WHAT IS CALCIUM??

Calcium is the most abundant and the most important mineral in the body, yet it is the most difficult to get absorbed, assimilated and utilized by the cells.

Calcium is a metal, a bright shiny metal like all other metals. Calcium is not the white powdery substance most people believe. The white powdery substance often associated with calcium is actually calcium carbonate, calcium lactate or another compound of calcium with calcium making up much less than half of the total molecular weight of the substance.

Organic calcium is used more than any other mineral in the body. There are 179 different known uses for calcium in the human body:

1) Formation and maintenance of strong bones and teeth

2) Prevents bone loss associated with osteoporosis

3) Control muscle contraction and with magnesium muscle relaxation

4) Required for muscle growth

5) Important in the maintenance of regular heart beat

6) Transmission of nerve impulses

7) Transfer of information between brain cells

8) Controls osmosis and diffusion through the cell membranes

9) Passing of information within the cell.

Calcium controls the formation of enzymes and hormones. It is involved in the activation of several enzymes including lipase. The amino acid lysine is needed for calcium absorption.

CALCIUM IS THE MAIN BUFFER USED TO NEUTRALIZE ACIDS AND TO MAINTAIN THE PROPER Ph throughout the body.

Nearly 99% of the body's calcium is deposited in the bones and teeth. The remaining 1% is present in body fluids, equally divided between diffusible calcium and non-diffusible calcium. The diffusible calcium is bound to blood proteins, chiefly to albumin, although a small amount is bound by the globulins in the blood.

Scientists have discovered that the body fluids of healthy people are mildly alkaline (high pH), whereas the body fluids of the sick are acidic (low pH). Calcium is responsible of maintaining the proper body fluid pH.

CALCIUM DEFICIENCY

Hypocalcemia, chronic calcium deficiency, is responsible for approximately 150 different degenerative diseases and conditions, and other problems that can be harmful or dangerous to the body.

All degenerative diseases, such as diabetes, cancer, heart disease, gallstones, kidney stones, arthritis, osteoporosis, and many more have been scientifically linked to deficiencies in calcium.

Calcium protects the bones and teeth from lead by inhibiting absorption of the toxic metal.

The following is a partial list of calcium deficiencies. Some of them may be familiar:

Arthritis	Heart Palpitation	Muscle cramps
Hypertension	Eczema	Loss of mental functions
Increased cholesterol levels		Indigestion
Insomnia	Rickets	Headaches
Kidney stones	Gall Stones	Bone spurs
Fibromyalgia	Hiatal hernia	Recessed gums
Low back pain	Asthma	Allergies

Colitis	Arrhythmia	Heart disease
Cancer	Acid reflux	

And about 125 others.

It is interesting to note that kidney stones are included. Kidney stones are a buildup of calcium in the kidney. Kidney stones are caused by **a lack of calcium in the diet.** Due to poor mineral ingestion the body becomes acidic.

The body then leaches calcium out of the bones to neutralize the acid and to keep the pH from dropping below the level that supports life. Calcium from the bones is not very bioavailable and only a small percentage is actually used to correct the acid situation; the rest starts to accumulate in the kidney, or other places.

Scientific evidence has proven that the stones are not formed from organic calcium in the diet by using radioactive markers on the dietary calcium. When the stones were examined there was not one bit of radioactive calcium contained in them. **Fully 100% of the kidney stones and bone spurs came from the calcium leached out of the bones in order to neutralize the acids in the body fluids.**

Female athletes and women experiencing menopause need greater amounts of organic calcium due to lower estrogen levels.

The average American diet of meats, refined grains (cereal), and soft drinks (high in phosphorus) has been documented to contribute to increased bone loss in adults. Proper calcium absorption absolutely requires an adequate level of vitamin D, through diet or supplementation. Vitamin D controls the absorption of calcium ions. The biochemical absorption and assimilation is not an easy matter. The excretion of calcium is largely through the mucosa of the small intestines, and a comparatively small amount (25-35%) is excreted in the urine as calcium phosphate. Since the excretion is a normal continuous process, a negative calcium balance can result if dietary intake is too low.

