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THE NUTRI-SPEC LETTER

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From:
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Dear Doctor,

You need to be concerned. Many, many of your patients are taking a drug from which they are suffering adverse reactions. Does the following list of symptoms and conditions exacerbated by this drug look familiar?

- loss of bone density
- arthritis
- spurs
- nervous twitches
- muscle cramps
- insomnia
- cysts
- kidney stones
- hypertension
- stress/anxiety
- erectile dysfunction
- tachycardia
- constipation
- dry mouth
- cold hands
- heart palpitations
- insulin resistance/diabetes
- fatigue
- depression
- low body temperature
- accelerated aging
- excitotoxic brain damage
- autoimmune diseases
- atherosclerosis

You may recognize this misery list from last month's Letter. What is the nasty drug responsible for such …

A DIVERSITY OF ADVERSITY?

What is the nasty drug insidiously sucking the life out of your patients? What is the nasty drug so deceptive it is never blamed for the symptoms if causes? What is the nasty drug driving your patients deeply into a Dysaerobic, Ketogenic, or Sympathetic Metabolic Imbalance? --- That drug, the proverbial …

WOLF IN SHEEP'S CLOTHING ...

is ...

CALCIUM.

How can I, a clinical nutritionist, refer to the essential nutrient calcium as a nasty drug? My critique of indiscriminant calcium supplementation is merely a reflection of our NUTRI-SPEC philosophy. Any substance, whether produced by a gigantic pharmaceutical manufacturer or peddled by your local health food store, if taken in a disease-specific attempt to treat or prevent symptoms, is a drug. When that disease-specific administration of a drug, taken without regard to the patient-specific requirements of the individual, causes undesired reactions (and it always will), we must consider that drug a nasty intrusion on the patient's maintenance of homeostasis.

THE ULTIMATE IRONY ...

is that the very conditions calcium is reported to be "good for" comprise much of the above list of pathologies caused by health-food-mentality calcium supplementation.

Our topic, begun in last month's Letter, is the ...

UNIVERSALLY POPULAR OSTEOPOROSIS.

Universally popular? Yes. --- Everyone "knows" that osteoporosis is pandemic in Western civilization (true), and "knows" that every woman with osteopenia needs some combination of estrogen, bis-phosphonates, calcium, or vitamin D to preserve bone density (false, false, false, and often false). But since calcium is universally embraced as a remedy for decreased bone mass, we must be thoroughly informed about the pros and cons of calcium supplementation --- the efficacious, the useless, and the damaging, whens, whys, and hows. Only after understanding calcium absorption and utilization can we go on to the essentials of osteoporosis --- nutrition, menopause/estrogen, exercise, drugs, and natural light.

ABSORPTION OF CALCIUM AND OTHER MINERALS

What do we mean by the term "mineral" nutrient? In the context of biological (as opposed to geological) discussion, the term mineral means any element (not compound) other than hydrogen, carbon, nitrogen, or oxygen, that is used in the physiology of a living being. These mineral nutrients must be obtained from the diet. However, most mineral

elements are not bioavailable in elemental form, and must be in the form of chemical compounds if they are to be absorbed and utilized. To illustrate --- what will happen if you eat a chunk of yellow sulfur crystals? Those crystals are comprised of elemental sulfur --- an essential nutrient. The problem is, that elemental sulfur is not absorbed in the least. To obtain sulfur nutritionally, you must eat it in the form of a sulfur-containing chemical compound such as magnesium sulfate. Both elements, sulfur and magnesium, in magnesium sulfate are reasonably well-absorbed, while pure elemental crystalline sulfur is useless as a mineral nutrient. So, what are the various types of chemical compounds existing in our natural environment from which we are designed to obtain our mineral nutrients?

There are 4 general categories of chemical compounds we can ingest as a bioavailable source of calcium and other mineral nutrients:

- Inorganic Salts
- Protein Chelates
- Organic Acid Chelates
- Amino Acid Chelates

INORGANIC SALTS ...

consist of a cation combined with a common anion --- most typically chlorides, sulfates, carbonates, and phosphates. To absorb mineral nutrients from inorganic salts, the salts must be soluble in water. These are simple ionizable compounds that must not just dissolve in something we drink, or in our digestive fluids, but must dissolve all the way to the point of ionizing --- that is, the molecule splitting into its constituent cation and anion. The mineral nutrients are absorbed as ions, which is ideal, because that is the way they are generally transported and utilized at the systemic, tissue, and cellular levels of biological organization.

There is a long-standing myth in the natural food movement expressed by the oft-heard slogan, “Inorganic minerals cannot be absorbed.” I have no idea how such a nonsensical notion got started, but that slogan could not be more in conflict with natural law. If it were true, then the most ubiquitous salt --- ordinary table salt --- would, when ingested, go right through us without being absorbed. It is obvious that virtually all the sodium and chloride in table salt is absorbed despite its completely inorganic status.

The truth is that human beings are very inefficient at extracting mineral nutrients from foods of animal source, and almost completely unable to absorb minerals from plant sources. Where, then, are we to get our mineral nutrients? Our drinking water, if sufficient in total

dissolved solids (that is, ionized mineral salts) is our most reliable and efficiently absorbed source of minerals. Calcium and magnesium are particularly difficult to extract from our foods, and must be concentrated in our drinking water.

