



IMAGE AWARENESS WELLNESS INSTITUTE

Balanced Nutrition: Synergism

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“Man is a food-dependent creature. If you don’t feed him, he will die. If you feed him improperly, part of him will die.”

--Emanuel Cheraskin, MD, DMD

BALANCE

Balance is key to nutritional intake. One writer says, “All living organisms require a regular supply of nutrients. This is as true for microbes as it is for man. If there is a deficiency, or an excess, in fact if there is an imbalance of nutrients, then normal development will cease, and abnormal development will result. If the imbalance is severe death will eventually result.”¹

The importance of balance is as plain as day in the nutritional literature, yet it is rarely discussed as a basic tenet of sound nutrition. Nutrients do not work in isolation, but in relationship to one another. Not only are excesses or deficiencies a nutritional problem, but imbalances can also result in severe and often unrecognized problems.

Unbalanced nutritional intake is every bit as common as excess or deficiency. These imbalances are often created or established by the refining of foods.

For example, wheat is converted to white flour removing as much as 30 percent of the grain. Man consumes the remaining 70 percent of the grain, but it is an unbalanced nutritional ration lacking in lipids, sterols, fiber and antioxidants and greatly

diminished in B complex vitamins.

The bran is removed from white rice. The bran is only a tiny part of the rice grain, but it contains a good part of the nutritional value of the grain. The removal and polishing of rice unleashed a plague of beriberi around the world. This small amount of processing decreased the amount of vitamin B1 below that required to sustain life.

The outer hull of the soybean is discarded when tofu is manufactured from the soybean. Once again the nutritionally significant lipids and sterols are removed.

The induction of deficiency diseases resulted in the fortification of foods. Sadly, the restoration of nutritional adequacy was only partial and no attention was given to establishing the proper balance of nutrients as we find them in nature. The fortification of foods prevented death from deficiencies, but most would agree that fortification is still

inadequate to restore optimal health promoting properties to the foods involved. Most fortified foods are a dim shadow of the nutritional powerhouses those same foods encapsulate in the form they are found in nature.

Manufacturers of supplements often fail to target balance and completeness as well. The general tendency is to throw as many vitamins and herbs as possible into a formula to produce an impressive label. The nutrients in these formulations are often of such poor quality that they do little or nothing at all to improve overall health.

The nutritionally significant lipids found in GNLD Tre-en-en are almost impossible to find in foods or supplements unless one is preparing foods from scratch and using whole grains as the raw material for meal preparation.

REFERENCE:

1. Schutte, Karl, and Myers, John, *Metabolic Aspects of Health*, Kentfield, CA: Discovery Press, 1979, 1.

SYNERGISM AND ANTAGONISM

The reason why balance is highly significant in nutritional intake is because nutrients often function in a synergistic or antagonistic relationship with other nutrients. This newsletter will discuss the synergism of nutrients or how they work together. My next newsletter will discuss antagonism or how nutrients compete with one another.





SYNERGISM

The idea that nutrients work together and reinforce one another is easier for most people to understand than is the concept that one nutrient can be antagonistic to another. Both concepts are key to understanding how to build a healthy diet or supplement program.

VITAMIN-VITAMIN SYNERGISM

One example of vitamin synergism is the relationship between vitamin B2 and vitamin B6. Vitamin B6 is only usable by the body in an activated form. Vitamin B2 is necessary to convert vitamin B6 to its active form.

Karl Folkers found that carpal tunnel syndrome was associated with deficiency of vitamin B6. Through experimentation he found that those that suffered with this condition were often deficient in vitamin B2 as well. Without B2 vitamin B6 was rendered ineffective as it could not be converted to its active form.

Another example of how vitamins work together is the instance of homocysteine. Homocysteine is a byproduct of metabolism of the amino acid methionine. It is a very potent free radical and implicated in heart disease, osteoporosis and a number of other health problems.

The body has the metabolic machinery to render homocysteine harmless, but it requires vitamin B6, vitamin B12, folic acid, and betaine.

If any of these nutrients is missing, homocysteine will accumulate and disease processes will begin.