Acidity, sugars, and artificial flavors and sweeteners can shorten life. It would take 32 glasses of alkaline water at an alkaline pH of 9 to neutralize the acid from one 12 oz. cola or soda. Drinking a cola or soda, the body will use up reserves of its own stored alkaline buffers, mainly calcium from the bones and DNA, to raise the body's alkalinity levels, especially to maintain proper blood alkaline pH levels.

Acidic levels cause death, and there are enough acids in one soda to kill if there is no mechanism to neutralize them.

Sodas, like water and other liquids, pass through the stomach into the small intestine where it is quickly assimilated into the bloodstream through the openings in the villi in the walls of the intestines. They are also absorbed right through the stomach's lining directly into the blood. Liquids do not stay in the digestive tract like solid foods. All liquids go into the bloodstream, **is filtered through the liver and kidneys,** and what is not needed is sent to the bladder and urinated out. These liquids come in contact with virtually every cell in the body.

When a substance is an acid, there are a large number of positively charged hydrogen ions. These ions are lacking electrons and steal electrons from other atoms in the body which themselves become electrically unstable and seek other from other atoms. Acids are free radicals that create a chain reaction of electron stealing. Whenever an electron is torn from an atom a little spark is produced that can damage cell membranes. It's called free radical damage and can be seen under a microscope in live blood cell analysis.

If there are not enough ionic minerals in the body, the process can not stop. Then the supply of available minerals to neutralize the acids will result into a very serious degenerative disease. Every soda one drinks will contribute to this acidity. Even without soda our bodies naturally produce aids. Minerals are needed in our diets in food and supplements to stop the deterioration process. Unfortunately, most of the food we consume no longer contains the minerals that we need.

ARE "USP" SUPPLEMENTSA GOOD SOURCE OF CALCIUM?

The vast majority of vitamins and minerals available today are supplied by a few extremely large and powerful chemical companies. The "nutrients" produced by these companies fall under the labeling of USP, United States Pharmacopoeia.

These nutrients are not a food that the body recognizes. The companies either break the food down and extract each vitamin separately or grind up rock to extract the minerals. These are known as Isolated Chemical nutrients, as they have been isolated from the food source leaving you with a single nutrient such as iron.

The vitamin coming from a natural source does not mean it is natural. Once they are isolated from the natural substances they were bound to, such as amino acids, proteins, carbohydrates, lipids and bioflavinoids, they no longer contain what they did in food to make them stable. Once this happens, they are no longer natural and not usable by the body.

Are you taking ground up rocks?

Confusion surrounds dietary practices, fueled partly by the food industries advertising campaigns. Health professionals acknowledge that humans are not supposed to consume soil as a food source for minerals, but most will overlook this fact when mineral supplementation is involved.

Most people are aware of the need for calcium in our diets. When health practitioners recommend that we go to the store and get Tums, Rolaids or Oyster Shell Tablets and take two daily, they are really not aware of how very little of the calcium is bioavailable to the cells in our bodies.

Minerals are either organic or inorganic. Would you rather get your calcium from concrete or green salad? The body can not get proper nutrition from inorganic minerals. It is designed to get nutrition form living plants. For human consumption, minerals from food are superior to minerals from soil.

Calcium is a prime example of how dangerous these minerals can be. Calcium supplements are taken by millions of women. American women take more calcium supplements than anywhere else in the world, yet we have one of the highest rates of osteoporosis. This deadly condition causes holes in the bone that can lead to a crippling fractures and often death.

Read the labels of your calcium supplement. Most calcium is sold in the form of calcium carbonate. This is an inorganic form of calcium, typically ground up oyster shells, chalk or extracted from rocks. If the label says Calcium Citrate – you think it comes from Oranges – NO, its calcium carbonate mixed with Citric Acid! If the label says Calcium Lactate – you think it comes from Milk – NO, its calcium carbonate mixed with Lactic acid!

Studies prove that about 2% of calcium carbonate is absorbed (not assimilated) by the body! Where does the other 98% go? Significant amount of unabsorbed calcium left in the body will interact with other inorganic compounds to form stones.

