SYNERGISTICALLY BALANCED AMINO ACID CHELATED MINERALS

Minerals – Why do we need them?

Minerals are essential constituents of all cells. They form the greater portion of the bones, teeth and nails and are also essential components of the soft tissues, muscles, nerve cells, enzymes, glandular secretions (i.e. – hormones) and blood. They regulate the "excitability" of muscle and nerve tissues and are essential in maintaining proper osmotic pressure equilibrium. Minerals are also necessary to maintain a proper acid-base balance and play an important role in regulating blood volume and maintaining the delicate water balance in our body tissues. Although minerals comprise only 4-5 percent of our body weight, without them life itself would be impossible.

Modern man has become increasingly reliant on canned, frozen, pre-cooked, chemically altered and denatured "food". Many farming methods such as "mono-cropping" (growing one crop on the same land year after year), the extensive use of fertilizers high in nitrogen, phosphorous, and potassium but deficient in many other key minerals and trace minerals and the harvesting of fruit and vegetables before they have fully ripened, have made it nearly impossible for even health conscious individuals to obtain all the nutrients they require for optimum health from the foods they consume.

In view of these factors the need to supplement a "balanced" diet with additional vitamins and minerals seem apparent. The form these supplements should take is of prime importance when considering how best to attain maximum "bioavailability".

Mineral absorption – the digestive process:

The prime function of our digestive system is to break down our foods into the various nutrient components necessary to maintain health. This process begins in the mouth where salivary amylase initiates the breakdown of starches. It continues in the harsh environment of the stomach where hydrochloric acid and gastric enzymes begin breaking down proteins (and to a very limited degree, carbohydrates). After a period of one to four hours (depending on the combination of foods ingested), peristaltic action pushes the "chyme" out of the stomach and into the small intestine where bile and various pancreatic enzymes complete the digestive process -

It is here, in the upper portion of the small intestine, where all minerals are ultimately absorbed.

Minerals are released from our food by the action of hydrochloric acid and gastric enzymes in the stomach. Once free, the mineral, that carries a positive electrical charge, will either:

1. Attach itself to a very strong negatively charged carrier, thereby creating a bond too strong to be broken in the stomach, or
2. Pass into the intestine as an unattached, positively charged mineral ion.

If the former occurs, the ionic compound, owing to the strength of the bond holding its mineral and mineral carrier components together, will pass through the intestine without further digestion. In other words, ***a mineral in this form is of little value to the body.***

On the other hand, a free positively charged mineral ***could only be assimilated*** (in the small intestine) if its charge is reduced to zero. This is because the intestinal villi (short filament-like projections which line the intestinal wall and through which absorption of most vitamins and all minerals takes place) carry a negative charge and thus create an attraction between themselves and the positively charged mineral ion (called a "cation"). This attraction is so strong that the metal cations will adhere to the villi ***without*** being

absorbed into the bloodstream. Surrounding it with a binding protein at the villi can neutralize the free mineral's positive charge. This is a slow process and as the intestine can only assimilate a small amount in a given period of time, much of the mineral will pass its receptor site ***before*** this neutralization can be achieved. Consequently, much of the ingested mineral is never absorbed.

Gluconates, citrates, sulphates, etc.:

Mineral salts such as calcium gluconate, zinc citrate or ferrous fumerate can be likened to two magnets of opposite charge; the mineral portion (calcium, zinc, iron, etc.) carries a positive charge, and the mineral carrier, the negative charge. The mineral and mineral carrier is held together by the attraction of their opposite charges, an attraction that yields a net charge of zero. If this electrochemical attraction was strong enough to hold the compound together in the acid environment of the stomach, a significant amount might pass into the small intestine to be absorbed through the villi.

However such is not usually the case. Because the charges held by the mineral and mineral carrier are relatively weak, so too will be the attraction between them. Consequently, the stomach's digestive enzymes easily break this bond and the positively charged mineral, now liberated from its carrier, will follow the usual digestive processes described earlier. It is apparent that these types of mineral compounds (citrates, gluconates, sulphates, etc.) permit only a ***very limited*** amount of the mineral to be absorbed. In fact, in a study measuring the retention of iron in body tissues after high oral administration of either ferric gluconate, ferric citrate (these are sometimes, though erroneously, referred to as "chelates") or inorganic ferrous sulphate, the percentage of the original oral dose of iron actually retained in the tissues was only 6% for the citrates, gluconates, and sulphates.

In other words, the so-called mineral "chelates" were ***no better absorbed*** than the inorganic mineral salt form. (Various experiments have shown that only 1-6% of minerals in these forms are ultimately absorbed into the bloodstream). In light of these factors there is an obvious need for a mineral supplement that is more readily absorbed than either the "organic" or "inorganic" mineral salt forms. A supplement in which minerals are chelated with amino acids seems to provide the best answer.

The amino acid chelates:

The ideal chelating agent is one which:

1. Provides a bond strong enough to hold the mineral chelate together while it is in the stomach, yet not so strong as to make its central mineral ion unavailable for absorption;
2. Allows the creation of a mineral chelate that carries a zero electrical charge so that the mineral ion encased therein might be attracted to the villi to a degree sufficient to permit assimilation into the bloodstream.

