MINERALS

Home

NEW Stem Cell Research Breakthrough

Much controversy and debate surrounds the subject of minerals. Sorting fact from fiction and debunking the myths about minerals!

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http://thedoctorwithin.com/index_fr.php?page=articles/mineral_nutrition.php

Inorganic, organic, chelated, elemental, ionic, colloidal, essential, trace - all these claims! What do we really need? Credentials in nutrition apparently mean very little when it comes to minerals. Much of what is written about minerals is speculative, market-oriented, or simply dead wrong.

A net search on minerals is an overwhelming assault on one's patience, time and credulity. How could all this stuff be right? Minerals come from mines right? Except when you're talking about nutrition. Then they come from food. At least they used to. **When we still had some mineralised viable topsoil to grow market vegetables in that is!** Four elements compose 96% of the body's makeup: carbon, hydrogen, oxygen, and nitrogen. The remaining 4% of the body's composition is mineral. There are several opinions about how many minerals are essential. The following table shows the ones that are not in dispute, in the first column. Macro means more than 100mg per day. Trace usually means we don't know how much we need and it is a very small quantity.

Essential Minerals

MACROMINERALS.....
Calcium
Chlorine
Sodium
Potassium
Phosphorus
Magnesium
Sulphur

TRACE ELEMENTS or MINERALS . . . . . .
Chromium
Tin
Zinc
Vanadium
Copper
Silicon
Manganese
Nickel
Iron
Molybdenum
Fluorine
Iodine
Cobalt
Selenium - U.S. Dept. of Agriculture National Research Council

The controversy primarily involves the second column - trace minerals.

Of the 14 trace minerals listed above, three or four may not have universal agreement as essential, but the majority of creditable sources admit that most of them are essential. Deficiency amounts have never been determined for most trace minerals, although several diseases have been linked with deficiencies of certain ones. Conclusive evidence has not been found regarding the exact daily intake amounts necessary, since some of the actual requirements may be too small to measure; hence the name "trace."

In the past few years, even mainstream medicine is beginning to acknowledge the incontrovertible importance of mineral supplementation. In an article appearing in *JAMA*, the top American medical journal, 24 Dec 1996, a controlled study of selenium use for cancer patients was written up. Selenium has been proven to be a powerful stimulator in antioxidant activity, by helping to neutralize free radicals, which are rampant in the presence of cancer. In this study, 1312 subjects were divided into groups. Some were given selenium; others the placebo.

Soon it was noticed that there was a decrease of 63% with prostate cancer, and 46% with lung cancer in the selenium group. The results were so blatant that the designers actually terminated the study early so that everyone could begin to benefit from selenium. This is just one example of the research that is currently being done on mineral supplementation. The problem is, if the results of studies economically threaten a current drug protocol, like chemotherapy, it is unlikely that an inexpensive natural supplement like selenium would be promoted by oncologists as a replacement in the foreseeable future.

There are six nutrient groups:

Water Vitamins Minerals Fats Protein Carbohydrate

All groups are necessary for complete body function.

The necessity for minerals is a recent historical discovery, only about 150 years old. In the 1850s, Pasteur's contemporary, Claude Bernard, learned about iron. Copper came about 10 years later, and zinc about the turn of the century. With the discovery of Vitamin A in 1912, minerals were downplayed for about 50 years in favour of vitamin research. By 1950, after about 14 vitamins had been discovered, attention returned once more to minerals when it was shown that they were necessary co-factors in order for vitamins to operate. Minerals are catalysts for most biological reactions. Soon the individual functions of minerals in the body were demonstrated:

- **Structural: bones, teeth, ligaments**
- **Solutes and electrolytes in the blood**
- **Enzyme actions**
- **Energy production from food breakdown**
- **Nerve transmission**
- **Muscle action**

The following is a table of minerals linked with the specific functions most commonly agreed upon today:

Calcium: Muscle contraction Bone building

Sodium: Cell life Waste removal

Potassium: Nerve transmission Cell life Normal blood pressure Muscle contraction

Phosphorus: Bone formation Cell energy

Magnesium: Muscle contraction Nerve transmission Calcium metabolism Enzyme cofactor

Chlorine: Digestion Normal blood pressure

Sulphur: Protein synthesis Collagen cross-linking, bone and ligament structure

Copper: Immune system Artery strength Forms haemoglobin from iron

Chromium: Insulin action Immune function Glucose tolerance factor

Iron: Blood formation Immune function

Selenium: Immune stimulant Fight free radicals Activates Vitamin E

Nickel: Immune regulation Brain development DNA synthesis

Iodine: Thyroid function

Vanadium: Circulation Sugar metabolism

Molybdenum: Enzyme action

Silicon: Enzyme action Connective tissue

Tin: Enzyme action

Manganese: Enzyme action

Fluorine: Teeth enamel

- Larry Berger, PhD and Parris Kidd, PhD

Zinc is necessary for antioxidant production, which prevents aging and cancer. It is also a cofactor for some 80 metabolic enzymes. (Erasmus, p 172) Zinc is necessary for wound healing, fat metabolism, insulin function, semen production, tissue repair, especially skin, and HCl production. (Erasmus)