Other than inorganic salts, our mineral elements must be supplied by one of the three categories of mineral chelates. The word chelate in this instance simply means a chemical compound in which the desired mineral is held firmly within the "claws" of some chemical compound, so that the mineral is absorbed still attached to the chelating chemical, rather than being split off as in the case of inorganic mineral salts. The more effective chelates remain bound to the mineral element until after absorption from the gut is achieved. The chelation bonds may then be broken in the liver, in the blood, in the cellular membrane, or perhaps within the cytoplasm or organelle membranes within the cell. The longer the chelation bond remain intact, the more effective that chelating agent is as a mineral delivery system.

PROTEIN CHELATES ...

are an important source of nutrition for certain minerals. An example would be sulfur, much of which is obtained in the sulfur-containing amino acids of our protein foods. In the amino acids methionine, cysteine, and the sulfonic acid Taurine, sulfur exists in sulfhydril form (an SH-group). This form is ideal because sulfhydril is the way sulfur is used in many biochemical processes. If we are looking at dietary sources of calcium, magnesium, and potassium, however, protein chelates are not a quantitatively important source.

ORGANIC ACID CHELATES ...

consist of a mineral cation bound to (chelated by) an organic acid. The common organic acid chelates found in our foods, and effectively used in nutrition supplements, include gluconate, citrate, lactate, malate, succinate, fumarate, AEP, picolinate, polynicotinate, glycerophosphate, and orotate. Most of these organic acids are technically not effective chelates, since the bond between the organic acid and the mineral is essentially the same type of weak bond that exists in inorganic mineral salts. Therefore, the chemical compound dissociates in our GI tract just as do the inorganic mineral salts. Mineral citrates and lactates, for example, are fairly easily dissociated, and the mineral is absorbed just as if it had been combined with an inorganic anion instead of the chelate. The chelator does not cross the intestinal or other cell membranes with the mineral still attached.

Even so, in many cases these organic acid mineral compounds can be readily absorbed after the chelate has been broken apart in the gut. Interestingly, the organic acid in these chelates often has a physiological effect, either beneficial or harmful, even more significant than the mineral nutrient it carries. The importance of these organic acids, as well as the importance of the anions in inorganic mineral salts, is grossly underappreciated by those with an interest in nutrition. Most people tend to think that a calcium supplement is a calcium supplement is a calcium supplement, when in actuality the anion or the organic acid to which the calcium is bound can have a huge effect on biochemical balance --- often far exceeding that of the calcium ion.

Are organic acid chelates a valuable way to supplement mineral nutrients? In some instances, with some minerals, yes, but in general, no. If we are interested particularly in calcium supplementation, most of these organic acid chelates of calcium are absorbed about as efficiently or less so than the inorganic salts of calcium. One reason why some of these organic acid chelates are poorly absorbed is because they alkalize the GI tract, and calcium (as well as many other minerals and trace minerals --- magnesium, copper, and manganese, in particular) need an acid environment in which to be absorbed through the gut wall.

Among the organic acid chelates, succinate and perhaps malate and fumarate show up at the cellular level in the form of succinic, fumaric, and malic acids. It is not clear, however, whether they enter the cell still combined with the mineral element or if dissociation occurs prior to cell entry, with the organic acids entering the cell separate from the mineral element. Orotic acid (mineral orotates) is the one organic acid demonstrating superior ability as a chelator in that it delivers the mineral directly to the cellular level still in chelated form.

While not an effective chelator as is orotate, glycerophosphate is of singular importance as a calcium supplement. It is by far the most soluble of all the calcium compounds. So, glycerophosphate is not an effective chelator of mineral elements, yet still it is an excellent form in which to supplement. The glycerophosphate dissociates completely into the mineral cation plus the glycerophosphate ion, and both are absorbed quite efficiently. The bonus here is that the glycerophosphate ion itself has tremendous biological activity, both intact and after further breaking down into glycerol and phosphate. You will be learning much more about glycerophosphate and glycerol in future Letters.

AMINO ACID CHELATES ...

are a very effective means of supplementing with calcium and other minerals. Though humans are extremely inefficient at GI absorption of

minerals, we are very efficient in absorbing amino acids, and particularly efficient in absorbing dipeptides. A dipeptide is a chemical compound in which 2 amino acids are linked together via the amino group of 1 amino acid and the acid group of the other. There is, in fact, a dedicated transport system in the cells of our intestinal lining specifically designed to absorb dipeptides. When we chelate a mineral element with a dipeptide, that mineral is effortlessly carried across the GI wall.

Amino acid chelates also avoid the competitive inhibition of absorption that exists between certain minerals when they are in ionic or organic acid form. For example, calcium and magnesium compete with each other for intestinal absorption, as do zinc and copper. When those minerals are chelated with a dipeptide there is no concern about one mineral blocking the absorption of another. Among the common amino acid chelates, which include mineral glycinates, methionates, and aspartates, the mineral aspartates have demonstrated their superior mineral delivery capability.

Getting back to osteoporosis --- we see that to the extent calcium supplementation is needed to prevent or stop bone density loss, there are 3 effective ways to supply that calcium:

- drinking water high in total dissolved solids
- calcium orotate
- calcium glycerophosphate
- calcium aspartate

All other forms of calcium are at best a waste of money, and often are counter-productive. Supplemented in the gross quantities recommended by "the authorities," those calcium supplements cause the long list of miseries you read at the beginning of this Letter.

We will present the rest of the story on calcium absorption and utilization next month, then move forward with all you need to know about osteoporosis. Meanwhile, appreciate that you, and only you, can offer your patients responsible, effective calcium supplementation --- with NUTRI-SPEC.

Sincerely,

Guy R. Schenker, D.C.