors in the lifestyle, which adversely affect the health and vigour of the bone cells, are much more likely to be the cause. Most women, not exposed to adverse Western-lifestyle factors, do not suffer from osteoporosis post-menopause. The steroid hormone drop is no more than a triggering factor which tends to get the blame, the real underlying cause being calcium-wasting factors in the lifestyle.

Although high calcium intake has long been recommended to prevent osteoporosis, there is little evidence that high calcium intake effectively prevents fractures. Although this may slow menopausal bone loss, it does not prevent it or reduce the amount

ultimately lost. All of these findings are due to the fact that prevailing calcium intake is not the limiting factor affecting bone mass; hence, altering it has little or no effect.^{1,18-20}

CALCIUM REQUIREMENTS

How much calcium do we really need? Orthodox health practitioners advise the intake of 1 000 - 1 200 mg of calcium per day,²¹ with intake of plenty of milk to obtain these levels. However, there is ample evidence that people can live well and produce good strong, well-calcified bones on daily intakes of calcium as low as 200 - 300 mg per day.^{2,11,22,23}

The daily requirement for calcium is a variable factor, dependent on the balance of other nutrients being received by the particular individual or population, and may also depend on non-nutritional factors. In our Western society, due to the prevalence of factors unfavourable to good calcium balance,¹⁸ the value of calcium requirement should be more in the order of 500 mg and the vulnerable group of women over the age of 50 may require, under the conditions of a Western lifestyle, a daily intake of 800 mg or even more. The requirement for menopausal woman is higher, because the drop in blood oestrogen levels leads to an increase in the urinary loss of calcium. The calcium requirement of the elderly is also usually higher, since ageing results in a drop in the rate of intestinal absorption of calcium.

ABSORPTION OF CALCIUM

Absorption of dietary calcium is also a variable factor, although in orthodox circles it is often said to be about 30% of intake. The deposition of calcium in the bone matrix occurs under the influence of finely tuned hormonal control. Females are less efficient than males at absorbing calcium, due to this hormonal control. Nutritional factors play a major role in calcium metabolism, for example the minerals magnesium, copper, manganese, chromium and zinc. The presence of vitamin D also contributes to calcium absorption in the intestines. Calcium absorption is further influenced by the calcium content of the meal. As the calcium load increases, absorption efficiency decreases, although net calcium absorbed increases. Calcium absorption is more efficient if the calcium is consumed in divided doses throughout the day.²⁴

Ligands, a substance that binds to calcium, can either improve calcium absorption, or inhibit absorption. The amino acids lysine and arginine are ligands that improve absorption, whereas oxalic acid (present in spinach, kale, soy beans, cocoa and rhubarb) and phytic acid (present in the outer coats of cereals, nuts and beans) inhibit absorption.

Dysbiosis (imbalance of gut flora) and inflamed conditions of the colon wall adversely affect calcium absorption. The administration of synbiotics (probiotics and prebiotics) facilitates calcium absorption.^{24,25} In an impacted colon, the bacterial population becomes putrefactive and the bowel contents tend towards alkalinity. Alkalinity in the colon will further impair absorption of calcium and other minerals.

Fruit and vegetables supply the best source of absorbable calcium.^{1,24,26-28} They consist of all the necessary co-factors for calcium absorption and metabolism.

CALCIUM IN FOOD

A diet consisting only of cereals, vegetables, fruit, pulses and nuts could yield on average 1 862 mg/day of calcium in a diet of 550 g/day of dry matter.² A non-vegan diet, which includes dairy, eggs and meat, would contribute even more calcium to the diet. This demonstrates the margin of safety that exists regarding calcium intake if we consume a balanced diet consisting of only natural wholefoods.¹⁵ However, if we consume mainly processed foods, with much of their mineral content extracted, we are heading for nutritional disaster.

CALCIUM SUPPLEMENTATION

Where there is a situation of negative calcium balance through failure to handle calcium correctly in the tissues, to add more calcium may well result in nothing more than just increased calcium excretion. If there is an additional tendency to calcium-dumping syndrome, the added calcium will just increase the amount of calcium dumped in incorrect locations. Taking calcium supplementation can turn negative calcium balance into calcium dumping.

The relative abundance of calcium in diets (even the average Western diet) makes calcium supplements for the purpose of providing adequate calcium intake, generally unnecessary. It makes more sense to follow a balanced wholefood diet^{14,15} and avoid the adverse lifestyle factors that affect calcium metabolism.

Calcium supplementation should only be taken for a short period of time (i.e. 3 months) to correct a known deficiency. There is controversy with regard to pregnant and lactating women taking calcium supplementation, but taking a good-quality calcium supplement during this time could prevent deficiencies. In Nutritional Medicine calcium supplements are only prescribed to control naturopathic eliminations. The severity of healing crises or aggravations could be diminished by calcium, without suppressing it. Since magnesium initiates eliminations, calcium is usually prescribed in combination with magnesium, because of its soothing and calming effect.²

Calcium supplements are only partially absorbed in the body and can be traced in the blood. However, due to the supplement's gross, inorganic, synthetic form, the cells cannot absorb it. Whatever the cells do not absorb cannot be metabolised and consequently is useless and even harmful to the body. It is therefore very clear that it is the quality that counts, not the quantity. You may ingest kilograms of calcium pills, but in the end your body will still have less available calcium than if you had eaten just one piece of broccoli.

Calcium supplements should be in the form of organic compounds, which cause the least disturbance to conditions in the digestive system and are better absorbed. Calcium carbonate (chalk) is used most extensively. However, it does not lead to the best levels of absorption and utilisation and has the disadvantage of neutralising some of the acid produced for digestive purposes by the stomach. Dolomite and other natural forms of calcium carbonate, like egg shell, oyster shell and coral calcium are all unfavorable. Calcium sulphate or phosphate also lacks sufficient solubility and the sulphate and phosphate ions themselves are not always desirable.

Calcium acetate or citrate is the best form to use. A standard dose of calcium supplementation, accompanying a balanced wholefood diet, should be in the order of 250 mg per day, with a maximum of 500 mg per day. The co-factors considered the most essential to complement calcium administration include vitamins D, K and the B-vitamins, magnesium, boron, manganese, chromium, silicon, copper and zinc. Essential fatty acids are another co-factor that increase bone density.

Calcium should always be given with magnesium, preferably in a 1:1 ratio. In certain cases, like the treatment of premenstrual tension, a ratio of 1:2 would be prescribed.^{2,29} However, most vitamin and mineral supplements have a fixed ratio of 2:1 calcium to magnesium. Magnesium is by far the more important mineral when it comes to bone loss. Orthodoxy neglects the major impact of other nutrients, especially minerals, on the body's handling of calcium.

CONCLUSION

Limited amounts of organic dairy could form part of a balanced wholefood diet. However, excessive calcium intake in the form of supplementation and through dairy consumption will result in hip fractures and various chronic diseases, not prevent them! The medical community and media promote a solution that does not work, and has been proven to actually exacerbate the problem.

The increasing evidence that diets high in fruit and vegetables are beneficial in preventing fractures,^{1,24,26-28} suggests common dietary aetiological factors. Alkaline-

producing dietary components, specifically fruits and vegetables, containing potassium and magnesium, contribute the most to the maintenance of good bone density.

We should ask ourselves: How do cows grow such large, strong bones? They don't drink milk, and they don't take calcium supplements. They eat grass – low in calcium and high in magnesium!

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