Mineral deficiency means that some of these jobs will not get done. The body is capable of prodigious amounts of adapting, and can operate for long periods of time with deficiencies of many of the above. But one day those cheques will have to be cashed. The result: premature aging and cell breakdown. Without minerals,

vitamins may have little or no effect. Minerals are catalysts – triggers for thousands of essential enzyme reactions in the body. **No trigger – no reaction**. Without enzyme reactions, caloric intake is meaningless, and the same for protein, fat, and carbohydrate intake. **Minerals trigger the vitamins and enzymes to act; that means digestion.**

DEFICIENCY

With the exception of those egregiously uninformed doctors who quack "you should be able to get all the nutrition you need from your food," a virtually undisputed fact is deficiency. Mineral deficiency is the reason for the titanic output of websites, articles, and supplements visible today. The majority of mineral websites quote a 1936 source - Senate Document #264, as scientific proof that dietary minerals are generally inadequate for optimum health.

"...most of us are suffering from certain diet deficiencies which cannot be remedied until deplete soils from which our food comes are brought into proper mineral balance."

"The alarming fact is that food...now being raised on millions of acres of land that no longer contain enough minerals are starving us… no matter how much of the food we eat."

"Lacking vitamins, the system can make use of minerals, but lacking minerals, vitamins are useless."

***Senate Document 264* 74th Congress, 1936**

The same document went on to quantify the extent of mineral deficiency: ***"99% of the American people are deficient in minerals, and a marked deficiency in any one of the more important minerals actually results in disease."***
Congressional documents are not generally highly regarded as scientific sources, and other reference texts cite other percentages. The figures quoted by Albion Laboratories, the world leader in patents on supplemental minerals, are somewhat lower, but the idea begins to come across:

DEFICIENCIES - % of U.S. Population

Magnesium - 75%
Iron - 58%
Copper - 81%
Manganese - 50%
Chromium - 90%
Zinc - 67%
Selenium - 60%

sources: Albion Labs, Fats That Heal

FIVE REASONS FOR MINERAL DEFICIENCY:

1. SOIL DEPLETION

Different studies will show different figures, of course, but there is certainly no lack of explanation for mass deficiencies of mineral intake. The most obvious of these is soil depletion and demineralisation.

In 1900, forests covered 40% of the earth. Today, the figure is about 27%. (Relating Land Use and Global Land Cover, Turner, 1992). Aside from hacking down temperate forests and rainforests in order to raise beef cattle or to build condos, one of the main reasons for the dying forests is mineral depletion. According to a paper read at the 1994 meeting of the International Society for Systems Sciences, this century is the first time ever that "mineral content available to forest and agricultural root systems is down 25%-40%." Less forests means less topsoil.

In the past 200 years, the U.S. has lost as much as 75% of its topsoil, according to John Robbins in his Pulitzer-nominated work Diet for a New America. To replace one inch of topsoil may take anywhere from 200-1000 years, depending on climate. (Utah Teachers Resource Books)

Demineralisation of topsoil translates to loss of productive capacity. Contributing further to this trend is the growing of produce that is harvested and shipped far away. (This would also account for the depletion of minerals from forested areas where the logs are shipped away from the forest for processing. Eds note.)

The standard NPK (nitrogen-phosphorus-potassium) fertilizer farmers commonly use is able to restore the soil enough to grow fruits and vegetables which are healthy looking, but may be entirely lacking in trace minerals. The inventor of the entire NPK philosophy, Baron von Leibig, recanted his theories before he died when he saw the deficiencies his methods were fostering as they became the agricultural standard in both Europe and America.

Mineral depletion in topsoil is hardly a controversial issue. The question is not if, but how much. Plants are the primary agents of mineral incorporation into the biosphere. The implication for our position on the food chain is simply: lowered mineral content in produce grown in U.S. topsoil. Not much argument here.

I have not found any source that insists that the mineral content of American or any developed nations topsoil is as good today as it was 50 years ago. Generally, studies talk in terms of how much, if any, minerals are still present.

2. DIET

The second contributor to mineral deficiency within the population is obviously, diet. Even if our produce did contain abundant minerals, less than 4% of the population eats sufficient fruits and vegetables to account for minimal RDAs. To compound matters further, mass amounts of processed food, excess protein, and refined sugars require most of our mineral stores in order to digest it and remove it. The removal process involves enzymes, which break things down. Enzyme activity, remember, is completely dependent on minerals like zinc, copper, chromium, selenium, cobalt and many others. No minerals – no enzyme action.

In addition, pasteurised/homogenised milk and dairy products, alcohol, and drugs inhibit the absorption of these minerals, further depleting reserves. So it is cyclical: refined foods inhibit mineral absorption, which then are not themselves efficiently digested because of diminished enzyme activity. **And then we go looking for bacteria and viruses as the cause of disease?**

3. MUCOID PLAQUE

The standard indigestible American/UK diet packs layer upon layer of plaque onto the inner lining of the colon. One of the prime functions of the colon is to reabsorb water, in order to prevent dehydration. Plaque prevents such a reclamation, and the result is that we lose both water and minerals that normally should be reabsorbed.