Calcium cannot be properly absorbed and assimilated unless other trace minerals are present along with it. Calcium requires boron, chromium, copper, iron, magnesium, manganese, phosphorus, silicon, strontium, and zinc to be absorbed to it s full potential.

A critical aspect of the transport of minerals into the human body is the necessity of protein “chaperones” found in all foods. Without a protein “chaperone” these supplements wander aimlessly within the body settling in places such as the heart, arteries (plaque) and in all other organs.

The absorption factor of these chemical isolates is in the area of 5%. Taking USP forms of isolated nutrients is the equivalent to sending your mail without addressing the envelope. The nutrients never get to where they needed to go.

Most Mineral Supplements are Industrial Chemicals

The following list will describe what many mineral salts/chelates used in supplements actually are and what they are used for when not in supplements:

1. **Boric acid** is the rock known a sassolite. Used in weatherproofing wood, fireproofing fabrics, and as an insecticide [14[.

2. **Calcium ascorbate:** is calcium carbonate processed with ascorbic acid and acetone. It is a manufactured product used as a non-food supplement [14].

3. **Calcium Carbonate:** is the rock known as limestone or chalk. Used in the manufacture of paint, rubber, plastics, ceramics, putty, polishes, insecticides, and inks. Used as filler for adhesives, matches, pencils, crayons, linoleum, insulating compounds and welding rods. [14].

4. **Calcium Chloride:** is calcium carbonate and chlorine and is the product of the Solvay ammonia-soda process. It is used for antifreeze, refrigeration, and fire extinguisher fluids. It is also used to preserve wood and stone. Other uses include cement, coagulant in rubber manufacturing, and dust control of unpaved roads, freeze proofing coal and increasing traction in tires. [14].

5. **Calcium citrate:** is calcium carbonate processed with lactic and citric acids. It is used to alter the baking properties of flour [14].

6. **Calcium gluconate:** is calcium carbonate processed with gluconic acid (which is used in cleaning compounds). It is used in sewage purification and to prevent coffee powders from caking [14].

7. **Calcium glycerophosphate:** is calcium carbonate processed with di-alpha-glycerophosphates. It is used in dentifrices, baking powder, and as a food stabilizer [14].

8. **Calcium hydroxyapatite:** is crushed bone and bone marrow, It is used as a fertilizer [15].

9. **Calcium iodide:** is calcium carbonate processed with iodine. It is an expectorant [14].

10. **Calcium lactate:** is calcium carbonate processed with lactic acid. It is used as a dentifrice and as a preservative [14].

11. **Calcium oxide:** is basically burnt calcium carbonate. It is used in bricks, plaster, mortar, stucco, and other building materials. It is also used in insecticides and fungicides.

12. **Calcium phosphate, tribasic:** is the rock known as oxydapatit or bone ash. It is used in the manufacture of fertilizers, milk glass, polishing powders, porcelain, pottery and enamels [14].

13. **Calcium chloride:** is a preparation of hex hydrates. It is used as a corrosion inhibitor and waterproofing agent [14].

14. **Chromium picolinate:** is chromium III processed with picolinic acid. Picolinic acid is used in herbicides [14].

"Chelated" Minerals

Chelated minerals, as a rule, are generally crushed biological industrial rocks processed with one or more acids. The biggest difference in minerals now compared to 45 years ago is that some companies have decided to industrially produce human made versions of minerals attached to peptides.

It does not appear that any of the minerals marketed as "chelated" are food concentrates (though there are foods which naturally contain chelated minerals, but these are normally marketed as food minerals. Industrial manufactured chelates are not natural food.

It is a well known among nutrition researchers that most essential minerals are not well absorbed (some are less than 1%) [24]. "Bioavailability" or orally administered vitamins, minerals, and trace elements is subject to a complex set of influences. In nutrition science the term "bioavailability" encompasses the sum of impacts that may reduce or foster the metabolic utilization of a nutrient [25]. University studies show that the bioavailability of organic / ionic minerals found in food and some supplements is greater than that of isolated inorganic mineral salts or chelates [e.g. 26-37].

