



# Ionic Minerals

## **THE CALCIUM-SILICON LINK IN NUTRITIONAL PROTOCOLS**

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### **INTRODUCTION:**

The AI (adequate intake) of the DRI (dietary reference intake) for calcium ingestion ranges from 210mgs for an infant to 6 months old (what an infant will receive from its mother's milk) to 1200 mgs per day for people over 51 years of age. A large number of Americans are following this protocol in daily calcium supplementation over and above whatever calcium they may be obtaining in their daily diets. And yet today, Americans exhibit the highest levels of osteoporosis and osteoarthritis among all developed countries. When compared to all other countries, the percentages are even higher. On the other side of the equation, there is no recommended intake level for the element silicon and we get very little silicon in the current SAD (Standard American Diet). The link between these two minerals is significant and adequate dietary levels of silicon are essential to reverse the increasing rates of both osteoporosis and osteoarthritis. It is the lack of silicon in our diet that is the cause of this problem, not the lack of calcium.

### **HISTORICAL DIETARY CONSUMPTION OF CALCIUM AND SILICA**

100 years ago, modern refrigeration was in its infancy and most Americans did not consume dairy products daily if at all. Dairy was only available on the farm when a farmer had a pregnant cow with no calf to feed. When consumed, milk and other dairy products were taken fresh and raw. Obviously, this lack of supply precluded those consumers who did not have a cow from access to the currently most recognized source of dietary calcium. Interestingly, there are no historical references at the time to calcium deficiency as a result of a lack of access to dairy products. At the same time, calcium supplementation was unheard of and up until the 1980's, was not a prevalently supplemented mineral. Also, while Jean Georges Lobstein, a French pathologist, had identified osteoporosis as a bone disease in the 1830's it did not become defined as a widespread and growing disease until the 1980's. Could it be that osteoporosis's identification as a prevalent and

growing disease has been more related to our ability to image bone mineral density than actual fracture rates?

By the 1980's, dairy consumption in this country was well established as a major source of dietary calcium, was a food group all its own, and was being consumed almost daily by most Americans in some form. Prior to dairy, calcium's primary source had been and should always be green leafy vegetables, nuts, seeds and grains.

150 years ago, the consumption of refined grain was limited only to the very wealthy as the ability to mechanically remove the silica rich husks of grains did not exist. (The highest sources of food based silica are the husks of rice, oats, barley, millet, spelt and wheat.) Whole grains were also ground into flour using silica rich stone grinders (usually fabricated from granite). Potato skins are also rich in silica and were a staple part of the winter diet. Foods were eaten in their entirety, delivering all of the mineral elements we had evolved to require for optimal health.

Consequently, 100-150 years ago, calcium consumption was much lower than today, and silica consumption was much higher. In fact, the current intake of these two essential elements has completely reversed itself over the last 150 years. This can be attributed to the advent of refrigeration, establishment of dairy as a food group, the complete refinement of grain starting with the removal of the outside husk and the mistaken belief that somehow we must ingest 1200 mgs of calcium daily if we are over 50.

## **ROLES OF CALCIUM IN THE BODY**

Calcium provides shape and rigidity to bones and teeth—the storehouses for calcium and other essential mineral nutrients. The mineral matrix, while primarily calcium is also composed of lesser amounts of magnesium, manganese, zinc, phosphorus, boron, copper, sulfur, and traces of other elements including strontium. Bone though is not just minerals. In fact, a far greater portion of bone (up to 80% in some bone) is organic type I collagen. Tissue levels of calcium have no bearing upon the tissue collagen levels or health. Calcium does not play any role in the production or repair of collagen.

Calcium has been identified in several essential metabolic roles in the body including:

- Blood clotting
- Nerve transmission
- Energy production
- Muscle contraction
- Cell membrane nutrient transport and osmotic equilibrium

Consequently, the human body has a high propensity to hold onto dietary calcium—storing it wherever it can in the absence of an ability to store it in bone.

## ROLES OF SILICON IN THE BODY

As with each individual element, metabolic roles vary widely. Silicon has been identified in research by Carslile, Schwartz, Loeper, Kervran, Bergna, Iler, and others as absolutely essential for life playing key roles in:

- Collagen production
- Calcium management
- Bone formation, and
- Connective tissue formation

Silica is absolutely essential, in good supply, for the body to be able to maintain proper collagen levels. You could say that silica is the anti-aging mineral for what is aging but the body's inability to maintain proper collagen levels. Silica is in fact the catalyst for collagen formation and the carrier of calcium into bone. Without it, the body will store ingested calcium wherever it can. Alternative locations include joints, organs, arteries, and soft tissue.