4. COMPETITION

The fourth reason for inadequate minerals in the body is a phenomenon known as secondary deficiency. It has been proven that an excess of one mineral may directly cause a deficiency of another, because minerals compete for absorption, compete for the same binding sites, like a molecular Musical Chairs. Secondary deficiency means that an excess of one mineral causes a deficiency of another. (Kidd)

For example, iron, copper, and zinc are competitive in this way. Copper is necessary for the conversion of iron to haemoglobin, but if there is excess zinc, less iron will be available for conversion. This may cause a secondary deficiency of iron, which can manifest itself as iron deficiency anaemia. All due simply to excess zinc! Researchers have found that these secondary deficiencies caused by excess of one mineral are almost always due to an imbalance of mineral supplements, since the quantities contained in food are so small.

5. DRUGS

A fourth, and increasingly serious reason for mineral deficiency in humans is overuse of prescription drugs. It has been known since the 1950s that antibiotics interfere with uptake of minerals, specifically zinc, chromium, and calcium. (The Plague Makers) Tylenol, Advil, Motrin, and aspirin have the same inhibitive effect on mineral absorption. Moreover, when the body has to try and metabolise these drugs to clear the system, its own mineral stores are heavily drawn upon. Such a waste of energy is used to metabolise laxatives, diuretics, chemotherapy drugs, and NSAIDs, such as Tylenol, Advil, and aspirin out of the body. This is one of the most basic mechanisms in drug-induced immune-suppression: minerals are essential for normal immune function.

Ultimately, the only issue that really counts with minerals is bio-availability. It really doesn't matter what we eat; it only matters what is available and is transported to the body's cells. Let's say someone is iron deficient, for example. Can't he just take a bar of iron and file off some iron filings into a teaspoon, and swallow them? Just took in more iron, didn't he? Will this remedy the iron deficiency? Of course not! Here is a major distinction: the difference between elemental minerals and nutrient minerals. Iron filings are in the elemental form; absorption will be 8% or less.

Same with most iron pills and most calcium supplements. Food-bound iron, on the other hand, like that contained in raisins or molasses, will have a much higher rate of absorption, since it is complexed with other living organic forms, and as such is classed as a nutrient mineral. Minerals are not living, though they are necessary for life. Minerals are necessary for cell life and enzyme reactions and hundreds, perhaps thousands of other reasons. But they must be in a form that can make it as far as the cells. What is not bio-available passes right through the body, a waste of time and often money spent on poor mineral supplements.

Bio-availability has a precursor, an opening act. It is called absorption. Take a mineral supplement pill. Put it in a glass of water and wait half an hour. If it is unchanged, chances are that the tablet itself would never even dissolve in the stomach or intestine, but pass right out of the body. **You would be astounded how many mineral supplements there are in this category.**

OK, let's say the tablet or capsule actually does dissolve in the digestive tract. Then what? In order to do us any good, the mineral must be absorbed into the bloodstream, through the intestinal walls. Elemental minerals are absorbed about 1-8% in this manner. The rest is excreted. **Elemental minerals are those found in the majority of supplements**, because they're **very cheap to produce**. For the small percentage that actually makes it to the bloodstream, the mineral is available for use by the cells, or as catalysts in thousands of essential enzyme reactions that keep every cell alive every second. Use at the cellular level is what bio-availability is all about.

With this background in mind, we can begin to understand that varying amounts of the seven macro-minerals and approximately 14 trace minerals are necessary in a bio-available form for optimum cell activity, optimum health and would seem to contribute to long lifespan.

So besides mineral deficiency of epidemic proportions, what's the problem?

In a word, supplementation! Mineral deficiency has become such an obvious health concern, causing specific diseases because of a lack of a single mineral, and general immune suppression with a lack of several… that the obvious need for supplementation has spawned an entire industry to the rescue. But in any market-driven industry involving pills, again we find that often the cures are worse than the original problems.

Why?... Toxicity!

Remember, even macro-minerals are only necessary in tiny amounts. Most trace minerals are necessary in amounts too small to be measured, and can only be estimated. Toxicity is a word that simply means extra stuff. When extra stuff gets put into the body, it's a big deal. All forces are mobilized for removal of the extra stuff, which are called antigens, toxins, poisons, reactants, etc, but you get the idea – it doesn't belong there. Toxicity means taking a non-essential non-nutrient into the body.

Take lead poisoning, for example. If lead gets into the blood, the body will try to remove it. Since the metal atoms are so heavy compared with the body's immune forces, removal may be impossible. Lead can initiate a chronic inflammatory response and can remain in the body permanently, which is why we don't have lead in paint or gasoline any more.

Most minerals can be toxic if taken to excess. And this excess would not happen from food; only from supplements. This is why if you are supplementing with trace minerals where the daily dose has not been established you should be taking only micro amounts of them.

SO, WHAT SUPPLEMENTS WOULD BE BAD?

Well, for starters, any supplement containing more than about 21 minerals, where the extra minerals are present in any other than **extremely small micro doses**, because little research, in fact no research in some cases, has been done on all the other trace elements. New toxicities are always being discovered.

