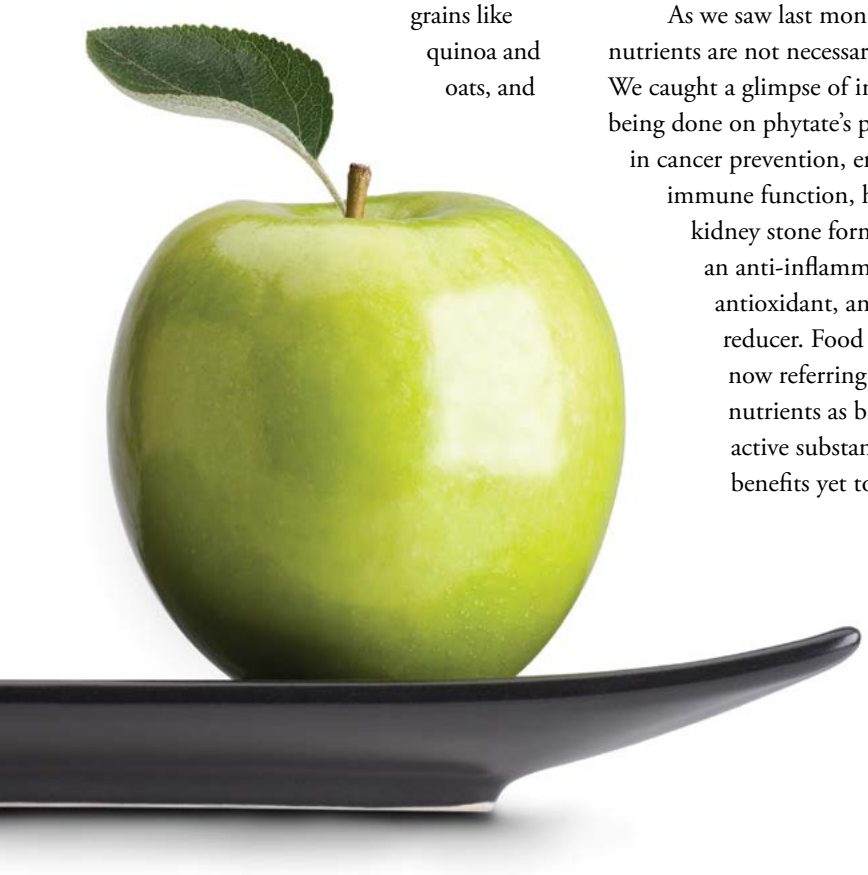
anti-nutrients

IF YOU are like me, you like to get the most bang for your buck, the best results from your effort, the greatest number of items on the to-do list accomplished for the time invested. When it comes to supplying the body with nutrition, we often hear health advisors encouraging nutritionally dense foods. This is referring to food items that pack a stronger nutritional punch per calories consumed. For example, as a starch, sweet potatoes are more nutritionally dense than say an equal serving of pasta. Both are high carbohydrate foods, but sweet potatoes offer a much richer assortment of nutrients. The perplexing paradox however is that it is in nutritionally dense foods where we find an array of anti-nutrients.

Anti-nutrients can be found in foods such as rhubarb, spinach, in whole grains like quinoa and oats, and in nuts, legumes, and seeds, as oxalic acid, saponins, lectins, tannins, and phytic acid. These are foods we regard as nutritionally dense. However, it is one thing for food to contain the potential to impart and another thing to actually receive what is anticipated. Anti-nutrients reduce the bioavailability of minerals, such as iron, calcium, and zinc.



The average anti-nutrient intake in humans varies greatly between developing and industrialized countries, between urban and rural areas, between young and old, and between omnivores and vegetarians. Their impact on overall nutritional status is affected by where you live as well as total composition of the diet. Those who live in nations where variety and amount of food is ample will not have the same mineral deficiency concern as those who live with limited food selection.

As we saw last month, anti-nutrients are not necessarily bad guys. We caught a glimpse of investigations being done on phytate's potential role in cancer prevention, enhancing immune function, hindering kidney stone formation, and as an anti-inflammatory agent, antioxidant, and cholesterol reducer. Food scientists are now referring to anti-nutrients as biologically active substances with benefits yet to be fully explained and discovered. The question I have for now is this: Is it possible to minimize anti-nutrient concentration just enough to receive maximum nutrient availability, while at the same time ingesting sufficient amounts to experience their potential benefits? Yep, as always I want the most bang for my buck. Various food preparation methods used for centuries offer a valuable place to find some direction.