One laboratory describes what happens when isolated inorganic mineral salts without protein chaperones are consumed, "It is after digestion when other mineral forms (mineral salts) have their mineral cleaved from their carriers. In this situation, these minerals become charged ions, and their absorbability becomes in jeopardy.

These charged free minerals are known to block the absorption of none another, or to combine with other dietary factors to form compounds that are not absorbable" [38]

Organic ionic minerals compared to mineral salts/chelate

Calcium up to 8.79 times more bioavailable [28].

Chromium up to 25 times more bioavailable [44].

Copper 1.85 times more retained in the liver [34].

Germanium 5.30 times more retained in the liver [26].

Iron 1.77 times more absorbed into the blood [34].

Magnesium up to 2.20 times more bioavailable [35].

Manganese 1.63 times more retained in the liver [34].

Selenium up to 17.60 times the antioxidant effect [37].

Zinc 6.46 times more absorbed into the blood [34].

Is Dairy a good source of Calcium?

Calcium from milk and milk products is absorbed at a higher percentage rate than calcium from inorganic supplements because of the cofactors found in the milk. However, the high animal protein content, fat, pesticides, and bovine growth hormones in the milk make it less than desirable to consume.

Who gets bone disease?

Nations with the highest rates of bone disease also have the highest milk consumption rates. The highest rates of osteoporosis are to be found in Denmark, Holland, Norway and Sweden.

Evidence is prevalent worldwide. In Africa, Masai tribesmen consume large amounts of calcium from the milk of their cattle. In rural Africa the agrigarians maintain good bones on less than 400 milligrams of calcium per day. We are encouraged to consume 1000 milligrams per day of calcium, yet Inuit Eskimos consume 3500 milligrams of calcium each day, and by age 40 are bone crippled.

THE KEY TO OSTEOPOROSIS: **It's not how much calcium you eat. It's how much calcium you prevent from leaving your bones.**

Why does Calcium Leave Bones?

There are 28 amino acids in nature. The human body can manufacture 19 of them. The other 9 are called essential. We must get them from the foods we eat. One of the essential aminos is methionine, which is C-5, H-11, NO, S

One needs Methionine for many human metabolic functions including digestion, detoxification of heavy metals, and muscle metabolism. However, an excess of methionine can be toxic. Eating foods containing too much methionine will cause the blood to become acidic. The body leaches calcium out of the bones to neutralize the acid.

According to Dr. Sellmeyer, "Sulfur containing-amino acids in protein-containing foods are metabolized to sulfuric acid. Animal foods provide predominantly acid precursors. Acidosis stimulates osteoclastic activity and inhibits osteoblast activity. Dietary protein increases production of acid in the blood which can be neutralized by calcium mobilized from the skeleton." American Journal of clinical Nutrition, 1995; 61 (4)

Animal proteins contain more methionine than plant proteins.

In 1988, N.A. Breslau and his colleagues identified the relationship between protein rich diets and calcium metabolism, noting that protein caused calcium loss. His work was published in the Journal of Clinical Endocrinology (1988;66:140-6)

“Even when eating 1,400 mg of calcium daily, one can lose up to 4% of his or her bone mass each year while consuming a high protein diet.” American Journal of Clinical Nutrition 1979; 32 (4)

“Increasing one’s protein intake by 100% may cause calcium loss to double.” Journal of Nutrition, 1981; 111 (3)

“Consumption of dairy products, particularly at age 20 years were associated with an increased risk of hip fractures…metabolism of dietary protein causes increased urinary excretion of calcium.” American Journal of Epidemiology 1994;139.

Meat Eaters have more hip fractures

Sellmeyer’s remarkable publication reveals:

“Women with high animal to vegetable protein ratios were heavier and had higher intake of total protein. These women had a significantly increased rate of bone loss than those who ate just vegetable protein. Women consuming higher rates of animal protein had higher rates of bone loss and hip fracture by a factor of four times”

Milk has been called the “liquid meat”. The average American eats five ounces of animal protein each day in the form of red meat and chicken. At the same time, the average American consumes nearly six times that amount (29.2) ounces of milk and dairy products per day

Ironically, the Dairy Industry Promotes the Cause of Bone Disease as the Cure.