Aluminium linked to Alzheimer's is a recent discovery. Beyond these 21 or so it's simply anybody's guess, no matter what they tell you about the 5 civilizations where people live to be 140 years old. People who show dramatic improvements from taking these broad spectrum mineral drinks generally were so depleted that they rapidly absorbed the essential minerals in which they were deficient. But the toxicities from the non essential, unknown minerals may take a long time to show up. Why take in anything extra? (In the case of micro supplementation with the other little known minerals, problems would not arise as these minerals would have all been available from properly mineralised food anyway and the body would either utilise them as needed or excrete them. So the possibility of any toxic effects from using micro amounts of the lesser known trace elements, as would be found in food growing on properly mineralised soils, would be remote indeed. Eds note.)

Amidst all the confusion about minerals, one thing should be made absolutely clear: **we only need tiny amounts of virtually all the trace elements**. **So the mineral supplements we take should be as absorbable and as bio-available as possible** – that way we won't have to take much and there is very little chance of toxicity.

So the question then becomes: which mineral supplements are the most absorbable and the most usable, and therefore effective in the smallest amounts possible? Four candidates present themselves, all contending for the title:

- **Elemental**
- **Ionic**
- **Colloidal**
- **Chelated**

Unravelling this puzzle is one area where a lot of confusion reigns.

There's only one answer, but it's buried deep. To find it, we have to review a little

BASIC PLUMBING:

The digestive tract goes like this: mouth, oesophagus, stomach, small intestine, large intestine, and out. Mineral absorption means transferring the mineral from the digestive tract through the wall of the intestine, into the bloodstream. You really have to picture this: the digestive tract is just a long tube, from one end to the other. As long as food and nutrients are inside this tube, they are actually considered to be still outside the body, because they haven't been absorbed into the bloodstream yet. This is an essential concept to understanding mineral absorption. Minerals can't do any good unless they make it into the bloodstream. This is exactly why most minerals bought at the supermarket and over the counter from health shops, are almost worthless: they pass right through the body - in one end and out the other. It's also why many nutritionists' and dieticians' advice is valueless; they commonly pretend and even believe their own hype that everything that is eaten is absorbed.

Two main reasons for lack of absorption:

- The pill never dissolved in the first place and was excreted along with other undigested stuff.
- The mineral was in its elemental form and was bio-unavailable. (non-nutrient, e.g., iron filings)

Let's say these problems are overcome… neither is true…or, let's say the mineral is contained within some food, such as iron in molasses, or potassium in bananas. Food-bound minerals are attached or complexed to organic molecules. Absorption into the blood is vastly increased, made easy. The mineral is not just a foreign metal that has been ingested; it is part of food. This is very important for the absorption of all minerals.

Fruits and vegetables with high mineral content are the best way to provide the body with adequate nutrition. Food-bound minerals are the original mode. As already cited above however, sufficient mineral content is an increasingly rare occurrence. Foods simply don't have sufficient quantities of most trace elements and minerals to properly sustain life. How little or what portion of normal depends on what studies

one finds. Suffice to say **virtually all scientists agree** that we do need a broad spectrum of a large number of minerals and trace elements. So, the necessity for supplementation becomes patently obvious, if the food no longer has it, and we need minerals… then pass the mineral supplements, please. But what supplements?

1. ELEMENTAL

Let's look at the four types one by one. Least beneficial are the supplements containing minerals in the elemental form. That means the mineral is just mentioned on the label. It's not ionized, it's not chelated, it's not complexed with an oxide or a carbonate or a sulfate, or with a food, and it's not colloidal. Like under "ingredients" it just says "iron" or "copper," or "calcium," etc.

Elemental minerals are obviously the cheapest to make. A liquid would only have to be poured over some nails to be said to contain iron. Elemental minerals are the most common in supermarket and over the counter health store supplements. They may not be toxic, as long as only the minerals mentioned on the label are included in the supplement. The problem is absorption: it's between 1 and 8 percent. The rest passes right through. Not only a waste of money; also a waste of energy: it has to be processed out of the body. This can actually use up available mineral stores.

2. IONIC

Next comes ionic minerals. Usually a step up. Ionic means in the form of ions. Ions are unstable molecules that want to bind with other molecules. An ion is an incomplete molecule. There is a definite pathway for the absorption of ionic minerals through the gut (intestine) into the blood. In fact, any percent of the elemental minerals that actually got absorbed became ions first, by being dissolved in stomach acids. Ionic minerals are not absorbed through the intestine intact.

The model for mineral ion absorption through the intestine is as follows. Ions are absorbed through the gut by a complicated process involving becoming attached or chelated to some special carrier proteins in the intestinal wall. Active transport is involved; meaning, energy is required to bring the ionic mineral from inside the intestine through the lining, to be deposited in the bloodstream on the other side.

Ionic minerals may be a good source of nutrients for the body, depending upon the type of ions, and on how difficult it is for the ion to get free at the appropriate moment and location. Minerals require an acidic environment for absorption. Low pH (less than 7) is acidic; high pH (above 7) is alkaline. As the stomach contents at pH 2 empty into the small intestine, the first few centimetres of the small intestine is the optimum location for mineral absorption. The acidic state is necessary for ionisation of the dissolved minerals. If the pH is too alkaline, the ions won't disassociate from whatever they're complexed with, and will simply pass on through to the colon without being absorbed.

