



Micronutrients

Minerals, Vitamins, Amino Acids and Fatty Acids

“To a significant degree, we are an overfed and undernourished nation digging an early grave with our teeth, and lacking the energy that could be ours because we overindulge in junk foods.”

-Ezra Taft Benson

Micronutrients are the vitamins, minerals, amino acids and fatty acids obtained from nutrient dense macronutrients. When these macronutrients are properly digested, the micronutrients are absorbed into our tissues to nourish our body and help us obtain optimal health.

Despite an abundant food supply, malnutrition continues to be an epidemic in developed countries. A study conducted as part of the National Health and Nutrition Examination Survey indicated that children and adults in the United States have high rates of deficiency of Vitamin A, B6, B12, C, D, E, and folate, as well as the mineral iron¹. This may come as a surprise when you consider the fact that developed countries have food fortification programs and the average American consumes a whopping 3,600 calories per day!² With all of the nutrient fortified food being consumed in developed countries, how can we be so deficient in so many nutrients?

THE UGLY TRUTH

Micronutrient deficiency is a global issue, not just an American issue. There are many factors that are responsible for the over-fed, yet undernourished world, which include excess consumption of processed foods, depleted nutrients in our soil, an abundance of toxins in our environment, increased use of prescription and over-the-counter pharmaceuticals and a growing population which requires bigger yields of crops from the land. All of these factors have created a micronutrient deficiency globally.

The human body can manufacture some vitamins, such as vitamin K and vitamin D (if your digestion is working properly and you have good healthy fats to absorb these nutrients), but the body cannot manufacture minerals. Minerals must be obtained through our food. Additionally, there are 31 essential vitamins, 9 essential amino acids and 2 essential fatty acids, which are only available through our food. If our food is grown in depleted soil (or our animals are fed food which was grown in depleted soil), our food will also be depleted of these essential nutrients. With an ever increasing human population, the demand for crops is growing at an exponential rate. With this bigger yield requirement, we have depleted our soil of its micronutrients in many ways³.

We have been aware of our soil depletion issue for many years. Farms in Asia have been measured at a 76%, Europe a 72% and North American a 85% reduction in mineral content⁴. This is the result of the higher yields necessary to feed our populations. The current goal is not to increase the mineral content of food, rather it is to increase the amount of food production while reducing the growing time. All of this

“The bottom line is that we either get our essential minerals from our food or a supplement or we don’t get them at all.”

-The Micronutrient
Miracle

is to ensure enough food is produced, prioritizing quantity over quality.

As if this is not a big enough issue, a large amount of the crops grown today are genetically modified. Foods that are genetically modified are meant to improve their resistance to pests, make them stronger to deal with imposing weather, increase yields and increase their production time. In order to accomplish all of this, food crops and animals are exposed to various artificial bacteria, viruses, insects and animals, all of which can effect their nutritional status.

It is estimated that nearly 60% of all calories consumed in the U.S. from 2007-2012 came from ultra-processed foods⁵. When food is processed, preserved, or exposed to heat, air or light, the micronutrients are depleted. Consider the purchase of carrots from the grocery store. You can now get them in many different forms—whole, julienned, diced or in sticks. Any carrot, even a whole carrot, has the potential of being nutrient deficient. The transportation time, cutting, treatment, packaging and exposure to air/lights as it sits on the truck and grocery store shelf all deplete the micronutrients from that carrot. Yet the overall calories of the carrot remain the same. And this is a carrot! Imagine what breakfast cereal, crackers, juice, processed cheese and bread have been through before it sits on the grocery store shelf!

And just when you think you have done your body a favor and changed your buying habits to all organic, unprocessed, local meat and produce, we have to consider the natural chemicals that are found on these foods. These chemicals are known as “anti-nutrients” and they can be found in some of the healthiest foods such as kale, chia seeds, spinach, nuts, sweet potatoes, and berries. These natural chemicals help protect the

plants in nature, but when ingested by humans (or animals), they can steal or block your body's ability to absorb or utilize the essential vitamins and minerals you need to be healthy. Proper preparation before consumption of these anti-nutrients can help remove them from the plant and make the micronutrients more bio-available for absorption.

WHAT TO DO ABOUT IT

Buy local- When buying produce locally, be sure to look for produce that is harvested at the peak of ripeness. The best places to find ripe produce is at a local farmers market and/or a local co-op. Produce eaten as soon as possible after harvest and with the least amount of travel time from the farm to your table, will contain the maximum amount of nutrients.

Be sure to ask the farmer about their growing practices, especially how they ensure nutrient dense produce, such as: is it organic? If not, are they following organic practices? Are crops rotated? Are cover crops utilized? Are animals part of the farming system?

Buy organic, pasture-raised meat and organic produce- organic produce has been shown to have between 19%-69% more health promoting antioxidants, such as flavonoids and carotenoids than conventional fruits and vegetables⁶. Animals that are pasture-raised are ingesting the vital micronutrients from their natural food sources, which are getting incorporated into their tissue, and that we obtain when ingested.

Follow a rotation diet- there are over 300 different varieties of fruits and vegetables, all of which have various nutrient content. No single food contains all of the vitamins and minerals we need and, therefore, a

balanced and varied diet is necessary for an adequate intake of all micronutrients.