Deborah Sellmeyer's work is supported by a grant form the National Institutes of Health.

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Her original column:

"Human breast milk is Mother Nature's perfect formula for baby humans. Even dairy industry scientists would not be foolish enough to debate this Universally Accepted Fact. In her wisdom, Mother Nature included 33 milligrams of calcium in every 100 grams, or 3 ½ ounce portion of human breast milk.

"Adults do not drink human breast milk. At the end of this column is a list of calcium values in the foods we eat. Each food is compared to human breast milk as the standard. You might be surprised to learn how many foods naturally contain an abundance of calcium. One must wonder why Asians traditionally did not get bone-crippling osteoporosis…that is, until they adopted the "American Diet, " a diet of milk and dairy products.

"The dairy industry owns the psychological exclusive rights to calcium in foods found in super markets. Few food manufacturers would dare to compete with the dairy message which infers that no other foods contain the calcium contained in milk, and without the milk and dairy products you're certain to one day end up with bone-crippling osteoporosis. Tropicana Orange Juice has been marketing a Fruit-Cal orange juice which, according to the Tropicana Company, contains a more absorbable type of calcium than other calcium supplements. Each cup of Tropicana's pure premium calcium contains 350 milligrams of calcium as opposed to 302 mg in one cup of milk and 172 mg in one ounce of American cheese. Minute Maid also has a Calcium-Orange Juice product and claims that it contains 15 times the amount of calcium as contained in an equivalent sample of regular orange juice. Gerber's Baby cereal sells a box of single grain barley upon which they write, "An excellent source of iron and a good source of calcium." The side panel of their box reveals that their cereal contains barley flour and tri and di calcium phosphate. Other than orange juice and baby food, no visible claim to calcium is made by any food manufacturer. The reason, of course, is that milk holds the monopoly. They hold title to and make claim to America's calcium perception. Few would argue that claim.

“The Dairy Industry and milk processors invest hundreds of millions of dollars each year to guarantee that Americans will continue to drink milk and eat dairy products, investing their money to continually let Americans know that milk tastes good and the intake of milk and dairy products must continue to insure good health. Milk mustaches are stylish. Drink milk and you’re beautiful! Gorgeous models, actors, actresses, sports heroes, even President Clinton and Bob dole have posed for milk advertisements. All have asserted by the milky white goo artificially applied to their upper lip that drinking milk is healthful and wholesome. Who would argue with such an overwhelming endorsement? Billboards spanning America ask the question: Got Milk?” Cal Ripken of the Baltimore Orioles broke Lou Gehrig’s record for consecutive major league baseball games played. Ripken, holding a baseball bat, smiles from inside the front cover of a “Got Milk” brochure proclaiming, “With all the skim milk I drink, my name might as well be Calcium Ripken, Jr.”

Common knowledge of osteoporosis is based upon false assumptions. American women have been drinking an average of two (2) pounds of milk or eating the equivalent milk in dairy products per day for their entire lives. Doctors recommend calcium intake for increasing and maintaining bone strength and bone density which they call bone mass. According to this regimen recommended by doctors and milk executives, women’s bone mass should approach that of prehistoric dinosaurs. This line of reasoning should be equally extinct. Twenty-five million American women have osteoporosis. Drinking milk does not prevent osteoporosis. Milk contains calcium. Bones contain calcium, too. When we are advised to add calcium to our diets we tend to drink milk or eat dairy foods.

In order to absorb calcium, the body needs comparable amounts of another mineral element, magnesium. Milk and dairy products contain only small amounts of magnesium. Without the presence of magnesium, the body only absorbs 25 percent of the available dairy calcium content. The remainder of the calcium spells trouble. Without magnesium, excess calcium is utilized by the body in injurious ways. The body uses the calcium to build the mortar on arterial walls which becomes atherosclerotic plaques. Excess calcium is diverted by the kidneys into painful kidney stones, blocking our urinary tracts. Excess calcium contributes to arthritis; painful calcium buildup often is manifested as gout. The USDA has formulated a chart of recommended daily intakes of vitamins and minerals. The term that FDA uses is Recommended Daily Allowance (RDA). The RDA for calcium is 1500 mg. The RDA for magnesium is 750 mg.