As the mineral ions are presented to the lining of the intestine, if all conditions are right, and there are not too much of competing minerals present, the ions will begin to be taken across the intestinal barrier, making their way into the bloodstream. This is a complicated, multi-step process, beyond the scope of this article. Simply, it involves the attachment of the free mineral ion to some carrier proteins within the intestinal membrane, which drag the ion across and free it into the bloodstream. A lot happens during the transfer, and much energy is required for all the steps. Just the right conditions and timing are necessary – proper pH, presence of vitamins for some, and the right section of the small intestine.

Iron, manganese, zinc, copper – these ions are bound to the carrier proteins which are embedded in the intestinal lining. The binding is accomplished by a sort of chelation process, which simply describes the type of binding which holds the ion. The carrier protein or ligand hands off the mineral to another larger carrier protein located deeper within the intestinal wall. After several other steps, if all conditions are favourable, the ion is finally deposited on the other side of the intestinal wall: the bloodstream, now usable by the cells.

Ionic mineral supplements do not guarantee absorption by their very nature, although they are certainly much more likely to be absorbed than are minerals in the raw, elemental state. However, ionic minerals are in the form required for uptake by the carrier proteins that reside in the intestinal wall.

The uncertainties with ionic minerals include how many, how much, and what else are the unstable ions likely to become bound to before the carrier proteins pick them up. All ionic supplements are not created equal. Just because it's an ion doesn't mean a supplemental mineral will be absorbed. Too many and too big a quantity of specific minerals in a poorly designed supplement will compete for absorption. Too much of one or more minerals will crowd out the others. The idea is to offer the body an opportunity for balance; rather than to overload it with the hope that some will make it through somehow. Minerals are biologically active in tiny amounts and the best supplements are the ones that provide micro doses at non toxic levels.

Recent scientific developments indicate a greater absorption of ionised minerals once they are complexed with organic fulvic acid. The same organic acid found in healthy soil full of micro-organisms, which allows elemental minerals to be absorbed and utilised by growing plants. The bio availability of minerals once complexed with organic fulvic acid is greater than minerals simply in an ionised form.

3. COLLOIDAL

Speaking of overloading, the third type of supplemental minerals is the one we hear the most about: **colloidal**. What does colloidal really mean? Colloidal refers to a solution, a dispersion medium in which mineral particles are so well suspended that they never settle out: you never have to shake the bottle. The other part of the dictionary definition has to do with diffusion through a membrane: "will not diffuse easily through vegetable or animal membrane." Yet this is supposed to be the whole rationale for taking colloidal minerals – their absorbability.

Colloidal guru Joel Wallach himself continuously claims that it is precisely the colloidal form of the minerals that allows for easy diffusion and absorption across the intestinal membrane, because the particles are so

small. Wallach claims 98% absorption, but cites no studies, experiments, journal articles or research of any kind to back up this figure.

Why not? Because there aren't any. The research on colloidal minerals has never been done. It's not out there. Senate Document 264 doesn't really cover it.

In reality, colloidal minerals are actually larger than ionic minerals, as discussed by researcher Max Motyka, MS. Because of the molecular size and suspension in the colloid medium, which Dorland's Medical dictionary describes as "like glue," absorption is inhibited, not enhanced. No less an authority than Dr. Royal Lee the man responsible for pointing out the distinction between whole food vitamins and synthetic vitamins, stated:

"A colloidal mineral is one that has been so altered that it will no longer pass through cell walls or other organic membranes."

Does that sound like easy absorption?

Stedman's Medical Dictionary talks about colloids ***…"resisting sedimentation, diffusion, and filtration…"*** Again, resisting diffusion seems to indicate inhibition of absorption, not increased absorption, wouldn't you think?

As Alexander Schauss and Parris Kidd both explain… ***"colloids are suspensions of minerals in clay and water. Clay often has levels of aluminium as high as 3000 parts per million, with safety levels set at 10 ppm or lower (Kidd). Aluminium has been proven to kill nerve cells, which we now see in the pathophysiology of Alzheimer's."***

Dr. Schauss characterizes the aluminium content as the big problem with colloidal minerals. He cites a standard geology reference text - Dana's Manual of Mineralogy - describing clay as primarily aluminium:

"Clay minerals are essentially hydrous aluminium silicates."
- Dana's Manual, p436

And another geology text: ***"[clays] are essentially hydrous aluminium silicates and are usually formed from the alteration of aluminium silicates."*** - Mineral Recognition p 273

Schauss finds references as high as 4400 PPM of aluminium in colloidal clay. Schauss states that he has done an exhaustive search for any human studies using colloidal minerals and after searching 2000 journals, like everyone else, has come up with zero.