## WHAT THE RESEARCH SHOWS

### CALCIUM

Calcium was isolated in 1808 by Sir Humphry Davy. Quite ironically, silica was identified in 1810 by Jons Jacob Berzelius (the same man who discovered protein). Calcium was only minimally used as a supplement up until the 1980's. Since the beginning of the 1980's until now, calcium supplementation has been on a steady, steep rise. Concomitantly, osteoporosis, osteoarthritis, and arteriosclerosis, have also been on a continuous increase in their level of occurrence. Osteoarthritis is the result of excessive calcium buildup in joints and arteriosclerosis is the buildup of calcium deposits in artery walls. Excessive calcium ingestion is now being implicated in osteoporosis.

A newly issued study recently completed by the Women's Health Initiative (WHI) demonstrated that at best, calcium supplementation with vitamin D offers only modest if any improvement in preserving bone mass—1%, and in preventing hip fractures. The control group had 4 more fractures per year than the test group out of a total test population of 36,282 women. Out of a group of 18,141 test and control subjects, the control group averaged 16 fractures per 10,000 while the test group averaged 14 fractures per 10,000. To me, this is noise level and statistically insignificant. The control group did have higher levels of kidney stones (17%) over the control, a statistically significant difference and an obvious marker of calcium mismanagement. Overall, there was no statistical difference between the test and control group and bone fracture. When other such studies are analyzed in detail, the same results become evident. Calcium supplementation does not statistically

improve bone density or bone fracture rates in any population. But, on the other hand can exacerbate other calcium excess symptoms such as osteoarthritis, fibromyalgia, and stone formation.

A review of the literature on calcium supplementation and the halting and reversing osteoporosis fractures revealed small or insignificant impact from its supplementation. If in fact osteoporosis is a disease caused by inadequate levels of calcium, then by definition, calcium supplementation should completely or significantly stop the disease. It does not do this. If vitamin D is added to the equation, nothing significant happens either. A look at other more trace minerals such as boron, fluoride, and strontium, yield the same results. What has not been looked at with the same enthusiasm is silica.

## **SILICA**

Two independent researchers in particular have looked extensively at silica in its biological role in mammals and birds—Edith Carlisle and Klaus Schwarz. Most notable in my opinion is the work of Carlisle, performed throughout the 70's at the UCLA School of Public Health. Her work demonstrated that connective tissues such as aorta, trachea, tendon, bone, skin and its appendages are unusually rich in silica. All the while, blood levels of silica remain quite constant averaging 50ug/dl. Initially, she demonstrated that silicon is involved in an early stage of bone calcification. This was followed by demonstrating the impact of dietary deficiencies of silicon in young chicks. These dietary induced deficiencies led to gross abnormalities of skull architecture, as well as other bone, articular cartilage, and other connective tissues. Even when the chicks were supplemented with 3 different levels of vitamin D the abnormalities were evident. Her conclusions that silicon plays a pivotal role in glycosaminoglycan formation in cartilage and connective tissue were groundbreaking and yet never received the attention of the scientific or medical communities at large.

Based on this research, the logic flows that silica is essential for connective tissue formation and calcium deposition into bone. The body intuitively wants to hold onto ingested calcium but can only efficiently store it in bone. When calcium cannot be efficiently metabolized into bone it will be stored wherever it can. Other storage sites include joints (as osteoarthritis), artery walls (as arteriosclerosis), and soft tissue (as fibromyalgia). Also without silica, the body cannot maintain proper bone and other collagen levels leading to porous, inflexible bone, dried out cartilage, and other organ degradation.

## **ORIGIN OF ALL THE MISINFORMATION**

I believe that we are focusing on calcium rather than silica for several reasons:

1. Calcium is the most obvious element to focus on. It is the most prevalent mineral in our body. It also represents the densest portion of bone. And, in fact, bone does lose some of its calcium content as osteoporosis advances. It though does not contribute to the creation of the collagen portion of bone structure, only its shape and rigidity. It is the integrity of the collagen matrix of bone that provides for its resiliency. This has somehow been missed by mainstream medicine, nutrition and science. Not though because of a lack of available research.

2. Our ability to accurately measure tissue levels of calcium is poor using the prevailing measuring tissue, which is blood. A more accurate method is hair tissue mineral analysis. TMA is an exceptionally close representation of the overall tissue mineral levels. Unfortunately, this mineral measuring protocol has not been widely accepted primarily due to the difficulty in accurately interpreting the test results. When tissue levels using hair mineral analysis are used, low calcium levels are rarely observed. High calcium levels are much more prevalent.