Society stresses the importance of calcium, but rarely magnesium. Yet, magnesium is vital to enzymatic activity. In addition to insuring proper absorption of calcium, magnesium is critical to proper neural and muscular function and to maintaining proper pH balance in the body. Magnesium, along with vitamin b6 (pyridoxine), helps to dissolve calcium phosphate stones which often accumulate from excess dairy intake. Good sources of magnesium include beans, green leafy vegetable like kale and collards, whole grains and orange juice. Non-dairy sources of calcium include green leafy vegetables, almonds, asparagus, broccoli, cabbage, oats, beans, parsley, sesame seeds and tofu.

Osteoporosis is NOT a problem that should be associated with lack of calcium intake. Osteoporosis results from calcium loss. The massive amounts of protein in milk result in a 50% loss of calcium in the urine. In other words, by doubling your protein intake there will be a loss of 1 – 1.5 in skeletal mass per year in postmenopausal women. If a post menopausal woman loses 1 – 1.5% bone mass per year, what will be the effect after 20 years? When osteoporosis occurs levels of calcium (being excreted from the bones) in the blood are high. Milk only adds to these high levels of calcium which is excreted or used by the body to add damaging atherosclerosis, gout, kidney stones, etc.

Bone mass does not increase after age 35. This is a biological fact that is not disputed by scientists. However, this fact is ignored by marketing geniuses in the milk industry who make certain that women this age and older are targeted consumers for milk and dairy products. At least one in four women will suffer from osteoporosis with fractures of the ribs, hip or forearm. In 1994, University of Texas researchers published results of an experiment indicating that supplemental calcium is ineffective in preventing bone loss. Within 5 years of the initial onset of menopause, there is an accelerated rate of loss of bone, particularly from the spine. During this period of time, estrogen replacement is most effective in preventing rapid bone density loss.

Milk Consumption Does not Prevent Hip Fractures

A publication in the February, 2003 issue of the American Journal of Clinical Nutrition (Vol. 77, No. 2, 504-511) clearly demonstrates that eighteen years of milk consumption did not prevent hip fractures for post-menopausal women. 72,737 subjects participated in the study.

As part of Walter Willett's Harvard Nurses Study, investigator Diane Feskanich performed statistical tests of significance for 18 years of data including dietary intake of calcium (dairy and supplements) to determine her findings. The conclusion reached from this analysis is that dietary calcium plays little or no role in preventing bone loss. Drinking milk does not prevent osteoporosis. A total of 603 hip fractures were analyzed.

The Harvard Nurses Study previously determined that there is no positive association between teenaged milk consumption and the risk of adult fractures. As a matter of fact, just the opposite was found to be true. Women consuming greater amounts of calcium from dairy foods suffered significantly increased risks of hip fractures. (American Journal of Public Health 1997;87).

In light of these findings, the dairy industry milk mustache campaign has proven to be one enormous deception. Bones break because women eating the wrong foods create an acid condition in their own bloodstreams, which must be neutralized by available calcium. The body achieves balance by taking calcium out of its own bones. People eating the greatest amount of animal protein, especially dairy products, are the ones experiencing accelerated rates of bone loss. The same Journal of Clinical Nutrition, (1995; 61,4) confirmed the truth: "Dietary protein increases the production of acid in the blood which can be neutralized by calcium mobilized from the skeleton."

The American Journal of clinical Nutrition (1979;32,4) reported: "Even when eating 1,400 mg of calcium daily, one cam lose up to 4% of his or her bone mass each year while consuming a high-protein diet."