For a mineral to be absorbed, **it must be either in the ionic state**, or else chelated, as explained above. The percentage of colloidal minerals which actually does get absorbed has to have been ionized somehow, due to the acidic conditions in the small intestine. Only then is the mineral capable of being taken up by the carrier proteins in the intestinal membrane, as mentioned above. But why create the extra step? Ionic minerals would be superior to colloidal, because they don't have to be dissociated from a suspension medium, which is by definition non-diffusible. All this extra work costs the body in energy and reserves.

In an editorial in *Am J of Nat Med*, Jan 97, Alexander Schauss further points out the error of Wallach's claims. Wallach states that colloidal minerals are negatively charged, and this enhances intestinal absorption. The problem is his science is 180° backward: Wallach claims the charge of the intestinal mucosa is positive, but all other sources have known for decades that the mucosal charge is negative. (Guyton, p13) This is why ionic minerals are presented to the intestinal surface as cations (positively charged ions). Opposites attract, like repels – remember? Another big minus for colloidals.

QUALITY CONTROL

What consistency of percentages of each mineral from batch to batch is there? Very simply, there isn't any with most of the mega mineral supplements, as many of the manufacturers will themselves admit. The ancient lakes and glaciers apparently have not been very accommodating when it comes to percent composition. Such a range of variation might be acceptable in, say, grenade tossing or blood dilution in seawater necessary to attract a shark, or IQ threshold of terrorists, or other areas where high standards of precision are not crucial. But a nutritional supplement that is supposed to enhance health by swallowing it – this is an area in which the details of composition should be fairly visible, verifiable, the same every time.

To ensure you are getting the minerals and trace elements at the correct rate a reputable company will use standardisation techniques for all the minerals which have are known to be essential and only include the lesser known elements in micro amounts. In addition a properly formulated mineral supplement will have been rigorously tested for the poisonous and toxic minerals such as aluminium, lead and cadmium and all traces removed.

In many of these 80-trace-mineral toddies, there is no way of testing the presence or absence of many of the individual minerals. Many established essential trace minerals do not even have an agreed-upon recommended daily allowance, for two reasons:

1. **The research has never been done**
2. **The amounts are too small to be measured.**

TOXICITY AND COMPETITION

Some essential minerals are toxic in excess, but essential in small amounts. Iron, chlorine, sodium, zinc, selenium and copper are in this category. Toxic levels have been established, and resulting pathologies have been identified: we know what diseases are caused by their excesses. How risky is it to take in 40 or 50 minerals for which no toxicity levels have ever been set? Again it must be stressed that micro amounts of trace elements, similar to levels found in plants growing on properly mineralised land is the only safe way to be taking a broad spectrum mineral supplement.

The problem is selective utilization, as explained by Dr. Parris Kidd. Toxic trace minerals may closely resemble the essential minerals in atomic configuration. The result is competition for enzyme sites by two similar minerals only one of which is beneficial:

"aluminum competes with silicon cadmium competes with zinc tellurium competes with selenium lanthanum competes with calcium…" - Kidd, p42

We also know that zinc competes with iron. (Erasmus)

A separate hoax is being played out with

COLLOIDAL SILVER: Used by many as a "natural antibiotic." Extremely uninformed physicians recommend daily doses of colloidal silver, in order to "prevent" colds, in the absence of any studies or trials whatsoever. As Dr. Kidd points out: ***"…the body is not well-equipped to handle silver. This element can poison the kidneys, become deposited in the brain, and even give to the skin a gunmetal type of gloss."***

Doug Grant, a nutritionist, cites several minerals which frequently appear on the ingredient labels of certain mega-mineral products – they actually admit their supplements contain or "may contain" some of the following: (the phrase "may contain" has always been scary for me. If they're not sure, then what else is there that this product "may contain" that they don't know about?)

Aluminium: Documented since the article in *Lancet* 14 Jan 1989 to be associated with Alzheimer's Disease, as well as blocking absorption of essential minerals like calcium, iron, and fluoride. If you want to ingest large amounts of aluminium simply start taking antacid tablets or absorb it through your skin by applying anti-deodorant under the arms!

Silver: questionable as a single-dose antibiotic, consistent intake of silver accumulates in the blood-forming organs – spleen, liver, and bone marrow-, as well as the skin, lungs, and muscles. Serious pathologies have resulted: blood disorders, cirrhosis, pulmonary edema, chronic bronchitis, and a permanent skin condition known as argyria, to name just a few. Silver is better left in the ancient lakes, and in tableware. It should not be taken regularly as a supplement on its own.

Gold: Manufacturers of mega-minerals hawk that "there's more gold in a ton of seawater than there is in a ton of ore." So what? Our blood is not seawater; it evolved from seawater. Gold used to be used to treat rheumatoid arthritis, but has largely been abandoned when they proved that it caused kidney cell destruction, bone marrow suppression, and immune abnormalities.

Lithium: Rarely used as an antipsychotic medication, lithium definitely can cause blackouts, coma, psychosis, kidney damage, and seizures. Outside of that, it should be fine.

The list goes on and on. These are just a few examples of mineral toxicities about which we have some idea. But for at least half the minerals in the mega toddies, we know nothing at all.