It has been established that amino acids (the "building blocks" of protein without which the formation of any living tissue is impossible), especially those producing neutral chelates, fulfill all essential characteristics required as chelating agents. Since the mineral is embedded in a cyclic or ring-like molecular configuration comprised of amino acids which bear no electrochemical charges, and the intestinal villi have receptors with ***the affinity to absorb 95% of all amino acids****. Properly absorbed amino acid chelated minerals will be absorbed through the villi ***intact*** (* some minerals may enter the bloodstream through the receptor sites of the amino acids simply by being "hidden" within the amino acid). This form of chelate cannot cause the intestinal problems sometimes encountered with prolonged use of mineral gluconates, citrates, sulphates or carbonates.

Enzyme hydrolysis of protein – a better way!

The recently developed enzyme hydrolysis method of chelating amino acids with minerals has several advantages over processes using strong acids of bases:

1. Enzyme hydrolysis of protein breaks down the protein molecule more thoroughly into its component peptides and polypeptides, thus providing chains of these units better suited to form strong, effective chelates.
2. The enzyme hydrolysis process is almost a ***duplication of that which occurs naturally in the gastro-intestinal tract***. The high temperatures required under extreme acid or base conditions maintained for long periods of time (about 24 hours) are not employed in the enzyme method of hydrolysing protein. This avoids the formation of harmful oxidation products.
3. Because the enzyme hydrolysis process takes place under neutral or near neutral pH conditions, it will not destroy acid and temperature sensitive amino acids such as tryptophan and methionine (as will methods using the acid hydrolysis procedure). Hydrolysis of protein using a strong basic medium also results in the destruction of serine, threonine and other amino acids not affected by the comparatively low (not more than 50-60° C.) temperatures used in the enzyme hydrolysis method.
4. When preparing chelates using highly acid or basic pH solutions for hydrolysing the protein, it is essential that a neutralizing salt solution be used. This will result in the formation of significant amounts of salts (rather than chelates). Because a neutral or slightly basic medium is used in the enzyme hydrolysis technique, there is no need for this neutralization step.

The importance of synergistically balanced minerals:

Often the absorption or "bioavailability" of a particular mineral can be enhanced by the simultaneous ingestion of certain minerals with balanced vitamins or enzymes. These "synergistic factors" may aid in the actual absorption of the mineral. Additionally, extra quantities of a particular mineral may be required if another mineral displaces or "uses up" the first in order to be absorbed itself. For example, an increased intake of calcium will bring about a decreased concentration of magnesium (as shown by an increase in urinary excretion). Some examples of this "synergism" between minerals and their "associate" nutrients are:

IRON - combining it with copper, vitamin C and various B complex members enhances its absorption.

MAGNESIUM – vitamin B-6, calcium and phosphorous all work to effect its assimilation.

ZINC – vitamin A and copper increase its absorption. Further, the addition of copper prevents its (copper's) depletion from body stores.

CALCIUM – Its bioavailability is greatly enhanced by the presence of vitamin D and magnesium (although phosphorous is also vital for calcium absorption, adequate supplies are usually obtained from a number of commonly consumed foods such as flesh foods, nuts, seeds, grains, etc.).

MANGANESE – The "synergistic factors" that facilitate its assimilation are vitamins B-1 and C.

SELENIUM – vitamin E and C enhance its effectiveness and (like selenium) are also important antioxidants themselves.

Summary:

Certain conditions are necessary before optimal mineral absorption can be attained.

1. The chelating agent must provide a bond of stability sufficient to hold the mineral chelate together in the stomach, yet allow its breakdown in the small intestine where mineral absorption takes place.
2. Whether they are formed by the natural digestive process or in the laboratory*all mineral chelates must be in a water-soluble form.*
3. The chelating agent must permit the creation of a mineral chelate that carries a neutral charge. This will create an attraction between the chelated mineral and negatively charged villi strong enough to permit optimum absorption into the bloodstream, yet sufficiently weak to eliminate the possibility of the mineral adhering to the villi (and thereby not be absorbed).
4. The completeness and thus the effectiveness of protein as a chelating agent are best preserved by the use of the enzyme method of protein hydrolysis. This method does not require the harsh acid or base mediums and extreme temperatures used in other methods of hydrolysis. Consequently, its implementation preserves the numerous pH and temperature sensitive amino acids which process the acid and base mediums often destroy.
5. The assimilation, retention and utilization of a mineral are greatly enhanced by its simultaneous ingestion with associate or "synergistic" vitamins, minerals and enzymes.

These nutrients either:

1. Work directly with the mineral to increase its effectiveness,
2. Increase the absorption of the mineral itself,
3. Prevent their being depleted from body tissues, bones, body fluids, etc. due to displacement by their "associate" mineral (i.e. – the excretion of magnesium when calcium is consumed).

Additionally, since all minerals absorbed are simultaneously absorbed through the same receptor site, the latter will not be so "tied up" by one mineral that the others cannot be absorbed. An optimum level of health can only be achieved if, in addition to eating whole, natural food, obtaining sufficient sleep, and exercising regularly, one also selects food supplements of the highest possible quality.

Enzyme amino acid technology has made possible the creation of minerals that are better assimilated, retained and utilized than ever before. When purchasing vitamin/mineral supplements, choose those formulae such as the SONA, where the minerals are properly chelated and synergistically balanced.

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