In 1992, B. J. Abelow and colleagues published their study of cross cultural associations between hip fractures and nutrition. Focusing upon dietary calcium and protein intake, their paper (Calcified Tissue International 50:14-18, 192) the research shows: *Nations in which calcium intake averaged 1000 milligrams per day "enjoyed" the highest rates of hip fractures. Nations in which very little calcium was consumed exhibited low rates of bone fractures, contrary to what doctors and dairy industry marketing representatives wish us to believe.*

Cow's milk is both a "great source" of calcium and animal protein. Nations eating such a "great source" of calcium and animal protein experience the highest rates of crippling bone disease.

Calcium Absorption

Calcium can not be absorbed and utilized in our bodies without certain trace minerals, including magnesium and boron and also many others, also being present. The full complement of these trace minerals is not found in most calcium supplementation tablets and are lacking to a great degree in the typical American diet. These trace minerals are important not only to facilitate the absorption of calcium (as in magnesium) but they are also needed by the body as well for the millions of biochemical reactions that are taking place in every body every day.

Calcium absorption needs an acid environment in the stomach for proper digestion and people over 60 years of age produce only approximately 25% of the stomach acid they produced when they were 20 years old. In addition, it is a known fact that as many as 40 percent of post menopausal women lack sufficient stomach acid for proper calcium absorption and that's without the intake of large volumes of alkaline calcium carbonate and calcium phosphate.

Maintenance of a positive calcium balance by the body depends on dietary intake and the efficiency of absorption of the calcium ion from the intestinal tract. Calcium is one of the more difficult elements for the body to digest and absorb and even more difficult to assimilate. Because calcium forms insoluble compounds with many of the anions present in food, efficient absorption of calcium is loaded with problems. In most instances phosphate is the principal interfering anion.

Of the calcium phosphate complexes, only calcium dihydrogen phosphate is sufficiently soluble to maintain the necessary levels for absorption of ionic calcium. Unfortunately this salt is stable only in highly acid media, such as stomach acid. And in the alkaline area of the small intestine, the much less soluble mono-hydrogen phosphate of the highly insoluble tertiary phosphate is the stable form, and both of these forms cannot be fully absorbed by the body. In addition to this, once calcium has dissolved, its absorption into the body is totally dependent on the presence of vitamin D in the intestine. Vitamin D, unfortunately, is not present in most of our food, so our body is dependent on the action of sunlight on our skin to synthesize vitamin D. Without intestinal vitamin D being present, ,most of the ionized calcium will pass through the body unused.

Conditions in the stomach normally provide sufficient acid for the stable intake of the free calcium ion even in the presence of phosphate ions; but absorption cannot take place there. As the contents of the stomach (chyme) are discharges from the stomach and moves through the small intestine, it is neutralized by the alkaline bile. Calcium absorption takes place in the duodenum, but it is apparent that solubility considerations counteract to prevent this uptake, except during the relatively short period of time before the chyme is completely neutralized. Absorption in the remainder of the intestine is pretty much nonexistent, because the calcium by then has been precipitated from solution due the alkalinity produced by the bile.

The Paradox of Coral Calcium

Many coral calcium vendors have tried to connect coral calcium to the longevity of Okinawans. The truth is most coral calcium supplements are made directly ("uncut") from coral reefs. The only calcium source found in coral reefs is calcium carbonate, the same calcium compound that is easily found in other rocks and limestone, and has been available for commercial use for decades.

Not all coral calcium is the same. While any coral calcium from Okinawa can give you some benefits because the chemical analysis is nearly identical to human bone…it is still inorganic and not a food. There are some coral calcium, even from Okinawa, that contain harmful materials such as lead, mercury, arsenic and more.

The secret of benefits attributed to coral calcium lies in the waters of Okinawa, not the inorganic coral reefs that most coral calcium products are made from. It is the algae that grows in the porous coral that produces the highly soluble organic calcium compounds.

If you are in search of "coral calcium from algae" it might be best to drink the water from Okinawa. Other option would be to clean the calcium from impurities and dissolve it into water. When placed into water, digestion is not required. The body will absorb minerals immediately upon entering the mouth and a majority of the minerals will be absorbed before it ever enters the lower stomach, therefore optimizing the alkaline effects. If a solid form like a pill is used, the body uses stomach acids with a pH of 2. and the acidity in the stomach will cancel out the alkalinity. If it is in the capsule or caplet form it will always damage the digestive process. Ionic calcium, on the other hand, needs no stomach acid to be absorbed and assimilated. Ionic calcium in water is the best form to use.