Prepare your food (properly)- when steaming vegetables, nutrients can be easily lost in the liquid. Be sure to incorporate or drink the liquid to obtain all the nutrients of the food. Do not overcook food, as the extra heat can damage the nutrients. Refer to the soaking and sprouting chart from the Macronutrient Module, to ensure all the anti-nutrients are removed and the micronutrients are made available for proper absorption.

HOW TO TEST FOR DEFICIENCIES

There are over 50 different micronutrients that can be tested for proper status.

Zinc Taste Test- This is an easy, inexpensive, at-home testing method to assess zinc status based on studies of taste and smell to zinc. The British Medical Association's British National Formulary published the first peer-reviewed study that provided recommendations on the use of the Zinc Taste Test to assess zinc need in 1988.

To perform the test, you will need 5-10 ml of aqueous zinc and you need to avoid eating, drinking or smoking for approximately one hour before the test to get accurate results. Start by taking a sip of the solution (approximately 5-10 ml) and holding or swirling it in the mouth for 30 seconds. Results are as follows:

Extremely deficient- after 30+ seconds, a sweet taste develops.

Deficient- no specific taste sensation is noticed (tastes like plain water).

Poor- no immediate taste is noticed but, within the 30 seconds, a 'dry' or 'metallic' taste is experienced.

Fair- an immediate slight taste is noted which increases with time over the 30 second period.

Excellent- an immediate, strong and unpleasant taste is experienced. This indicates that no zinc deficiency exists.

Tissue Mineral Test (Lowenburg's Test)- One of the strongest indicators of tissue calcium deficiency is muscle cramping at rest. This test is a means of checking tissue calcium stores, along with the co-factors required for proper tissue calcium absorption.

Caution: do not use this test if peripheral vascular disease is present or suspected.

To perform this test, you will need a manual blood pressure cuff. Place a blood pressure cuff around the calf. Pump the cuff up slowly, watching the gauge. Stop and release the pressure from the cuff at the first onset of a twinge or cramp, or at 220-240 mm/Hg. Never pump the blood pressure cuff above 240 mm/Hg. Write down the number and repeat the test after waiting one minute so the body can return to baseline. If mineral status is sufficient, the body should tolerate the cuff pumped up to 220-240 mm/Hg.

Vibrant America Micronutrient Test- Blood tests are available to test your micronutrient status. It is important to know both your extracellular and intracellular micronutrient levels as different nutrients are used and stored in different areas of the cells. Knowing your nutrient levels is key to a thorough understanding of your nutritional requirements at a foundational level, which may contribute to your risk for disease, while simultaneously and positively impacting your overall health and well-being.

SUPPLEMENTATION

Though it would seem obvious to boost the body's nutrients with one of the many commercially available supplements, the human body is more complex than that. Plenty of evidence exists to show that micronutrient excess can also cause harm and long-term supplement intake can risk excessive levels.

Certain nutrients perform best in the presence of other nutrients. For example, the body needs vitamin D to absorb calcium.

Certain nutrients may perform counteractive functions. For example, beta-carotene and vitamin C enhance iron absorption, while calcium and polyphenols appear to reduce the absorption of iron.⁷

Using the wide variety of micronutrient tests available and working with your practitioner to address symptoms from micronutrient deficiencies is the best approach to balancing the body and obtaining optimal health status. If you have nutrient deficiency symptom, or test low on a specific mineral, it is always best to increase whole foods rich in those nutrients along with considering additional supplementation.

REFERENCES

- 1- www.ncbi.nlm.nih.gov/pmc/articles/PMC5537775/
- 2- www.ourworldindata.org/food-per-person#the-global-persepctive-on-caloric-supply
- 3- www.ncbi.nlm.nih.gov/pubmed/15637215
- 4- Declining fruit and vegetable nutrients <https://journals.ashs.org/hortsci/view/journals/hortsci/44/1/article-p15.pdf?ijkey=RfqpDkPqP6D3rR>
- 5- BMJ Open. 2018; 8(3): e020574. Published online 2018 Mar 9. doi: 10.1136/bmjopen-2017-020574
Consumption of ultra-processed foods and associated sociodemographic factors in the USA between 2007 and 2012: evidence from a nationally representative cross-sectional study
- 6- theguardian.com/environment/2014/jul/11/organic-food-more-antioxidants-study
- 7- <https://www.vibrant-america.com/micronutrient/>

Homework

Part 1: Eat the Rainbow

Fruits and vegetables fall into five different color categories: red, purple/blue, orange/yellow, green and white/brown. Each color carries its own set of unique disease fighting chemicals called phytochemicals. These phytochemicals that give fruits and vegetables their vibrant color also provide us with their micronutrient properties. It can be easy to get stuck eating the same foods over and over again. This month, the goal is to eat all the colors of the rainbow at every meal.

Some ideas of color rich foods:

RED- bell peppers, tomatoes, radish, raspberries, apples, grapes, cherries, rhubarb

PURPLE/BLUE- cabbage, blueberries, beet root, eggplant, purple asparagus, blackberries, grapes

ORANGE/YELLOW- tomatoes, carrots, lemons, sweet potato, pumpkin, pineapple, corn, squash, grapefruit

GREEN- swiss chard, spinach, asparagus, avocado, broccoli, limes, kiwi, lettuce, celery, cucumber

WHITE/BROWN- cauliflower, pears, mushrooms, garlic, potato, onions, ginger, parsnips, turnips