4. CHELATED

The fourth form of supplemental minerals is the chelated variety. Some clarification of this term is immediately necessary. Chelated is a general term that describes a certain chemical configuration, or shape of a compound in which some molecule gets hooked up with some other chemical structures. When a mineral is bound or stuck to certain carrier molecules, which are known as chelating agents, or ligands, and a ring-like molecule is the result, we say that a chelate is formed. Chelate is from the Greek word for claw, suggested by the open v-shape of the two ligands on each side, with the mineral ion in the center.

Chelation occurs in many situations. Many things can be chelated, including minerals, vitamins, and enzymes. Minerals in food may be bound with organic molecules in a chelated state. Many molecules in the body are chelated in normal metabolic processes. The carrier proteins in the intestinal wall discussed above, whose job it is to transport ionic minerals – these chelate the ions. Another sense of the word chelation as exemplified in a mainstream therapy for removing heavy metals from the blood is called chelation therapy. The toxic metals are bound to a therapeutic amino acid ligand called EDTA. With a Pac-Man action, the metals are thus removed from the blood.

Molecular weight is measured in units called daltons. The ligands or binding agents may very small (800 daltons) or very large (500,000 daltons) resulting in a many sizes of chelates. Mineral + ligand = chelate. Generally the largest chelates are the most stable, and also the most difficult to absorb. Ionic minerals absorbed through the intestine are chelated to the carrier proteins, at least two separate times.

Using the word chelated with respect to mineral supplements refers a very specific type of chelation. The idea is to bind the mineral ion to ligands that will facilitate absorption of the mineral through the intestine into the bloodstream, bypassing the pathway used for ionic mineral absorption. Sometimes minerals prepared in this way are described as "pre-chelated" since any ionic mineral will be chelated anyway once it is taken up by the intestinal membrane.

After decades of research at Albion Laboratories in Utah, it was learned that small quantities of amino acids,

especially **glycine**, are the best ligands for chelating minerals, for three reasons: (You will find the best mineral formulas are always combined with amino acids **especially glycine**. Eds note)

1. **Bypasses the entire process of chelation by the intestine's own carrier proteins**
2. **Facilitates absorption by an entirely different pathway of intestinal absorption, skipping the intermediate steps which ionic minerals go through**
3. **The chelate will be the at the most absorbable molecular weight for intestinal transfer: less than 1500 daltons**

It has also been established beyond controversy that certain pairs of amino acids (dipeptides) are the easiest of all chelates to be absorbed, often easier than individual amino acids. Proteins are made of amino acids. Normal digestion presumably breaks down the proteins to its amino acid building blocks so they can be absorbed. But total breakdown is not always necessary. It has long been known that many nutrient chains of two or three or even more amino acids may be absorbed just as easily as single amino acids. Food-bound copper, vitamin C with hemoglobin molecule, animal protein zinc, are some examples of amino acids chelates that are easily absorbed intact. (Intestinal Absorption of Metal Ions, Chapter 7).

To take another example, in abnormal digestion it is well known that chains of amino acids - dipeptides, tripeptides, even polypeptide proteins - sometimes become absorbed intact in a pathology known to gastroenterologists as Leaky Gut Syndrome. Obviously it is not healthy and has many adverse consequences, but the point is that amino acids chains are frequently absorbed, for many different reasons. It's not always like it says in the boldface section headings in Guyton's Physiology.

The reason these dipeptide chelates are absorbed faster than ionic minerals is that the chelated mineral was bonded tightly enough so that it did not dissociate in the acidic small intestine and offer itself for capture by the intestinal membrane's carrier proteins. That whole process was thus avoided. The chelate is absorbed intact. An easier form. This is a vast oversimplification, and the most concise summary, of why chelated minerals may be superior to the standard ionic forms of mineral supplements, provided it's the right chelate. Only a specific chelate can resist digestion and maintain its integrity as it is absorbed through the gut. Again, all chelates are not created equal. Inferior chelates, used because they are cheaper to produce, include the following:

- **carbonates**
- citrates
- oxides
- sulphates
- chlorides
- phosphates

If the label gives one of these chelates, it means the mineral is bound either too strongly or not tightly enough, and will be released at the wrong time and the wrong place. Chelation of minerals in nutrient supplements is a very precise science, yielding chelates superior to those occurring naturally in foods.

Intact absorption is faster, easier, and requires less metabolic energy, provided the chelate is about 1500 daltons.

To compare chelated and ionic minerals, once the research is presented, there is really not much of a dispute about which is absorbed faster, ionic minerals or dipeptide-like amino acid chelates. Meticulous isotope testing has shown the following increases in percent absorption of chelates, as compared with ionic:

Iron 490% greater
Copper 580% greater
Magnesium 410% greater
Calcium 421% greater
Manganese 340% greater - Source: *Journal of Applied Nutrition* 22:42 1970

Again, this is just the briefest glance at the prodigious amount of research comparing ionic with chelated minerals, but the results are uniform. The winner of the bioavailability contest is: chelated minerals, **provided the chelate was maintained as small as possible**, generally using glycine as the amino acid ligands, at a total weight of about 1500 daltons.