Phytic acid is the storage form of phosphorus and is widely distributed in seeds. Phytate is the salt of phytic acid. Processing techniques such as soaking, germinating, malting, and fermenting can reduce phytate content by increasing the activity of naturally present phytase. Phytase is an enzyme that breaks down phytic acid. The microorganisms living within the digestive system of ruminant animals produce ample phytase to digest phytate and receive maximum nutrients from the grains, grass, seeds, or legumes that they consume. Interestingly enough, vegetarians who likely consume more phytates than omnivores have a greater capacity to break down phytates. In one study it was found that the microbiota (internal population of microorganisms) of vegetarians "particularly degraded" phytate. The conclusion was, "A diet rich in phytate increases the potential of intestinal microbiota to degrade phytate. The co-operation of aerobic and anaerobic bacteria is essential for the complete phytate degradation."[1] Certain bacterial strains can also alter the pH of the intestines, favoring phytase activity.

The following are examples of how phytic acid can be minimized. It is in no way thorough in its scope. Let's begin with the effect of yeast and fermentation.

FERMENTATION

Whole wheat flour has a considerable amount of phytic acid. In cereals, up to 80 percent of the phytate content is found in the bran, some in the germ, while the endosperm is almost phytate-free. Co-existing with phytic acid in grains is the enzyme phytase. Investigation has found that the addition of yeast and the process of fermentation used in bread making catalyze phytase activity and significantly reduces phytic acid. In other words, unleavened breads that do not contain yeast nor have been proofed for hours will have more phytic acid than leavened bread. In one study, allowing bread dough to rise for two hours was found to greatly enhance phytase activity. Reducing the pH of dough by adding citric acid, or the use of a starter for leavening, was also found to reduce phytic acid levels. In addition, freshly ground flour has more phytase present than after significant storage time.

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SOAKING

Another study investigated the effect of soaking on legumes (peas, chickpeas, fava and kidney beans). Soaking the legumes for 16 hours and draining the legumes before cooking "significantly decreased anti-nutrients such as phytic acid, tannins, phenols, α-amylase and trypsin inhibitors."[2] The process of cooking at a higher heat also added to the reduction in phytic acid in legumes.

An intervention study in Malawi, where cereals are heavily relied upon as a food source, found that soaking unrefined maize flour reduced phytate content by 50 percent. The traditional Mexican process of treating maize with lime-water improves nutritional availability as well. The impact of soaking on other grains is still in question. The conclusion of another study found that "Germination, but not soaking, increased phytase activity 3 to 5-fold in some cereal grains and legume seeds."[3]

SPROUTING

During the germination of seeds, phytate is degraded, and phosphorous along with minerals such as calcium, magnesium, and iron are liberated, becoming available for germination and development of the seedlings.

Sprouting lentils and legumes has been found to increase the activity of phytase activity resulting in decreased phytate content.

MINERAL ABSORPTION ENHANCERS

Aside from making any dish more flavorful, garlic and onions act as mineral absorption enhancers in the diet. An Indian study found that the addition of garlic and onion significantly increased the bioaccessibility of both iron and zinc in two representative cereals and pulses.

The recent attention given to anti-nutrients has largely stemmed from those who advocate ancestral eating. Their perspective of history dramatically differs from mine and lies at the foundation of our belief of what foods are the most beneficial for mankind. I believe that, "Grains, fruits, nuts, and vegetables constitute the diet chosen for us by our Creator. These foods, prepared in as simple and natural a manner as possible, are the most healthful and nourishing. They impart a strength, a power of endurance, and a vigor of intellect that are not afforded by a more complex and stimulating diet."[4]

[1] L.H. Markiewicz, J. Honke, M. Haros, D. Świątecka, B. Wróblewska, "Diet Shapes the Ability of Human Intestinal Microbiota to Degrade Phytate--In Vitro Studies," *Bauman College of Community Forums*, 115(1): 247-259, 7/2013, http://www.baumancollege.org/forum/index.php?topic=14171.0.

[2] E.A. Abd El-Hady, R.A. Habiba, "Effect of soaking and extrusion conditions on antinutrients and protein digestibility of legume seeds," *LWT-Food Science and Technology*, Volume 36, Issue 3, 5/2003, http://www.sciencedirect.com/science/article/pii/S0023643802002177.

[3] I. Egli, L. Davidsson, et al., "The Influence of Soaking and Germination on the Phytase Activity and Phytic Acid Content of Grains and Seeds Potentially Useful for Complementary Feedin," *Journal of Food Science*, 7/20/2006, http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2621.2002.tb09609.x/abstract.

[4] Ellen White, *The Ministry of Healing*, p. 296.

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