Ionic calcium (Ca^{++}) is the only physiologically active form of this element. Bone, though considered primarily as the structural support for the soft tissues of the body, also serves as a storage deposit for ionic calcium. The bone's calcium is available to the body and is

drawn upon to maintain normal blood calcium levels during periods of low calcium intake.

The protein bound calcium of the blood probably serves as a secondary reservoir, becoming available locally only during excessive loss or use of ionic calcium. It is important to note that because ionic calcium is the only physiologically active form of this element, all sources of this mineral, whether through the diet or from bones, must be broken down to its ionic form before it can be used by the body for any of the functions listed above.

Calcium is present in different forms. To evaluate the absorbable calcium of each product we need to know (a) what the amount of available calcium is, and (b) what is the biochemical absorption percentage for the compound in **ideal conditions**. Following is a brief summary which addresses how much calcium is actually available to the human body from commonly available calcium products.

A.) **Calcium carbonate** {CACO3} is known as Caltrate, Oyster Shell calcium, Tums, or generic. Total molecular weight of this compound is 100.9 mg. So Calcium carbonate is 40% inorganic calcium. Scientists tell us that only 10% of the calcium is absorbed from the carbonate. So, for every 1,000 mg of calcium carbonate 40% of 400 mg 10% is absorbed, or only 40 mg of usable calcium.

B.) **Tribasic Calcium Phosphate** {Ca3(PO4)2} is known as Posture. Total molecular weight of this compound is 310.18 mg therefore calcium phosphate is 39% inorganic calcium. Scientists tell us that only 10% of the calcium is absorbed from this phosphate. So for every 1,000 mg of calcium phosphate 39% or 390 mg is inorganic calcium. Of this 390 mg, 10% is absorbed, or only 105 mg of usable calcium.

C.) **Calcium Lactate** {(CH3CH[OH]COO)2Ca} is commonly found in dairy products. Total molecular weight of this compound is 218.22 mg, therefore calcium lactate is 37% inorganic calcium. Scientists tell us that only 33% of the calcium is absorbed for the lactate. So, for every 1,000 mg of calcium lactate 37% or 370 mg is inorganic calcium. Of this 370 mg 33% is absorbed, or only 105 mg of usable calcium.

D.) **Calcium Citrate** {Ca3(C6H307)2} IS KNOWN AS Citrical. Total molecular weight of this compound is 572.72 mg, therefore calcium citrate is 21% inorganic calcium. Scientists tell us that 50% of the calcium is absorbed form the citrate.

So, for every 1,000 mg of calcium citrate 21% or 210 mg is calcium. Of this 210 mg 50% is absorbed, or only 105 mg of usable calcium.

E.) **Ionic Calcium** {Ca++}. Total weight of ionic calcium is 40.09 mg. So ionic calcium is 100% organic calcium. Scientists tell us that 98% of the ionic calcium is absorbed and assimilated

It becomes obvious that consuming large amounts of calcium tablets to achieve the desired absorption can have serious negative results.

When non-biologically active forms of minerals are used people, especially older people, are put at risk as the minerals will neutralize the stomach acids and damage the digestive process. This makes the ionic form the only logical choice for anyone who wants to be healthy.

It is important for calcium to be consumed in “healthy amounts”. Just because it is consumed it does not always end up being fully absorbed then assimilated by the body. All dietary calcium must be made soluble (ionized) in the stomach and then pass to the small intestine where (if it makes it that far) it combines with a calcium binding molecule so it can be absorbed. Because calcium competes with zinc, manganese, magnesium, copper, and iron for absorption in the intestine, a high intake of one mineral can reduce the absorption of others. The end result is that calcium is the most important mineral to the body, it is often the hardest of all the minerals to absorb and even harder to assimilate.

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