REFERENCE:

Contemporary therapy with vitamin B6, vitamin B2, and coenzyme Q10, *Chemical and Engineering News*, April 21, 1986; 27-29.

VITAMIN-MINERAL SYNERGISM

Vitamin-mineral synergism is every bit as important as vitamin-vitamin synergism. Vitamins are closely associated with the functioning of minerals in the body. Many vitamins function as co-enzymes making the activity of minerals possible or optimizing it.

For example, rickets is a calcium disorder, but rickets responds to vitamin D supplementation. The body can not use calcium efficiently and appropriately if a vitamin D deficiency exists.

Iron deficiency anemia may not respond to iron supplementation if there is a deficiency of vitamin C or vitamin A.

Zinc and vitamin A are partners. The body cannot remove vitamin A from storage areas in the body such as the liver if zinc is deficient. Studies of night blindness, a classic vitamin A deficiency, have shown that many sufferers will only improve after zinc is added to the diet. In such a situation adding more vitamin A would have created a risk of vitamin A toxicity and likely would not have resolved the problem because of the missing zinc. A severe nutritional imbalance could have been established.

REFERENCE:

Watts, David L., *Trace Elements and Other Essential Nutrients*, Dallas, Texas: Trace Elements, 1995, 21.

VITAMIN-AMINO ACID SYNERGISM

One of the most historically significant synergisms was the relationship between the amino acid tryptophan and vitamin B3 or niacin.

The body can convert tryptophan to niacin with the help of vitamin B6.

It just so happens that corn is deficient in both vitamin B3 and tryptophan. Corn formed a dietary staple in many of the poorer areas of the world around the turn of the 20th century.

A severe deficiency of vitamin B3 results in a terrible disease called pellagra characterized by sensitivity to sunlight, skin conditions, diarrhea and dementia.

Initially it was thought that pellagra might be associated with inadequate protein intake until it was learned that an unknown vitamin was missing in corn. Multiple tens of thousands of people suffered from pellagra in the southern part of the United States until Joseph Goldberger demonstrated that the disease was caused by a nutritional deficiency.

About 10 percent of the body's tryptophan is used for the production of serotonin which promotes sleep and improves mood. Many SSRI drugs like Prozac are designed to promote the functionality of serotonin. Low intake of vitamins B6, B3, or iron can interfere with serotonin production contributing to depression and interfering with sleep.

ANTIOXIDANT SYNERGISM

One of the most serious mistakes made regarding nutrition is the



failure to realize the powerful synergistic effects which are achieved when antioxidants work together.

The nature of this synergism is two-fold. Firstly, there is a specificity of action with regard to antioxidants. An antioxidant may be able to cope with only one kind of free radical, or it may concentrate in very specific areas of the body.

Secondly, antioxidants have the ability to regenerate one another. They work like a bucket brigade putting a fire out. It a particular kind of antioxidant is missing it is like having a hole in the fire line.

SPECIFICITY OF ACTION

Specificity of action refers to the fact that different forms of nutrients and different nutrients perform different functions in the body. For example, we tend to think of fiber as a single entity, but it is not. We know that pectins detoxify the digestive tract, soluble fibers function to regulate blood sugar, and insoluble fibers are best for bulking up the stool and preventing constipation and the disorders associated with it.

Carotenoids provide an excellent illustration of specificity of action. In one study, alpha-carotene was found to be ten times more effective than beta-carotene in the inhibition of cancer growth. Lutein and zeaxanthin provide very specific protection for the macula lutea in the eye preventing macular degeneration. Lycopene provides very specific protection against prostate cancer not offered by other carotenoids.

Even tiny changes in the structure of how a molecule is put together can alter the way that that molecule functions in the human body. When vitamins are synthesized one will often get a mirror image of a natural molecule. Sometimes there are many different forms (stereoisomers) of a vitamin.

For example, there are 272 ste-

reoisomers (3-dimensional arrangements) of beta-carotene alone. The synthetic product consists of totally different stereoisomers than does the natural product. The *New England Journal of Medicine* wrote, "...how a particular beta carotene came to be selected for world-wide testing is neither hard to understand nor easy to forgive." (Synthetic beta-carotene does not appear to prevent cancer and may actually increase it while the natural forms of carotenoids found in foods are strongly associated with decreased risk of development of cancer and a number of other diseases.)