(In the case of ionised minerals complexed with organic fulvic acid, amino acids including glycine, phyto nutrients and essential vitamins, the balance swings back in favour of the ionised formula. New research is indicating that mineral formulas presented to the body in these complex matrixes are the most bio-available of all the mineral formulas on the market. Eds note).

FOOD-BOUND CHELATED MINERALS

Often you will hear this or that company claiming that "organic" minerals contained in food are the best, cannot be improved upon, and are superior to all possible types of mineral supplements. This is almost true. The only exception is glycine-chelated minerals, for two reasons: - the exact amount of minerals in any food is extremely variable and difficult to measure, even if there is high mineral content of the soil. Pesticides destroy root organisms in the soil. These bugs play a major role in selective mineral absorption. (Jensen p 55)

The ligands that bind the mineral in the food chelate may be too strong or too weak to dissociate at exactly the right time for maximum absorption in the human digestive tract. Glycine chelates are uniform and easily measurable. No question about dosage.

Marketing is a wonderful thing – two different companies are now attributing the longevity of the Hunza tribe in Pakistan to two entirely different properties of their water: one, the minerals; the other, molecular configuration. A classic error in logic is described as "post hoc, ergo propter hoc" - after this, therefore because of this. Maybe it was the weather that made the Hunzas live longer, or their grains, or the absence of toothpaste or webservers or… Marketing is the art of persuasion by suspending logic.

The average lifespan of an American is about 75 years. No one has ever proven that taking mineral supplements will extend life because no one has been studying people for long enough as far as minerals are concerned. Many old people never took a mineral or a vitamin in their life. However, by the same token most really old people have lived the vast majority of their years eating far less adulterated, denatured and demineralised food than what young people do today. It really comes down to quality of life and the incidence of chronic and degenerative disease during the lifespan!

For how many days or months of the total lifespan was the person ill? We are the walking petri dishes of Alexis Carrel – remember? Carrel was the French biochemist, a Nobel prize winner, who did the famous experiment in which he kept chicken heart cells alive in a petri dish for 28 years just by changing the solutes every day. Could've gone longer, but figured he'd proven his point. Mineral content factors largely in the quality of our solutes: the blood - the milieu interior, the biological terrain.

The U.S. has the highest incidence of degenerative diseases of any developed country on earth. In addition, the infectious diseases are coming back; antibiotics are getting less effective every year. Americans' confidence in prescription drugs is weakening. Allow me to disabuse you of unfounded hopes: cancer and AIDS will never be cured by the discovery of some new drug. It's not going to happen. There probably will never be another Alexander Fleming – turns out penicillin was just a brief detour anyway. Bacteria have had 50 billion years to figure out ways to adapt. The only way that anyone recovers from any illness is when the immune system overcomes the problem. Allergy shots never cured an allergy – people who take allergy shots always have allergies.

Our only hope of better health is to do everything possible to build up our natural immune system. One of these preventative measures is nutritional supplementation. It may not be dramatic, but daily deposits to the immune system bank account will pay off down the road. Healthy people don't get sick.

With respect to minerals, then, what are our goals? My opinion is that having once realized the necessity for mineral supplementation, our objectives should be simple:

- **Take only the minerals proven to be essential that we absolutely need.**
- **Take the smallest amounts possible of any others.**
- **Nothing left over (no metabolic residue)**

Some of the above ideas may seem strange and difficult to understand, on first reading. But it is truly a very simplified version of what actually takes place. Most of the technical details were omitted for the sake of clarity and brevity. However, the correctness of the above basic framework is verifiable. The reader is encouraged to flesh things out a little by consulting the attached reference list.

We are living in the age of the Junk Science Hustle. Everybody's an expert, often quoting shaky sources, shaky facts, and shaky claims which may have no foundation in physical reality. Seems there's a formula:

1. Get a product
2. Get a marketing company
3. Get some university MD endorsements
4. Get some miraculous testimonials

In a certain way, all this is actually a good sign - a natural consequence of the explosion in holistic nutrition and supplementation. Because in the midst of the quagmire of hype and junk science, some truly superlative items have emerged onto the marketplace which have benefited indirectly from biomedical advances evolved in the challenged, time-bomb world of mainstream pharmacology.

Most, if not all of the new holistic supplements are far less toxic than standard pharmaceutical drugs, because they're in a category the FDA calls GRAS (Generally Regarded As Safe. That's definitely a lot more than we can say for Prozac, fen-phen, and Viagra Etc.) Many of the extraordinary holistic supplements won't be sold in stores, and no one is going to give them away. So welcome to the marketplace. Very time-consuming and confusing is the screening process one must go through to unearth the treasures that can reward the patient and resolute search. Caveat emptor.

Are minerals important?

Two-time Nobel Prize winner Linus Pauling thought so:

"You can trace every sickness, every disease, every ailment to mineral deficiency."

Using the image of Carrel's solutes in the petri dish as the analogue of blood in our bodies, adequate mineral content is undoubtedly an advantage and a vital component of the body's own solutes in its constant effort to cleanse and operate all its cells at an optimum metabolic vibrancy and resilience.

Healthy people don't get sick. Ever!

Ten FREE Cancer

Reports sent by email

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2539