3. Our ability to measure silicon tissue levels is very problematical. Most testing protocols do not test for it even though it is the 8<sup>th</sup> most prevalent mineral in our body after calcium. I believe the reason is twofold. One, researchers don't attach much importance to this element, and two, it is difficult to measure using glass vessels in an ICP mass spectrophotometer as glass is silica.

4. The dairy industry has an effective lobby in this country and their efforts to promote their product have been very effective over the last 80+ years. A big part of their marketing has focused on dairy being an excellent source of bio-available calcium and have focused on how important calcium is to our health. What they fail to mention is that no other mammal on the planet drinks milk after they are weaned nor do they address how we got our dietary calcium prior to the advent of inexpensive refrigeration.

For reasons I cannot quite fathom, there has been no long-term study comparing the effect of calcium vs. silicon on bone and cartilage health. I am confident, the differences would be dramatic and would validate what I and others have known for many years. Such a study would be groundbreaking and revolutionize the concept of bone and connective tissue health.

## **HOW WAS THE CURRENT CALCIUM RECOMMENDATION ESTABLISHED**

The following statement is from page 288 of "DIETARY REFERENCE INTAKES: THE ESSENTIAL GUIDE TO NUTRIENT REQUIREMENTS", published by the above referenced institution in their 2006 edition.

"There is no biochemical assay that reflects calcium nutritional status. Except in extreme circumstances, such as severe malnutrition or hyperparathyroidism, circulating levels of blood calcium can actually be normal during chronic calcium deficiency because calcium is resorbed from the skeleton to maintain a normal circulating concentration. Since data were inadequate to determine an EAR (estimated average requirement) and thus calculate an RDA for calcium, an AI (adequate intake) was instead developed. Therefore, the adult AI's for calcium are based on desirable rates of calcium retention as determined from balance studies), factorial estimates of requirements, and limited data on changes in bone mineral density (BMD) and bone mineral content (BMC). These indicators were chosen as reasonable surrogate markers to reflect changes in skeletal calcium content and therefore calcium retention.

The AI represents the approximate calcium intake that appears sufficient to maintain calcium nutriture, while recognizing that lower intakes may be adequate for some. However, this evaluation must await additional studies on calcium balance over broad ranges of intakes or long-term measures of calcium sufficiency, or both."

There doesn't appear in this qualifying statement to be much confidence in the recommendations for calcium ingestion. On top of that, there is no addressing what one may be ingesting daily from their diet. A search on PubMed did not turn up any references to balance studies on calcium. The AI recommendation is defined as follows: The recommended average daily intake level based on observed or experimentally determined approximations or estimates of nutrient intake by a group (or groups) of apparently healthy people that are assumed to be adequate.

## **HOW DID WE AS A SPECIES OBTAIN SILICA AND VITAMIN D BEFORE THE INDUSTRIAL REVOLUTION**

Historically, 100 to 150 years ago and earlier, silica was much more prevalent in our diets. It was available in our breads primarily from the husks of grains. Technology did not exist prior to the industrial revolution to remove these husks. Consequently, flour included the husks and was also ground using stone grinders. They were usually made of granite, which is a silica rich rock matrix. Additionally, vitamin D was not in short supply as we were an outdoor species. We worked and played outside where we were

constantly exposed to UV energy waves providing us with all of our needs of this essential vitamin.

## **CONCLUSION**

A rational approach when dealing with the degenerative diseases of osteoporosis, osteoarthritis, arteriosclerosis and gastrointestinal tract disorders would include the following:

-SUBSTANTIALLY REDUCE OR STOP CALCIUM SUPPLEMENTATION.

-INCORPORATE SILICON AS SILICA INTO ONE'S SUPPLEMENTATION REGIME. IT DOES NOT MATTER IF IT IS ORGANIC OR INORGANIC ALTHOUGH INORGANIC FORMS SHOULD BE LIQUID AND COLLOIDAL FOR OPTIMAL ABSORPTION. A MINIMUM THERAPUTIC DOSE OF 375MGS DAILY IS ESSENTIAL.

-STRESS CONSUMPTION OF WHOLE GRAINS AND GRASSES FOR SILICA.

-STRESS CONSUMPTION OF GREEN LEAFY VEGETABLES FOR CALCIUM. NO OTHER ANIMAL ON THE PLANET CONSUMES DAIRY PRODUCTS AFTER THEY ARE WEANED.

-ELIMINATE ALL REFINED PRODUCTS FROM THE DIET-ESPECIALLY SUGARS AND FLOURS.

## References

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