Vitamin E provides us an example of the dramatic difference a slight change in the structure of a molecule can make. Synthetic vitamin E is made from isophytol, a petroleum or turpentine product. It consists of molecules which, when in solution rotate polarized light to the left (an "L" structure) and molecules which rotate light to the right (a "d" structure). Only the "D" form is natural for vitamin E.

Studies have shown that the natural form of vitamin E is 50% more effective than synthetic vitamin E. Researchers discovered that the placental cords of pregnant women had 3 1/2 times more natural vitamin E than the synthetic. The body was selectively targeting the natural molecule for the infant.

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Richard Young, Ph. D., member Jules Stein Eye Institute, personal communication.

Kurashige, M. et al., "Inhibition of oxidative injury of biological membranes by astaxanthin," *Physiological Chemistry and Physics and Medical Nmr*, 1990, 22(1):27-38.

Carotenoids: Colorful cancer protection, *Science News*, November 4, 1989, 294.

American Journal of Clinical Nutrition, April 1998.

Shute, Evan, *Common Questions on Vitamin E and Their Answers*, p. 82.



THE BUCKET BRIGADE EFFECT

The interaction of antioxidants of various types is quite complex as they do their work of preventing damage from free radicals--nature's hand grenades. *Science News* summarized their function as follows: "The scheme the chemists propose works something like a bucket brigade, with the dangerous chemical property being passed from one molecule to the next. First, vitamin E reacts with the free radicals, restoring them to their less harmful state. This reaction, however, turns vitamin E into a potentially damaging free radical, which the carotenoids then inactivate. Finally, vitamin C repairs the resulting carotenoid radicals, and the water soluble vitamin C radicals eventually wash out of the body."

Another illustration is a relay race. The baton would represent the free radical being passed from one antioxidant to another.

REFERENCE:

W., C., "How antioxidants defend cells," *Science News*, Vol. 151, February 15, 1997, p. 111.

ADEQUACY

Obtaining a broad spectrum of antioxidants is important for optimal protection of the body from free radical damage. Equally important is adequate intake of the protective factors.

Roy Walford, a leading anti-aging researcher writes, "In rodents the amount of free radical scavengers that must be included in the diet to



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prolong 50 percent survival is much larger than an animal would get in any ordinary diet. In transposing the animal data into possible human application, we shall not get far unless we are bold enough to part company with the Food and Drug Administration, the nutrition moguls of the National Academy of Sciences, and many experts occupying academic chaise longues, because we must in some instances considerably exceed a sacred quantity, the Recommended Daily Allowance (RDA)."

REFERENCE:

Walford, Roy, Maximum Life Span, New York: W.W. Norton & Co., 1983, p. 136.

CONCLUSIONS

The complicated synergisims evident in the nutritional world should underline the importance of completeness and balance of nutritional intake. Major gaps can result in failure of function of essential nutrients.

Even seemingly inconsequential aspects of foods may later prove to be highly significant. It was not so very long ago that flavonoids were considered an unnecessary and inconsequential component of the vitamin C complex. Today volumes have been written on the



nutritional significance of these potent antioxidants and the protection they provide to cells and tissues. GNLD did not add flavonoids to their vitamin C products because of any proven benefits initially. They were simply a component of the vitamin C complex as one finds it in nature.

In the realm of the antioxidants, completeness of intake provides far better protection from the ravages of aging than will an erratic and incomplete intake of nutrients. It is a failure of understanding of these complex interrelationships which leads to the addition of one or two carotenoids or flavonoids to a nutritional formula. This is why GNLD so frequently mentions "Complex" on product labels.

The conscious attempt to provide complexes of nutrients as one finds them in the foods one eats is GNLD's tribute to the inherent wisdom and

adequacy of nutrients as they are fabricated in the living world rather than in the test tube or the food processing plant. It is insurance that nutrients will function properly.

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